Treatment and Managed Care Issues of Atopic Dermatitis

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ABSTRACT

The specific cause of atopic dermatitis (AD) is not known. It is a multifactorial disease involving environmental agents, immune dysregulation, genetic predisposition, and defects in skin barrier function. Patients are typically classified as having mild, moderate, or severe disease. Most patients with AD can control their symptoms with various combinations of moisturizers, conventional prescription therapies, and lifestyle modifications, while patients with more severe disease may require adjunctive treatment with phototherapy, biologic treatments, or systemic immunosuppressants. As a result, patient-centered treatment plans are critical to patient care. The appropriate use of nonpharmacologic and pharmacologic treatment interventions combined with patient-specific written action plans could improve both patient health and medication outcomes.

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For author information and disclosures, see end of text.

The etiology of AD is not well understood. Evidence suggests that AD is a multifactorial disease involving environmental agents, immune dysregulation, genetic predisposition, and defects in skin barrier function.[1] Diagnosis of AD is complicated by variability in clinical presentation and the lack of consensus surrounding diagnostic criteria.[2] Patients are typically classified as having mild, moderate, or severe disease. The majority of patients can control AD symptoms with various combinations of moisturizers, conventional prescription therapies, and lifestyle modifications. Patients with more severe disease may require adjunctive treatment with phototherapy, biologic treatments, or systemic immunosuppressants. Consequently, accurate diagnosis and individualized patient-centered treatment plans are critical to patient care.

Nonpharmacologic Interventions

Topical Moisturizers and Prescription Emollient Devices

Maintaining skin hydration and preventing transepidermal water loss (TEWL) are essential components of AD treatment. Over-the-counter (OTC) topical moisturizers are applied to the skin to prevent dryness and TEWL. Studies show that the application of topical moisturizing agents alone reduces symptom severity[3,4] as effectively as topical corticosteroids (TCSs) used in patients with AD.[5] In a 3-week study involving children with mild-to-moderate AD, the application of desonide 0.05% every other day plus 2% sunflower oil twice daily was as effective as once- or twice-daily desonide alone ($P = .83$).[6] The properties and composition of topical moisturizers can vary greatly, making a given product more or less suitable for an individual. Traditional agents contain varying amounts of the following: 1) emollients that soften skin by filling in spaces between desquamating corneocytes; 2) occlusive agents that create a hydrophobic film on the surface of skin to prevent TEWL; and 3) humectants that attract and retain water from the deeper dermis.[7] Topical moisturizers are available as oils, lotions, creams, ointments, and gels. Lotions often contain preservatives and fragrances, which can function as irritants to the skin; they

also have a high water content, which creates an additional drying effect. Ointments have the advantage of generally being preservative free; however, cosmetic acceptability of ointments is a concern due to their greasy texture and may inhibit adherence.[8] As a result, the following factors must be taken into consideration when helping patients and caregivers select a topical moisturizer: ease of application, how it smells, how well it is absorbed, and how it feels on the skin.[9] Regardless of the particular product and delivery system that is used, the selected moisturizer must be one that the patient feels comfortable using on a daily basis, given our current understanding of barrier dysfunction in the pathogenesis of AD. Topical moisturizers enhance the hydration of the skin and minimize flare-ups and complications of AD. Therefore, they are considered an integral component of the maintenance plan. Application should be individualized for patients and can range from daily to multiple applications in a day. Topical moisturizers are best when applied soon after bathing to optimize skin hydration.[8,10]

In addition to topical moisturizers, prescription emollient devices (PEDs) are used to prevent TEWL and to improve skin hydration in patients with AD. PEDs are different from OTC moisturizers in that they are FDA-approved, 510(k) devices that provide a structural role in skin barrier function; they do not exert their effects by any chemical actions.[8] They are generally applied to the skin 2 to 3 times daily depending on the specific agent. Comparative studies evaluating the cost-effectiveness of PEDs and OTC moisturizers have produced mixed results.[11,12] In an investigation of treatment cost, a total of 39 patients aged 2 through 17 years with mild-to-moderate AD were randomized to receive 1 of the following treatments: glycyrrhetinic acid containing PED, ceramide-dominant PED, or OTC petrolatum-based topical moisturizer. Patients were instructed to apply the study treatment 3 times daily for 21 days. No significant between-group differences were observed at days 7 or 21, but OTC petrolatum-based moisturizer was nearly 50 times more cost-effective than either PED.[12]

Notably, head-to-head trials comparing specific topical moisturizing agents are limited. As a result, the selection of moisturizing agents is highly dependent on patient preference and cost. There is no published guidance on the correct order of application of moisturizers and prescription AD treatments. One study showed that the order of TCSs and moisturizers did not matter as far as influencing severity of disease.[13] Product labeling of topical calcineurin inhibitors (TCIs) indicates that moisturizers may be applied after use.[14,15]

Bathing and Wet Wrap Therapy

While the daily application of topical moisturizers is an integral part of managing AD, bathing and wet wrap therapy are additional interventions that can reduce disease severity. There are no data to suggest an appropriate frequency or duration of bathing. Expert consensus indicates that bathing up to 1 time daily for 5 to 10 minutes with warm water can remove excess scale.[8] Hypoallergenic and fragrance-free cleansers that support optimal skin surface pH are recommended for use on a limited basis. After bathing, topical moisturizers should be applied after gently toweling skin to improve skin hydration.[8] For areas of the body with significant lesions, the nighttime soak-and-smear technique has proved to be a simple, inexpensive method that provides symptomatic improvement.[16] This technique involves a 20-minute soak with plain water followed immediately (no drying skin) by smearing a mid- to high-potency TCS ointment on damp skin; this functions to trap water, allowing deeper penetration of the corticosteroid. Time to symptomatic improvement correlates with underlying disease severity, although most patients show improvement within several days to 2 weeks of continued application. If the patient has moderate-to-severe disease and a history of *Staphylococcus aureus* infection, bleach baths 2 to 3 times weekly may help decrease the number of local skin infections and reduce the need for antibiotics in patients with AD. Bleach baths are prepared by adding a quarter cup to a half cup of common bleach solution to approximately 1 full tub of bath water.[17] Huang et al conducted a randomized, investigator-blinded, placebo-controlled study (N = 31) that showed a greater mean reduction in Eczema Area and Severity Index (EASI-75) scores in patients who received diluted bleach bath treatment compared with placebo group at both 1-month and 3-month follow-ups.[18]

Wet wrap therapy has proved to be an effective treatment in patients with moderate-to-severe disease, especially during periods of significant flares.[19] Application techniques that have been reported in literature vary. Briefly, most wet wrap dressings involve the application of a TCS that is covered by wet gauze or bandages; a dry cotton second layer is then applied to maintain skin hydration. Wet wraps are typically worn for several hours to 1 full day and repeated for several days to 2 weeks. The impact of wet wrap therapy was evaluated in 72 children with moderate-to-severe disease treated with wet wrap therapy and monitored for outcomes within a supervised multidisciplinary AD treatment program. Wet wraps were left in place a minimum of 2 hours and were generally removed after 4 to 6 hours. Improvement in disease severity was assessed using the Scoring Atopic Dermatitis (SCORAD) instrument. Disease severity at admission and at discharge showed significant differences in mean $\pm$ SD values, of 49.68 $\pm$ 17.72 versus 14.83 $\pm$ 7.45, respectively (t, 18.93; df, 71; P <.001). The average duration of treatment was 7.5 days, ranging from 2 days up to a maximum of 16 days.[20] Due to the occlusive barrier that is created with wet wrap therapy, secondary infections, maceration of the skin, and systemic bioactivity of TCSs can occur when wet wraps are overused or used incorrectly.[8,17] Consequently, patients must be supervised closely, ideally by a medical provider who has expertise in the use of wet wrap interventions.

TABLE. Number of FTUs Required for Select Body Sites on Children[29]

Age	Number of Fingertip Units				
	Face and Neck	Arm and Hand	Leg and Foot	Trunk (front)	Trunk (back)
3 to 6 months	1	1	1.5	1	1.5
1 to 2 years	1.5	1.5	2	2	3
3 to 5 years	1.5	2	3	3	3.5
6 to 10 years	2	2.5	4.5	3.5	5

Table is adapted with permission from Long CC, Mills CM, Finlay AY. A practical guide to topical therapy in children. *Br J Dermatol*. 1998;138(2):293-296. Copyright 1998.

Pharmacologic Interventions

Topical Corticosteroids

When AD is not controlled by nonpharmacologic interventions, TCSs are recommended as first-line prescription treatments. Multiple studies support the use of TCSs, and they are the standard to which other AD therapies are compared.[8] TCSs act on a wide range of immune cells, suppressing the release of proinflammatory cytokines while exerting antiproliferative effects on several cell types, including T-lymphocytes. The potency of TCSs is based on their vasoconstricting ability and ranked on a scale of 1 through 7.[8] Very-high-potency agents are ranked in class I, whereas the least potent corticosteroids are ranked in class VII.[8,21] Low- to mid-potency agents are preferred for children as well as for body sites with thin skin due to an increased likelihood of systemic absorption. The face, neck, and skin folds are common areas of the body where low-potency TCSs are preferred.[22] Available vehicles include foams, ointments, solutions, creams, gels, and lotions.

Despite the extensive use of TCSs, there are limited data regarding optimal duration and frequency of therapy.[23] The majority of studies evaluating the safety and efficacy of TCSs involve once- or twice-daily dosing.[24] Some experts recommend using a short burst of a high-potency TCS to rapidly control active disease, followed by a quick taper with a low-potency TCS. Others use the least potent TCS that is thought to be effective and titrate upward as needed.[8] During periods of acute flares, the continuous use of TCSs is recommended until inflammatory lesions have significantly improved[25]; however, prescribers may recommend continued use of TCSs for up to 3 days beyond clearance.[26] The median time to clinical resolution is dependent on disease severity and may require daily use of TCSs for up to multiple weeks at a time. In the past, once clinical resolution of flares was achieved, TCS therapy was stopped, changing to daily use of topical moisturizers and reinstituting TCSs during subsequent relapses.[8] However, studies demonstrate that a proactive dosing strategy of 2 to 3 applications per week on areas that commonly flare may be a more cost-effective treatment approach.[27] This practice is supported by treatment guidelines from the American Academy of Dermatology with both the TCSs or TCIs for the prevention of AD flares. Continuous application of TCSs for extended periods of time should be avoided.[25]

Results from clinical studies suggest that TCSs are associated with few adverse effects (AEs) when applied appropriately. Skin atrophy, or thinning of the skin, is typically the greatest concern among patients and caregivers because it can lead to over-caution and suboptimal treatment. Many TCS-related AEs resolve after discontinuing use; in some cases, it may take months.[28] Therefore, it is important that patients and caregivers understand the appropriate quantity of drug that is required for each body site. The fingertip unit (FTU) is a reference tool that qualitatively describes the amount of drug to be used.[29] It is the amount of drug removed from a tube with a 5-mm diameter nozzle, applied from the tip of the index finger to the distal skin crease.[29] One FTU is approximately equal to 0.5 grams, which effectively covers an area equivalent to 2 adult hands with fingers together. The table illustrates the number of FTUs required for specific body sites on children (**Table**[29]).[29]

Topical Calcineurin Inhibitors

Tacrolimus ointment and pimecrolimus cream are TCIs that are indicated as second-line treatments in patients with AD.[8] Calcineurin, found in the skin, regulates the activity of transcription factors that control cell division and early stages of T-cell activation. Through inhibition of calcineurin, tacrolimus and pimecrolimus exhibit their clinical effect. Tacrolimus ointment is approved for moderate-to-severe disease; the 0.1% ointment is approved for patients ≥16 years of age and the 0.03% ointment is approved for patients ≥2 years of age.[15] Pimecrolimus is approved for mild-to-moderate AD and is available as a 1% cream for patients ≥2 years of age.[14] The key benefit of TCIs is that they can be used in place of TCS with fewer associated AEs. Pharmacokinetic studies demonstrate that systemic absorption is negligible when TCIs are applied according to product labeling.[30,31] As a result, they are commonly used on body sites with thin skin and when continuous treatment or widespread application is required.[8] Expert consensus recommends that TCIs should be considered in the following clinical conditions: 1) patients who are refractory to TCS; 2) treatment of the face, neck, and skin-fold; 3) patients who experience steroid-induced atrophy; and 4) long-term continuous therapy with TCSs.[8] TCIs are recommended to be used twice daily and should not be used with occlusive dressings; patient re-evaluation is recommended if symptoms persist beyond 6 weeks. Similar to therapeutic trends for TCSs, multiple studies have demonstrated that proactive 2- to 3-times-weekly dosing of TCIs provides incremental health benefits at a lower cost compared with traditional TCI dosing regimens.[32,33] The most common AEs with TCIs are stinging and burning, which are usually transient and resolve after several days of treatment.[34]

In January 2006, the FDA issued a black box warning for TCIs based on a theoretical risk of malignancy, which remains in effect

to this date.[35] This concern stemmed from cases of skin cancer and lymphoma that were observed with the use of high-dose oral calcineurin inhibitors in transplant recipients as well as dose-ranging studies performed in animals. In 2011, the FDA Pediatric Advisory Committee reviewed multiple postmarketing studies and concluded that the risk of malignancy following TCI use is no higher than what is observed in the general population.[36] The precautionary warning is still listed in product labeling.

Topical Crisaborole

The lack of suitable alternatives leads to the continued use of TCSs as first-line AD treatments. However, the development of newer agents with improved safety profiles may influence changes in clinical practice. In December 2016, the FDA approved topical crisaborole, which is the first new AD treatment in more than a decade. Crisaborole ointment, 0.2%, is a nonsteroidal phosphodiesterase-4 (PDE-4) enzyme inhibitor that is indicated for mild-to-moderate AD.[37] PDE-4 inhibits cyclic adenosine monophosphate (cAMP), which is believed to play a significant role in the release of intracellular proinflammatory cytokines. Crisaborole inhibits PDE-4 and its ability to degrade cAMP, thereby suppressing the downstream production and release of proinflammatory mediators in atopic skin. Initial pharmacokinetic studies show topical crisaborole is rapidly absorbed and metabolized to inactive metabolites that have no significant effects on PDE-4 activity.[38] Consequently, the risks of both systemic exposure and AEs are low.[38,39] Crisaborole is applied twice daily and is approved for use in patients ≥2 years of age.

Multiple studies support the safe and effective use of topical crisaborole in mild-to-moderate AD. Two randomized, double-blind, vehicle-controlled, phase 3 studies (AD-301 and AD-302) were conducted to evaluate the safety and efficacy of crisaborole over a period of 28 days. Key inclusion criteria required patients to be aged 2 years or older and have a baseline Investigator's Static Global Assessment (ISGA) score of mild (2) or moderate (3) AD.[40] The primary endpoint was an ISGA score at day 29 of clear (0) or almost clear (1), with a 2-grade or greater improvement from baseline. Additional endpoints assessed the severity of pruritus and signs of AD. Patients were instructed to apply the study drug twice daily throughout the study period to all areas affected by AD; the scalp area was not included because of potential patient dissatisfaction with cosmetic effects involving the head. Patients were permitted to continue the use of topical moisturizers to manage dry skin around the areas of crisaborole- or vehicle-treated lesions. At day 29, more patients in the crisaborole treatment group achieved an ISGA score of clear (0) or almost clear (1) compared with vehicle (AD-301: 51.7% vs 40.6%, $P = .005$; AD-302: 48.5% vs 29.7%, $P < .001$). In addition, more crisaborole-treated patients demonstrated improvement in pruritus at day 29; the difference was statistically significant ($P = .002$). Additionally, more crisaborole-treated patients had reductions in mean disease severity, with statistically significant results (pooled data, erythema: $P < .001$; exudation: $P = .001$; excoriation: $P < .001$; induration: $P = .002$; lichenification: $P < .001$). Crisaborole-treated patients demonstrated a low incidence of treatment-related AEs. Application site pain was the most commonly reported event, which occurred in 4.4% of crisaborole-treated patients versus 1.2% receiving placebo.[40]

Dupilumab

A second new agent, dupilumab, was FDA approved in March 2017 for the treatment of patients with moderate-to-severe AD whose disease is not adequately controlled with topical prescription therapies, or for patients in whom the use of such therapies is medically inadvisable. Dupilumab is a fully human monoclonal antibody that inhibits interleukin-4 and interleukin-13 intracellular signaling, which is believed to play an important role in the inflammatory process of myriad allergic diseases, including asthma and AD.[1,41]

Data from SOLO 1, SOLO 2, and CHRONOS clinical trials were instrumental in the regulatory approval of dupilumab. SOLO 1 and SOLO 2 were 2 identical 16-week, randomized, placebo-controlled, phase 3 trials that evaluated the safety and efficacy of subcutaneous (SC) dupilumab compared with placebo in 671 and 708 patients, respectively.[42] Key inclusion criteria required patients to be aged 18 years or older, have a diagnosis of moderate-to-severe AD for which topical treatment did not provide adequate control or was medically inadvisable, and an ISGA score of 3 (moderate) or 4 (severe). Patients received a 600-mg SC dose of dupilumab at day 1, followed by SC injections of dupilumab 300 mg weekly, every other week, or placebo; each study group was also required to apply topical moisturizers twice daily throughout the 16-week trial period. In SOLO 1, 38% of patients receiving dupilumab every other week and 37% of patients receiving dupilumab once weekly achieved the primary endpoint of an ISGA score of clear (0) or almost clear (1), compared with 10% receiving placebo ($P < .001$ for both comparisons). In SOLO 2, 36% of patients receiving dupilumab every other week and 36% of patients receiving dupilumab once weekly achieved an ISGA score of clear (0) or almost clear (1) compared with 8% receiving placebo ($P < .001$ for both comparisons). In both trials, dupilumab-treated patients demonstrated at least a 3- to 4-point improvement in pruritus, and EASI-75 scores improved by at least 75% from baseline to week 16 compared with placebo ($P < .001$ for both comparisons). Clinically significant improvements were also observed regarding anxiety and depression, health-related quality of life, and patient-reported symptoms of AD.[42]

In the CHRONOS study, 740 patients with moderate-to-severe disease who were inadequately controlled with topical medications and had a baseline ISGA score of moderate (3) or severe (4) were randomly assigned to 1 of 3 treatment groups (all in combination with the daily application of a low- to mid-potency TCS): dupilumab

300 mg SC once weekly, dupilumab 300 mg SC every other week, or placebo.[43] In the dupilumab-treatment groups, a 600-mg dose was administered at day 1 followed by the aforementioned treatment regimens. The primary endpoints of the study were the percentage of patients who achieved an ISGA score of clear (0) or almost clear (1) as well as a reduction from baseline of at least 2 points at week 16. Thirty-nine percent of patients who received either dupilumab 300 mg weekly plus a TCS or dupilumab 300 mg every other week plus a TCS achieved an ISGA score of clear (0) or almost clear (1) at 16 weeks, compared with 12% receiving a TCS and placebo (P <.0001). In addition, 64% of patients who received dupilumab 300 mg weekly plus a TCS, and 69% of patients who received dupilumab 300 mg every other week plus a TCS, had EASI-75 scores improve by at least 75% from baseline to week 16, compared with 23% receiving a TCS and placebo (P <.0001). The secondary endpoint 52-week results regarding the percentage of patients who achieved either an ISGA score of clear (0) or almost clear (1) or EASI-75 were nearly identical to week 16 results. The most common AEs that occurred in early- and late-phase studies of dupilumab were injection-site reactions, headache, mouth sores, and conjunctivitis; all were reported with a higher frequency compared with placebo.[42,44]

Dupilumab is FDA approved for use in adult patients only. The recommended dosing regimen includes an initial dose of 600 mg (two 300-mg SC injections administered at different locations), followed by 300 mg given every other week. It is available in 2 product formulations: a 300 mg per 2 mL prefilled syringe with or without a needle shield. Dupilumab should be stored in the refrigerator; once removed from the refrigerator, syringes should be used within 14 days or discarded. Due to an increased risk of ocular complications with dupilumab, patients should be advised to consult their healthcare provider if new-onset or worsening eye symptoms develop, such as redness, itching, or tearing of the eye.[45]

Phototherapy and Systemic Agents

Some patients with AD are refractory to optimized topical regimens and require phototherapy or systemic immunosuppressants. Different forms of phototherapy have distinct profiles that must be considered before treatment. As a result, all forms of phototherapy are typically performed under the guidance of physicians who specialize in phototherapy techniques. Narrowband ultraviolet B phototherapy has emerged as the modality of choice by providers when considering its availability, low-risk profile, and relative efficacy.[10] There are few studies that compare the efficacy of systemic immunosuppressants for the management of AD, and none are FDA approved for use. The most commonly prescribed therapies include cyclosporine, azathioprine, methotrexate, and mycophenolate mofetil.[46] Available data suggest that each agent is effective for the treatment of AD[47-50]; however, optimal dosing strategies and duration of treatment are unclear. In addition, product labeling and clinical guideline recommendations should be consulted as monitoring parameters for each individual agent are significant.

Managing Atopic Dermatitis in the Managed Care Environment

Burden of Disease

The public health burden of AD is considerable. Patients with AD incur more costs, lose more work days, and have poorer overall health than those without AD. A recent analysis of adult patients with AD showed that patients paid $37.7 billion in out-of-pocket healthcare costs in 2010; adult patients with AD paid $371 higher out-of-pocket costs per person-year compared with those without AD.[51] In addition, a total of 73 million weighted days of lost work occurred in 2010. Adults with AD are 53% more likely than those without disease to have 6 or more lost workdays from any cause. AD has a significant impact on the mental health of patients as well. In the International Study of Life with Atopic Eczema, more than one-half of patients reported symptoms of depression and exacerbations affecting sleep patterns an average of 14.6 nights per flare, corresponding to 162 nights per year.[52] Every missed opportunity for improving healthcare may result in unnecessary patient suffering. Patient-centered care in collaboration with various medical providers is an important way to optimize health and medication outcomes.

Pharmacist-Patient Care Process

All patients and families should be educated on skin care, considering that the efficacy of AD treatment regimens is only as good as each patient's ability and willingness to implement clinical recommendations. Coordinated, interprofessional, patient-centered care is a method that has been shown to improve patient outcomes and is a key component in the evolving healthcare model. In recent years, the Joint Commission of Pharmacy Practitioners developed the pharmacist-patient care process, which provides a framework for delivering consistent pharmacy care in any practice setting.[53] The 5 basic components of the pharmacist-patient care process are: collect, assess, plan, implement, and follow up.

An essential first step in the pharmacist-patient care process is developing a relationship with the patient and family that supports effective communication. To understand the clinical status of each patient, the pharmacist must collect patient- and family-specific information to assess financial resources available to obtain medications, previous treatment failures, current medications, disease severity, and patient-specific AD triggers.[2] Once subjective and objective data are collected, prioritizing patient-specific, drug-related problems and aligning treatment goals are vital. A primary goal in the treatment of AD is to improve medication adherence and reduce unnecessary costs. Frequently, treatment failure or suboptimal responses to therapy can be attributed to medication nonadherence. Common reasons for patient and/or caregiver nonadherence include patient

or caregivers being unaware of the correct frequency and the type of medication that should be applied; lack of motivation and not refilling prescriptions; perception that treatment does not work, medication is cosmetically unacceptable, or medication is too painful to apply; or medication has unacceptable AEs.[54] In a study evaluating medication adherence, 37 patients treated with 0.1% triamcinolone ointment and instructed to apply medication twice daily to affected skin area for a total of 8 weeks.[55] The average adherence from baseline to study completion was only 32%. One of the most difficult problems regarding medication adherence is steroid phobia, which is fear and anxiety on the part of patients that TCSs cause harm. As many as 80% of patients admit to concerns about TCSs and nearly 40% use them less frequently or for shorter periods than prescribed.[52,56] Educating patients and families to be aware of the signs of skin atrophy, as well as explaining that mild cutaneous AEs are reversible with time, may lessen anxiety about TCSs and improve adherence. In addition, parental education regarding the appropriate application of topical treatments should not be overlooked. One survey reported that fewer than 5% of parents were provided instruction or demonstration about the application of topical therapies by medical providers.[57] Considering children are disproportionately affected by AD, parental involvement and education are vital to help reduce flares and extend periods of remission in children with AD.

Patient and family concerns about AD and related treatments may be overcome with written action plans. AD action plans include written instructions about how and when to apply topical and systemic medications, when to increase or decrease treatment, appropriate bathing practices, and when to seek medical treatment. A sample AD action plan from the American Academy of Dermatology website is illustrated in the **Figure**[58].[58] The efficacy of written action plans has been evaluated in several small studies. In a demonstration of AD action plan efficacy, AD action plans were associated with significant improvements in patients with AD, including patients understanding of benefits and risks associated with prescribed medications ($P = .02$), recognition of AD exacerbating factors ($P = .02$), and adjusting treatment based on disease severity ($P < .01$), compared with verbal instruction.[59] In a separate study, as many as 80% of parents reported lower disease severity in their children after the implementation of written action plans, and of those children whose AD improved in severity, 68% of parents attributed the written action plan as a contributing factor.[60]

The pharmacist-patient care process begins with the initial encounter and continues through each follow-up visit. All AD treatment plans should include scheduled follow-up visits to assess medication adherence, disease severity, overall patient satisfaction, and the need for physician referral. Several instruments are available to assess disease severity but there is no consensus of a "gold standard" among providers.[8,61] Each instrument assigns a patient a severity score that is based on multiple factors, such as body surface area affected, course of disease, and severity of pruritus. Every pharmacist is encouraged to incorporate some method of consistent grading of AD symptoms into daily practice to effectively monitor clinical progression. Two of the most commonly used instruments are SCORAD and EASI.[61] Worsening disease severity may result from patients and/or family members applying an inadequate amount of drug to targeted treatment sites, which can be related to steroid phobia, improper technique, or the daily burden of disease. Data suggest that families spend an average of 63 minutes per day managing their child's AD, including time applying topical treatments and avoiding triggers.[62] As a result, it is important that pharmacists revisit the FTU reference tool at follow-up visits, demonstrate the recommended amount of drug that is required based on body surface area affected, and emphasize the importance of daily adherence to written action plans. When behavioral- or disease-related support beyond pharmacist-provided education is needed, consideration for physician referral is appropriate.

Conclusion

Several conventional therapies as well as 2 first-in-class agents are available to treat AD disease flares and extend periods of remission. Data show that no single treatment regimen will work for all patients. Consequently, treatment strategies must be individualized. The implementation of coordinated interprofessional care methods and a pharmacist-patient care process is critical to achieve optimal patient health and medication outcomes. Sufficient time must be spent providing patient education and teaching self-management strategies through the development of AD written action plans. By increasing patient education efforts, reviewing evidence-based methods to treat disease, and addressing unfounded concerns about new and existing therapies, medication adherence may improve while reducing unnecessary costs associated with the management of AD.

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FIGURE. American Academy of Dermatology Eczema Action Plan[58]

Eczema Action Plan

Eczema under control

Skin soft, supple, maybe some dryness

1. Bathe (5-10 minutes) in lukewarm water every _____ .
2. Apply moisturizer to all skin within 3 minutes of finishing bath.
3. Apply moisturizer **2 more times** during day to skin that feels dry or often flares.

Eczema flare

Itchy skin with redness or rash

Use your child's medicine and moisturizer (shown below) as often as indicated.

Bathe your child (5-10 minutes) in lukewarm water every _____.

Within 3 minutes of bathing:

- Apply child's medicine (shown below) to the eczema.
- Apply child's moisturizer, skipping areas with medicine. You don't want to apply moisturizer on top of the medicine.

Medicine for mild flare (*redness, some itch*)

Face _____ Apply _____ times a day (maximum _____ days)

Scalp _____ Apply _____ times a day (maximum _____ days)

Body _____ Apply _____ times a day (maximum _____ days)

Medicine for moderate or severe flare (*very itchy rash*)

Face _____ Apply _____ times a day (maximum _____ days)

Scalp _____ Apply _____ times a day (maximum _____ days)

Body _____ Apply _____ times a day (maximum _____ days)

Cleanser

_____ Use _____ times a day

Moisturizer

Day _____ Apply _____ times a day

Night _____

Other medicine

Itching (*day*)
Take _____ tsp/cc/pills of _____ in the morning.

Itching (*night*)
Take _____ tsp/cc/pills of _____ before bed.

Skin
Take _____ tsp/cc/pills of _____ for ____ days,
taking ____ times per day.

When to call the dermatologist

- Skin weeping, oozing pus
- Skin very painful
- Severe itch
- Fever
- Chills
- Eczema remains the same or barely diminishes with treatment

If your child has a **fever and clusters of itchy blisters**, call your dermatologist immediately. If you cannot reach your dermatologist, take your child to the nearest emergency room.

Dermatologist _____

Phone _____

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