Acne in Childhood: An Update
Wendy Kim, DO; and Anthony J. Mancini, MD

Acne is the most common chronic skin disease affecting children and adolescents, with an 85% prevalence rate among those aged 12 to 24 years. However, recent data suggest a younger age of onset is common and that teenagers only comprise 36.5% of patients with acne. This article provides an overview of acne, its pathophysiology, and contemporary classification; reviews treatment options; and reviews recently published algorithms for treating acne of differing levels of severity.

Acne can be classified based on lesion type (morphology) and the age group affected. The contemporary classification of acne based on several recent reviews is addressed below. Acne lesions (see Table 1, page 419) can be divided into noninflammatory lesions (open and closed comedones, see Figure 1) and inflammatory lesions (papules, pustules, and nodules, see Figure 2). The comedone begins with the microcomedone, which is a microscopic plug of the follicular ostia of the pilosebaceous unit. Four processes are necessary for an acne lesion to evolve: 1) altered shedding of the keratinocytes that line the pilosebaceous unit; 2) increased sebum production; 3) proliferation of Propionibacterium acnes (considered the “acne organism”); and 4) the release of inflammatory mediators. The sequence of these events remains under investigation (ie, some recent studies suggest that even comedones may be preceded by inflam-
matory events), but once the comedone has formed it can proceed to become an inflammatory lesion. Treatment is dependent upon the types and severity of acne lesions that are present.

**IMPACT ON QUALITY OF LIFE**

Long regarded as a rite of passage of adolescence, it is now clear that acne patients suffer significant social and psychological impact from the disease. Acne has been associated with anxiety, low self-esteem, embarrassment, social withdrawal, and depression. In fact, the psychological impact of acne has been demonstrated to be as severe as that of patients with insulin-dependent diabetes, cystic fibrosis, cancer, epilepsy, and some psychiatric disorders.

Several recent publications have addressed body dysmorphic disorder (BDD), which is defined as a life-altering preoccupation with a minimal or imperceptible flaw in appearance, in acne patients. It occurs in an estimated 2% of the general population, but it has been estimated to occur in 6.7% of patients in a general dermatology clinic and up to 14% of patients in a cosmetic dermatology clinic. These patients are frequently dissatisfied with medical treatment and procedural outcomes, which makes adherence more challenging. A high percentage (36.7%) of acne patients with barely perceptible or mild acne were found to meet subjective criteria for BDD via survey, and patients who had received therapy with isotretinoin were twice as likely as controls to meet subjective criteria for BDD (15.5% of patients who had never used isotretinoin vs. 31.8% of patients who had used isotretinoin). Importantly, more than one-third of acne patients with barely perceptible to mild acne reported severe disabling symptoms of preoccupation with their acne.

It is important to be aware of the potential psychosocial ramifications of acne given that these patients experience higher rates of depression and suicide than their peers. Cotterill and Cunliffe described 16 dermatology patients who completed suicide, and almost half of this cohort had acne. Gupta and Gupta showed that active suicidal ideation was found in 5.6% of acne patients who were screened in a dermatology clinic setting. Acne patients had a higher score on the Carroll Rating Scale for Depression (CRSD) than patients with alopecia areata, atopic dermatitis, and psoriasis involving less than 30% of the body surface area, suggesting a higher rate of depression than patients with other chronic skin conditions. These statistics underscore the importance of recognizing the detriment to body image and potential self-harm that acne patients may experience. Such observations also highlight the utility of early institution of therapy for acne.

**CONTEMPORARY CLASSIFICATION**

The term pediatric acne is used to describe acne that occurs from birth through age 11 years, with acne occurring from age 12 years through adulthood referred to as adolescent acne. Pediatric acne can be further subdivided based on the age of onset of the disease: neonatal acne occurs from birth through age 4 weeks; infantile acne has its onset between age 1 and 12 months; mid-childhood acne occurs from age 1 year through age 6 years; and preadolescent or prepubertal acne occurs from age 7 to 11 years. The specific type of acne, based on this classification system, helps to determine whether other evaluations (eg, for an underlying endocrinologic abnormality) are indicated.

**Neonatal Acne**

Neonatal acne may affect up to 20% of infants, although this figure is difficult to confirm because there may be overlap with other papulopustular conditions (eg, erythema toxicum neonatorum, eosinophilic folliculitis, transient neonatal pustular melanosis, milia, milia). The lesions of neonatal acne may present from birth to age 4 weeks. Usually, this type of acne is characterized by inflammatory lesions (papules and pustules), although comedones may occasionally be present. The latter are believed by some acne experts to be more indicative of infantile acne than neonatal acne. Neonatal acne is believed to be caused by increased production of

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**TABLE 1. Acne Lesion Nomenclature**

<table>
<thead>
<tr>
<th>Lesion Type</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>Comedone</td>
<td>May be closed (&quot;whitehead&quot;) or open (&quot;blackhead&quot;); believed to develop from microscopic plugs of desquamated cells from the follicle; early treatment of comedones may help prevent progression to clinically inflammatory lesions.</td>
</tr>
<tr>
<td>Inflammatory lesion</td>
<td>May be a papule, pustule, or nodule; related to inflammatory mediators, which increase in response to the <em>P. acnes</em> organism; nodules often result in scarring.</td>
</tr>
<tr>
<td>Post-inflammatory change</td>
<td>May be hypo- or hyperpigmentation, or erythema; changes may last for months to years.</td>
</tr>
<tr>
<td>Scarring</td>
<td>A sequela of inflammatory acne; often persistent and very difficult to treat.</td>
</tr>
</tbody>
</table>
dehydroepiandrosterone (DHEA), in association with a large androgen-producing zona reticularis in the fetal adrenal glands. There is also transplacental passage of androgens, which stimulate sebaceous glands, as well as testicular production of androgens. From birth through age 6 to 12 months, boys also have pubertal levels of testosterone, which might explain why acne is more common in male infants than in female infants.

In recent years, a more pustular presentation of neonatal acne has been described and termed neonatal cephalic pustulosis (see Figure 3). A relationship between this condition and increased colonization with (or hypersensitivity to) Malassezia furfur, M. sympodialis, or other species has been suggested. In a 1996 cohort of 13 neonates, pustule smears from the faces and necks were notable for M. furfur in eight patients, whose skin all cleared rapidly following application of ketoconazole cream. Subsequent studies have been inconsistent in their findings, but many experts still recommend consideration of topical antifungal therapy in neonates with severe pustular acneiform eruptions.

Infantile Acne

Infantile acne begins sometime in the first year of life, typically between ages 4 to 6 weeks and age 1 year. It is more common in boys than in girls and is more likely than neonatal acne to be predominantly comedonal (see Figure 4). Inflammatory lesions may or may not be present, but if present they may occasionally be severe. Nodules can also occur occasionally, and when infantile acne is moderate to severe, scarring may result (see Figure 5). In patients with infantile acne, the physical examination should include a growth assessment as well as evaluation for any features of precocious puberty or androgen excess, including axillary odor,
breast development, clitoromegaly, presence of axillary and/or genital hair, and increased muscle mass. If concerns are present, laboratory workup and/or referral to a pediatric endocrinologist are recommended. Sidebar 1 (see page 423) lists the recommended laboratory evaluation when androgen excess is suspected.14,15,17

Mid-Childhood Acne

Acne that begins in children aged 1 to 7 years is termed mid-childhood acne and is never considered normal. The neonatal adrenal gland continues to secrete high levels of androgen through age 1 year, and then the zona reticularis of the adrenal gland is quiescent until adrenarche, around age 7 years. Late-onset congenital adrenal hyperplasia, true precocious puberty, and androgen-secreting tumors are a few of the potential underlying causes of mid-childhood acne, and laboratory evaluation should be performed in all patients presenting with acne onset during this time (see Sidebar 1, page 423).16,18 Table 2 lists recommended therapies for neonatal, infantile, and mid-childhood acne.

Preadolescent Acne

Preadolescent acne, which presents between age 7 and 11 years, is similar in presentation to adolescent acne, and it is considered by most experts to be a common initial sign of impending pubertal maturation. Comedones tend to predominate (see Figure 6, page 423), especially in the “T zone” (ie, across the forehead, on the nose and on the chin) of the face, but inflammatory lesions may also be present. This form of acne is likely becoming more common, in parallel with the downward trend in the timing of onset of puberty that has been observed over the past century.19-21 The severity of preadolescent acne may be predictive of the future, as Lucky and colleagues22 found in a longitudinal study that adolescent

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**TABLE 2. Therapeutic Options for Neonatal, Infantile, and Mid-Childhood Acne**

<table>
<thead>
<tr>
<th>Type of Acne</th>
<th>Therapeutic Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonatal</td>
<td>No therapy; topical azole antifungal cream (ie ketoconazole) if markedly pustular.</td>
</tr>
<tr>
<td>Infantile</td>
<td>Benzoyl peroxide; topical retinoid (if primarily comedonal); topical antibiotic (if significant inflammatory component); oral non-cycline antibiotic (ie erythromycin, if moderate to severe inflammatory disease); consider androgen excess when severe.</td>
</tr>
<tr>
<td>Mid-childhood acne</td>
<td>Same as above for infantile acne; evaluation for androgen excess always indicated.</td>
</tr>
</tbody>
</table>

**TABLE 3. Fixed-Dose Combination Prescription Acne Therapies**

<table>
<thead>
<tr>
<th>Active Ingredients</th>
<th>Product</th>
<th>Age Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP and clindamycin</td>
<td>BenzaClin gel (Dermik)</td>
<td>≥ 12 years</td>
</tr>
<tr>
<td></td>
<td>Duac gel (Stiefel Labs)</td>
<td>≥ 12 years</td>
</tr>
<tr>
<td></td>
<td>Acanya gel (Medicis Pharma)</td>
<td>≥ 12 years</td>
</tr>
<tr>
<td>BP and adapalene</td>
<td>Epiduo gel (Guderma)</td>
<td>≥ 9 years</td>
</tr>
<tr>
<td>Clindamycin and</td>
<td>Ziana gel (Medicis Pharma)</td>
<td>≥ 12 years</td>
</tr>
<tr>
<td>tretinoin</td>
<td>Veltin gel (Stiefel Labs)</td>
<td>≥ 12 years</td>
</tr>
<tr>
<td>BP and erythromycin</td>
<td>Benzamycin gel (Dermik)</td>
<td>≥ 12 years</td>
</tr>
</tbody>
</table>

BP = benzoyl peroxide.

**TABLE 4. Topical Retinoids Used for Acne Therapy***

<table>
<thead>
<tr>
<th>Retinoid</th>
<th>Available Formulations</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapalene</td>
<td>Cream, gel, solution, lotion</td>
<td>Considered the least irritating of the topical retinoids; very lipophilic, so concentrates in the pilosebaceous unit; pregnancy category C; brand name Differin (Galderma).</td>
</tr>
<tr>
<td>Tretinoin</td>
<td>Cream, gel, microsphere gel</td>
<td>Considered the original topical retinoid; pregnancy category C; Atralin (tretinoin 0.05% gel) approved down to 10 years of age; brand names also include Retin A, Retin A Micro (Medicis), Avita (Mylan).</td>
</tr>
<tr>
<td>Tazarotene</td>
<td>Gel, cream, foam</td>
<td>Also approved for treatment of psoriasis; pregnancy category X; brand names include Tazorac(Allergan), Fabor (GlaxoSmithKline).</td>
</tr>
</tbody>
</table>

*Unless otherwise noted, all are approved by the US Food and Drug Administration for patients aged 12 years and older.
girls with more severe acne were more likely to have had more comedonal and inflammatory lesions as early as age 10 years. This cohort also was also more likely to undergo earlier menarche than those girls who had had mild preadolescent comedonal acne.  

**ACNE THERAPY**

The following sections apply to adolescent acne, although preadolescent acne is usually treated with similar agents (albeit often in “off-label” fashion). An exhaustive discussion of acne therapy is beyond the scope of this article (for more information, the reader is directed to recent reviews).  

**TOPICAL THERAPY**

Proper skin cleansing should always be discussed with acne patients. Although the patient may be under the impression that scrubbing to remove dirt and oil will improve the appearance of acne, such overmanipulation may actually increase inflammation and, hence, should be discouraged. Cleansing once to twice daily with warm water and a gentle acne wash should be encouraged. The use of scrubbing devices or abrasive sponges should be discouraged for most patients.  

Many over-the-counter products and “systems” for acne are available. The active ingredients in these products are often benzoyl peroxide (BP) or salicylic acid. BP has been available since 1934 and works by creating free radicals that destroy the acne organism, *P. acnes*. Additionally, it reduces the release of reactive oxygen species from neutrophils, thereby reducing inflammation. BP has gained favor in recent years given its utility in acne therapy combined with the lack of development of resistance to this agent. It has also been shown to decrease the development of resistance to concomitant antibiotics utilized as part of the acne regimen. BP is available in a variety of washes and “leave-on” gels, in strengths ranging from 2.5% to 10%. Although previously available by prescription, BP washes are now available exclusively on an over-the-counter basis. However, it is also found in several fixed-dose combination products available by prescription (see Table 3, page 422). Patients should be warned about the potential bleaching of linens and clothing by BP. Salicylic acid is a keratolytic agent that may be beneficial for mild comedonal acne. It is available in washes, pads, and other over-the-counter products.  

Topical retinoids play a paramount role in the treatment of acne. They are vitamin A derivatives (either naturally occurring or synthetic) that bind to retinoid receptors in the skin. They work within the nucleus to alter down-stream signals affecting inflammatory pathways and proliferation. Specifically, retinoids normalize follicular keratinization and prevent the microcomedone from forming; therefore, they play a preventive role in the treatment of acne in addition to their beneficial effects on the existing comedones. It is important to educate patients on proper use and expectations with topical retinoids. These agents may result in some peeling, redness, and irritation, primarily with initial use. These side effects tend to decrease after 4 weeks of regular use and can be minimized by alternate-night (or every third night) application during initiation, if needed. It should be reiterated that topical retinoids should be applied as a thin film at bedtime to all “fields” where the patient gets acne, and not as spot therapy. Table 4 (see page 422) lists the available topical retinoids, along with their strengths, vehicles, and proprietary names.
Topical antibiotics, including erythromycin and clindamycin, are used in the treatment of inflammatory acne and are aimed at the reduction of *P. acnes*. These agents are typically applied once daily. Clindamycin is available as a 1% gel, solution, lotion, and foam, and erythromycin is available as a 5% gel and solution. Monotherapy with topical antibiotics is not recommended because of their prolonged onset of action and the likelihood of bacterial resistance. Since the 1970s, the resistance of *P. acnes* to erythromycin as well as clindamycin has increased dramatically. Concomitant use of BP, either as a wash or as part of a fixed-dose combination product, is highly recommended when topical antibiotics are used. Dapsone 5% gel (Aczone, Allergan) was recently approved for acne. It has been shown to reduce inflammatory lesions in as early as 2 weeks, with the safety of twice-daily use being demonstrated for up to 1 year in patients aged 12 to 15 years. Hemolytic anemia can occur in patients with glucose-6-phosphate dehydrogenase (G6PD) deficiency when treated with oral dapsone, but this effect seems very unlikely in G6PD-deficient patients treated with topical dapsone. Sulfur exhibits antibacterial and keratolytic properties, and it is often combined with sodium sulfacetamide in acne products to mask its odor. Sodium sulfacetamide is available as a solution or lotion.

Several topical, fixed-dose combination therapies have been approved for the treatment of mild-to-moderate acne vulgaris (see Table 3, page 422). The advantages of these therapies include the improved adherence they offer (via simplification of the treatment regimen) and the complementary mechanisms of action of the individual components. The fixed-dose combination products currently available include products containing BP and clindamycin, BP and adapalene, BP and erythromycin, and tretinoin and clindamycin. These agents are typically applied once to twice daily. To obtain US Food and Drug Administration (FDA) approval...

### TABLE 5.

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Recommended Dose</th>
<th>Potential Adverse Events / Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doxycycline</td>
<td>50 mg-100 mg BID</td>
<td>GI upset, pill esophagitis, sensitivity in the sun (including photo-onycholyis), dental discoloration (not recommended &lt; 8 years of age), IBD, hepatitis, vaginal candidiasis; subantimicrobial dosing also used at 20 mg BID; available in delayed-release formulation.</td>
</tr>
<tr>
<td>Minocycline</td>
<td>50 mg-100 mg BID</td>
<td>Cutaneous and mucosal hyperpigmentation, drug hypersensitivity with hepatitis and pneumonitis, lupus-like syndrome, Stevens Johnson syndrome, vaginal candidiasis, vestibular effects, dental discoloration (not recommended &lt; 8 years of age), IBD, photosensitivity (less than doxycycline), pseudotumor cerebi; available in extended-release formulation.</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>250 mg-500 mg BID</td>
<td>GI upset, pill esophagitis, sensitivity in the sun, hepatic dysfunction, dental discoloration (not recommended &lt; 8 years of age), IBD.</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>250 mg-500 mg BID</td>
<td>Marked GI upset, diarrhea, prolongation of QT interval, increasing resistance in acne; no longer recommended by most experts.</td>
</tr>
<tr>
<td>Cephalexin</td>
<td>250 mg-500 mg BID</td>
<td>Vaginal candidiasis, rare drug reactions; routine use for acne not recommended.</td>
</tr>
<tr>
<td>Trimethoprin-sulfamethoxazole</td>
<td>80 mg/400 mg to 160 mg/800 mg</td>
<td>Severe drug reactions, bone marrow suppression, drug hypersensitivity syndrome; routine use for acne strongly discouraged.</td>
</tr>
</tbody>
</table>

*BID = twice daily; GI = gastrointestinal; IBD = inflammatory bowel disease.*

### SIDE BAR 2.

**General Guidelines in Oral Antibiotic Therapy for Acne**

- Continue oral antibiotics for at least 2 to 3 months to assess for response
- Oral antibiotic therapy should be combined with a topical regimen that includes: Benzoyl peroxide (either as part of a “leave-on” regimen or as a wash), in an effort to minimize the development of bacterial resistance; and Topical retinoid, to more effectively treat comedones and for their role in prevention of the development of new acne
- Educate patients to expect a 3- to 6-month period of therapy (occasionally longer), with the goal of discontinuing the oral treatment as early as feasible (while continuing the topical maintenance regimen).
- Discuss potential side effects and warnings of oral antibiotic therapy.
- Routine laboratory monitoring is not recommended in the absence of underlying conditions that may predispose the patient to toxicities (ie hepatic or renal insufficiency)

Adapted from Eichenfield and Mancini, Thiboutot et al, Tsankov et al, Webster and Graber, Zaenglein and Thiboutot, and Del Rosso and Kim.
for these products, manufacturers need to show that the combination product demonstrates increased efficacy compared with the individual components (the “monads”) and the vehicle.

**Oral Therapy**

Although only two oral antibiotics (minocycline extended-release for moderate and severe acne and doxycycline delayed-release for severe acne) are FDA-approved for the treatment of acne, the use of oral antibiotics has been common practice for decades. The goal of antibiotic therapy is to reduce the *P. acnes* count and therefore the inflammatory stimulus. Oral antibiotics are typically viewed as “anti-inflammatory” treatment for acne, rather than treatment for a true infection. By reducing the overall *P. acnes* load, bacterial lipases (and therefore triglycerides and subsequent free fatty acids) are reduced as well. Oral antibiotics are typically recommended when there is a suboptimal response to a topical therapeutic regimen, when there is widespread disease (ie, extensive truncal disease) for which topical therapy alone may not be feasible, and when there is greater overall severity that seem unlikely to respond to topical treatments alone. Chlortetracycline, the first antibiotic in the tetracycline class, was introduced in 1948. Antibiotics in this class are still first-line therapy for patients older than 8 years with moderate-to-severe inflammatory acne. Tetracycline, however, has become less desirable in the era of newer-generation cyclines, such as minocycline and doxycycline, given its limitations related to dosing on an empty stomach and gastrointestinal intolerance. Table 5 summarizes the oral antibiotics most commonly used for acne therapy. Some general guidelines in oral antibiotic therapy for acne are listed in Sidebar 2 (see page 424).

Hormonal therapies, including spironolactone and combined oral contraceptive pills, are potentially effective therapies in some patients with adolescent or young adult acne. Patients most likely to respond include females of childbearing age with acne accentuated on the neck and in the mandibular regions, those with perimenstrual flares in their acne, those with hirsutism or other features of androgen excess, and those with a poor response to conventional treatments.

**Oral isotretinoin** is an extremely effective treatment for nodulocystic acne, and it was approved for use in 1982. It should be considered in patients with severe or resistant acne vulgaris in whom the likelihood for scarring is considered significant. Isotretinoin is a known teratogen, a fact that led to the development of the isPLEDGE program. iPLEDGE is an FDA-mandated registration program for prospective patients as well as prescribing physicians and dispensing pharmacies. The goal of the program is to reduce fetal exposure to isotretinoin by requiring monthly pregnancy tests in females of childbearing age. Unfortunately, a recent retrospective study of pregnancies occurring during isotretinoin use revealed that iPLEDGE has not made a significant impact in this regard. Isotretinoin is most appropriately prescribed by dermatologists (or other clinicians familiar with its use); further discussion of this topic is beyond the scope of this article.

**TABLE 6.**

**Treatment Recommendations Based on Acne Severity**

<table>
<thead>
<tr>
<th>Type of Acne</th>
<th>Initial Therapy</th>
<th>Inadequate Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>BP or topical retinoid or topical combination therapy (ie, BP/antibiotic combination, retinoid/BP combination, or retinoid/antibiotic combination plus BP)</td>
<td>Add BP or retinoid if not already using, or change topical retinoid concentration/type/formulation, or change topical combination therapy.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Topical combination therapy (ie, retinoid/BP combination, BP/antibiotic combination plus a retinoid, or retinoid/antibiotic combination plus BP) or oral antibiotic + topical retinoid/BP combination</td>
<td>Change topical retinoid concentration/type/formulation, or change topical combination therapy; or add/change oral antibiotic; or consider hormonal therapy for female patients; or consider isotretinoin referral.</td>
</tr>
<tr>
<td>Severe</td>
<td>Combination therapy (oral antibiotic plus topical retinoid plus BP, with or without topical antibiotic)</td>
<td>Consider changing oral antibiotic and consider oral isotretinoin; consider hormonal therapy for female patients.</td>
</tr>
</tbody>
</table>

*BP = benzoyl peroxide.*  
Adapted from Eichenfield et al.  

**DESIGNING A TREATMENT REGIMEN**

Table 6 is a summary of recently published acne-treatment algorithms, with suggestions for initial therapy and subsequent treatment modifications based on acne severity. When developing a treatment plan for acne patients, one must evaluate the type and severity of lesions as well as the potential psychosocial impact. It is important to take into account the patient’s perspective on their acne, as...
some with even mild acne may be experiencing serious psychosocial compromise. Patients and their parents should be warned if they are likely to have permanent scarring.

Before utilizing a treatment algorithm, the patient’s acne should be categorized as mild (predominantly comedonal or mixed comedonal and mildly inflammatory acne), moderate (more inflammatory lesions with a substantial comedonal component as well), or severe (even greater numbers of inflammatory lesions and often comedones as well as nodules, and greater risk for scarring). Proper use and application of the treatment regimen should be discussed, including a discussion of expected side effects of the medications. Written action plans are very beneficial and may increase adherence, which should be assessed at every visit, and the patient should be offered positive reinforcement when improvement is noted. It is also important to highlight changes that may not be clear to the patient, such as post-inflamatory hyperpigmentation as a sign of treatment response.

Adherence to therapy is a major issue in acne treatment in adolescents. Nonconfrontational but directed questions such as “How many times per week do you forget to use your medication?” rather than “Are you using your medication as directed?” may lead to more truthful answers. Other suggestions for increasing adherence with acne regimens include simplifying the number of medications prescribed (when feasible), setting realistic expectations, and reinforcing maintenance therapy once clinical improvement is noted. Ease of use and choice of vehicle for topical medications should be considered. For example, gels are traditionally more drying than creams, but may be appropriate for patients with oily skin. In addition, newer gel technologies are well tolerated and less drying than their prior formulations.

CONCLUSION

The pathogenesis of acne is complex and multifactorial, and our understanding of it continues to evolve. Acne may be associated with significant psychosocial compromise and BDD, highlighting the importance of early therapy. Acne presenting in younger children may have other ramifications, and it can be categorized by the age of onset. In preadolescents and adolescents with acne, there are a variety of traditional and newer treatment options. Use of a published treatment algorithm is helpful in guiding initial and subsequent therapeutic agents and combinations. Benzoyl peroxide is desirable as a component of any acne regimen, given its ability to help diminish the development of resistance. Topical retinoids play an important role in acne therapy, both for their effects on established lesions as well as their role in long-term maintenance. Adherence to an acne-treatment plan can be increased by appropriate education, anticipatory guidance, written action protocols, frequent follow-up, and simplification of the regimen, as feasible.

REFERENCES


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ASSOCIATION AND MEETING SOLUTIONS, LLC
6900 Grove Road, Thorofare, NJ 08086
Infectious Diseases in Children® 2013 Symposium ................................................................. C2-385
PFIZER INC
235 East 42nd Street, New York, NY 10017
Children’s Advil ......................................................................................................................... C4
SALIX PHARMACEUTICALS INC.
8510 Colonnade Center Drive, Raleigh, NC 27615
Vesicoureteral Reflux ........................................................................................................... 392A-D
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While every precaution is taken to ensure accuracy, Pediatric Annals cannot guarantee against occasional changes or omissions in the preparation of this index.

Erratum:
At the request of the authors, the online article by Linda Van Horn, PHD, RD and Eileen Vincent, MS, RD, “The CHILD 1 and DASH Diets: Rationale and Translational Application” (September 2013) contains updated nutritional information in the Tables that differs from the print version. It can be seen at Healio.com/Pediatrics. Search the authors’ names to view those revisions.