



NCC Pediatrics Continuity Clinic Curriculum

Eczema

Pre-Meeting Preparation

- Read the extract on eczema treatment and management from the Pediatric Clinics of North America article from 2000.
- Familiarize yourself with the “fingertip unit” concept for topical steroid dosing.

Objectives

Upon completion of this module, the reader should be able to:

- Know that children with one component of atopy syndrome (allergic rhinitis, asthma, eczema) have a threefold greater risk of developing a second component
- Know that some patients with moderate or severe eczema have positive skin tests to food, may or may not have acute symptoms on ingesting these foods, and experience improvement in their eczema after eliminating these foods
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- Understand the relationship of eczema and food allergies, and how to evaluate a patient with both
- Recognize thrombocytopenia, eczematoid rash & recurrent infections as signs of Wiskott-Aldrich syndrome
- Plan appropriate treatment of eczema (emollients, corticosteroids, antibiotics, and allergen elimination when appropriate)
- Identify factors that worsen eczema (drying, chemical irritants, heat, and physical trauma)

Spend only ten minutes per patient vignette!

1) A nine-month-old presents to your clinic for a well visit, and has a scaly red rash on the face and patches on the trunk.

What additional history would you obtain?

What is the role of diet in the pathogenesis and treatment of eczema?

Describe a staged management approach to treating this patient.



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2) A 4 year old boy has thickened scaly skin on the wrists, forearms, and shins bilaterally. The rash is particularly itchy in the elbow creases. The parents have been using hydrocortisone cream and moisturizer and report “they don’t work.”

Discuss possible reasons why the therapies prescribed aren’t working.

For the patient described, what is the appropriate amount of topical steroid cream to apply?

What is the role of anti-histamines and antibiotics in treating eczema?

Dosing Topical Steroids: Pediatric Reference Table

	Face & Neck	Arm & Hand	Leg & Foot	Trunk (Front)	Trunk (Back) inc. buttocks
Age	Number of FTUs				
3-6 m	1	1	1½	1	1½
1-2 y	1½	1½	2	2	3
3-5 y	1½	2	3	3	3½
6-10 y	2	2½	4½	3½	5

TREATMENT PRINCIPLES

Treatment of acute and chronic atopic dermatitis involves several approaches to basic skin care, medication, and allergen control.

Hydration

Hydration is essential to treating atopic dermatitis. The basis of adequate hydration is increasing the water content of the skin by means of baths or soaks and applying a hydrophobic barrier to prevent evaporation. Bathing for 15 to 20 minutes two times a day is adequate, but hot water must be avoided. Oatmeal products added to the bathwater may be soothing but do not increase water absorption. Oils should not be added because they may interfere with optimal water penetration. Mild cleansers (e.g., Dove or Dial) or nonsoap cleansers (e.g., Cetaphil) may be used, although water alone is best. After bathing, excess water should be removed by patting with a soft towel. Water evaporates rapidly from the skin surface, and hydrophobic occlusion (e.g., petrolatum) must be applied within 5 minutes. Topical medications are also best applied after bathing because penetration is far greater in hydrated skin.

Severe disease may require soaking after baths to maintain continuous hydration and further increase penetration of topical medications. Soaks also may be soothing to inflamed skin. From a practical standpoint, soaks and wraps are best applied at bedtime. Severely affected areas on the extremities may be dressed with gauze and bandage wraps. Total-body occlusion may be accomplished by using two pairs of cotton pajamas. The first pair is wetted, wrung out to dampness, and placed on the patient. The second pair is worn dry over the wet pair. Hands and feet may be occluded, with wet socks followed by dry socks. Soaking of the face may be accomplished by applying two layers of wet gauze followed by two layers of dry gauze held in place with Spandex netting. If crusts are present, Burow's solution may be added to baths and soaks at a 1:40 dilution (one packet of Domeboro powder per quart). This therapy provides astringent and antibacterial effects for localized weeping lesions, but use for more than 3 days may lead to excessive drying and cracking. ^[12]

There are patients in whom frequent bathing may exacerbate their pruritus leading to worsening dermatitis. It is important to recognize this and to limit bathing in these patients. These patients require liberal applications of emollients to maintain adequate hydration.

In patients with chronic disease, liberal application three to four times daily is recommended with water-in-oil moisturizers (e.g., Eucerin, Aquaphor, Lubriderm, or Cetaphil). Lactic acid preparations (e.g., Lac-Hydrin) are useful in removing scales, especially in patients with ichthyosis vulgaris, but stinging may occur in areas containing fissures or areas with changes of acute dermatitis.

Topical Corticosteroids

Topical corticosteroids impart anti-inflammatory, antipruritic, and vasoconstrictive effects. Some general guidelines apply to the use of topical corticosteroids in atopic dermatitis and include:

- Topical steroids should be applied immediately after baths or soaks to increase penetration.
- Topical steroids should not be applied more than twice daily because frequent application does not improve efficacy and increases the risk for side effects.
- Ointments provide the most occlusion but, in humid environments, may lead to folliculitis. Creams may be better tolerated in some instances. Lotions and sprays are most appropriate for hair-bearing areas.
- The lowest-potency effective agent should be used. Higher-potency, fluorinated agents may be necessary during an acute flare, but these should not be used on thin-skinned areas of the face, neck, axillae, or groin.

Adverse effects of topical corticosteroids include atrophy, depigmentation, steroid acne, and rarely systemic absorption with suppression of the hypothalamic-pituitary-adrenal axis. ^[18]

If a patient is bathing twice daily, after the baths, a low-potency or mid-potency topical steroid ointment should be applied to all affected areas except the face, groin, or axillae. These areas may be treated with 1% hydrocortisone or 0.05% desonide. As the dermatitis improves, frequency of application should be decreased with the substitution of less-potent agents. When disease is controlled, topical corticosteroid therapy should be eliminated and treatment should center on hydration. Ointment-based occlusives, such as Aquaphor, petrolatum, Eucerin, or Crisco, should be applied after the topical steroids are applied and in the middle of the day.

Systemic Corticosteroids

Oral corticosteroids typically are not indicated in the treatment of patients with atopic dermatitis, a chronic, non-life-threatening illness. Although they may be a "quick fix" resulting in a rapid improvement, severe flares often occur during

steroid withdrawal. If a short course of oral steroid therapy is given, the dosage must be tapered slowly and intensive skin care must be instituted to prevent a flare of disease. Systemic corticosteroids have no role in the management of patients with chronic atopic dermatitis; the potential side effects far outweigh any benefits.

Systemic Antibiotics

Oral antibiotics are sometimes necessary because secondary bacterial infections may exacerbate and complicate an acute flare. Infection is suggested by the presence of honey-colored crusts, extensive serous weeping, folliculitis, pyoderma, and furunculosis. Penicillin-resistant *S. aureus* cause most of these flares. Dicloxacillin or cephalexin may be used as first-line oral therapy because penicillin resistance is almost universal. For patients with a penicillin allergy, erythromycin is the first choice of therapy. Caution must be exercised, however, in asthmatic patients using theophylline because erythromycin slows metabolism. Clindamycin is an alternative agent, especially in penicillin-allergic patients carrying erythromycin-resistant strains of *S. aureus*, which have been reported in 23% and 39% of isolates from the nares and skin, respectively. Culture and sensitivity testing are essential during acute flares, not only to identify resistance to erythromycin but also because methicillin-resistant *S. aureus* has been reported in 9% and 11% of isolates from the nares and skin, respectively. [27] Antibacterial cleansers and topical antibiotics, with the exception of mupirocin (Bactroban), should not be used because they may sensitize patients. Long-term use of mupirocin may lead to bacterial resistance.

Antihistamines

Antihistamines are a standard therapy for atopic dermatitis and are recommended in many clinical treatment protocols. Despite frequent use, surprisingly few clinical studies have examined their efficacy. Moreover, atopic dermatitis and associated pruritus are not mediated primarily by histamine. A recent evidence-based review [26] of 16 trials of oral antihistamines revealed that none fulfilled the criteria for a well-designed study that contained a sufficient number of subjects to permit definitive conclusions. Sedating antihistamines commonly are used for their soporific effect to facilitate peaceful sleep because itch intensity often increases at night. Unfortunately, daytime use is problematic for that reason, although some patients may acclimate to this effect.

The development of nonsedating oral antihistamines (e.g., loratadine) has led physicians to prescribe these agents in the hope of providing daytime relief. Studies have failed, however, to demonstrate efficacy. [26] Moreover, compared with sedating agents, they are much more expensive. Oral hydroxyzine (Atarax) and diphenhydramine (Benadryl) are reasonable choices and should be used on a regular basis for optimal results. Topical antihistamines (e.g., doxepin) or anesthetic agents (e.g., benzocaine) are unhelpful in relieving pruritus and may cause allergic contact dermatitis. [25] [36]

Tars

Tars and extracts of crude coal tar have anti-inflammatory effects and are most useful in replacing topical corticosteroids in the management of chronic disease. Five percent liquid carbonis detergens in petrolatum (Aquaphor) may be prepared by a pharmacy and has acceptable cosmetic properties. Tar gel products (e.g., Estar Gel) are a formulation of crude coal tar that is conveniently commercially available and cosmetically acceptable. They frequently contain alcohol, however, and may cause stinging and irritation of inflamed skin. Tar gels are drying and are best applied under emollients. They may be used only at bedtime under pajamas, which maximizes compliance and minimizes staining of clothing. A new tar preparation (Micanol) contains tar encapsulated in a crystal form that stains far less than older preparations. Clothing and bed sheets should be washed in cool water because heating may lead to staining. The side effects of tars include folliculitis, photosensitization, and contact dermatitis.

Ultraviolet Radiation

Ultraviolet radiation may be a useful therapy for patients with recalcitrant atopic dermatitis. Ultraviolet B or psoralens plus ultraviolet A (PUVA) are used three or four times weekly. In adolescents with severe atopic dermatitis, PUVA led to significant improvement in disease and growth responses on percentile curves. [6] A subsequent study showed that PUVA twice weekly led to clearance or near-clearance in 39 of 53 children (aged 6-16 years) after a mean of 9 weeks. [49] Patients who expose themselves to natural sunlight should be warned not to sunburn and to avoid hot or humid conditions that may flare their disease. Home lamp treatments may lead to overexposure and should not be used. Side effects of ultraviolet therapy include acute phototoxicity and an increased risk for skin cancers with prolonged treatment. Caution should be exercised in patients with fair skin.

Leukotriene Inhibitors

Leukotriene inhibitors (e.g., zafirlukast) are a new class of medication in the treatment of asthma. A recent small series [10] of four patients with atopic dermatitis showed improvement with zafirlukast. Additional larger studies are needed to evaluate the role of this class of medication.

IDENTIFICATION AND ELIMINATION OF EXACERBATING FACTORS

Atopic dermatitis commonly is exacerbated by environmental factors that, once identified and eliminated or controlled, lead to far better control of disease. Exacerbating factors include irritants; emotional stress; allergens, including food; and infections.

Irritants

Atopic dermatitis is a condition of dry, sensitive skin that is extremely vulnerable to irritation with various agents. The most commonly used irritant is soap, which depletes the skin of natural moisturizers and water. To prevent irritation, drying soaps, solvents, and other compounds should be minimized. Gentle soaps include Dove, Dial, Tone, Alpha Keri, Basis, Lowila, and Neutrogena. Nonsoap cleansing agents, such as Cetaphil and Aveeno, may be least irritating. Soap should be used only in intertriginous areas to avoid drying of large areas of skin. Laundry soaps also may be irritating, and the authors recommend allergen-free detergents (e.g., Tide Free) and two rinse cycles. Bubble baths should be discouraged strongly.

Clothing that may be irritating, especially wool, should be eliminated. Children do best with soft, cotton clothing and avoidance of coarse, thick fabrics. Open-weave, loose-fitting garments are preferred. Sweating also may irritate atopic skin, and activities should be modified accordingly. Patients should sleep in comfortable surroundings at a fairly constant temperature (20-24°C) and humidity (45-55%). Swimming is recommended and well tolerated, but chlorine or bromine in pool water may be irritating. Showering with the application of occlusives after swimming minimizes this effect.

Emotional Stress

Itching can be a direct result of emotional and social stress. Atopic dermatitis is a chronic disease, and families may unknowingly worsen disease by excessive attention on skin appearance and projection of their frustration. Classmates also may induce itching by taunting affected children. Parents can alert teachers to the nature of the disease and encourage them to address the problem openly with other children. The period after school, especially when children do not have close supervision, can be a vulnerable period for itching and scratching. Provision of diversions is better than merely warning a child not to scratch.

Allergens

Aeroallergens may exacerbate atopic dermatitis. Although potential aeroallergen triggers may be elucidated by immediate hypersensitivity skin testing, such testing is not helpful in management except in cases of comorbid allergic rhinitis. If patients are found to have positive skin or RAST tests, those identified allergens should be avoided.

House dust mites and their feces may be allergens in atopic dermatitis. They thrive in settings of wall-to-wall carpeting and high humidity. Bedding and furniture also harbor dust mites, which feed on human scales. A standardized patch test to house dust mites is still in development, but suspected mite allergy can be addressed by using hypoallergenic mattress and pillow covers that are available commercially. Removal or frequent vacuuming of carpets and covered furniture, acaricidal treatment of carpets, and laundering linens with hot water may help to ameliorate disease.

The role of food allergens is controversial. The most common inciting allergens are eggs, cow's milk, soy products, wheat, peanuts, and fish. ^[44] A review article ^[42] on atopic dermatitis provided the following general guidelines regarding the role of diet:

- Breastfeeding in conjunction with maternal hypoallergenic diets seems to decrease the prevalence of atopic dermatitis in high-risk infants, but benefits may not be sustained. ^[16] ^[51] ^[52]
- Food allergy or intolerance may exacerbate disease in a small subgroup and may be appropriate to consider, given a history of provocation with food or when treatment is ineffective.
- Positive skin tests or a history of food allergy should prompt an elimination diet as long as nutrition is not compromised.

The potential role of several foods should be addressed using double-blind, placebo-controlled food trials. With the exception of sensitivity to peanuts, most food allergies wane with time, and these foods may be returned to the diet after 1 year of age.

Infection may flare atopic dermatitis. Many patients carry *S. aureus* on the skin and nares and, in children with frequent bouts of infection-associated flares, attempts should be made to eliminate colonizing pathogens. The use of oral antibiotics in conjunction with mupirocin (Bactroban) applied to the nares three times daily may eliminate colonizing staphylococci during episodes of infection-mediated flares.

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Allergy to pets is often suspected but seldom documented. In children with associated asthma, keeping pets outdoors, restricting pets from bedrooms, and frequent vacuuming are probably prudent. Flaring of atopic dermatitis when embracing a pet is the best approach to assessing the possibility of an allergy. Because triggers are usually multifactorial, discarding pets is not recommended.

Therapeutic Advances

Topical FK506 ointment (tacrolimus) is likely to be available soon in the United States for the treatment of atopic dermatitis. Used historically for transplant rejection as Prograf, tacrolimus has been shown to be effective in clinical trials. The drug does not accumulate in the skin or in the systemic circulation after repeated topical administration. [4] Side effects may include itching or burning at sites of application.

Topical SDZ ASM 981, a macrolactam ascomycin, is an inflammatory cytokine inhibitor under development. When applied in a recent trial, [37] it was as potent as clobetasol, without local side effects. Clinical efficacy and safety have been confirmed in short-term trials in patients with moderate atopic dermatitis. [56] Side effects include burning and stinging at sites of application.

Oral cyclosporin A (Sandimmune) may provide a dramatic response in patients with severe atopic dermatitis, but rapid relapses occur after discontinuance. [56] Side effects include hypertension, increases in serum creatinine level, and paresthesias.

A recent case series [52] of 24 patients treated with human interferon gamma for 2 years demonstrated safety and efficacy, but flares occurred rapidly after withdrawal. [9] Also, phosphodiesterase inhibitors show promise, but these agents are early in development.

Alternative Therapies

Chinese herbal formulations have generated interest based on small studies. Zemaphyte, a proprietary formulation containing 10 Chinese herbs, has been used successfully in several trials in Great Britain. [48] One double-blind, placebo-controlled, crossover study [17] of 37 Chinese patients with recalcitrant atopic dermatitis, however, showed no improvement. Moreover, given an unknown mode of action and controversy regarding variations in formulations, Chinese herbal therapy is not recommended. Phase 2 multicenter trials are underway in the United States to assess the findings of studies conducted in Great Britain.

Schachner et al [45] have reported that daily massage for 20 minutes resulted in improvements in redness, scaling, lichenification, excoriation, and pruritus over a 1-month treatment period. Patients' activity levels and dispositions improved, and parents administering massages also reported diminished anxiety levels. A control group receiving topical treatment alone improved significantly only on the scaling measure.

SUMMARY

The goal in treating patients with atopic dermatitis is to maintain adequate hydration while decreasing pruritus and inflammation. It is also important to recognize factors that are responsible for flares. Although the etiology of atopic dermatitis remains unknown, therapies are being developed targeting immunologic defects in this disease.

Fingertip Units for Topical Steroids

Topical steroids are used for various skin conditions. The amount of topical steroid that you should apply is commonly measured by 'fingertip units'.

What are topical steroids and how do they work?

Topical steroids are creams, ointments and lotions which contain steroid drugs. Topical steroids work by reducing inflammation in the skin. They are used for various skin conditions such as atopic eczema. Unlike many other creams and ointments, it is important to get the dose right when using topical steroids. This is why a standard measure is often used - the fingertip unit.

Fingertip units

One fingertip unit (FTU) is the amount of topical steroid that is squeezed out from a standard tube along an adults fingertip. (This assumes the tube has a standard 5 mm nozzle.) A finger tip is from the very end of the finger to the first crease in the finger. One FTU is enough to treat an area of skin twice the size of the flat of an adult's hand with the fingers together.



Two FTUs are about the same as 1 g of topical steroid. Therefore, for example, say you treat an area of skin the size of eight adult hands. You will need four FTUs for each dose. (This is 2 g per dose. If the dose is once a day, then a 30 g tube should last about 15 days of treatment.)

The following are further examples:

Area of skin to be treated (adults)	Size is roughly:	FTUs each dose (adults)
A hand and fingers (front and back)	About 2 adult hands	1 FTU
Front of chest and abdomen	About 14 adult hands	7 FTUs
Back and buttocks	About 14 adult hands	7 FTUs
Face and neck	About 5 adult hands	2.5 FTUs
An entire arm and hand	About 8 adult hands	4 FTUs
An entire leg and foot	About 16 adult hands	8 FTUs

Fingertip units and children

An FTU of cream or ointment is measured on an adult index finger before being rubbed onto a child. Again, one FTU is used to treat an area of skin on a child equivalent to twice the size of the flat of an adult's hand with the fingers together. You can gauge the amount of topical steroid to use by using your (adult) hand to measure the amount of skin affected on the child. From this you can work out the amount of topical steroid to use.

The following gives a rough guide:

For a 3-6 month old child

- Entire face and neck - 1 FTU
- An entire arm and hand - 1 FTU
- An entire leg and foot - 1.5 FTUs
- The entire front of chest and abdomen - 1 FTU
- The entire back including buttocks - 1.5 FTUs

For a 1-2 year old child

- Entire face and neck - 1.5 FTUs
- An entire arm and hand - 1.5 FTUs
- An entire leg and foot - 2 FTUs
- The entire front of chest and abdomen - 2 FTUs
- The entire back including buttocks - 3 FTUs

For a 3-5 year old child

- Entire face and neck - 1.5 FTUs
- An entire arm and hand - 2 FTUs
- An entire leg and foot - 3 FTUs
- The entire front of chest and abdomen - 3 FTUs
- The entire back including buttocks - 3.5 FTUs

For a 6-10 year old child

- Entire face and neck - 2 FTUs
- An entire arm and hand - 2.5 FTUs
- An entire leg and foot - 4.5 FTUs
- The entire front of chest and abdomen - 3.5 FTUs
- The entire back including buttocks - 5 FTUs

Further help and information

National Eczema Society

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Tel (Helpline): 0800 089 1122 Web: www.eczema.org

References

- [Eczema - atopic](#), Clinical Knowledge Summaries (July 2008)
- [MeReC](#) Using topical corticosteroids in general practice 1999
- [Long CC, Finlay AY](#); The finger-tip unit--a new practical measure. Clin Exp Dermatol. 1991 Nov;16(6):444-7. [abstract]
- [Long CC, Mills CM, Finlay AY](#); A practical guide to topical therapy in children. Br J Dermatol. 1998 Feb;138(2):293-6. [abstract]

Comprehensive patient resources are available at www.patient.co.uk

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