OTC Advisor
Self-Care for Dermatologic Disorders
Monograph 6

A continuing pharmacy education activity for pharmacists

Supported by an independent educational grant from P&G
Activity Preview
Dermatologic disorders are a common concern of patients in all age groups. Fewer than half of patients may seek medical advice for dermatologic disorders; instead, they turn to self-treatment options that may or may not be appropriate for their particular complaint. It is essential for pharmacists to be able to recognize and differentiate common skin conditions, suggest appropriate treatments for these conditions, and know when to refer patients to a primary care provider or dermatologist for further evaluation.

This monograph addresses self-treatment strategies for atopic dermatitis, contact dermatitis (including poison ivy), insect bites, insect stings, scaly dermatoses, acne, fungal skin infections (athlete’s foot, ringworm, and jock itch), warts, corns and calluses, pediculosis, and minor burns and sunburn. Each condition is defined, and its pathophysiology is reviewed. Exclusions for self-treatment are presented and explained. Self-care options—nonprescription medications and nonpharmacologic interventions—are discussed in the context of a self-treatment algorithm. Each section of the monograph concludes with a list of Points to Remember that provides a quick summary of the major concepts and recommendations.

Learning Objectives
At the completion of this activity, the pharmacist will be able to:
1. Summarize general principles of topical therapy for dermatologic disorders.
2. Describe common presentations of atopic dermatitis, contact dermatitis (including poison ivy), insect bites, insect stings, scaly dermatoses, acne, fungal skin infections (athlete’s foot, ringworm, and jock itch), warts, corns and calluses, pediculosis, and minor burns and sunburn.
3. Differentiate these dermatologic disorders from closely related conditions.
4. Identify exclusions to self-treatment of these dermatologic disorders.
5. Outline appropriate self-treatment of these dermatologic disorders, with attention to both pharmacologic and nonpharmacologic treatment options.

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INTRODUCTION

Dermatologic disorders are very common, with various conditions occurring throughout the lifespan. Fewer than half of patients may seek medical advice for dermatologic disorders; instead, they turn to self-treatment options that may or may not be appropriate for their particular complaint. It is essential for pharmacists to be able to recognize and differentiate common skin conditions, suggest appropriate treatments for these conditions, and know when to refer patients to a primary care provider or dermatologist for further evaluation.

This monograph reviews the self-care of atopic dermatitis, contact dermatitis (including poison ivy), insect bites, insect stings, scaly dermatoses, acne, fungal skin infections (athlete's foot, ringworm, and jock itch), warts, corns and calluses, pediculosis, and minor burns and sunburn.

HUMAN SKIN AND PRINCIPLES OF TOPICAL THERAPY

The skin is the largest organ of the human body, accounting for approximately 15% of the body weight of an average person. Skin performs a number of vital physiologic functions, including:

• Protecting the body from injury.
• Serving as a barrier against microorganisms.
• Synthesizing melanin to protect underlying tissues from irradiation.
• Receiving sensory input from the proximal environment.
• Producing cholecalciferol (vitamin D³) through exposure to ultraviolet (UV) radiation.

The skin also plays a major role in thermoregulation, as both cutaneous blood flow and perspiration contribute to maintaining a normal core body temperature.

Human skin is about 1 to 2 mm thick. It is composed of three functionally distinct regions: epidermis, dermis, and hypodermis (Figure 1). The epidermis—the outermost and thinnest layer of the skin—regulates the water content of the skin and controls drug absorption into the lower layers and systemic circulation. The dermis, immediately below the epidermis, is much thicker than the epidermis and contains nerve endings, blood vessels, and hair follicles. It also contains the sebaceous glands, which produce oil (sebum) that lubricates the skin and prevents excess drying. The hypodermis provides nourishment and cushioning for the upper two layers.

Principles of Drug Absorption

When a drug is applied topically, it is transported from the skin surface to the general circulation through percutaneous absorption. The major mechanism of drug absorption is passive diffusion through the stratum corneum—the outermost layer of the epidermis—followed by transport through the deeper epidermal regions and then the dermis.

The stratum corneum provides the greatest resistance and is often a rate-limiting barrier to percutaneous absorption. Because it is nonliving tissue, the stratum corneum may be viewed as having the general characteristics of an artificial and semipermeable membrane. Once a molecule has crossed this layer, there is much less resistance to its transport through the rest of the epidermis and into the dermis.

Drug movement into and through the stratum corneum is enhanced or inhibited to varying degrees by a number of factors. For example, when the temperature of the skin is elevated at the site of application, blood flow in the area also increases, which enhances percutaneous absorption. Vigorously rubbing or massaging a topical medication into the skin increases absorption in part by increasing the blood supply to the local area. Drug diffusion also may be accelerated when the stratum corneum is hydrated. Occluding the skin with an oleaginous ointment base or closed, airtight dressing (e.g., plastic wrap) enhances the transfer of most drugs because it increases hydration of the stratum corneum.

Drugs used to treat dermatologic disorders may be formulated as ointments, creams, lotions, gels, solutions, suspensions, aerosols, foams, powders, or pastes. Ointments may have oleaginous hydrocarbon bases (e.g., petrolatum, mineral oil) or hydrophilic absorption bases (e.g.,...
anhydrous lanolin, hydrophilic petrolatum). Ointments with oleaginous hydrocarbon bases such as petrolatum are transiently occlusive, promote hydration, and generally enhance the transport of medications through the skin layers. Creams and lotions are hydrous emulsion bases that contain varying amounts of water; they are less occlusive than ointments. Water-soluble bases (e.g., polyethylene glycol) are minimally occlusive, may attract water from the stratum corneum, and may decrease drug transport. Powders with hydrophilic ingredients presumably decrease hydration by absorbing available water from the skin.

Percutaneous absorption also is influenced by extremes of age. Topical drug delivery may be impeded in older patients because their skin usually is poorly hydrated. Conversely, young children generally show greater percutaneous absorption of topical agents because of an increased skin surface to weight ratio. The ratio of body surface area to body weight in a newborn is approximately two to three times that of an adult; thus, the proportion of drug absorbed per kilogram of body weight is greater in a newborn. Infants also have immature hepatic enzyme systems and a reduced capability to biotransform drugs absorbed by the cutaneous route. Because young children are at increased risk for systemic effects from topically applied drugs, topical medications should not be used on children 2 years of age or younger, except under the advice and supervision of a primary care provider.

Alterations in the integrity of the stratum corneum can result in artificial shunts of the percutaneous absorption process. Breaks in the skin (e.g., fissures, ulcerations, abrasions, chafed areas, burns, exfoliative eruptions) and inflammation (e.g., from dermatitis) can enhance the absorption of topically applied medications and increase the risk of local adverse effects or systemic complications, particularly if large areas of the skin are involved. In contrast, thick scale or crust markedly decreases the absorptive capacity of the skin.

**Product Selection Considerations**

A general approach to product selection for dermatologic disorders is summarized by the adage: “If it’s dry, wet it; if it’s wet, dry it.” Dry lesions benefit from products that have enough occlusive property to help the skin surface retain water content. Wet lesions benefit from products with a higher water content; these products provide a drying effect as water evaporates from the skin.

Ointments are the vehicle of choice for dry lesions, especially areas of skin that are very dry and fissured. Ointments should not be used on lesions that are moist,weeping, oozing, or infected. Oleaginous bases (petrolatum in particular) can cause tissue maceration, as well as trap bacteria and lead to secondary infections. Ointments also should not be applied over puncture wounds or lacerations; they should be used sparingly, if at all, on intertriginous areas (e.g., axillae, skin folds of the groin, finger and toe webs), mucous membranes, and acne-prone areas.

Creams may be used for dry lesions, but they are less occlusive than ointments. When only ointment and cream formulations of a product are available, a cream should be used on lesions that are moist, macerated, weeping, or oozing. Compared with ointments, creams allow fluid to flow freely from lesions and do not trap bacteria. However, solutions, gels, or lotions are the vehicles of choice for wet areas. Pharmacists should be aware that gels can be excessively drying when used for prolonged periods, especially if they contain high concentrations of alcohol or propylene glycol. Propylene glycol also may sting when applied to abraded skin.

It is possible to dry some moist, macerated, weeping, or oozing lesions with astringents or “shake lotions” before applying a more occlusive vehicle such as a cream. Aluminum acetate (Burow’s solution) is a common nonprescription astringent that is applied as a wet dressing or compress or used as a soak. It forms a protein precipitate that stops or reduces the oozing of capillaries or the fluid release from blisters or inflamed tissues, thereby promoting drying. Astringents aid in cleansing the skin of exudates, crust, and surface debris; they also cause vasoconstriction and reduce inflammation. The protein precipitates may serve as a protective coat, allowing new tissues to grow underneath. Shake lotions are lotions to which a powder is added to increase the surface area of evaporation; the increased evaporation boosts the drying and cooling effect on wet and weeping skin. Shake lotions derive their name from the need to shake the preparation well before each use to encourage a homogeneous suspension. Calamine lotion is a common shake lotion containing calamine and zinc oxide, which act as skin protectants.

Pharmacists should consider patient preference when recommending products for dermatologic disorders. Ointments typically are very greasy; as a result, they can be difficult for patients to spread and remove and may stain clothing and other fabrics. To avoid a greasy feeling, patients should be advised to warm an ointment product gently in the hands, apply a very thin layer, and massage it into the skin gently but thoroughly. Creams generally are a more acceptable alternative for patients who are unwilling to use ointments. Foams, sprays, and lotions are especially useful in areas that pose application challenges such as the scalp, other hairy areas, and locations that are difficult to reach.

**ATOPIC DERMATITIS**

Atopic dermatitis—also known as atopic eczema, eczematous dermatitis, or eczema—is a chronic, relapsing skin disorder that typically begins during infancy or early childhood and often continues into adulthood. In the United States, approximately 6% of the population have atopic dermatitis, often in conjunction with other atopic disorders such as allergic rhinitis and asthma. It is considered to be the most common dermatologic condition in children, with more than 5% of children affected by age 6 months.

Atopic dermatitis can be thought of as an exaggerated skin response to environmental stimuli. It has a genetic basis, but its expression is modified by a broad spectrum of exogenous mani-
festations. There is a family history of atopic disorders in 70% of cases. Because no established diagnostic test exists, atopic dermatitis is identified according to the clinical criteria listed in Table 1. It often is referred to as “the itch that rashes”: intensely pruritic patches form, and the ensuing scratching often leads to redness, swelling, cracking, weeping, crusting (dried exudate), and scaling. In infants, atopic dermatitis initially appears as redness and chapping on the cheeks and may progress to the face, neck, extensor surfaces of the forearms and legs, and trunk. In adults, it is more common for the rash to appear in the flexural folds of the extremities or on the hands.

Exclusions for Self-Treatment
As many as 75% of patients with atopic dermatitis do not seek medical care and are likely to look for advice regarding self-treatment of this condition. Because secondary or associated cutaneous infections are common, patients should be counseled to seek medical attention promptly if signs of bacterial or viral skin infection are noticed. These signs include pustules, vesicles (especially exudative or pus filled), and yellowish crusting.

Other exclusions for self-treatment of atopic dermatitis are listed in the algorithm depicted in Figure 2.

Self-Treatment of Atopic Dermatitis
Although atopic dermatitis cannot be cured, it can be managed satisfactorily. The goals of self-treatment are to:
• Stop the itch–scratch cycle.
• Avoid or minimize factors that trigger or aggravate the condition.
• Maintain skin hydration.
• Prevent secondary infections. The patient’s age, sex, and social conditions—as well as the site(s) and severity of the lesions—should be considered when individualizing treatment.

A general approach to the self-treatment of atopic dermatitis is presented in Figure 2.

General Treatment Measures
A key step in managing atopic dermatitis is to identify the factors that trigger or aggravate it, then take steps to reduce or eliminate the patient’s exposure to those factors. Common exacerbating factors include foods, soaps, detergents, fragrances, chemicals, cigarette smoke, dust, pollens, certain bacteria, and emotional stress. Patients also frequently are intolerant of sudden and extreme changes in temperature.
and humidity; both the perspiration caused by high temperatures and the dry skin caused by cold weather and low humidity lead to increased pruritus.

Patients with atopic dermatitis may be especially sensitive to low concentrations of irritants that generally would not cause a reaction on normal skin. Patients should be encouraged to wear nonirritating fabrics (e.g., cotton) and launder and thoroughly rinse all new clothing. Patients also should use nonirritating sunscreens to avoid sunburn.

Patients should be educated about adjunctive measures to minimize scratching and the associated damage. To the extent possible, patients should remain in moderate temperature settings with moderate humidity. They should avoid wearing tight, occlusive clothing. Patients should keep their fingernails short, smooth, and clean. They also should consider wearing cotton gloves or socks on their hands when going to bed to lessen nighttime scratching.

Drying Weeping or Oozing Lesions

Weeping or oozing lesions can be dried with tepid tap water compresses applied for up to 20 minutes, four to six times daily. An astringent aluminum acetate solution also can be used.

Aluminum acetate is available as premixed Burow’s solution that is diluted with water to obtain the desired concentration (1:10 to 1:40). Alternatively, patients may prepare a modified Burow’s solution in various concentrations from powder or tablets that contain aluminum sulfate and calcium acetate (e.g., Domeboro). When the powder or tablet is dissolved in water according to label instructions, the aluminum sulfate and calcium acetate combine to form an aluminum acetate solution with a calcium sulfate precipitate.

If the affected area is relatively small, patients can soak it in the aluminum acetate solution three times daily for 15 to 30 minutes. For larger areas, patients should saturate a clean, soft, white cloth (e.g., washcloth, cheesecloth, diaper, small towel) in the solution and wring it gently so the cloth is wet but not dripping. The dressing should be applied loosely to the affected area, then rewetted and reapplied every few minutes for 20 to 30 minutes, four to six times daily. The solution always should be discarded after each use and a fresh solution prepared for subsequent soaks or applications.

Maintaining Skin Hydration

The stratum corneum in patients with atopic dermatitis contains less moisture than that of normal skin. As a result, patients tend to have dry skin and reduced skin barrier function that contributes to the development of microfissures and cracks. Errors in bathing and moisturizing are considered to be the most common factors in persistent atopic dermatitis.

Bathing. Patients should be encouraged to bathe for only 3 to 5 minutes every other day using tepid (not hot) water. Mild nonsoap cleansers (e.g., Cetaphil) are recommended because common bar soaps usually are too drying. Patients who take tub baths should add a fragrance-free, water-miscible bath oil to the water to soothe the skin. When patients are done bathing, they should pat (not rub) the body dry gently with a towel, leaving the skin slightly damp.

Bathing with colloidal oatmeal products may be soothing and antipruritic. To use colloidal oatmeal as a bath treatment, patients are instructed to turn the tub faucets (adjusted for warm water) on to full force and slowly sprinkle 1 cup (or one individual-use packet) of colloidal oatmeal directly under the faucet into the tub. Before patients enter the tub, they should stir any colloidal oatmeal that may have settled to the bottom. Patients should soak for 15 to 20 minutes, then pat dry (not rub) with a towel.

Colloidal oatmeal makes bath water extremely slippery. Placing a rubber mat in the tub and a dry rug or towel on the floor will help prevent patients from falling.

Moisturizing. After bathing, patients should apply generous amounts of an effective moisturizer to damp skin within 3 minutes to prevent evaporation of water from the stratum corneum. Moisturizers should be reapplied throughout the day—as often as three to four times daily—for maximum benefit.

Most moisturizers are ointments, oils, creams, or lotions that contain various combinations of ingredients with occlusive, emollient, and humectant properties. Occlusives coat the stratum corneum and decrease evaporation of water from the skin. Emollients fill the spaces between desquamating skin scales to create a smooth surface. Humectants are hygroscopic substances (e.g., glycerin, hyaluronic acid, propylene glycol) that draw water into the stratum corneum from the dermis or the atmosphere (in conditions of at least 80% humidity), thereby complementing the action of occlusives.

The more occlusive a moisturizer is, the more effective it is at preventing water loss. Ointments and oils are most occlusive. In general, creams are more occlusive than lotions. Creams and lotions that are water-in-oil emulsions are more occlusive than oil-in-water emulsions; however, patients tend to prefer oil-in-water emulsions because they do not feel as greasy when applied to the skin.

Some nonprescription moisturizers contain urea in concentrations of 10% to 30%. Urea is mildly keratolytic and increases water uptake in the stratum corneum, giving it a high water-binding capacity. Lotion and cream formulations containing urea

Table 1. Diagnostic Criteria for Atopic Dermatitis

| An itchy skin condition, plus three or more of the following criteria: |
| • Onset at <2 years of age |
| • History of skin crease involvement (including cheeks in children <10 years of age) |
| • History of generally dry skin |
| • Personal history of asthma, allergic rhinitis, and/or allergic conjunctivitis or history of any atopic disease in first-degree relative in children <4 years of age |
| • Visible dermatitis on the flexural areas (the inside of the knees and elbows) or dermatitis of cheeks/forehead and other outer limbs in children <4 years of age |

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Figure 2. Algorithm for Self-Treatment of Atopic Dermatitis

Exclusions for Self-Treatment
- Severe condition with intense pruritus
- Involvement of large area of body
- <2 years of age
- Skin appears to be infected

OTC = over-the-counter; PCP = primary care provider.

may be better at helping to remove scales and crusts, whereas urea in emollient ointments (e.g., urea in a hydrophilic ointment base) may be better at rehydrating the skin. Urea preparations can cause stinging, burning, and irritation, particularly on broken skin.

Lactic acid is an α-hydroxy acid used in concentrations of 2% to 5% for treating dry skin conditions. Lactic acid increases skin hydration and may act as a modulator of epidermal keratinization at low concentrations. It may be added to urea preparations for its stabilizing and hydrating effects.

**Pharmacologic Therapy**

Topical corticosteroids are the mainstay of therapy for atopic dermatitis. Hydrocortisone is the only topical corticosteroid available without a prescription, at concentrations of 0.5% to 1%. It is a low-potency corticosteroid with a weak anti-inflammatory effect. Available formulations include ointments, creams, gels, and lotions.

To help relieve pruritus, patients with atopic dermatitis may apply hydrocortisone 1% cream or ointment sparingly to the affected area three to four times daily. Because response to hydrocortisone may decrease with continued use, intermittent courses of hydrocortisone therapy are advised. Product labeling directs patients to stop use and ask a doctor if symptoms persist for more than 7 days while using hydrocortisone.

Hydrocortisone should not be applied to infected skin, because it can mask the signs of infection and allow the infection to progress. Other local adverse effects (e.g., epidermal atrophy, folliculitis) rarely occur at nonprescription concentrations of hydrocortisone. Systemic complications also are rare when nonprescription hydrocortisone products are used in accordance with labeled directions.

**Follow-Up**

Symptoms of atopic dermatitis should resolve or at least show some improvements within 2 to 3 days. If symptoms persist, the patients should be referred to primary care providers. Patients also should be referred to a primary care provider or dermatologist if they feel the need to continue self-treatment for more than 7 days.

**Points to Remember**

- Most patients with mild to moderate atopic dermatitis are candidates for self-treatment.
- Patients with yellow, crusty, atopic dermatitis lesions and all children younger than 2 years of age with atopic dermatitis should be referred to a primary care provider or dermatologist for evaluation and treatment.
- Patients presenting with suspected atopic dermatitis should be questioned about exposure to soaps, detergents, fragrances, chemicals, irritants, changes in environmental temperature, allergens, and bathing.
- Patients should be advised to take brief baths using tepid water and apply moisturizers within 3 minutes of completing each bath or shower.
- Patients should be advised to use mild skin cleansers and avoid products with fragrances or other potential irritants.
- Patients should be educated about the importance of stopping the itch–scratch cycle, avoiding triggers, and maintaining adequate skin hydration through proper bathing and moisturizing practices.
- To help relieve pruritus, patients with atopic dermatitis may apply hydrocortisone 1% cream or ointment sparingly to the affected area three to four times daily.
- Patients should contact their primary care provider if symptoms worsen or do not improve within 7 days.

**CONTACT DERMATITIS**

Contact dermatitis is an acute inflammation of the skin caused by irritants (e.g., chemicals, soaps) or allergens (primarily poison ivy/oak/sumac). Symptoms may include pruritus, burning, redness, stinging, and the formation of vesicles and pustules on exposed areas. Contact dermatitis occurs in 1% to 10% of the population and accounts for an estimated 5.7 million primary care provider visits per year.

Contact dermatitis is classified as either irritant contact dermatitis (ICD) or allergic contact dermatitis (ACD), based on the offending agent. The symptoms and characteristics of ICD and ACD are differentiated in Table 2.

**Irritant Contact Dermatitis**

ICD accounts for 80% to 90% of all cases of contact dermatitis. The majority of ICD cases are caused by occupational exposures; the face and dorsal surfaces of the hands and arms are most likely to be affected. Persons employed in forestry, agriculture, fishing, manufacturing, and certain service sectors (e.g., health care professionals, hair stylists) have the highest incidence of ICD.

ICD is a nonspecific reaction that may appear after a single exposure to an irritant or following multiple exposures to the same agent. The skin typically becomes inflamed and swollen, turns red, and may develop small vesicles or papules that ooze fluid when opened and then crust within several days. Ulcer formation and localized necrosis are also possible. The magnitude of the skin response is influenced by factors such as the quantity and concentration of the irritant, the duration of contact, the condition of the skin (e.g., presence of coexisting skin diseases or conditions), and environmental factors. Although some patients who are chronically exposed to irritants recover completely, others improve but continue to have recurrences.

**Allergic Contact Dermatitis**

ACD accounts for 10% to 20% of contact dermatitis cases. It is a delayed, cell-mediated hypersensitivity reaction that has two phases: (1) initial exposure and sensitization to an antigen, followed by (2) an inflammatory response on subsequent exposures to the antigen. Sensitization may occur quickly (e.g., within 6 to 10 days) with strong sensitizers such as poison ivy, or it may occur over months or years of repeated exposures to weak sensitizers. Once a person is sensitized, symptoms typically develop within 24 to 48 hours following reexposure. Patients usually have intense pruritus that may be accompanied by burning and pain; skin changes range from erythema to vesiculation to severe bullae and edematous swelling.

Poison ivy, poison oak, and poison sumac are the principal causes
Self-Treatment of Contact Dermatitis

Exclusions listed in treatment if they exhibit any of the exclusions listed in Figure 3.

Patients with contact dermatitis should be evaluated by a primary care provider before attempting self-treatment if they exhibit any of the exclusions listed in Figure 3.

Self-Treatment of Contact Dermatitis

Table 2. Differentiation of Irritant and Allergic Contact Dermatitis

<table>
<thead>
<tr>
<th>Symptom or Characteristic</th>
<th>Irritant Contact Dermatitis</th>
<th>Allergic Contact Dermatitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pruritus</td>
<td>Yes, late</td>
<td>Yes, early</td>
</tr>
<tr>
<td>Stinging, burning</td>
<td>Early</td>
<td>Late or not at all</td>
</tr>
<tr>
<td>Erythema</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Vesicles</td>
<td>Yes, minimal</td>
<td>Yes, early</td>
</tr>
<tr>
<td>Pustules</td>
<td>Yes</td>
<td>Yes, minimal</td>
</tr>
<tr>
<td>Dermal edema</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Delayed reaction to exposure</td>
<td>Minutes to hours</td>
<td>Days, slow reaction</td>
</tr>
<tr>
<td>Appearance of symptoms in relation to exposures</td>
<td>Single or multiple exposures</td>
<td>Delayed</td>
</tr>
<tr>
<td>Substance concentration at exposure</td>
<td>Very important</td>
<td>Less important</td>
</tr>
<tr>
<td>Mechanism of reaction</td>
<td>Direct tissue damage</td>
<td>Immunologic reaction</td>
</tr>
</tbody>
</table>

Dermatitis

ICD generally resolves within several days if the patient remains free of the irritant. The goals of self-treatment for ICD are to:
- Relieve the inflammation, dermal tenderness, and irritation.
- Prevent continued exposure to the irritant substance.

ACD generally resolves in 10 to 21 days with or without treatment, as a result of the patient’s own immune system. The goals of self-treatment for ACD are to:
- Protect the affected area during the acute phase of the rash.
- Prevent pruritus and excessive scratching that may lead to open lesions and potential secondary skin infections.
- Prevent the accumulation of debris that arises from the vesicle fluids oozing, crust, and scaling, thereby preventing spread of the dermatitis to the surrounding area of inflammation.

As shown in the algorithm in Figure 3, similar treatment strategies are used to achieve self-treatment goals for both ICD and ACD. Patients also should be educated about ways to minimize or eliminate future exposure to the offending irritant or allergen.

General Treatment Measures

If patients realize that they have been exposed to a known or suspected irritant or allergen, they should rinse the exposed areas immediately with copious amounts of water and cleanse the areas with a mild or hypoallergenic soap if possible. These measures will reduce the contact time of the offending substance and help to minimize the spread of dermatitis if a dermal response occurs. Patients who have been exposed to urushiol should pay particular attention to cleansing under the fingernails, because scratching or touching other parts of the body may result in spread of the urushiol oleoresin.

Products marketed specifically for the removal of urushiol (although not approved by the U.S. Food and Drug Administration [FDA] for that purpose) include Tecnu Outdoor Skin Cleanser, Tecnu Extreme Poison Ivy Scrub, and Zanfel Poison Ivy Wash. Tecnu Outdoor Skin Cleanser contains mineral spirits, soap, water, and a surface-active agent; it was developed originally for the removal of radioactive matter from the skin surface of exposed individuals. Patients are directed to apply the product to the affected area as soon as possible after exposure (although it can be used up to 8 hours after exposure) and rub it vigorously into the skin for 15 minutes. The liquid is then rinsed off with copious amounts of water.

Myths About Poison Ivy

Scratching poison ivy blisters will spread the rash.

The rash is spread only by urushiol and the fluid in the blisters does not contain urushiol; therefore, it will not spread the rash. However, if urushiol still is present on the skin, clothing, or other objects, touching another part of the body will cause a rash in the area(s) of contact.

The rash is “contagious.”

A poison ivy rash cannot pass from person to person; only contact with urushiol can produce a rash.

Once allergic, always allergic.

A person’s sensitivity may change over time. Sensitivity tends to decline with age.

Dead poison ivy plants are no longer toxic.

Urushiol continues to be active within dead and dried parts of plants.
vigorously for 2 minutes, then rinse the skin clean with cool running water or wipe off the product with a cloth. Tecnu Extreme Poison Ivy Scrub and Zanfel Poison Ivy Wash are scrubs that include polyethylene beads, alcohol solubles, and surfactants among their ingredients. The directions for use differ slightly for each product, but both are mixed with a small amount of water, rubbed gently onto the affected area for 15 seconds (or up to 3 minutes for Zanfel), and then rinsed off thoroughly.

The primary nonpharmacologic measure for relieving pruritus (at least temporarily) is to take soapless cool baths or tepid showers. A tepid shower is approximately 90°F (32.2°C) or cooler. Patients also may add colloidal oatmeal or 1 or 2 cups of sodium bicarbonate powder (baking soda) to warm bath water to cleanse and soothe lesions and help relieve pruritus and irritation. Patients should be reminded to pat (not wipe) the skin dry so that a film of colloidal oatmeal or baking soda will remain on the skin. Patients also should take care to remove all traces of urushiol from their skin before bathing in a tub, to avoid spreading the oleo-resin to other areas of the body.

Opened and weeping lesions can be dried with aluminum acetate compresses (see ATOPIC DERMATITIS section) or calamine lotion. Calamine lotion should be applied liberally to the affected areas; application is facilitated by using a cotton ball or pad. Patients should be warned that calamine leaves a light pink film in the application area. Because product buildup can occur,

Figure 3. Algorithm for Self-Treatment of Contact Dermatitis

gentle cleansing of the affected area before product reaplication (as needed) is recommended.

Patients with either wet or dry lesions may use sodium bicarbonate as a paste or a cool compress to relieve pruritus and irritation. For paste application, cool tap water is added to baking soda in sufficient quantity to prepare a paste for direct application to the affected area. Baking soda compresses may be applied for 15 to 30 minutes and repeated as needed. Baking soda should not be used near the eyes and should not be applied to patients younger than 2 years of age.

A systematic review of contact dermatitis treatment and prevention concluded that oil-rich moisturizers (e.g., ointments, creams) can treat ICD effectively, at least in the short term.

**Pharmacologic Therapy**

Hydrocortisone is the most effective topical agent for treating symptoms of mild to moderately severe ICD or ACD that does not involve edema or extensive areas of the skin. A cream, gel, or lotion formulation (i.e., not an ointment) should be used on opened and weeping blisters, vesicles, or bullae. All types of formulations may be used on dry rashes. Whichever formulation is used, it should be applied sparingly to the affected area up to three to four times daily for no more than 7 days.

Topical preparations containing anesthetics (especially benzocaine), antihistamines, or antibiotics are best avoided in the treatment of ICD or ACD. These agents are known sensitizers that can cause a drug-induced dermatitis along with the existing dermatitis. If pruritus interferes with sleeping, oral nonprescription sleep aids containing diphenhydramine or doxylamine may be helpful.

**Preventive and Protective Measures**

Patients should avoid all contact with known irritants and allergens to the extent possible. If contact may occur, patients should be encouraged to use protective clothing, gloves, and other protective equipment (e.g., face masks) to reduce their exposure. Barrier creams (e.g., Hydropel Sports Ointment, Hollister Moisture Barrier) may help to prevent dermatitis if applied before contact with an irritant or allergen. Moisturizers with a high oil content may help to prevent ICD.

IvyBlock Lotion is the only barrier product approved by the FDA to provide protection against exposure to poison ivy/oak/sumac. It contains bentoquatam, an organoclay that possesses little antigenicity or toxicity when applied topically. It is believed to physically block urushiol from being absorbed into the skin. This product should be applied generously to clean, dry skin at least 15 minutes before potential exposures and reapplied every 4 hours or as needed. Use of IvyBlock Lotion in children younger than 6 years of age is not recommended.

Preventive and protective measures specifically for dermatitis caused by poison ivy/oak/sumac are summarized in Table 3.

**Follow-Up**

After recommending treatment for contact dermatitis, pharmacists may choose to follow up with the patient after several days of self-treatment; alternatively, pharmacists may encourage the patient to call for additional advice if they fail to see a slow but steady reduction in pruritus, weeping, and dermatitis after 5 to 7 days of therapy. Patients should be referred to a primary care provider or dermatologist if the rash has increased significantly in size, affects the eyes or genitals, or covers extensive areas of the face at follow-up.

**CASE 1. ALLERGIC AND CONTACT DERMATITIS**

CB is a 40-year-old man who has worked as a custodian at the local elementary school for the past 8 years. He seeks advice about treating a rash on his hands. He had felt an unusual burning sensation on his hands when he was mopping the floor yesterday afternoon; the rash appeared within several hours and began to itch. The rash is confined to CB's hands and has a few scattered vesicles. Upon questioning, CB reports that he just began using a new brand of cleaning solution. CB does not wear gloves while working, even while wringing out the mop with his hands. He reports no history of similar rashes.

Which of the following conditions is the most likely explanation for CB’s rash?

a. Allergic contact dermatitis.
b. Atopic dermatitis.
c. Irritant contact dermatitis.

Case study responses appear on page 40.

**Points to Remember**

- Patients who are sensitive to irritants, allergens, or urushiol may take precautions to eliminate unnecessary exposure by avoiding these agents, limiting exposure time, and wearing protective clothing and equipment. Once exposed to an irritant or allergen, the patient can take protective measures that include bathing with mild soap and water or using large volumes of cool water immediately after exposure to reduce the risk of dermatitis.
- Irritant, allergic, and poison ivy/oak/sumac dermatitis generally resolves within 21 days with or without topical therapy. Nonprescription medications serve in part to relieve the intense pruritus, inflammation, weeping, and crust that may accompany these dermatoses.
- Treatment of localized, pruritic rash consists of a topical application of hydrocortisone cream or ointment, sodium bicarbonate paste, compresses, or baths. Weeping vesicles or bullae may be soothed and dried with astringent aluminum acetate compresses. Colloidal oatmeal baths may be used to treat the pruritic rash, soothe the skin, and provide an emollient action on dry skin.

**INSECT BITES**

When patients use the term “insect bite,” they usually are referring to a bite from an insect (e.g., mosquito,
flea, bedbug) or an arachnid (e.g., chigger, tick, spider). Each of these arthropods has distinctive biting organs and salivary secretions that contribute to the characteristic signs and symptoms for each type of bite.

After landing on a person’s skin, mosquitoes inject an anticoagulant saliva that causes the characteristic welt and pruritus. Although bites are most common on exposed skin, mosquitoes also can bite through thin clothing. Both malaria and West Nile virus can be transmitted by mosquito bites.

Fleas are tiny bloodsucking insects that may be attracted to hosts by body warmth or exhaled carbon dioxide. Flea bites usually are multiple and grouped; in humans, the bites occur primarily on the legs and ankles. Each lesion is characterized by an erythematous region around the puncture and intense pruritus. Serious diseases such as bubonic plague and endemic typhus can be transmitted by flea bites.

Bedbugs usually hide and deposit their eggs in crevices of walls, floors, picture frames, bedding, and furniture during the day, then bite their victims at night. People also may be bitten while sitting in theaters or other public places with subdued lighting. The reaction to a bedbug bite can range from irritation at the site to a small dermal hemorrhage, depending on the sensitivity of the individual. It is possible for hepatitis B to be transferred through bedbug bites.

Chiggers (red bugs) live in shrubby, trees, and grass. After attaching to the skin, chigger larvae secrete a digestive fluid that causes a red papule and intense pruritus. This fluid also causes the skin to harden and form a tiny tube where the chigger lies and continues to feed until engorged. It then drops off and changes into an adult.

Ticks feed on the blood of humans and both wild and domesticated animals. During feeding, the tick’s mouthparts are introduced into the skin, enabling it to hold firmly. If the tick remains attached, it becomes fully engorged with blood and remains in place for up to 10 days before dropping off. The local reaction to tick bites consists of pruritic papules that disappear within 1 week. If the tick is removed but the mouthparts are left behind, intense pruritus ensues and nodules requiring surgical excision may develop. Certain species of ticks can transmit systemic diseases such as Rocky Mountain spotted fever (wood ticks, dog ticks) and Lyme disease (deer ticks).

Of the biting arthropods, only spiders have bites that are venomous. However, most species of spiders have fangs that are too short or too fragile to penetrate human skin. Black widow and brown recluse spiders are notable exceptions. Deaths from bites of either species are rare, but symptoms can be serious and may include delayed intense pain, joint stiffness, abdominal disturbances, fever, chills, and dyspnea. Brown recluse spider bites can cause these symptoms as well as a spreading ulcerated wound at the bite site.

**Exclusions for Self-Treatment**

Self-treatment of bites from mosquitoes, fleas, bedbugs, or chiggers is appropriate if the reaction is confined to the bite site and the patient is 2 years of age or older. All patients with suspected bites from ticks or spiders should be evaluated by a primary care provider. If a black widow or brown recluse spider bite is suspected, the patient should be advised to seek immediate medical attention.

Other exclusions for self-treatment of insect bites are listed in Figure 4.

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**Table 3. Preventive and Protective Measures to Avoid Poison Ivy/Oak/Sumac Dermatitis**

<table>
<thead>
<tr>
<th>Preventive Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Learn the physical appearance and usual habitat of Toxicodendron plants. Avoid contact with the sap on plants, which may be clear or appear as black, hardened spots.</td>
</tr>
<tr>
<td>• Survey the area of an outdoor visit, identify surrounding plants, and assess potential risk for exposure to Toxicodendron plants.</td>
</tr>
<tr>
<td>• Eradicate Toxicodendron plants near one’s residence by removing the plant and its roots or by applying an herbicide recommended by the state farm bureau or the U.S. Department of Agriculture Extension Services. Cover the nose and mouth with a protective mask when removing or eradicating Toxicodendron plants.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post-Exposure Protective Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>• When exposure to Toxicodendron plants is anticipated, wear protective clothing to cover as much of the skin as possible.</td>
</tr>
<tr>
<td>• Apply bentoquatam on exposed areas of body to reduce the risk of contamination before visiting an outdoor site. Repeat application every 4 hours until the potential exposure has ended. Flush the skin with water to remove bentoquatam and any urushiol that may have been deposited on the skin surface.</td>
</tr>
</tbody>
</table>

**Pre-Exposure Protective Measures**

- Avoid Poison Ivy/Oak/Sumac Dermatitis
- Survey the area of an outdoor visit, identify surrounding plants, and assess potential risk for exposure to Toxicodendron plants.
- Eradicate Toxicodendron plants near one’s residence by removing the plant and its roots or by applying an herbicide recommended by the state farm bureau or the U.S. Department of Agriculture Extension Services. Cover the nose and mouth with a protective mask when removing or eradicating Toxicodendron plants.

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**Post-Exposure Protective Measures**

- Remove all clothing worn during exposure and place the clothing directly into a washing machine. Wash this clothing separately from other clothes using ordinary detergent. (If clothes are dry-cleaned to remove urushiol, warn cleaning personnel of the possible contamination. Put contaminated clothing in a plastic bag for transport.)
- Wash any areas of suspected exposure as soon as possible—preferably within the first 10 minutes after exposure—with a mild soap and water as well as other suggested removal products. If thorough washing is not possible, rinse with water as soon as feasible.
- At the earliest convenience, take a complete shower. Avoid tub baths right after exposure, because oleoresin may remain in the tub and potentially affect other unaffected areas.
- Meticulously clean under the fingernails to avoid transferring trapped urushiol to clean skin surfaces.
- As soon as possible after use, thoroughly wash with soap and water (or with water alone) any shoes, gloves, jackets, or other protective garments; sports equipment; garden and work tools; and any other items that may be contaminated with urushiol. Wear vinyl gloves when washing contaminated objects.
- Cleanse the fur of pets after known or suspected exposure to poison ivy/oak/sumac plants.
- Cleanse the fur of pets after known or suspected exposure to poison ivy/oak/sumac plants.

**Exclusions for Self-Treatment**

Self-treatment of bites from mosquitoes, fleas, bedbugs, or chiggers is appropriate if the reaction is confined to the bite site and the patient is 2 years of age or older. All patients with suspected bites from ticks or spiders should be evaluated by a primary care provider. If a black widow or brown recluse spider bite is suspected, the patient should be advised to seek immediate medical attention.

Other exclusions for self-treatment of insect bites are listed in Figure 4.
Self-Treatment of Insect Bites

The goals of self-treatment for insect bites are to:

- Relieve symptoms.
- Prevent secondary bacterial infections.

Secondary bacterial infections (e.g., impetigo) can occur if skin in the affected area is abraded from scratching. Applying an ice pack to the affected area may provide sufficient relief of pain and irritation. Patients should be advised to avoid scratching the bite area; trimming children’s fingernails may prevent further injury from scratching.

Topical anesthetics, counterirritants, topical antihistamines, and topical hydrocortisone are used to relieve the pain and pruritus associated with insect bites. As outlined in Figure 4, topical anesthetics may be recommended to all patients who are not allergic to those agents. Lotions, ointments, or creams containing the skin protectants calamine and zinc oxide may be applied to the bite area up to four times daily to reduce inflammation and irritation and promote healing.

Topical Anesthetics

Topical (local) anesthetics include benzocaine, benzy1 alcohol, butam- ben, dibucaine, lidocaine, phenol, pramoxine, and tetracaine. Because the itching sensation is mediated by the same nerve fibers that carry pain impulses, topical anesthetics are able to provide temporary (15 to 45 minutes) relief from both pruritus and pain by reversibly blocking nerve impulses along axonal membranes. (Phenol exerts a topical anesthetic action by depressing cutaneous sensory receptors.)

Topical anesthetics are formulated as creams, ointments, aerosols, or lotions. They may be applied to the affected area up to three to four times daily for no longer than 7 days. More frequent application increases the risk of a hypersensitivity reaction (typically contact dermatitis), especially with benzocaine. If a patient experiences new or worsening pruritus, erythema, or urticaria after applying a topical anesthetic, the product should be washed off with mild soap and water and not applied again. Pramoxine and benzyl alcohol appear to cause fewer adverse effects and exhibit less cross-sensitivity than other local anesthetics.

The labeling of nonprescription products containing dibucaine warns against use of large quantities, especially over raw surfaces or blistered areas. Convulsions, myocardial depression, and death have been reported from systemic absorption. Systemic absorption of phenol carries similar risks; products containing phenol should not be applied to extensive areas of the body, especially under compresses or bandages. Products containing phenol also should be avoided in children and pregnant women.

Counterirritants

The counterirritants camphor and menthol usually are applied topically to relieve musculoskeletal pain. However, at low concentrations (camphor 0.1% to 3%, menthol 0.1% to 1%), they act as local anesthetics by depressing cutaneous receptors. Counterirritants may be applied up to three or four times daily for no more than 7 days to relieve pruritus and pain. Camphor can be very dangerous if ingested. Patients should be warned to keep camphor-containing products out of the reach of children.

Topical Antihistamines

The antihistamines diphenhydramine, pyrilamine, and tripelennamine are approved for nonprescription topical use. Diphenhydramine is most widely available—in cream, gel, and spray formulations—at concentrations of 0.5% to 2%.

Although topical antihistamines block the action of histamine at H1-receptor sites, they also exert a local anesthetic effect by depressing cutaneous receptors. The latter may be the more important mechanism of action, because pruritus in many dermatologic conditions appears to be related more to cytokine release than to histamine release. Topical antihistamines may be applied up to three to four times daily for no longer than 7 consecutive days.

Although topical antihistamines are absorbed through the skin, they generally are not absorbed in sufficient quantities to cause systemic side effects, even when applied to damaged skin. Systemic absorption is of more concern when these products are used over large body areas, especially in young children. Serious systemic toxicity also can occur if topical antihistamines are used in conjunction with oral antihistamines. Topical antihistamines are capable of producing hypersensitivity reactions; continued use of these agents for 3 to 4 weeks increases the possibility of contact dermatitis.

Preventive Measures

Patients should be educated about measures for avoiding future insect bites. These measures include:

- Covering as much of the skin as possible with clothing, hats, and shoes.
- Cutting clothing around ankles, wrists, and neck.
- Avoiding swamps, dense woods, and brush that might harbor ticks, mosquitoes, and chiggers.
- Keeping pets free of fleas and ticks.
- Removing standing water from around the home to reduce breeding areas for mosquitoes.

Insect repellents may be used to prevent bites in adults and children older than 2 months of age. Most commercial products contain N,N-diethyl-m-toluamide (DEET) in concentrations ranging from 7% to 40% (although higher concentrations are available). DEET is a volatile compound; the vapors it releases tend to discourage the approach of insects. DEET is considered to be safe if used appropriately, even in women who are pregnant or breastfeeding. However, patients should be cautioned to read and follow all of the directions and precautions listed on the product label. Skin irritation is the most frequent DEET-related problem, but central nervous system reactions—including seizures, ataxia, hypotension, encephalopathy, and angioedema—have been reported in association with improper use or ingestion.

Picaridin is a relatively new insect repellent that has been marketed as an alternative to DEET. In particular, picaridin is promoted as having less odor and being less irritating to skin.
than DEET.

Insect repellent sprays and soaks containing permethrin 0.5% are designed for use only on clothing and camping equipment; they must not be applied to the skin. One application of permethrin may provide weeks of repellent activity.

Products containing citronella, lemon eucalyptus oil, soybean oil, cedar oil, lavender oil, tea tree oil, garlic, thiamine, or scented moisturizers in mineral oil (e.g., Skin So Soft Original Bath Oil) are marketed as alternatives to DEET. These products generally have been found to be less effective than DEET as repellents against mosquitoes, particularly with regard to duration of action.

Follow-Up
Pharmacists should follow up with patients after 7 days of self-treatment. Patients should be advised to seek medical attention if symptoms such as redness, pruritus, and localized swelling worsen during treatment or if they develop secondary infection, fever, joint pain, or lymph node enlargement. Medical attention also is
INSECT STINGS

Anyone who spends time outdoors is at risk for insect stings. Although most stings cause only transient local reactions, anaphylaxis to insect stings has occurred in an estimated 3% of adults. More people in the United States die from insect stings than from bites of all poisonous animals combined; half of all fatalities involve people with no history of previous sting reactions.

Stinging insects such as bees, wasps, hornets, yellow jackets, and fire ants are members of the order Hymenoptera. Wild honey bees are found most commonly in the western and midwestern United States; they usually nest in hollow tree trunks. They have a barbed stinger that remains embedded in the skin and continues to inject venom after the bee pulls away. Africanized bees—so-called “killer bees” feared for their aggressive, swarm-and-attack behavior—are found in certain areas of the southwestern United States.

Paper wasps, hornets, and yellow jackets do not have barbed stingers. These insects—found most abundantly in the southern, central, and southwestern United States—are able to withdraw their stingers from their victims and sting repeatedly. Paper wasps tend to nest in high places, such as under house eaves or on tree branches. Hornets nest in hollow spaces, especially hollow trees. Yellow jackets nest in low spaces such as burrows in the ground, small shrubs, or sidewalk cracks. Yellow jackets are considered to be the most common source of stings.

Fire ants are found in the southern and western United States. They live in underground colonies marked by large, raised mounds.

The typical reaction to an insect sting is pain, pruritus, and irritation at the sting site. Patients who are allergic to insect stings may experience more severe local reactions involving hives, pruritus, edema, and burning sensations of the skin. Systemic reactions may cause any one or more of the signs and symptoms of anaphylaxis, including hypotension, light-headedness, chest tightening, dyspnea, and even loss of consciousness. Patients also may experience abdominal cramps, nausea, vomiting, and diarrhea.

Exclusions for Self-Treatment

Patients who experience symptoms of an allergic reaction an insect sting (e.g., hives, excessive swelling, dizziness, vomiting, difficulty breathing) should seek immediate emergency care. Other exclusions for self-treatment of insect stings are listed in Figure 5.

Self-Treatment of Insect Stings

The goal of self-treatment of insect stings is to relieve the pruritus and pain associated with nonallergic local reactions. Self-treatment strategies are outlined in Figure 5.

If a stinger is left in the skin, both the stinger and venom sac should be removed as soon as possible. If feasible, the patient should scrape the stinger away with the edge of a credit card or the dull blade of a butter knife—held at an angle almost parallel to the skin surface—to minimize the flow of venom. Patients should avoid squeezing the venom sac because rubbing, scratching, or grasping the sac releases more venom. Hydrogen peroxide, alcohol, or another antiseptic should be applied to the site after the stinger is removed.

All patients should be advised to apply cold packs to the sting site in 10-minute intervals, beginning as soon as possible after the sting occurs. Cold therapy helps to slow absorption of venom and reduces local pruritus, swelling, and pain.

Pharmacologic options for relieving pain, pruritus, and irritation from insect stings are similar to those for insect bites, including topical anesthetics, counterirritants, topical antihistamines, topical hydrocortisone, and skin protectants. The effectiveness of folk remedies such as meat tenderizer, ammonia, and baking soda for the relief of pruritus associated with insect stings has not been determined.

Preventive Measures

Avoiding future insect stings can prevent patients from developing allergic reactions. Measures recommended to avoid attracting stinging insects are listed in Table 4.

Patients who have experienced anaphylactic reactions from insect stings should be counseled about the importance of carrying an injectable form of epinephrine (e.g., EpiPen Auto-Injector) for emergency self-treatment. Because these products are used infrequently, patients should monitor the expiration date and check the product regularly for signs of discoloration.

Patients who have had allergic reactions to insect stings may benefit from venom immunotherapy, in which small amounts of Hymenoptera venom are administered by subcutaneous injection in gradually increasing doses at regularly scheduled intervals. Venom immunotherapy has been found to be 75% to 98% effective in preventing anaphylaxis.
Table 4. Strategies to Avoid Attracting Stinging Insects

- Avoid wearing brightly colored clothing
- Avoid wearing perfumes or scented lotions
- Change children’s clothing if it becomes contaminated with summer foods such as fruits
- Control odors in picnic and garbage areas
- Destroy nests of stinging insects near homes
- Wear shoes when outdoors

Points to Remember

- Self-treatment of insect stings is appropriate only for nonallergic cutaneous reactions in patients 2 years of age or older. All patients with suspected allergic reactions should seek emergency medical care.
- If a stinger is left in the skin by a stinging insect, both the stinger and venom sac should be removed as soon as possible. One effective approach is to scrape the dull blade of a butter knife or the edge of a credit card along the sting site at an angle almost parallel to the skin surface. Hydrogen peroxide, alcohol, or another antiseptic should be applied to the site after the stinger is removed.
- Applying cold packs to the sting site in 10-minute intervals, beginning soon after the sting occurs, helps to slow absorption of venom and minimizes the local reaction.
- The pain and pruritus associated with insect stings may be relieved with topical nonprescription products containing anesthetics, antihistamines, hydrocortisone, or counterirritants.
- The need to have emergency epinephrine injection available for future situations should be emphasized to all patients who have experienced an allergic reaction to an insect sting.

Exclusions for Self-Treatment

- Hives, excessive swelling, dizziness, weakness, nausea, vomiting, difficulty breathing
- Significant allergic response away from site of sting
- Previous sting by bee, wasp, or hornet (need to evaluate possible development of hypersensitivity)
- Previous severe reaction to insect stings
- Personal or family history of significant allergic reactions (e.g., hay fever)
- <2 years of age

AH = antihistamine; D/C = discontinue; OTC = over-the-counter.

Follow-Up
Follow-up for nonallergic reactions to insect stings should occur within 7 days. Patients should be advised to seek medical attention if symptoms of pain, pruritus, or localized swelling persist or worsen or if they develop fever or symptoms of secondary infection.

SCALY DERMATOSES

The scaly dermatoses—dandruff, seborrheic dermatitis (seborrhea), and psoriasis—are chronic conditions that affect the epidermis. They are characterized by accelerated epidermal cell turnover on a continuum from dandruff to psoriasis. Normal epidermal cell turnover is 25 to 30 days; it increases to 13 to 15 days for dandruff, 9 to 10 days for seborrheic dermatitis, and approximately 4 days for psoriasis. The distinguishing features of these conditions are summarized in Table 5.

Dandruff manifests as an excessive scaling of the scalp. The sloughing of large white or gray scales (“dandruff flakes”) is the only visible sign of dandruff. Pruritus is common, although not universal. Dandruff may be an embarrassment for those afflicted, however it rarely is a serious medical concern.

Seborrheic dermatitis is a subacute or chronic inflammatory disorder that occurs predominantly in areas with a dense distribution of sebaceous glands (e.g., scalp, face, trunk). It typically appears as well-demarcated dull, yellowish, oily, scaly areas on red skin. In intertriginous areas, the scales may be absent, but fissures may occur. Pruritus is common at all sites. The disease lasts for years to decades with periods of improvement in warmer seasons and periods of exacerbation in the colder months.

In adults, seborrheic dermatitis occurs most commonly on the scalp and often extends to the middle third of the face with subsequent eye involvement. It ranges in severity from a mild form, presenting as white dandruff, to severe disease with exudation and thick crusting.

Cradle cap is a common form of seborrheic dermatitis that affects an infant’s scalp within the first 3 months of life. Other sites for infantile seborrhea include the neck, the area behind the ears, and intertriginous folds. Cradle cap usually clears without treatment by age 8 to 12 months, after which the disease is rare until puberty.

Psoriasis is a chronic, relapsing inflammatory disorder marked by unpredictable remissions and exacerbations. Some common triggers for the onset of psoriasis are listed in Table 6. There are several clinical forms of psoriasis including plaque, inverse, guttate (drop-like), pustular, and erythrodermic. Plaque psoriasis is the most common, occurring in about 90% of patients. Lesions start as small papules that grow and unite to form sharply demarcated, light pink to bright red or maroon plaques covered with thick, adherent, white scales that can be peeled off in layers. Punctate bleeding points sometimes can be seen when the scales are lifted from the base of the plaque. Lesions are found most commonly on the scalp, the extensor surfaces of the elbow and knees, the lumbar region of the back, the area behind the ears, the external auditory canal, and the glans penis.

Regardless of the type, psoriasis usually is symmetrical, with minimal pruritus. Lesions may be localized or generalized over much of the body surface. They may disappear spontaneously or last a lifetime. Unrelenting generalized psoriasis may cause enough psychological distress to adversely affect the patient’s quality of life.

The etiology of the scaly dermatoses remains unknown. Possible
causes include increased sebum secretion, abnormal sebum composition, certain drugs, and *Malassezia* yeasts.

**Agents Used in the Self-Treatment of Scaly Dermatoses**

Nonprescription products used specifically for the treatment of scaly dermatoses include cytostatic agents, keratolytic agents, and the antifungal agent ketoconazole. Topical hydrocortisone also is used in the treatment of seborrheic dermatitis and psoriasis, but not dandruff.

**Cytostatic Agents**

Topical cytostatic agents decrease the rate of epidermal cell replication, resulting in a reduced number of visible flakes and scales. The cytostatic agents approved for scaly dermatoses include coal tar, pyrithione zinc, and selenium sulfide.

**Coal Tar.** Coal tar is available in a variety of formulations including creams, ointments, pastes, lotions, bath and body oils, shampoos, soaps, and gels in concentrations of 0.5% to 5%. Crude coal tar has a strong odor, is brown to black, and has staining properties; the wide variety of dosage forms in part reflects the many attempts to develop cosmetically acceptable products. Some products incorporate the more acceptable coal tar solution (i.e., liquor carbonis detergens) in concentrations of 3% to 15%. Tar gels—found in products such as Neutrogena T/Gel Shampoo and Polytar Shampoo—are a nongreasy, nonstaining, and nearly colorless alternative form. However, they can have a drying effect on the skin, necessitating that patients use moisturizers.

Side effects associated with the use of coal tar include folliculitis, stains to the skin and hair (particularly blond, gray, and dyed hair), ICD, and photosensitization. Patients using coal tar preparations should avoid sun exposure for 24 hours after application.

**Pyrithione Zinc.** Pyrithione zinc shampoos and soaps are available in 1% and 2% concentrations. Absorption increases with contact time, temperature, concentration, and frequency of application. Rare cases of contact dermatitis have been reported with the use of this agent on broken skin.

**Selenium Sulfide.** Selenium sulfide is available in a 1% concentration in nonprescription products. Like pyrithione zinc, selenium sulfide is more effective with longer contact time. The product may discolor blond, gray, or dyed hair and leaves a residual odor and oily scalp with frequent use. Because of the risk of systemic toxicity, it should be applied only to intact skin.

**Keratolytic Agents**

The keratolytic agents salicylic acid and sulfur dissolve the “cement” that holds epidermal cells together and facilitate the removal of flakes and scales. In nonprescription products, salicylic acid is used in concentrations of 1.8% to 3%, and sulfur is used in concentrations of 2% to 5%. Although sulfur is approved as a single-entity active ingredient, it often is used in combination with salicylic acid.

Keratolytic agents have a concentration-dependent irritant effect, particularly on mucous membranes and the conjunctiva of the eye. Extended use may affect hair keratin and alter hair appearance. Salicylic acid should not be applied over extensive areas because of the potential for percutaneous absorption and systemic toxicity (e.g., tinnitus).

**Ketoconazole**

Ketoconazole, a synthetic azole antifungal agent, is available in a 1% concentration as a nonprescription shampoo formulation (Nizoral A-D). It is active against most pathogenic fungi but is indicated specifically for *Malassezia* yeast and the treatment of dandruff and seborrheic dermatitis of the scalp. Adverse effects are minimal, but hair loss, skin irritation, abnormal hair texture, and dry skin have been reported.

**Exclusions for Self-Treatment**

Exclusions for self-treatment of dandruff, seborrheic dermatitis, and psoriasis are listed in Figure 6.

**Self-Treatment of Scaly Dermatoses**

Figure 6 presents an algorithm for the self-treatment of scaly dermatoses.

**Dandruff**

Goals for the self-treatment of dandruff are to:

- Reduce the turnover rate of epidermal cells on the scalp.
- Minimize the cosmetic embarrassment of visible scaling.
- Minimize pruritus.

For some patients, washing the hair and scalp with a nonmedicated shampoo every day or every other day will be sufficient to control mild to moderate dandruff.

When nonmedicated shampoos fail to reduce dandruff symptoms, a medicated shampoo containing a cytostatic agent is recommended initially (Figure 6). Ketoconazole shampoo is an alternative treatment. (See **Effective Use of Medicated Shampoos** for additional information.)

**Seborrheic Dermatitis**

The goals for self-treatment of seborrheic dermatitis are to:

- Reduce inflammation and the epidermal turnover rate of the scalp skin.
- Minimize or eliminate visible erythema and scaling.

It is important for patients to understand that seborrhea is chronic and that treatment is directed at controlling the disease rather than curing it.

The cornerstone of therapy in adults is use of a medicated shampoo containing ketoconazole, pyrithione.
Figure 6. Algorithm for Self-Treatment of Scaly Dermatoses

**Exclusions for Self-Treatment**
- Dandruff, seborrhea, and psoriasis
- <2 years of age
- Worsening or no improvement of disorder after 2 weeks of proper use of OTC medications
- Psoriasis only
- >10% involvement of BSA

**BSA** = body surface area; **OTC** = over-the-counter.

Effective Use of Medicated Shampoos

Adequate contact with the scalp is the key to effectiveness with medicated shampoos. Before using a medicated shampoo, patients should shampoo with a nonmedicated, nonresidue shampoo (e.g., Prell, Johnson’s Baby Shampoo) or liquid dishwashing soap (e.g., Dawn) to remove scalp and hair dirt, oil, and scale. Patients then should massage the medicated shampoo into the scalp with a scalp scrubber and leave it on for 3 to 5 minutes before rinsing thoroughly and repeating. The shampoo should be used twice a week for 4 weeks, then once weekly or every other week to control the condition. Ketoconazole shampoo is used twice a week for 4 weeks, with at least 3 days between each treatment. Once the condition is controlled, the shampoo can be applied once weekly or once every other week.

Medicated shampoos containing cytostatic or keratolytic agents should be used two to three times weekly for 2 to 3 weeks, then once weekly or every other week to control the regimen also should be considered. Nondrug measures can alleviate some of the signs and symptoms of psoriasis, although it is unlikely that these measures alone will be sufficient. All patients should be advised to minimize psychological stress and avoid physical, chemical, or ultraviolet injury to the skin. Patients who are overweight should be encouraged to lose weight, and patients who smoke should be encouraged to quit. Alcohol consumption should be discouraged.

Follow-Up

Pharmacists should follow up with patients who are self-treating scaly dermatoses after 1 week. A scheduled in-person visit is preferable if the lesions are on a part of the body that can be inspected. Patients should be referred to a primary care provider or dermatologist if the symptoms persist or have worsened at that time. If some improvement is noted, the pharmacist should follow up with the patient after a second week of self-treatment and refer the patient for medical management if no additional improvement is seen. Pharmacists should be aware that patients with dandruff may require 4 to 8 weeks of consistent self-treatment to realize substantial improvement in symptoms.

Psoriasis

Only mild cases of psoriasis affecting less than 10% of the body surface area are considered to be appropriate for self-treatment. Psoriasis cannot be cured. The goals of therapy are to:

- Control or eliminate inflammation, scaling, and pruritus.
- Prevent or minimize the likelihood of flares.

Selection of therapy depends on the site, severity, and duration of lesions; previous treatment; and the age of the patient. The cost of therapy and the ability of the patient to adhere to the regimen also should be considered.

Acne

Acne vulgaris is the most common skin condition in the United States, affecting an estimated 40 million to 50 million people. Although
**CASE 2. SCALY DERMATOSES**

JB is a 24-year-old man who complains of excessive dandruff with an itchy, flaky scalp during the past several months. He also has some yellow, oily scales around his hairline, nose, and mouth. JB’s condition has worsened with the recent onset of cold weather. Daily use of a dandruff shampoo containing pyrithione zinc 1% for the past 2 weeks has not improved his symptoms.

JB’s symptoms are most consistent with which of the following conditions?

- a. Dandruff
- b. Seborrhea
- c. Psoriasis

Which of the following initial self-treatment strategies would be most appropriate for JB, according to the algorithm presented in Figure 6?

- a. Increase use of the medicated dandruff shampoo to twice daily.
- b. Apply ketoconazole shampoo to the scalp and affected areas of the face twice a week for 4 weeks.
- c. Apply a shampoo containing salicylic acid to the scalp and affected areas of the face daily for 7 to 10 days.

Case study responses appear on page 40.

Points to Remember
- The hallmark of the scaly dermatoses—dandruff, seborrheic dermatitis, and psoriasis—is accelerated epidermal cell turnover, which leads to skin flaking and scaling. Treatment is aimed at reducing the cell turnover rate.
- Some patients with mild to moderate dandruff will be able to control symptoms sufficiently by washing their hair and scalp with a nonmedicated shampoo every day or every other day. Others will need to use a medicated shampoo containing a cytostatic agent (preferred) or ketoconazole.
- Seborrhea of the scalp in adults is treated with a medicated shampoo containing ketoconazole (preferred), pyrithione zinc, or selenium sulfide. Topical hydrocortisone may be applied two to three times daily to treat inflammation and pruritus, then intermittently to control acute exacerbations. A lotion formulation is recommended for use on the scalp.
- Patients with mild cases of psoriasis (affecting less than 10% of the body surface area) may attempt self-treatment. General treatment measures include stress management, weight loss, and smoking cessation as appropriate, as well as liberal use of lubricating bath products and moisturizers. Nonprescription therapy may include the use of topical hydrocortisone 1% cream or ointment, coal tar products, or keratolytic agents such as salicylic acid. Products containing coal tar or salicylic acid should not be applied to intertriginous areas. Use of products containing coal tar or salicylic acid should be suspended during acute localized flares of psoriasis.

roughly 85% of people with acne are adolescents, acne can occur at any age. Upward of 40% of men and women older than 25 years of age have acne.

**Pathophysiology and Presentation**

Acne is the result of several pathologic processes that occur with the pilosebaceous unit (i.e., hair follicle plus associated sebaceous glands) located in the dermis. The pathologic processes involved in the development of acne include:

- Androgenic hormonal triggers.
- Excessive production of sebum by the sebaceous glands.
- Abnormal follicular desquamation.
- Proliferation of the gram-positive bacteria Propionibacterium acnes.
- Inflammatory responses.

Acne lesions begin when keratinocytes form a plug that blocks the follicular opening. This plug distends the follicle and creates a microcomedo, the initial pathologic lesion. As cells and sebum accumulate behind the plug, the microcomedo enlarges and becomes visible just below the skin surface as a closed comedo (whitehead). An open comedo (blackhead) forms if the follicular opening becomes distended and the plug is able to protrude at the skin surface. The dark color of open comedones is attributable to the presence of melanin and oxidation of lipids upon exposure to air; blackheads are not caused by dirt, nor are they an indicator of poor hygiene.

Closed and open comedones constitute noninflammatory acne. These lesions often are the first to manifest in the early stage of puberty and often appear initially on the forehead. With the progression of puberty and with age, lesions tend to appear on areas of the body below the neck (e.g., the chest and back). Women in their 30s and 40s frequently have lesions on the chin and along the jaw line.

Closed and open comedones are the precursors of inflammatory acne lesions, which result from proliferation of P. acnes and localized tissue destruction. Acne papules are characterized by redness and inflammation in and around the follicular canal; pustules have visible purulence in the center of the lesion. Nodules form when the follicular wall ruptures and releases the contents of the follicle into the surrounding dermis.

**Exclusions for Self-Treatment**

Self-treatment with nonprescription products is appropriate only for patients with mild to moderate non-inflammatory acne. Patients with inflammatory acne lesions should consult a primary care provider or dermatologist for appropriate evaluation and treatment.

If acne lesions persist beyond the mid-20s or develop in the mid-20s or later, the patient may have rosacea rather than acne vulgaris. If rosacea is a possibility, the patient should be evaluated by a primary care provider or dermatologist who can make a differential diagnosis.

Other exclusions for self-treatment are listed in Figure 7.
The primary goals of self-treatment of mild, noninflammatory acne are to:
- Prevent new lesions.
- Prevent scarring.
- Decrease morbidity associated with the psychological implications of acne.

As shown in Figure 7, these goals are accomplished primarily through topical application of nonprescription products containing benzoyl peroxide, salicylic acid, or (less commonly) sulfur, coupled with nonpharmacologic measures.

Patients whose acne is being managed by a primary care provider or dermatologist may be instructed to use nonprescription products as an adjunct to prescription therapies. However, pharmacists should discourage patients from adding nonprescription products to a treatment regimen without the prescriber’s knowledge. Combining some nonprescription products with prescription acne drugs may decrease a patient’s ability to tolerate the prescribed therapy.

There is no cure for acne. Thus, a reduction in the number and severity of lesions is a more realistic expectation for self-treatment than complete resolution of symptoms. Because acne persists for long periods, treatment must be long term, continuous, and consistent.

Nonpharmacologic Measures
Patients may erroneously attribute their acne to dirty skin or not cleaning their skin thoroughly. However, overcleansing or using abrasive products may actually worsen acne. Patients should wash the affected areas gently but thoroughly twice daily using warm water and a mild soap or nonsoap cleanser. Medicated cleansing products (bars or liquids) generally do not leave enough active ingredient on the skin to be effective.

Minimizing factors that exacerbate acne can help control the condition. For example, acne symptoms may
**CASE 3. ACNE**

SV, a 20-year-old woman, presents with a recent outbreak of closed and open noninflammatory comedones on the nose and cheeks. Although she had experienced occasional mild acne outbreaks as a teenager, she was hoping that she would have “grown out of it” by now. SV has switched to a facial cleanser containing salicylic acid; she has been washing with the product twice daily for the past 3 weeks, but has not seen any improvement. She doesn’t understand why this treatment regimen “isn’t working” and asks for your recommendations.

Which of the following self-treatment options is the best course of action for SV?

- a. Continue using the salicylic acid cleanser; 3 weeks is not a long enough time to see results.
- b. Switch to a nonmedicated cleanser and initiate a trial of therapy with benzoyl peroxide 2.5% gel.
- c. Self-treatment is not appropriate for SV. She should be evaluated for the presence of rosacea.

Case study responses appear on page 41.

Increase because of local irritation or friction from occlusive clothing, headbands, helmets, or other friction-producing devices (acne mechanica). Even resting the chin or cheek on the hand often or for long periods creates localized conditions conducive to lesion formation in acne-prone patients. Exposure to dirt, vaporized cooking oils, or certain industrial chemicals such as coal tar and petroleum derivatives may cause occupational acne.

Oil-based cosmetics and topical products that contain comedogenic oils (e.g., lanolin, mineral oil, cocoa butter) may exacerbate acne or even induce it. Patients should use water-based cosmetic products and wash oily hair frequently with a water-based shampoo.

Certain medications can exacerbate preexisting acne. Key culprits can be remembered using the mnemonic PIMPLES, which stands for phenytoin, isoniazid, moisturizers, phenobarbital, lithium, ethionamide, and steroids. However, patients should not discontinue any prescribed medication without consulting the prescriber.

Although there is little evidence that supports a direct relationship between acne and diet, pharmacists should advise patients to avoid any particular food that seems to exacerbate their acne. Pharmacists also should advise patients to stay well hydrated; there is some evidence that dehydration may alter the natural desquamation process of the stratum corneum.

Patients should be advised not to pick at or squeeze the lesions, because this can exacerbate acne and scarring. A better alternative for attempting to extract impacted comedones is the wide range of acrylate glue-based strips (e.g., Biore Pore Strips) that are applied to the affected area, left to dry and adhere, then peeled off slowly. Patients also may be referred for professional comedo extraction.

**Pharmacologic Therapy**

The primary nonprescription agents for self-treatment of mild, noninflammatory acne are benzoyl peroxide, salicylic acid, sulfur, and sulfur combination products. These agents are available in a wide variety of topical dosage forms. Both gels and solutions are good choices for patients with oily skin. Gels tend to be the most effective, because they have astringent properties and remain on the skin the longest. Creams and lotions generally are less irritating to the skin than gels and liquids and thus may be a better choice for patients with dry or sensitive skin. Ointments are not used because their occlusive properties can aggravate acne.

**Benzoyl Peroxide.** Benzoyl peroxide is considered to be the most effective nonprescription medication currently available for the treatment of noninflammatory acne. It inhibits the growth of *P. acnes* by generating free radicals that oxidize protein in the cell membrane. Benzoyl peroxide has the ability to prevent or eliminate the development of *P. acnes* resistance, and it often is used in conjunction with topical or oral antibiotics. It also acts as a keratolytic by reducing follicular hyperkeratosis.

Benzoyl peroxide is available for nonprescription use in concentrations ranging from 2.5% to 10%. It should be applied in a thin layer to the entire affected area, not just on visible blemishes. Some mild stinging or peeling is normal and usually diminishes with continued use.

Because benzoyl peroxide can be irritating, it is advisable for patients to determine their sensitivity before initiating regular treatment. Patients should begin with one application daily or every other day before bedtime for the first few weeks using the 2.5% strength. The initial application should be left on the skin for 15 minutes, then washed off. If no discomfort occurs, the patient should increase the amount of time the product is left on the skin in 15 minute increments until the product is tolerated for 2 hours. At that time, the patient may leave the product on overnight.

The frequency of application and product strength can be adjusted as needed and tolerated to achieve optimal results. After the initial 1 to 2 weeks of treatment, benzoyl peroxide can be applied up to two to three times per day; applications should be increased over a period of 2 to 3 days. If treatment is well tolerated but the problem persists, the strength may be increased to 5% after 1 week and to 10% after 2 weeks.

To minimize irritation, patients should not apply benzoyl peroxide for 15 to 20 minutes after washing the affected area. Patients also should avoid using the product near the eyes, mouth, lips, or nose, as well as near cuts, scrapes, and other abrasions. If excessive dryness occurs, a lower concentration should be used or the product should be applied less frequently.

Patients should be aware that maximum effectiveness of benzoyl perox-
ide may be achieved only after 4 to 6 weeks of continued use. The treatment regimen should be continued even after lesions have cleared to prevent the formation of new ones.

Patients should be cautioned that benzoyl peroxide may cause bleaching of hair, clothing, bed linens, and towels. Benzoyl peroxide also may cause increased sensitivity to the sun. Patients should be advised to avoid excessive sun exposure and to use a sunscreen product with a sun protection factor (SPF) of 15 or higher when going outdoors.

Pregnant women often have problems with acne as a result of hormonal imbalances. Benzoyl peroxide is a Pregnancy Category C medication and should be used only with the knowledge and consent of the patient’s obstetrician or primary care provider.

**Salicylic Acid.** Salicylic acid is a mild comedolytic and keratolytic agent available for nonprescription use in concentrations ranging from 0.5% to 2%. It provides a milder, albeit less effective, alternative to the prescription agent tretinoin. It also is considered to be less effective than benzoyl peroxide.

Salicylic acid is applied once or twice daily, usually in a gel formulation. The gel should be applied to affected areas only. Use should be limited to once daily or every other day if excessive peeling occurs. As with benzoyl peroxide, patients should be cautioned to avoid excessive sun exposure and use a sunscreen product with SPF 15 or higher when going outdoors.

**Sulfur.** Precipitated or colloidal sulfur is a keratolytic agent that also may have antibacterial effects. It is available in nonprescription products in concentrations ranging from 3% to 10% and is applied one to three times per day. It is considered to be less effective than benzoyl peroxide, and its use is mostly adjunctive. Moreover, a chalky yellow color and unpleasant odor may affect patient acceptance of sulfur-containing products.

**Sulfur Combination Products.** Combination products containing sulfur 3% to 8% with resorcinol 2% to 3% function primarily as keratolytics, fostering cell turnover and desquamation. Resorcinol has the potential to cause a reversible, dark brown scale on darker-skinned patients.

Combination products containing sulfur and sodium sulfacetamide are postulated to work by destroying para-aminobenzoic acid, an essential component for bacterial cell growth.

**Points to Remember**

- Acne cannot be cured, but it may be controlled enough to improve cosmetic appearance and prevent development of severe acne with resultant scarring. Only patients with mild, noninflammatory acne should attempt self-treatment with nonprescription products.
- Adherence to the acne treatment regimen is a critical factor in achieving a successful outcome.
- Minimizing environmental and physical factors that exacerbate acne can help limit the extent of the condition.
- Benzoyl peroxide is considered to be the most effective nonprescription medication currently available for the treatment of noninflammatory acne.

**Follow-Up**

If a patient’s acne shows no improvement after 6 weeks of self-treatment, the pharmacist should determine whether the patient has been following the recommended regimen. Patients who have not followed the regimen diligently should be encouraged to do so and educated about the importance of consistent treatment. Patients who have been adherent should be referred to a primary care provider or dermatologist.

**Fungal Skin Infections (Tinea Infections)**

Dermatomycoses—fungal skin infections—are among the most common cutaneous disorders. Tinea refers exclusively to fungal infections of the skin caused by dermatophytes. They generally are caused by three genera of fungi: *Trichophyton*, *Microsporum*, and *Epidermophyton*. Most often, these infections are named on the basis of the affected body site:

- **Tinea pedis** (feet).
- **Tinea unguium** (nails).
- **Tinea corporis** (body).
- **Tinea cruris** (groin).
- **Tinea capitis** (scalp).

An estimated 10% to 20% of the U.S. population has a tinea infection at any one time. Although the infections usually are superficial, they can range from mild cases with pruritus and scaling to severe cases with denudation, fissuring, crust formation, and disfiguring of the affected skin. Transmission of the causative organisms occurs through contact with infected people, animals, soil, or fomites (contaminated inanimate surfaces or objects). Most tinea infections are caused by person-to-person contact.

A number of factors can contribute to development of a fungal infection. Humid climate, occlusive footwear, and wearing wet clothing for long periods of time can predispose individuals to the development of tinea corporis and tinea cruris. Chronic health problems and medications that weaken or suppress the immune system also can increase the risk for development of tinea infections.

**Tinea Pedis**

Tinea pedis—commonly known as athlete’s foot—is the most common fungal infection of the skin. It is more prevalent in male patients than female patients, adults than children, and whites than blacks. An estimated 70% of people will be afflicted with athlete’s foot in their lifetime.

There are four types of tinea pedis. The most common type is a chronic infection characterized by one or more of the following findings: fissuring, scaling, or maceration between the toes; malodor; pruritus; a stinging sensation on the feet. The infection is most likely to occur between the fourth and fifth or third and fourth toes. It can spread from the toes to the sole or instep of the foot. Because warmth and humidity aggravate this condition, excessive sweating should be controlled. Secondary bacterial infection can be a problem.

Other variants of tinea pedis include a chronic infection that results in a moccasin-like scaling on the soles of the feet; an infection typified by small vesicles or vesicopustules and skin scaling on the soles of the feet that is aggravated in the summer and calmed during cooler months; and an acute infection characterized by weeping, malodorous ulcerations on the sole of...
the foot that may be complicated by a *Proteus* or *Pseudomonas* infection.

**Tinea Unguium**

*Tinea unguium*—ringworm of the nails—is sometimes associated with tinea pedis. Nails affected by tinea unguium gradually lose their normal, shiny luster and become opaque. Topical antifungals are ineffective when used on the nail. If left untreated, the nails become thick, rough, yellow, opaque, and may become separated from the nail bed.

**Tinea Corporis**

*Tinea corporis*—ringworm of the body—is most common in prepubescent individuals and individuals of any age who live in hot, humid climates. Individuals who are under stress or overweight also are at increased risk for the development of tinea corporis. Infections often begin as small, circular, erythematous, scaly areas that may be itchy. They spread peripherally, and the borders may contain vesicles or pustules.

**Tinea Cruris**

*Tinea cruris*—often referred to as jock itch—is most common during warm weather but can occur at any time of the year when the skin in the groin area is kept warm and moist for long periods of time. It occurs bilaterally on the inside and upper parts of the thighs and the pubic area and is more common in male patients. The lesions have well-demarcated margins that are elevated slightly and more erythematous than the central area, and the lesions may cause significant pruritus and pain. They usually spare the penis and scrotum. This characteristic can help to distinguish tinea cruris from candidiasis, which does cause lesions in these areas.

**Tinea Capitis**

*Tinea capitis*—ringworm of the scalp—occurs most often in children. It can be spread by direct contact with an infected person but is often spread by contact with fomites (e.g., using contaminated combs, hats, toys, or telephones; wearing contaminated clothing; using contaminated towels; sleeping on contaminated linens). In some instances, tinea capitis is spread through contact with other infected individuals or with infected cats or dogs. There are four types of tinea capitis. In noninflammatory tinea capitis, or “gray patch” ringworm, hair appearing gray breaks off above the scalp, leaving short stubs. Inflammatory tinea capitis leaves a thick crust on the scalp due to exudate from weeping lesions. In the black-dot variety of tinea capitis, hairs break off at the level of the scalp, leaving black dots on the scalp surface. The favus variant of tinea capitis presents as patchy areas of hair loss and yellowish crusts and scales known as cutula.

**Exclusions for Self-Treatment**

Self-treatment should not be attempted unless there is reasonable certainty that the lesions are consistent with a tinea infection. Table 7 summarizes key differences among fungal skin infections, contact dermatitis, and bacterial skin infections. When doubt exists about the true cause of a condition, the patient may need to consult a primary care provider or dermatologist for an accurate diagnosis and appropriate treatment. Suspected cases of tinea unguium and tinea capitis also should be treated by a primary care provider or dermatologist.

### Table 7. Differentiation of Fungal Skin Infections and Skin Disorders With Similar Presentations

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Fungal Skin Infections</th>
<th>Contact Dermatitis</th>
<th>Bacterial Skin Infections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>On areas of the body where excess moisture accumulates such as the feet, groin area, scalp, and under the arms</td>
<td>Any area of the body exposed to the allergen or irritant</td>
<td>Anywhere on the body</td>
</tr>
<tr>
<td>Signs</td>
<td>Presents either as soggy, malodorous, thickened skin; acute vesicular rash; or fine scaling of affected area with varying degrees of inflammation</td>
<td>Presents as a variety of lesions from raised wheals to fluid-filled vesicles or both</td>
<td>Presents as a variety of lesions from macules to pustules to ulcers, with redness surrounding the lesions</td>
</tr>
<tr>
<td>Symptoms</td>
<td>Pruritus and fissures may be present</td>
<td>Pruritus and pain</td>
<td>Irritation and pain</td>
</tr>
<tr>
<td>Quantity/severity</td>
<td>Usually localized to one region of the body but can spread</td>
<td>Affects all areas of exposed skin but does not spread</td>
<td>Usually localized to one region of the body but can spread</td>
</tr>
<tr>
<td>Timing</td>
<td>Variable onset</td>
<td>Variable onset from immediately after exposure to 3 weeks after contact</td>
<td>Variable onset</td>
</tr>
</tbody>
</table>
Figure 8. Algorithm for Self-Treatment of Fungal Skin Infections

Exclusions for Self-Treatment

- Causative factor unclear
- Unsuccessful initial treatment or worsening of condition
- Nails or scalp involved
- Face, mucous membranes, or genitalia involved
- Signs of possible secondary bacterial infection (oozing purulent material)
- Excessive and continuous exudation
- Condition extensive, seriously inflamed, or debilitating
- Diabetes, systemic infection, asthma, immune deficiency
- Fever, malaise, or both

Scaling, itching skin lesions

Obtain medical/medication history; review history of symptoms, appearance of lesion(s), and affected body areas

Lesions characteristic of fungal infection (see Table 7)?

Exclusions for self-treatment?

Feet involved?

Groin area primarily involved with erythematous, poorly demarcated lesions?

Groin area primarily involved with erythematous, well-demarcated lesions?

Round lesions with central clearings, erythema, scaling on trunk?

Medical management

Assess probable cause; recommend appropriate treatment approach

Medical management

Tinea corporis likely: antifungal agent 2×/day for 4 weeks + nondrug measures

Tinea cruris likely: antifungal agent 2×/day for 2 weeks + nondrug measures

Symptoms resolved?

Medical management

Continue good skin hygiene; keep skin dry

Medical management

Go to next page

Tinea cruris likely: antifungal agent 2×/day for 2 weeks + nondrug measures

Tinea corporis likely: antifungal agent 2×/day for 4 weeks + nondrug measures

Symptoms resolved?

Yes

No

Exclusions for Self-Treatment

Yes

No

Yes

No

No
Figure 8. Algorithm for Self-Treatment of Fungal Skin Infections (continued)

Treat foot lesions according to symptoms

Lesions with inflammation
Small vesicles, scaling without inflammation
Wet, soggy type of athlete’s foot without fissures
Wet, soggy athlete’s foot + deep fissures

Aluminum acetate solution 1:40 2-3x/day as foot soaks or compresses, for up to 1 week concurrent with antifungal treatment 2x/day for 4 weeks + nondrug measures
Antifungal 2x/day for 4 weeks + nondrug measures
Aluminum acetate solution 1:40 2-3x/day as foot soaks or compresses until odor, wetness, whiteness abate; (up to 1 week) concurrent with antifungal treatment 2x/day for 4 weeks + nondrug measures
Medical management

Symptoms resolved after 4 weeks of treatment?

Yes → Continue good foot hygiene; keep feet dry

No → Symptoms improved?

Yes → Continue therapy 2 more weeks

No → Symptoms resolved?

Yes → Continue good foot hygiene; keep feet dry

No → Medical management

Symptoms improved?

No → Medical management

Yes → Continue therapy 2 more weeks

Other exclusions for self-treatment are listed in Figure 8.

**Self-Treatment of Fungal Skin Infections**

The goals of self-treatment of tinea pedis, tinea corporis, and tinea cruris are to:

- Provide symptomatic relief.
- Eradicate existing infection.
- Prevent future infections.

As shown in Figure 8, those goals usually can be achieved with a combination of topical antifungal therapy and nonpharmacologic measures. In cases of acute, inflammatory tinea pedis—characterized by reddened, oozing, and vesicular eruptions—the inflammation should be counteracted with an astringent aluminum acetate solution before antifungal therapy is instituted.

In general, patients should begin to see some relief of pruritus, scaling, and/or inflammation within 1 week. If the infection shows improvement within this time frame, treatment should be continued for 1 to 3 additional weeks (depending on the type of tinea infection) to ensure complete eradication of the infection. Adherence and persistence may be difficult because patients may be tempted to terminate therapy when their symptoms subside but before the infection has been eradicated.

If the disorder has not improved or has worsened after 1 week, the patient should consult a primary care provider for more aggressive therapy. Recurrent skin infections may be a sign of undiagnosed diabetes, immunodeficiency, or another problem that requires medical evaluation.

**Nonpharmacologic Measures**

Nondrug therapy primarily is focused on halting the spread of infection to other parts of the body and other individuals. The skin should be cleansed daily with soap and water to remove substances that promote fungi growth, and the affected areas should be dried carefully, using a separate towel or drying the affected area last. Patients with fungal skin infections should not share personal items (e.g., towels, clothing) with other people. To reduce perspiration, patients should choose clothing that breathes, and shoes and socks should be changed frequently.

Aluminum acetate solution in a 1:40 dilution shifts the disease process in tinea pedis from the inflammatory or wet, soggy type of athlete’s foot to the simple dry type, thereby facilitating treatment with antifungal agents. Depending on the extent of the infection, the patient may immerse the whole foot in the solution for 20 minutes up to three times per day (every 6 to 8 hours) or apply the solution to the affected area in the form of a wet dressing. Because prolonged or continuous use of aluminum acetate solution can produce tissue necrosis, patients should discontinue its use if inflammatory lesions appear or worsen.

**Pharmacologic Therapy**

Several topical antifungal agents are available for self-treatment of fungal skin infections. They are formulated as creams, solutions, gels, foams, ointments, powders, and aerosols that usually are applied twice daily for up to 4 weeks. (Variations from this dosing schedule are noted below in the descriptions of individual ingredients.) Creams or solutions are the most efficient and effective dosage forms for delivery of the active ingredient to the epidermis. Sprays and powders are less effective because often they are not rubbed into the skin. They are probably more useful as adjuncts to a cream or a solution, or as prophylactic agents in preventing new or recurrent infections.

**Butenafine Hydrochloride.** Topical butenafine hydrochloride 1% is available as a cream. For athlete’s foot, the product should be applied twice daily for 1 week or once daily for 4 weeks. Effective treatment rates for interdigital tinea pedis with application durations of 1 week and 4 weeks are reported to be approximately 38% and 74%, respectively. In clinical trials, butenafine kept users free of athlete’s foot for up to 3 months. Patients with jock itch or ringworm should apply the product once daily for 2 weeks. Butenafine has a low incidence of side effects.

**Clotrimazole and Miconazole Nitrate.** Clotrimazole and miconazole nitrate are available in cream, lotion, powder, spray liquid, and spray powder dosage forms for the treatment of athlete’s foot, ringworm, and jock itch. Rare cases of mild skin irritation, burning, and stinging have occurred with their use.

**Terbinafine Hydrochloride.** Topical terbinafine hydrochloride 1% is available as cream and spray formulations. Terbinafine is the only nonprescription topical antifungal agent that has been shown in clinical trials to cure athlete’s foot after 1 week of treatment. However, complete reso-

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**CASE 4. FUNGAL SKIN INFECTIONS**

AB is a 21-year-old male college student. As a member of the varsity track team, he has been showering twice daily: once in the morning in his dormitory, and again in the afternoon at the athletic complex after practice. He recently developed a burning, itching sensation between the toes of his left foot. The symptoms are becoming worse each day and are quite bothersome, particularly at bedtime; they seem to become worse after showering. Physical examination reveals soggy, macerated, malodorous skin consistent with athlete’s foot.

Which of the following self-treatment options is the best initial course of action for AB?

a. Apply tolnaftate spray twice daily for 4 weeks.

b. Soak the affected area in a solution of aluminum acetate (1:40 dilution) twice daily.

c. Self-treatment is not appropriate for AB.

Case study responses appear on page 41.
solution of symptoms may require up to 4 weeks of treatment. The dosing instructions on the Drug Facts label vary according to the site and type of infection:

- Between the toes—apply twice daily for 1 week.
- On the bottom or sides of the foot—apply twice daily for 2 weeks.
- For jock itch and ringworm—apply once daily for 1 week.

Terbinafine has a low incidence of side effects (primarily irritation, burning, and itching/dryness).

**Tolnaftate.** Tolnaftate is the only nonprescription drug approved for both preventing and treating athlete’s foot. Historically, it has been the nonprescription drug of choice for the treatment of athlete’s foot, ringworm, and jock itch. Tolnaftate is available in cream, solution, powder, spray liquid, and spray powder formulations. It is well tolerated when applied to intact or broken skin.

**Undecylenic Acid.** Combination undecylenic acid and undecylenate salts are fungistatic and effective in mild chronic cases of tinea pedis. The product is available in ointment, powder spray, and foam formulations.

The combination of undecylenic acid and zinc undecylenate is relatively nonirritating, and hypersensitivity reactions are rare. The strong odor of undecylenic acid can be objectionable to some patients, possibly promoting patient nonadherence.

**Follow-Up**

Patients should be referred to a primary care provider in all of the following scenarios: (1) they do not experience any relief from pruritus, scaling, and/or inflammation after 1 week of self-treatment; (2) they experience some relief from pruritus, scaling, and/or inflammation after 1 week of self-treatment, but their condition persists after a full course of self-treatment (i.e., up to 3 additional weeks); (3) their condition worsens any time during self-treatment.

If the infection shows improvement after 1 week of self-treatment, the therapy should be continued for 1 to 3 additional weeks (depending on the type of tinea infection) to ensure complete eradication of the infection.

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**WARTS**

Verrucae—familiarly known as warts—are common viral infections of the epithelium of the skin and mucous membranes. They are caused by human papillomavirus (HPV). Approximately 7% to 10% of people have warts, with peak incidence occurring between the ages of 12 and 16 years. Warts usually are not permanent; approximately 30% clear spontaneously in 6 months, 65% clear within 2 years, and most clear within 5 years.

Warts typically are defined by their location. Common warts can appear anywhere, but they usually are found on the hands and fingers (and, less frequently, the face). Plantar warts usually are found on the weight-bearing areas of the foot or on non-weight-bearing areas of the sole of the foot. Other types of warts include:

- Periungual and subungual warts, which occur around and underneath the nail beds, respectively.
- Juvenile (or flat) warts, which occur on the face, neck, and dorsa of the hands, wrists, and knees of children.
- Venereal warts, which occur near the genitalia and anus.

Only common warts and plantar warts are amenable to self-treatment.

**Pathophysiology and Presentation**

Warts may spread by direct person-to-person contact, autoinoculation to another body area, or indirect exposure in high-traffic areas such as public shower floors or swimming pools. (A heat-stable protein coat is believed to allow HPV to remain infectious outside host cells for substantial periods of time.) The incubation period after inoculation is 1 to 9 months, with an average of 3 to 4 months for a wart to become clinically apparent. An individual’s immune system must be susceptible to the virus, which likely explains why some people develop warts and others do not.

Common warts begin as minute, smooth-surfaced, skin-colored lesions that enlarge over time from repeated irritation. Common warts can be recognized by their cauliflower-like appearance: slightly scaly, rough papules or nodules that appear alone or grouped. They usually are asymptomatic.

Plantar warts usually are asymptomatic when small and go unnoticed. As the wart gets larger, pressure causes the wart to grow inward; this can cause discomfort or pain, making it difficult for the person to stand or walk. Plantar warts appear grayish and friable, and the surrounding skin is thick and heaped. Several warts may coalesce, giving the appearance of one large wart (mosaic wart). Such mosaic warts can be difficult to treat because of their numerous foci of viral infection.

**Exclusions for Self-Treatment**

Because warts occasionally may be confused with more serious condi-
Nonpharmacologic therapy is aimed at preventing the spread of warts. It is important for health care professionals to help patients understand that warts are contagious and can spread to other parts of the body unless proper precautions are taken. Patients should be advised to wash their hands before and after treating or touching wart tissue. A specific towel should be used for drying only the affected area after cleaning. Prolonged treatment with nonprescription products may increase the chance of autoinoculation.

Patients should not probe, poke, or cut the wart tissue. If warts are present on the sole of the foot, patients should not walk in bare feet unless the wart is securely covered.

There has been increasing interest in using duct tape for wart removal, because this approach is inexpensive and painless, and has few adverse effects. Duct tape is believed to cause irritation, leading the host to mount an immune response against the causative virus. Results of a prospective, randomized controlled trial by Focht and colleagues suggested that duct tape occlusion therapy was more effective than cryotherapy for treatment of the common wart. However, duct tape was no more effective than a moleskin control in two recent studies by de Haen and colleagues and Wenner and colleagues. In both studies, subjects applied either duct tape or moleskin to the wart. The treatment was left on for 7 days, then removed; the wart was soaked in warm water for 5 minutes, then rubbed with a pumice stone. The treatment was repeated the following day for another 7 days, and treatment continued in that manner for 6 to 8 weeks. In the study by de Haen and colleagues, wart resolution was noted in 16% of tape-treated subjects and in 6% of controls, although the difference was not significant. In the study by Wenner and colleagues, wart resolution was similar in both groups: 22% in the treatment group and 21% in the control group.

Pharmacologic Therapy
Salicylic acid is the only topical agent recognized as safe and effective for self-treatment of common or plantar warts. A Cochrane database review of randomized, controlled trials in immunocompetent subjects concluded that salicylic acid was superior to physician-administered cryotherapy.

Salicylic acid is available for self-treatment of warts in varying concentrations in three different vehicles:

- Salicylic acid 12% to 40% in a plaster vehicle.
- Salicylic acid 5% to 17% in a collodion-like vehicle.
- Salicylic acid 15% in a karaya gum–glycol plaster vehicle.

Guidelines for the use of each product are shown in Table 9. Patients with poor

### Table 8. Differentiation of Warts, Calluses, and Corns

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Warts</th>
<th>Corns</th>
<th>Calluses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Anywhere virus can gain entry into skin</td>
<td>Usually over bony prominences of fourth and fifth toes with hard corns occurring on tops of toes and soft corns in toe webs</td>
<td>Usually over weight-bearing areas of foot</td>
</tr>
<tr>
<td>Signs</td>
<td>Slightly scaly, rough papules or nodules, cauliflower-like in appearance; may occur alone or in groups; plantar warts disrupt normal skin ridges</td>
<td>Raised, sharply demarcated, hyperkeratotic lesion with central core; hard corns are shiny and soft corns are white</td>
<td>Raised, yellowish lesions with irregular margins and diffuse thickening of skin; may be broad based or have central core; no disruption of normal skin ridges</td>
</tr>
<tr>
<td>Symptoms</td>
<td>Pain if warts appear on weight-bearing areas of foot</td>
<td>Pain</td>
<td>Pain</td>
</tr>
<tr>
<td>Quantity/ severity</td>
<td>Varies from a few millimeters to 3 centimeters</td>
<td>Varies from a few millimeters to 1 centimeter</td>
<td>Varies from a few millimeters to several centimeters</td>
</tr>
<tr>
<td>Timing</td>
<td>1–24 months of incubation after inoculation, with average of 3–4 months</td>
<td>Variable onset; lesions may progressively enlarge</td>
<td>Variable onset; lesions may progressively enlarge</td>
</tr>
</tbody>
</table>
Figure 9. Algorithm for Self-Treatment of Warts

- **Lesion suspected to be wart**
  - Obtain medical/medication history. Review history of symptoms, appearance of lesion(s) and affected body areas
  - **Yes**
    - **Lesion typical of warts?**
      - **No**
        - **Medical management**
      - **Yes**
        - **Exclusions for self-treatment?**
          - **No**
            - Recommend treatment based on patient preference. Explain ways to prevent spread of warts
          - **Yes**
            - **Lesion gone after recommended treatment period?**
              - **No**
                - **Medical management**
              - **Yes**
                - **Lesion typical of warts?**
                  - **Yes**
                    - **Lesion typical of corns/calluses?**
                      - **Yes**
                        - **See FIGURE 10**
                      - **No**
                        - **Medical management**

- **Exclusions for self-treatment**
  - Face, toenails or fingernails, anus and/or genitalia involved
  - Extensive warts at one body site
  - Painful plantar warts
  - One or more chronic, debilitating diseases (e.g., diabetes, peripheral vascular disease), which contraindicate use of foot care products
  - Physical or mental impairments that make following product directions difficult
  - Immunosuppressive medications or other medications (e.g., other salicylates) that contraindicate use of salicylic acid

- **Salicylic acid in collodion-like vehicle applied 1-2x/day as needed up to 12 weeks**
- **Salicylic acid in plaster vehicle applied then removed every 48 hours up to 12 weeks**
- **Salicylic acid in karaya gum–glycol plaster vehicle applied at bedtime then removed in the morning after at least 8 hours; repeated every 24 hours up to 12 weeks**
- **Cryotherapy with DMEP up to 3x; 10-day lapse between treatments**

- **Lesion gone after recommended treatment period?**
  - **No**
    - **Medical management**
  - **Yes**
    - **Warts may reappear months after treatment. Recurrent warts may require medical attention**

**DMEP = dimethyl ether and propane.**

Points to Remember

- Warts represent self-limited infections of the epithelium caused by HPV. Because warts are contagious, patients should take precautions to avoid spreading the infection to other parts of the body or to other people.
- The majority of warts regress spontaneously within 2 to 3 years. Patients who seek a faster resolution may self-treat most common warts and plantar warts with topical salicylic acid or home cryotherapy (chemical freezing), coupled with nonpharmacologic measures.
- Salicylic acid is available in a collodion-like vehicle or plaster vehicles. Warts on thin epidermis can be treated with lower concentrations of salicylic acid (up to 17%), while plantar warts require higher concentrations (up to 40%). Complete wart removal usually occurs within 6 to 12 weeks with sustained product use.
- Home cryotherapy products employ DMEP to freeze the wart, which falls off after about 10 days (although repeat treatments may be needed). Patients should follow the product directions carefully to avoid injury to neighboring healthy tissue.
- There is growing interest in using duct tape occlusion therapy for wart removal, because this approach is inexpensive and painless, and has few adverse effects. However, evidence regarding the efficacy of this approach is inconclusive.
- Patients with warts that persist after 12 weeks of self-treatment with salicylic acid or the maximum number of recommended cryotherapy treatments should be evaluated by a primary care provider.

Table 9. Guidelines for Treating Warts With Salicylic Acid Products

<table>
<thead>
<tr>
<th>Salicylic Acid Product</th>
<th>Dosing Regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Salicylic acid 5%–17% in a collodion-like vehicle</strong></td>
<td>Apply product to wart no more often than twice daily. Morning and evening are usually the most convenient times. Apply solution 1 drop at a time until affected area is covered. Do not overuse the product. If the medication touches healthy skin, wash it off immediately with soap and water. Allow the solution to harden so that it does not run. Repeat this procedure as needed for up to 12 weeks. After use, cap the container tightly to prevent evaporation and to prevent the active ingredients from assuming a greater concentration. Store product in an amber or light-resistant container away from direct sunlight or heat.</td>
</tr>
<tr>
<td><strong>Salicylic acid 12%–40% in a plaster vehicle</strong></td>
<td>Apply the medicated pad, disc, or strip (or other plaster vehicle) to the affected area as directed in product labeling. Some pads or discs may need to be trimmed to follow the contours of the corn or callus. Remove the pad, disc, or strip (or other plaster vehicle) after 48 hours. Repeat every 48 hours as needed for up to 12 weeks.</td>
</tr>
<tr>
<td><strong>Salicylic acid 15% in a karaya gum–glycol plaster vehicle</strong></td>
<td>Apply plaster to wart at bedtime, and leave it on for at least 8 hours. Remove and discard plaster in the morning. Repeat every 24 hours as needed for up to 12 weeks.</td>
</tr>
</tbody>
</table>

Werts on thin epidermis can be treated with lower concentrations of salicylic acid (up to 17%). Plantar warts should be treated with a higher concentration (up to 40%). Patients should notice visible improvement within the first or second week of treatment; removal should be complete within 6 to 12 weeks of product use. Selection of regular and convenient times to apply the product encourages adherence to the dosing regimen.

Cryotherapy

Cryotherapy, a standard treatment for wart removal for many years, causes irritation and tissue destruction that induces the host to mount an immune response against HPV. Traditionally, dermatologists have used liquid nitrogen to freeze warts. A nonprescription treatment containing dimethyl ether and propane (DMEP) is available, allowing patients to perform cryotherapy at home. Individual DMEP products have specific instructions. However, all systems require activation of the product before application to the wart. After application, a blister will form under the wart. In about 10 days, the frozen skin and wart fall off and reveal newly formed skin underneath. Because the process involves freezing of skin tissue, the product must be used very carefully to avoid destruction of neighboring healthy tissue.

Studies have shown little difference in treatment effectiveness between liquid nitrogen and DMEP. In the Cochrane database review mentioned earlier, DMEP was not superior to salicylic acid.

Follow-Up

Successful wart removal with salicylic acid can take 6 to 12 weeks. When patients select this treatment option, pharmacists should schedule the initial follow-up visit after 6 weeks of treatment. If the wart is still present, the patient should be reminded of the proper application procedures and advised to continue treatment. Patients with warts that persist after 12 weeks of self-treatment should be evaluated by a primary care provider.

Cryotherapy can be repeated up to three or four times (depending on the product) with a 10-day lapse between treatments. Medical referral is appropriate if the wart persists after the maximum number of treatments. Because of the latency factor, warts may reappear several months after the initial treatment.

Corns and calluses are common foot disorders characterized by marked hyperkeratosis (thickening) of the stratum corneum in response to friction, pressure, or both. Although
corns and calluses represent natural protective mechanisms of the skin surface, they may signal biomechanical problems that cause abnormal weight distribution in a particular area of the foot.

**Pathophysiology and Presentation**

Skin cells normally divide at approximately the same rate as other skin cells die, leading to complete replacement of the epidermis in approximately 1 month. Friction and pressure increase mitotic activity in the skin’s basal cell layer; as a result, more cells reach the outer skin surface, and the stratum corneum thickens. When friction and pressure subside, mitotic activity returns to normal, and the hyperkeratotic lesion eventually disappears.

There are a number of marked differences between corns and calluses (Table 8). A corn is a pea-sized, yellowish-gray hyperkeratosis. It has well-defined borders and a central core caused by pressure from underlying bony prominences; this central core differentiates a corn from a wart. Corns grow inward from the skin surface, forming an apex that presses on the nerve endings in the dermis and causes pain.

Corns may be hard or soft. Hard corns are more common and usually occur on the surface of the fourth or fifth toes. They are shiny, dry, and polished. Soft corns are whitish thickenings of the skin that occur between adjacent toes. A protrusion on the bone surface (bony spur) often is the cause of long-lasting hard and soft corns. Pressure from inappropriate, tight-fitting shoes is the most frequent cause of pain from corns. As narrowed or high-heeled shoes crowd toes into a narrow toe box, the most lateral toe (i.e., the fifth toe) sustains the most pressure and friction and is the usual site of a corn. The resultant pain may be severe and sharp (when downward pressure is applied) or dull and discomforting.

In contrast, a callus has a broad base with relatively even thickening of skin and lacks defined borders and a central core. Most often, a callus occurs on the bottom of the foot in areas such as the heel, ball of the foot, toes, and sides of the foot. It usually is raised and yellow, and it has a normal pattern of skin ridges on its surface. Calluses often are asymptomatic but may be painful with applied pressure. Common causes include friction caused by loose-fitting shoes, walking barefoot, and biomechanical problems.

**Exclusions for Self-Treatment**

Nonprescription products for corns and calluses are not recommended for patients with diabetes or circulatory problems. Treatment of corns and calluses in these patients should be managed by a primary care provider or podiatrist.

Other exclusions to self-treatment are listed in Figure 10.

**Self-Treatment of Corns and Calluses**

The goals of self-treatment of corns and calluses are to:
- Provide symptomatic relief.
- Remove the corn or callus.
- Prevent recurrence by correcting underlying causes.

Although effective nonprescription products are available for removing corns and calluses, ultimate success depends on eliminating the pressure and friction that caused the hyperkeratosis.

Self-treatment strategies for corns and calluses are outlined in Figure 10.

**Nonpharmacologic Measures**

There are a number of nondrug adjunctive measures patients can take to reduce corns and calluses and relieve the pressure and friction. Daily soaking of the affected area throughout treatment for at least 5 minutes in warm (not hot) water softens dead tissue and facilitates its removal. Dead tissue should be removed gently using a callus file or pumice stone. Sharp knives or razor blades should be avoided, because they may lacerate the skin and lead to localized infection.

Circular foam cushioning pads with an opening for the corn or callus can provide temporary pain relief. The pad should be changed daily if the adhesive causes maceration of the skin; otherwise, pads may be left in place for up to 7 days. If the pad begins to cause itching, burning, or pain at any time, it should be removed immediately and a primary care provider or podiatrist should be consulted. Other measures include the use of a foam spacer or lamb’s wool to provide relief for soft corns; a metatarsal pad to relieve pain and pressure from calluses on the ball of the foot; and silicone toe sleeves impregnated with mineral oil to protect and cushion hard corns as well as soften the skin.

Patients should be advised to wear shoes that fit well and evenly distribute body weight. A trained person should check the patient’s shoe size every 2 years. The shoe should have a roomy toe box so the toes do not feel cramped, a snug-fitting heel area, and a heel height of 1 inch or less. Both shoes should be tried on late in the day, when feet tend to be larger. Wearing the type of socks or stocking to be worn with the shoe helps to ensure the proper fit. Patients with anatomic foot deformities should be referred to a podiatrist for proper orthopedic corrections.

**Pharmacologic Therapy**

The salicylic acid products available for the removal of corns and calluses are similar to those available for the removal of warts: salicylic acid 12% to 40% in a plaster vehicle (including disks and pads), and salicylic acid 12% to 17.6% in a collodion-like vehicle. Guidelines for proper use of these products are presented in Table 10.

**Follow-Up**

Remission of corns and calluses can take several days to several months. If hard corns or calluses persist after 14 days of self-treatment, the patient should consult a primary care provider or podiatrist for evaluation.

**PEDICULOSIS**

Pediculosis—lice infestation—is a parasitic infection of the head and scalp (pediculosis capitis), body (pediculosis corporis), or pubic region (pediculosis pubis). Lice that infest humans survive by feeding on blood. The bite of a louse usually causes intense pruritus; the itching leads to scratch-
ing, which may result in excoriation and secondary bacterial infection.

**Pediculosis Capitis**

Pediculosis capitis is the most common type of lice infestation. Outbreaks of head lice (Pediculus humanus capitis) occur frequently in places such as schools and day care centers and usually peak after the opening of schools each year (between August and November). Infestations are spread through close personal contact or sharing personal items such as hats, hairbrushes, or combs.

The life cycle of the head louse has three stages: egg (nit), nymph, and adult. An adult female can produce 5 to 10 eggs per day during an average life span of 30 days. The nits are approximately 1 mm in diameter and appear yellowish or grayish-white; they are attached firmly to the base of the hair shaft nearest the scalp. When the nit hatches (after approximately 6 to 9 days), the nit casing remains attached to the hair shaft. The immature nymph must begin feeding on blood within 24 hours or it dies. Nymphs mature within 8 to 9 days into adults that are about the size of a sesame seed. Adult lice must feed on blood several times daily; without blood, lice typically will die within 48 hours.

**Pediculosis Corporis**

Body lice (Pediculus humanus corporis) live, hide, and lay their eggs in clothing, particularly in seams and folds of underclothes. They periodically attack body areas for blood feedings and can transmit infections such as typhus and trench fever. Body lice are found almost exclusive-
Otc Advisor: Self-Care for Dermatologic Disorders

Table 10. Guidelines for Treating Corns and Calluses With Salicylic Acid Products

| Wash and dry the affected area before applying the salicylic acid product. |
| Salicylic acid 12%–17.6% in a collodion-like vehicle | Apply product no more than twice daily. Morning and evening are usually the most convenient times. |
| Do not let adjacent areas of normal healthy skin come in contact with the medication. If they do, wash off the solution immediately with soap and water. |
| Apply one drop at a time directly to the corn or callus until the affected area is well covered. Do not overuse the product. |
| Allow the drops to dry and harden so the solution does not run. |
| For hard corns and calluses, the solution is applied once or twice daily for up to 14 days. |
| For soft corns between the toes, hold the toes apart until the solution has dried; then apply a dressing. Treat these corns for 3–6 days. |
| After use, cap the container tightly to prevent evaporation and to prevent the active ingredients from assuming a greater concentration. |

Salicylic acid 12%–40% in a plaster vehicle

| Apply the medicated pad, disc, or bandage (or other plaster vehicle) to the affected area as directed in product labeling. Some pads or discs may need to be trimmed to follow the contours of the corn or callus. |
| Remove the pad, disc, or bandage (or other plaster vehicle) after 48 hours. |
| Soak the affected foot in warm water for 5 minutes. Remove the macerated skin by rubbing gently with a rough towel, pumice stone, or callus file. Do not debride the healthy skin. |
| Apply a new pad, disc, or bandage (or other plaster vehicle) to the affected area. |
| Repeat every 48 hours as needed over a 2-week period. |

Points to Remember

- Corns and calluses are common foot disorders characterized by marked hyperkeratosis (thickening) of the stratum corneum in response to friction and pressure. Ultimate treatment success depends on eliminating the source of friction and pressure (e.g., ill-fitting footwear).
- Circular foam cushioning pads with an opening for the corn or callus can provide temporary relief from pain.
- Most corns and calluses may be self-treated with a salicylic acid product labeled for use on these types of lesions. Some patients may need to be dissuaded from using harmful practices such as scraping or cutting corns and calluses to remove dead skin.
- Hard corns or calluses that persist after 14 days of self-treatment should be evaluated by a primary care provider or podiatrist.

by crawling (they cannot jump or fly). Evidence of lice feces, in the form of dark powdery specks, also may be present.

Exclusions for Self-Treatment

Patients should not attempt self-treatment of lice infestations that involve the eyelids or eyebrows. Self-treatment also is contraindicated if there is evidence of a secondary skin infection in lice-infested areas.

Nonprescription pediculicides are primary treatments for head and pubic lice infestations. (Because body lice reproduce in the clothing—not on the skin—infestations usually are cured through bathing and either laundering or discarding infested clothing.) Nonprescription pediculicides contain or are derived from oleoresins obtained from chrysanthemum flowers. Patients who are allergic to chrysanthemums should not use nonprescription pediculicides; patients who are sensitive to ragweed also risk cross-sensitivity. These patients should be directed to nondrug options or referred to a primary care provider for alternative treatments.

Other exclusions for self-treatment of pediculosis are listed in Figure 11.

Self-Treatment of Pediculosis

The goals of self-treating pediculosis are to:

- Rid the infested patient of lice by...
killing adult and nymph lice.

- Remove nits from the patient’s hair when present.

For head lice and pubic lice, these goals usually are accomplished by applying a pediculicide to the infested body area to rid the patient of lice, then combing the hair with a lice/nit comb to remove nits from the hair shaft and clear the area of dead lice. An algorithm for self-treatment is presented in Figure 11. Because of an apparent increasing trend of lice resistance to pediculicides, there also is growing interest in and reliance on nonpharmacologic measures.

Strategies for preventing reinfection and transmission are an important part of self-treatment of pediculosis. Patients should avoid direct physical contact with noninfested individuals, and they should not share articles such as combs, hairbrushes, towels, caps, hats, and stuffed animals. Hairbrushes and combs should be washed in very hot water (e.g., in the dishwasher); they may be pretreated with a pediculicide left on for 10 to 15 minutes. Clothing and bedding should be washed in hot water and dried in a clothes dryer on the hot cycle. Items that cannot be washed may be sealed in a plastic bag and stored in a warm area for 2 weeks. Carpets, rugs, floors, and furniture should be vacuumed thoroughly to remove any hairs with viable eggs attached. Insecticidal sprays should be used sparingly, if at all; they can be harmful to humans and often are not necessary because lice generally survive for less than 48 hours when not in contact with a host.

Body lice are controlled easily by appropriate hygiene.

Nonpharmacologic Measures

The technique known as “wet combing with conditioner” originated as a method of detecting head lice and subsequently has been advocated as a means of treatment. It involves combing systematically through wet, well-conditioned hair from roots to ends with a fine-toothed comb every 3 to 4 days for a total of 2 weeks. Wetting the hair facilitates removal of lice, because they are temporarily immobilized by water. Apply-

---

**Figure 11. Algorithm for Self-Treatment of Pediculosis**

<table>
<thead>
<tr>
<th>Patient with suspected lice infestation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obtain symptom information, medical/medication history, allergy information</td>
</tr>
<tr>
<td>Live lice observed in scalp hair, clothes, or pubic area?</td>
</tr>
<tr>
<td>Exclusions for self-treatment?</td>
</tr>
<tr>
<td>Lice observed in pubic area?</td>
</tr>
<tr>
<td>Lice observed on scalp</td>
</tr>
<tr>
<td>Pediculicide containing permethrin or pyrethrins. Counsel on product use and preventive measures</td>
</tr>
<tr>
<td>Symptoms resolved after second treatment?</td>
</tr>
<tr>
<td>Advise patient/caregiver to D/C treatments. Reinforce counseling on preventive measures</td>
</tr>
</tbody>
</table>

**Exclusions for Self-Treatment**

- Hypersensitivity to chrysanthemums, ragweed, or pediculicide ingredients
- Presence of secondary skin infection in lice-infested area
- <2 years of age
- Lice infestation of eyelids or eyebrows
- Pregnancy or breastfeeding (strong caution for self-treatment; benefits must outweigh risks)
- Presence of active tumors

D/C = discontinue.

Points to Remember

- Pediculosis is a parasitic infestation of the head and scalp, body, or pubic region by various species of lice.
- Nonprescription pediculicides are primary treatments for head and pubic lice infestations. Products containing either synergized pyrethrins or permethrin may be used to treat head lice infestations, only synergized pyrethrins are used to treat pubic lice.
- Applications of pediculicides should be followed by wet combing of the hair to remove the dead lice and nits. Because of an apparent increasing trend of lice resistance to pediculicides, there also is growing interest in and reliance on wet combing as a stand-alone treatment.
- A second application of pediculicide may be required after 7 to 10 days to kill recently hatched lice. Patients should be evaluated by a primary care provider if signs of lice infestation persist after the second application.
- Strategies for preventing reinfection and transmission are an important part of self-treatment of pediculosis.

A new strategy being studied involves applying Cetaphil cleanser (referred to by Pearlman as Nuvo lotion) to the patient’s scalp and hair and then blow-drying the patient’s hair. The dried lotion forms a shrink-wrap–like layer that coats, and eventually suffocates, the lice. The dried lotion is left on for at least 8 hours, then washed out. A second treatment is applied 7 to 10 days later to kill any lice that may have hatched since the first treatment.

Pharmacologic Therapy

Two nonprescription pediculicide agents are available for treating pediculosis: synergized pyrethrins and permethrin. Head lice may be treated with either pyrethrins or permethrin. Cases of pubic lice are treated with pyrethrins only. These treatments should be followed by wet combing to remove the dead lice and nits; however, it is important that hair conditioner not be applied to the hair before pediculicides are used, because the conditioner may coat the hair and protect the lice and nits.

Synergized pyrethrins are available as shampoos, foams, solutions, or gels in concentrations ranging from 0.17% to 0.33%. They generally are used in combination with 2% to 4% piperonyl butoxide. Pyrethrins block nerve impulse transmission, causing the insect’s paralysis and death; the addition of piperonyl butoxide to pyrethrins increases their insecticidal effect.

Pyrethrins are applied to the affected area, left on for 10 minutes, then rinsed off. Retreatment in 7 to 10 days is advised to kill any lice that have since hatched.

Permethrin is available as a 1% cream rinse for treating head lice. Like pyrethrins, permethrin is applied to the affected area, left on for 10 minutes, then rinsed off. However, because the rinse has residual effects for up to 10 days, retreatment is not required unless active lice are detected.

Toxicity is low when pyrethrins or permethrin are applied according to directions. Possible adverse reactions include irritation, erythema, pruritus, and swelling. Contact with eyes and mucous membranes should be avoided. Women who are pregnant or breastfeeding should use nonprescription pediculicides only under the direction of a primary care provider.

Follow-Up

Follow-up evaluation of lice infestations should occur within 10 days. Patients should be advised to seek medical attention if signs of lice infestation persist after a second application of a self-care pediculicide because treatment with a prescription pediculicide product may be indicated.

MINOR BURNS AND SUNBURN

Burns are tissue injuries caused by thermal, electrical, chemical, or UV radiation exposure. The traditional classification of burns as first, second, or third degree has been replaced by new terms—superficial, superficial partial thickness, deep partial thickness, and full thickness—related to the depth of injury to the skin (Figure 12). Many superficial thermal burns, some superficial partial-thickness thermal burns, and most cases of sunburn are amenable to self-treatment with nonprescription products.

Self-treatable thermal burns usually occur in the home and are caused by contact with flames, scalding liquids, or hot objects (e.g., irons, oven broiler elements, hot pans, curling irons, radiators). Brief exposure to low heat results in a superficial burn with a painful area of erythema but no significant damage to epithelial cells. Redness, warmth, and slight edema
Figure 12. Cross-Section of Skin Showing Depth of Burns

<table>
<thead>
<tr>
<th>Depth of Burn</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial burn</td>
<td>Epidermis</td>
</tr>
<tr>
<td>Superficial partial thickness</td>
<td></td>
</tr>
<tr>
<td>Deep partial thickness</td>
<td>Dermis</td>
</tr>
<tr>
<td>Full thickness</td>
<td>Subcutaneous tissue</td>
</tr>
<tr>
<td>Deep thermal necrosis</td>
<td>Muscle</td>
</tr>
</tbody>
</table>


are present, but blistering is uncommon. Superficial burns typically heal within 3 to 6 days.

Higher levels of heat or longer exposures than those involved in superficial burns result in a superficial partial-thickness burn with damage to the outer epidermal areas and painful blistering. These burns generally are moist and weeping, as well as painful and sensitive to temperature and air. They also blanch with pressure (i.e., lighten in color when pressed with a finger). Healing typically occurs within 2 to 3 weeks with minimal or no scarring.

Acute overexposure of the skin to UV radiation—from sunlight, tanning beds, or UV lamps—generally causes a superficial burn injury characterized by erythema and slight dermal edema, resulting from an increase in blood flow to the affected skin. The increased blood flow begins approximately 4 hours after exposure and peaks 12 to 24 hours after exposure. Pain and low-grade fever may accompany the erythema; scaling and peeling of the skin follow. Blistering, superficial partial-thickness burns are possible with prolonged exposure to UV radiation. Repeated sunburns are a risk factor for melanoma, especially in children.

Exclusions for Self-Treatment

Certain types of burns require emergency care. These include all deep partial-thickness burns and full-thickness burns, as well as all electrical and chemical burns. Medical attention also is needed for burns of at least superficial partial thickness that involve 2% or more of the patient’s body surface area.

Heat stroke may occur with excessive exposure to sunlight in an environment that is hot or humid, or both. Patients exhibiting signs of possible heat stroke (i.e., fever, confusion, weakness, or convulsions) should be referred for emergency care.

Additional exclusions for self-treatment of minor burns and sunburn are listed in Figure 13.

Self-Treatment of Minor Burns and Sunburn

The goals of self-treatment for superficial burns and superficial partial-thickness burns are to:

- Relieve pain associated with the burn.
- Provide physical protection to damaged skin.
- Establish a favorable environment for healing that minimizes the possibility of infection and scarring.

As outlined in Figure 13 and discussed in detail below, these goals may be achieved through a combination of first-aid measures, cleansing and protective measures, and pharmacologic therapy.

Burned skin is more susceptible to sunburn for several weeks after initial injury, therefore avoiding sun exposure and using sunscreen agents during this period are recommended. (See APPROPRIATE USE OF SUNSCREEN PRODUCTS.)

Active Cooling

Immediate first aid for recent superficial and superficial partial-thickness thermal burns (i.e., burns that occurred in the previous 15 minutes) involves cooling the affected area with tepid tap water, through immersion or irrigation, for up to 20 minutes. Active cooling delays progression of the burn by decreasing cutaneous vasodilation; it has been shown to decrease edema, blister formation, and pain. Ice or iced water should not be used for active cooling because it induces harmful vasoconstriction and may cause further damage to the skin.

Minor sunburn can be relieved to some extent with cool compresses or a cool bath.

Cleansing and Protective Measures

After applying cool moisture to a burned area, the patient should cleanse the area gently with a water-based disinfectant. Alcohol-containing preparations should not be used because they dehydrate the area and cause pain to denuded skin (i.e., skin missing the outer protective epithelial layer). Hydrogen peroxide also should be avoided because it damages healthy tissue. After cleansing, small burns may be covered with either an adhesive gauze-type (nonstick) pad or bandage, or a self-adherent, semicocclusive film (e.g., Nexcare Tega-
Soaking a weeping burn in cool tap water three to six times per day for 15 to 30 minutes provides a soothing effect and diminishes weeping. Blisters should not be disturbed because blister fluid protects the underlying skin. When the blisters are no longer intact, the area should be cleansed once or twice daily to remove dead skin and prevent infection. Patients should be advised not to pull at loose skin or peel off burned skin because viable skin may be removed in the process, thereby delaying healing.

**Figure 13. Algorithm for Self-Treatment of Minor Burns and Sunburn**

- **Patient with burn**
  - Identify cause and affected body areas. Obtain medical/medication history
  - **Exclusions for self-treatment?**
    - **Yes** → Immediate referral to PCP or emergency facility
    - **No** → **Cause of burn unclear?**
      - **Yes** → Check medication history for possible photosensitization
        - **Photosensitization ruled in?**
          - **Yes** → Discontinue suspected agent. Refer to dermatologist
          - **No** → Immerse affected area in tepid tap water for up to 20 minutes, or apply other appropriate first-aid measures
        - **No** → Aspirin, NSAIDs, or acetaminophen
          - **Burn area dry?**
            - **Yes** → Skin protectant ointment and/or absorbent dressing
            - **No** → Burn worse after 24-48 hours of treatment?
              - **Yes** → Medical management
              - **No** → Continue treatment as needed up to 7 days after burn occurred
          - **Pain present?**
            - **Yes** → Skin protectant cream and/or absorbent dressing
            - **No** → D/C treatment
        - **Burn occurred in past 15 minutes?**
          - **Yes** → Immerse affected area in tepid tap water for up to 20 minutes, or apply other appropriate first-aid measures
          - **No** → **Skin protectant cream and/or absorbent dressing**
        - **Skin protectant cream and/or absorbent dressing**
      - **No** → Skin protectant ointment and/or absorbent dressing
      - **Yes** → Burn worse after 24-48 hours of treatment?
        - **Yes** → Medical management
        - **No** → Continue treatment as needed up to 7 days after burn occurred
    - **No** → Skin protectant ointment and/or absorbent dressing
- **Exclusions for Self-Treatment**
  - Burn to BSA of 2% or more
  - Burns involving eyes, ears, face, hands, feet, or perineum
  - Chemical burns (use first-aid measures then seek medical attention)
  - Electrical or inhalation burns
  - Persons of advanced age
  - Patients with diabetes or multiple medical disorders
  - Immunocompromised patients

**BSA = body surface area; D/C = discontinue; NSAID = nonsteroidal anti-inflammatory drug; PCP = primary care provider.**

Pharmacologic Therapy

Skin Protectants. Skin protectants benefit patients with minor burns by making the wound area less painful and facilitating healing. They protect the burn from mechanical irritation caused by friction and rubbing, and they prevent drying of the stratum corneum. Although skin protectants usually are applied in addition to a dressing, they may be used in place of a dressing, particularly if the burn is extensive or in an area that cannot be dressed easily.

Skin-protectant ingredients used in the treatment of minor burns include allantoin, cocoa butter, petrolatum, shark liver oil, and white petrolatum. As shown in Figure 13, an ointment formulation is preferred for dry burn areas; a cream is preferred for wet burn areas. In general, skin protectants can be applied as often as needed.

Systemic Analgesics. Short-term administration of systemic analgesics helps to reduce pain associated with minor burns and sunburns. An agent with anti-inflammatory activity (i.e., ibuprofen, naproxen, or aspirin) is preferred; because these agents inhibit prostaglandin synthesis, they may decrease erythema and edema in the burned area.

Nonsteroidal anti-inflammatory drugs (NSAIDs) may be especially beneficial in patients with mild sunburn by decreasing inflammation caused by overexposure to UV radiation. However, this effect may be limited to the first 24 hours following overexposure. Only the initial inflammation of sunburn appears to be mediated by prostaglandins; the later inflammation is associated primarily with leukocytes.

For patients who cannot tolerate NSAIDs, acetaminophen can provide pain relief, but it will not affect inflammation.

Topical Anesthetics. Topical anesthetics may be used to provide temporary relief of pain associated with minor burns and sunburn. However, because they have a short duration of action (typically 15 to 45 minutes), they do not provide continuous pain relief. Products with higher concentrations of topical anesthetics may be used if the skin is intact; lower concentrations should be used if the skin surface is not intact to minimize the risk of systemic toxicity. Topical anesthetics should be applied to small areas only and should not be used more frequently than three to four times per day to minimize the risk of systemic toxicity.

Other Agents. Nonprescription first-aid antibiotic or antiseptic products are of limited value for minor burns or sunburn, especially if the skin is intact. However, they may be used on minor burns when the skin is broken.

Although counterirritants have been proposed for use in the treatment of minor burns, they generally should not be used. Counterirritants increase blood flow to the area of application, which would exacerbate edema; they also could irritate already sensitized and damaged skin.

The ability of topical forms of aloe vera or vitamin E to aid in the healing of minor burns and sunburn has not been substantiated. Fresh aloe vera gel (from a live plant) may be effective and worth considering, based on the results of a few small clinical studies. Some commercial aloe vera preparations can be drying to the skin.

Appropriate Use of Sunscreen Products

Sunscreens are classified into two major categories:

- Chemical sunscreens, which work by absorbing and thus blocking the transmission of ultraviolet (UV) radiation.
- Physical sunscreens, which generally are opaque and act by reflecting or scattering UV radiation.

The degree of protection afforded by a sunscreen is described in terms of the sun protection factor (SPF), a measure of the product’s effectiveness against UVB radiation. The SPF value can be thought of as a multiplier. For example, if a patient usually could stay in the sun 10 minutes before burning without protection, an SPF 15 sunscreen could theoretically extend the time before burning by a factor of 1.5 (i.e., protect the skin from burning for 1.5 times the length of time).

In general, the higher the SPF, the more effective the product is in preventing sunburn. However, large increases in the SPF of a product translate into relatively small percentages of additional UVB radiation blocked. SPF 15 blocks 93% of UVB radiation, while SPF 30 blocks 96.7%, and SPF 40 blocks 97.5%. SPF 70 increases the UVB protection only to 98.6%.

The American Academy of Dermatology recommends the use of a water-resistant sunscreen that provides broad-spectrum coverage against both UVA and UVB radiation, with SPF 30 or higher. However, SPF is not a reliable measure of UVA protection, and no comparable index of protection for UVA radiation exists yet. The U.S. Food and Drug Administration has proposed a new regulation that would create a four-star system rating the level of UVA protection from “low” (one star) to “highest” (four stars). A final rule is expected in June 2010.

For maximum effectiveness, sunscreens should be applied liberally to all exposed areas of the body 15 to 30 minutes before UV exposure and reapplied at least as frequently as recommended on the product label. Replication of sunscreen also is necessary after sweating, swimming, or drying with a towel. As a rule, people use far less sunscreen than is required for adequate protection. The American Academy of Dermatology recommends that adults wearing a swimsuit apply 1 fl oz (30 mL) of sunscreen—an amount that would fill a shot glass. This volume of sunscreen should be distributed approximately as follows:

- Face and neck: slightly more than ½ teaspoon (3 mL)
- Arms and shoulders: slightly more than ½ teaspoon (3 mL) to each side of body
- Torso: slightly more than 1 teaspoon (6 mL) each to front and back
- Legs and top of feet: slightly more than 1 teaspoon (6 mL) to each side of body

The American Academy of Dermatology also recommends use of a lip balm that contains sunscreen with SPF 30 or higher.

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Burn wounds should be reassessed after 24 to 48 hours, because the full extent of skin damage may not be initially apparent. If the burn has progressed or worsened, the patient should be referred to a primary care provider for further evaluation. If the burn has not progressed or worsened after 24 to 48 hours, treatment may be continued as needed up to 7 days after the burn occurred.

The burn wound should exhibit decreased redness during healing. Signs of cellulitis or tissue infection (e.g., increasing redness, pain, and swelling that extend beyond the boundaries of the original wound) or signs of contact dermatitis from topical treatment suggest the need for further evaluation.

If the burn has not improved in 7 days or if it worsens during or after treatment, the patient should consult a primary care provider promptly.

Points to Remember

- Minor thermal burns and sunburn often can be self-treated. However, deeper burn injuries or burns affecting more than 2% of the body surface area require medical attention. Burn injuries may increase in severity over the first 24 to 48 hours, so reassessment is always necessary.
- Patient complaints usually focus on pain. Skin protectants and dressings should be recommended, and NSAIDs or aspirin often are helpful. Blisters should not be ruptured.
- Topical anesthetics may provide additional relief in some patients, but they should be used sparingly on broken skin. Counterirritants should be avoided.
CASE STUDY RESPONSES

Case 1. Allergic and Contact Dermatitis
Which of the following conditions is the most likely explanation for CB’s rash?

a. Allergic contact dermatitis.
   Incorrect. Allergic contact dermatitis is most likely to be caused by sensitization, and subsequent exposure, to poison ivy, poison oak, or poison sumac.

b. Atopic dermatitis.
   Incorrect. Although atopic dermatitis can be exacerbated by chemicals or detergents, CB does not report a history consistent with atopic disease.

c. Irritant contact dermatitis.
   Correct. CB’s rash most likely is irritant contact dermatitis precipitated by the new cleaning solution.

Case 2. Scaly Dermatoses
JB’s symptoms are most consistent with which of the following conditions?

a. Dandruff.
   Incorrect. Although JB may indeed have classic dandruff on his scalp, the yellow, oily scales on his face are consistent with seborrhea. The scales on his scalp should be examined to determine whether they are dry or oily; dry scales would indicate dandruff.

b. Seborrhea.
   Correct. JB appears to have seborrheic dermatitis on his face and possibly his scalp.

c. Psoriasis.
   Incorrect. Psoriasis is characterized by dry, silvery lesions with minimal itching.

Which of the following initial self-treatment strategies would be most appropriate for JB?

a. Increase use of the medicated dandruff shampoo to twice daily.
   Incorrect. More frequent application of the shampoo is unlikely to increase efficacy. However, JB should be questioned about his use of the shampoo; it should be left on the scalp for at least 5 minutes before rinsing and repeating. If JB has not been leaving it on the scalp, a trial using that method of application (to the scalp and affected areas of the face) could prove effective.

b. Apply ketoconazole shampoo to the scalp and affected areas of the face twice a week for 4 weeks.
   Correct. Ketoconazole is an appropriate choice for both dandruff and seborrhea. At least 3 days should elapse between individual applications.

c. Apply a shampoo containing salicylic acid to the scalp and affected areas of the face daily for 7 to 10 days.
   Incorrect. Although a shampoo containing salicylic acid is a possible treatment for seborrheic dermatitis, it is not considered to be a first-line agent.
CASE STUDY RESPONSES (CONTINUED)

Case 3. Acne
Which of the following self-treatment options is the best course of action for SV?

a. Continue using the salicylic acid cleanser; 3 weeks is not a long enough time to see results.
   *Incorrect. Cleansing washes or bars that contain acne medications do not leave enough active ingredient on the skin to be effective.*

b. Switch to a nonmedicated cleanser and initiate a trial of therapy with benzoyl peroxide 2.5% gel.
   *Correct. Benzoyl peroxide is the preferred nonprescription medication for use in treating noninflammatory acne. Because benzoyl peroxide can be highly irritating, treatment should be initiated with a low concentration, applied to only one or two small areas, and left on for 15 minutes.*

c. Self-treatment is not appropriate for SV. She should be evaluated for the presence of rosacea.
   *Incorrect. SV’s age, symptoms, and history are not consistent with rosacea.*

Case 4. Fungal Skin Infections
Which of the following self-treatment options is the best initial course of action for AB?

a. Apply tolnaftate spray twice daily for 4 weeks.
   *Incorrect. The best initial course of action is twice-daily application of an aqueous solution of aluminum chloride until the odor, wetness, and whiteness resolve.*

b. Soak the affected area in a solution of aluminum acetate (1:40 dilution) twice daily.
   *Correct. Twice-daily soaks should be continued until the odor, wetness, and whiteness resolve, then they should be reduced to once daily accompanied by antifungal therapy.*

c. Self-treatment is not appropriate for AB.
   *Incorrect. AB has not reported any obvious exclusions to self-treatment.*
REFERENCES
The following chapters in the Handbook of Nonprescription Drugs: An Interactive Approach to Self-Care served as the primary sources of information for this monograph.


Additional primary sources of information for this monograph are listed below.


Otc Advisor: self-care for dermatologic disorders


CPE EXAM

Instructions: The assessment questions printed below allow you to preview the online CPE exam. Please review all of your answers to be sure you have marked the proper letter on the online CPE exam. There is only one correct answer to each question.

1. Which of the following vehicles enhances the transport of drugs through the skin layers?
   a. Hydrophilic powder.
   b. Petrolatum.
   c. Polyethylene glycol.
   d. Water-soluble gel.

2. In general, topical medications should not be used on children:
   a. 2 years of age or younger.
   b. 4 years or age or younger.
   c. 6 years of age or younger.
   d. 12 years of age or younger.

3. Which of the following disorders is associated with a history of asthma and allergic rhinitis?
   a. Dry skin.
   b. Atopic dermatitis.
   c. Contact dermatitis.
   d. Dandruff.

4. Which of the following is considered to be the most common factor in persistent atopic dermatitis?
   a. Animal dander.
   b. Errors in bathing and moisturizing.
   c. Molds and pollens.
   d. Stress.

5. Which of the following statements about contact dermatitis is true?
   a. Symptoms of allergic contact dermatitis resemble those of a thermal burn.
   b. Utushiol dermatitis (e.g., poison ivy) is the most common form of allergic contact dermatitis.
   c. Contact dermatitis generally resolves in about 7 days with or without treatment.
   d. Hat showers have been shown to significantly reduce pruritus.

6. Which of the following is not an exclusion for self-treatment of contact dermatitis?
   a. Eyelids are affected or eyes are swollen shut.
   b. Extreme pruritus and irritation.
   c. Presence of opened and weeping blisters, vesicles, or bullae.
   d. Involvement of mucous membranes of the mouth, eyes, nose, or anus.

7. Which of the following agents is considered to be most effective for the treatment of mild to moderate contact dermatitis?
   a. Calamine lotion.
   b. Counterirritant.
   c. Hydrocortisone.
   d. Topical anesthetic.

8. Patients should not attempt self-treatment of bites from which of the following types of arthropods?
   a. Chiggers.
   b. Fleas.
   c. Mosquitoes.
   d. Spiders.

9. Which of the following agents is preferred for self-treatment of an insect bite or sting, assuming that no patient allergy exists?
   a. Counterirritant.
   b. Hydrocortisone.
   c. Topical anesthetic.
   d. Topical antihistamine.

10. Which of the following reactions to an insect sting is a signal that the patient requires emergency treatment?
    a. Dizziness.
    b. Excessive swelling.
    c. Vomiting.
    d. All of the above.

11. Local treatment for an insect sting should involve which of the following?
    a. Remove the stinger as soon as possible.
    b. Apply a heating pad.
    c. Squeeze the venom sac to release the venom.
    d. All of the above.

12. The most common area for scaly dermatoses to occur is:
    b. Ear canal.
    c. Shoulders.
    d. Scalp.

13. All of the following are classified as cytostatic agents for the treatment of dandruff and seborrhea except:
    a. Coal tar.
    b. Ketoconazole.
    c. Pyrithione zinc.
    d. Selenium sulfide.

14. Which of the following agents should be recommended for an acute psoriatic flare?
    a. Coal tar.
    b. Hydrocortisone.
    c. Salicylic acid.
    d. Selenium sulfide.

15. All of the following medications can exacerbate preexisting acne except:
    a. Isoniazid.
    b. Lithium.
    c. Methylphenidate.
    d. Phenobarbital.
16. Which of the following nonprescription medications is considered to be most effective for the treatment of noninflammatory acne vulgaris?  
   a. Benzoyl peroxide.  
   b. Salicylic acid.  
   c. Sulfur.  
   d. Sulfur combined with resorcinol.

17. To gauge the effectiveness of a self-treatment regimen for acne, pharmacists should follow up with patients after:  
   a. 1 week.  
   b. 2 weeks.  
   c. 4 weeks.  
   d. 6 weeks.

18. Which of the following tinea infections is not amenable to self-treatment?  
   a. Tinea corporis.  
   b. Tinea cruris.  
   c. Tinea pedis.  
   d. Tinea unguium.

19. Treatment for tinea infections generally needs to be continued for:  
   a. 1 to 2 weeks.  
   b. 2 to 4 weeks.  
   c. 4 to 6 weeks.  
   d. 6 to 8 weeks.

20. Patients with athlete’s foot whose symptoms include white, macerated skin should:  
   a. Apply an astringent before using an antifungal agent.  
   b. Use medicated foot powders to dry the lesions.  
   c. Be referred to a podiatrist.  
   d. Wrap the foot with an occlusive dressing.

21. Spray and powder dosage forms of topical antifungal agents are considered to be least effective because:  
   a. Patients typically do not apply a sufficient amount of product.  
   b. These dosage forms often are not rubbed into the skin.  
   c. These products usually do not incorporate a skin-protectant ingredient.  
   d. They wash off too easily.

22. Which of the following types of warts is amenable to self-treatment?  
   a. Periungual warts.  
   b. Plantar warts.  
   c. Venereal warts.  
   d. All of the above.

23. Salicylic acid may be used in the treatment of which of the following conditions?  
   a. Corns.  
   b. Calluses.  
   c. Warts.  
   d. All of the above.

24. Products for home cryotherapy contain which of the following active ingredients?  
   a. Carbon dioxide.  
   b. Dimethyl ether and propane.  
   c. Liquid nitrogen.  
   d. All of the above.

25. The feature of corns that differentiates them from warts is:  
   a. A broad base with relatively even thickening of skin.  
   b. A center area with black dots or seeds.  
   c. A hard central core.  
   d. A viral etiology.

26. The use of nonprescription pediculicides is contraindicated in patients who are allergic to:  
   a. Latex.  
   b. Mold spores.  
   c. Ragweed.  
   d. Wheat.

27. What is the most common reason for reapplying a nonprescription pediculicide after 7 to 10 days?  
   a. Because of increasing resistance, nonprescription pediculicides rarely kill all active lice on the first application.  
   b. Patients typically do not use pediculicides correctly, necessitating a second application.  
   c. Pediculicides are effective against adult and nymph lice only, not nits; the second application targets recently hatched lice.  
   d. The directions for use on the Drug Facts label of all nonprescription pediculicides specify two applications.

28. Which of the following types of burns requires emergency care?  
   b. Full-thickness burns.  
   c. Chemical burns.  
   d. All of the above.

29. The first step in treating recent superficial and superficial partial-thickness thermal burns should be:  
   a. Application of a skin protectant to the affected area.  
   b. Cooling the affected area with tepid tap water for up to 20 minutes.  
   c. Covering the affected area with a nonadherent gauze or semipermeable dressing.  
   d. Gentle cleansing of the area with water and mild soap.

30. Under the proposed new rule for sunscreen products, the level of UVA protection would be indicated by:  
   a. A numerical value ranging from 2 to 50+.  
   b. A four-star rating system.  
   c. The phrases “no UVA protection,” “moderate UVA protection,” and “high UVA protection.”  
   d. A letter grading system in which “A” indicates highest UVA protection and “F” indicates no UVA protection.
CPE INSTRUCTIONS

Completing a posttest at www.pharmacist.com/education is as easy as 1-2-3…

1. Go to Online CPE Quick List and click on the title of this activity.
2. Log in. APhA members enter your user name and password. Not an APhA member? Just click “Create one now” to open an account. No fee is required to register.
3. Successfully complete the CPE exam and evaluation form to gain immediate access to your Statement of Credit.

Live step-by-step assistance is available Monday through Friday, 8:30 AM to 5:00 PM ET from APhA Member Services at 800-237-APhA (2742) or e-mail InfoCenter@pharmacist.com.