Topical Dermatologic Therapies

Basic Dermatology Curriculum

Last updated January 2016

Module Instructions

- The following module contains a number of blue, underlined terms which are hyperlinked to the dermatology glossary, an illustrated guide to clinical dermatology and dermatopathology.
- We encourage the learner to read all the hyperlinked information.

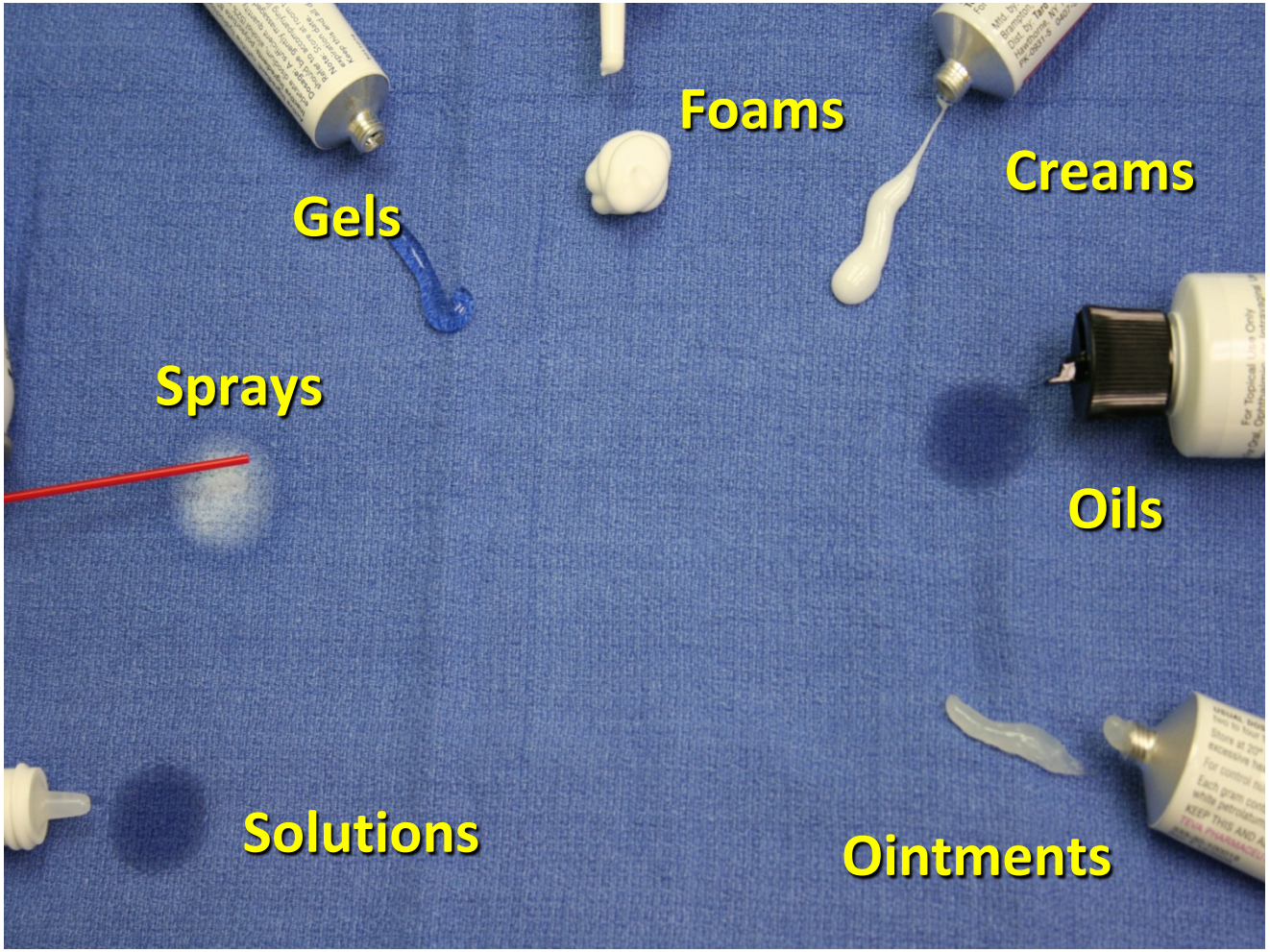
Goals and Objectives

- The purpose of this module is to help learners gain familiarity with common dermatologic treatments
- By completing this module, the learner will be able to:
  - Estimate the amount of topical medication needed for therapy based on frequency of application and body surface area involved
  - Match individual topical steroids to their potency class
  - Choose appropriate strengths of topical steroids based on age, body location and severity of dermatitis
  - List side effects of prolonged use of topical steroids
  - Discuss the basic principles of common topical medications used to treat acne, superficial fungal infections and psoriasis

Principles of Dermatologic Therapy

- The efficacy of any topical medication is related to:
  - Active ingredient (inherent **strength**)
  - Anatomic **location**
  - **Vehicle** (the mode in which it is transported)
  - **Concentration** of the medication

Vehicles



Vehicles

- **Ointments** (e.g., Vaseline): lubricating, semiocclusive, greasy, does not sting
  - Useful for smooth, non-hairy skin; dry, thick, or hyperkeratotic lesions
- **Creams** (vanish when rubbed in): less greasy, not occlusive, may sting, could cause irritation (preservatives/fragrances)
  - Useful for acute exudative inflammation, intertriginous areas (when skin is in contact with skin, e.g., armpits, groin, pannus)
- **Lotion** (pourable liquid): less greasy, less occlusive, may sting
  - Helpful for acute exudative inflammation (e.g., acute contact dermatitis) and on hairy areas

Vehicles

- **Oils**: less stinging, keratolytic (removes scale)
  - Useful for the scalp, especially for people with coarse or very curly hair
- **Gel** (jelly-like): may sting, greaseless, least occlusive, dry quickly
  - Useful for acne and on scalp/hairy areas without matting
- **Foams** (cosmetically elegant): spread readily, easier to apply, more expensive
  - Useful for hairy areas and inflamed skin
- **Sprays**: aerosols (rarely used), pump sprays

Medication Costs

- Topical medications can be very expensive
- They are not all covered by insurance
- Over the counter (OTC) treatments are generally cheaper than prescriptions
- Generics are usually less expensive than brand name prescriptions
- It is helpful to know the costs of the medications prescribed and be able to tell the patient in advance what they should expect to pay

Topical Prescriptions

- Patient vehicle preference, cost and availability determine their selection
- What goes into a topical prescription?
  - Desonide cream 0.05% apply a thin layer to affected area (face) BID PRN for red, itchy skin #60 grams refills 3

Topical Prescriptions

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  - Sig (directions)

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  - Vehicle
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  - Amount

Topical Prescriptions

- What goes into a prescription?
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  - Vehicle
  - Concentration
  - Sig
  - Amount
  - Refills

Let's Review Some Common Types of Topical Medications Used by Dermatologists

Topical Corticosteroids

- Topical corticosteroids steroids produce an anti-inflammatory response in the skin
- They are used to treat many dermatological conditions, including atopic dermatitis and psoriasis
- They also provide symptomatic relief for burning and pruritic lesions

Topical Corticosteroids

- Topical corticosteroids are organized into classes based on their strength (**potency**), ranging from super high potency (class I) to low potency (class VII)
  - Steroids within any class are equivalent in strength
  - Class one is about 1000 times more potent than hydrocortisone 1%
- Strength is inherent to the molecule, not the concentration

Topical Corticosteroid Strength

Potency	Class	Example Agent
Super high	I	Clobetasol propionate cream 0.05%
High	II	Fluocinonide cream, ointment 0.05% Mometasone furoate ointment 0.1%
Medium	III – V	Mometasone furoate cream 0.1% Triamcinolone acetonide cream, ointment 0.1%
Low	VI – VII	Fluocinolone acetonide cream 0.01% Desonide cream, ointment 0.05% Hydrocortisone cream, ointment 1%

Topical Corticosteroid Strength

- Remember to look at the **class** not the percentage
  - Clobetasol 0.05% is much stronger than hydrocortisone 1%
- Note that mometasone ointment is high potency while mometasone cream is low potency because of the nature of the vehicle

Potency	Class	Example Agent
Super high	I	Clobetasol propionate cream 0.05%
High	II	Fluocinonide cream, ointment 0.05% Mometasone furoate ointment 0.1%
Medium	III – V	Mometasone furoate cream 0.1% Triamcinolone acetonide cream, ointment 0.1%
Low	VI – VII	Fluocinolone acetonide cream 0.01% Desonide cream, ointment 0.05% Hydrocortisone cream, ointment 1%

Topical Corticosteroid Selection

- **Super high** potency (class I) are used for severe dermatoses over nonfacial and nonintertriginous areas
  - **Scalp**, **palms**, **soles,** and **thick plaques** on extensor surfaces
- **Medium to high** potency steroids (classes II-V) are appropriate for mild to moderate nonfacial and nonintertriginous areas
  - Okay to use on flexural surfaces for limited periods
- **Low** potency steroids (classes VI, VII) can be used for large areas and on thinner skin
  - **Face**, **eyelid**, **genital** and **intertriginous** areas
- **Know one steroid from each class that would be available to the majority of your patients**

Absorption

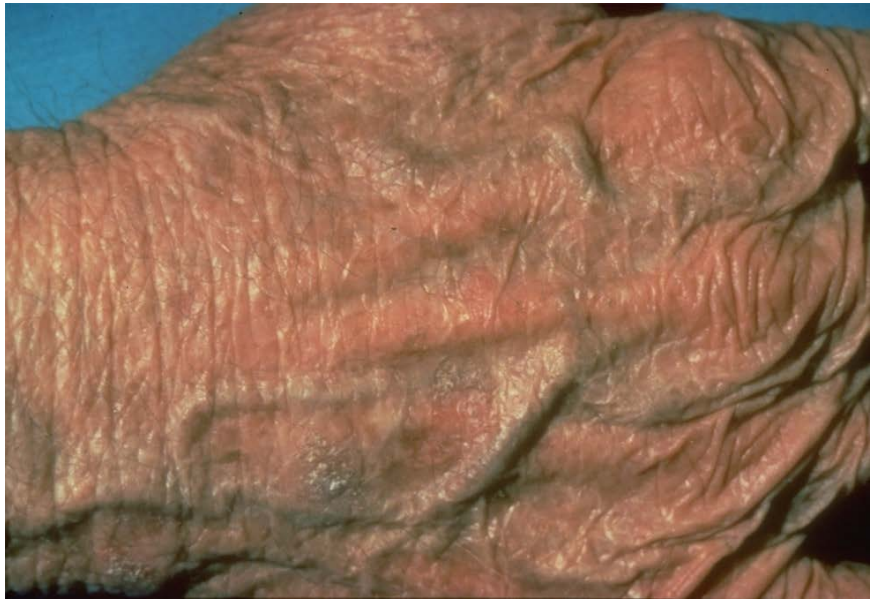
- Topical corticosteroids are better absorbed through areas of inflammation and desquamation compared to normal skin
- Absorbed more readily through thin stratum corneum of infants compared to adults
- Anatomic regions with a thin epidermis are significantly (e.g., eyelid) more permeable then thick-skinned areas (e.g., palms)
- Ointments allow better percutaneous drug absorption and are therefore more potent than creams or lotions

Local Cutaneous Side Effects

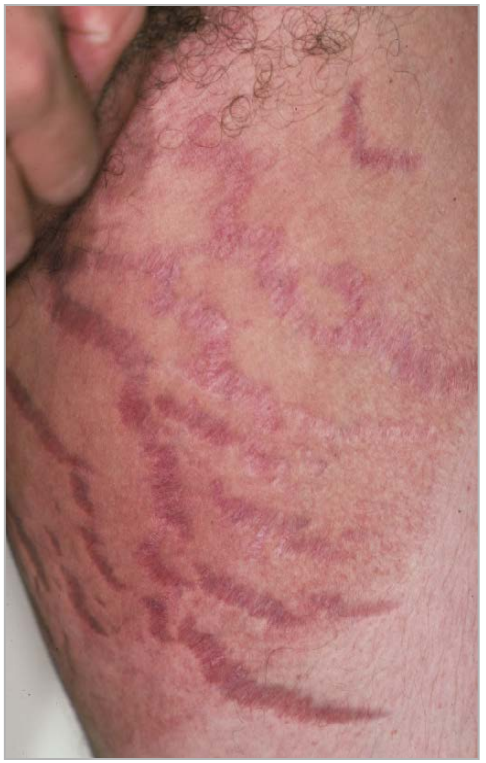
- Local side effects of topical steroids include:
  - Skin atrophy
  - Telangiectasias
  - Striae
  - Acne or rosacea-like eruption
  - Allergic contact dermatitis
  - Hypopigmentation
- The higher the potency the more likely side effects are to occur
- To reduce risk, the least potent steroid should be used for the shortest time, while still maintaining effectiveness

Local Cutaneous Side Effects

Skin Atrophy

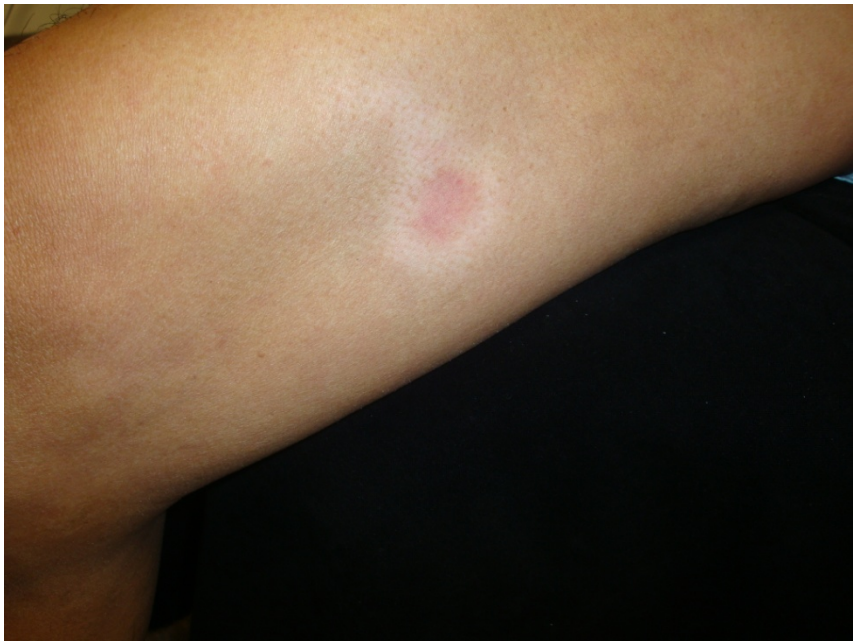


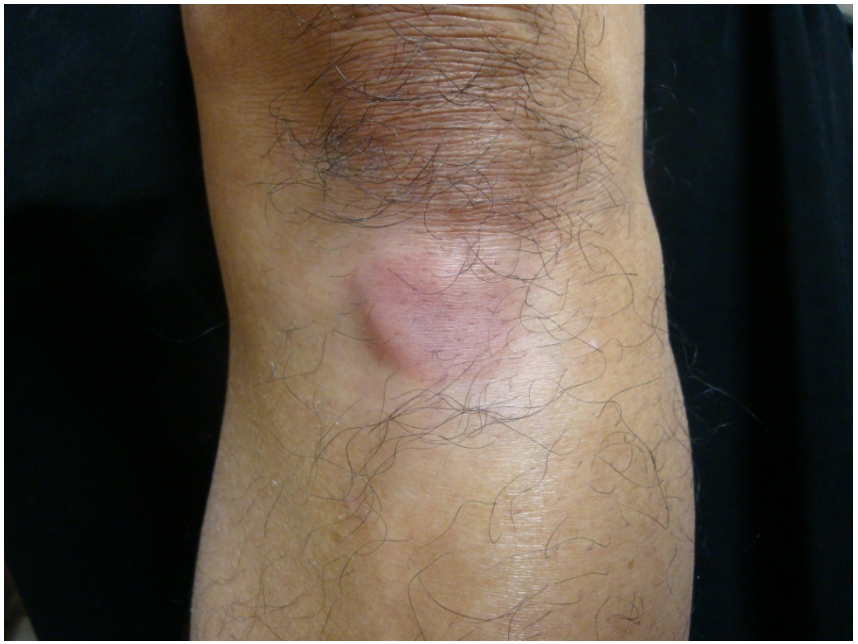
Striae



Local Cutaneous Side Effects

Hypopigmentation





Systemic Side Effects

- Systemic side effects from topical corticosteroids are **rare** due to low percutaneous absorption
- They can include:
  - Glaucoma
  - Hypothalamic pituitary axis suppression
  - Cushing's syndrome
  - Hypertension
  - Hyperglycemia
- Exercise caution with widespread use and occlusive methods (e.g., plastic wrap, bandages)

Treatment Duration

- In general:
  - Super high potency: treat for <4 weeks
  - High and Medium potency: <6-8 weeks
  - Low potency: side effects are rare. Treat facial, intertriginous, and genital dermatoses for 1-2 week intervals to avoid skin atrophy, telangiectasia, and steroid-induced acne
- Longer-term management: use least-potent corticosteroid that is effective

Treatment Duration

- Stop treatment when skin condition resolves
  - Taper with gradual reduction of both potency and dosing frequency to avoid rebound/flares
- Intermittent therapy may be effective for maintaining long-term disease control
  - Twice weekly application of topical corticosteroids have been shown to reduce the risk of relapse in patients with atopic dermatitis
- If the patient does not respond to treatment within these guidelines, consider referral to a dermatologist

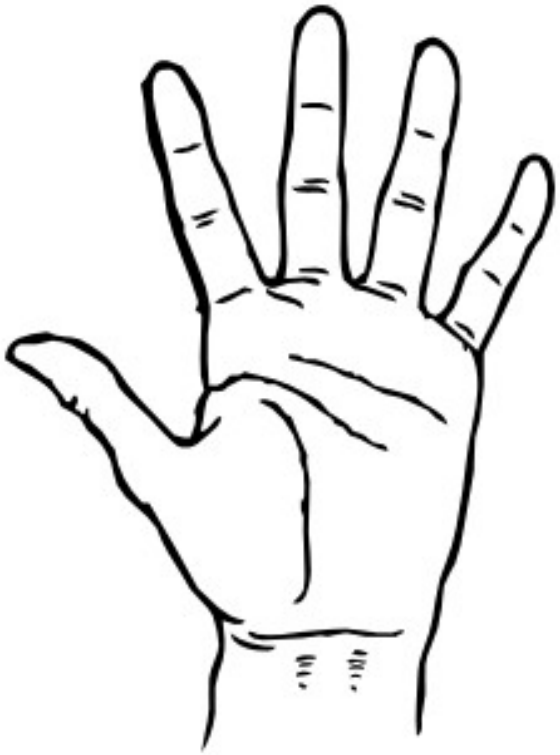
Treatment Tips

- Greater caution regarding potency is needed when treating thin sites (face, neck and skin folds)
- Avoid placing an absolute limit on duration of steroid use, which can lead to unsatisfactory outcomes
- Address patient fears of side effects, which improved adherence and avoids under treatment

Prescribing Topical Medications

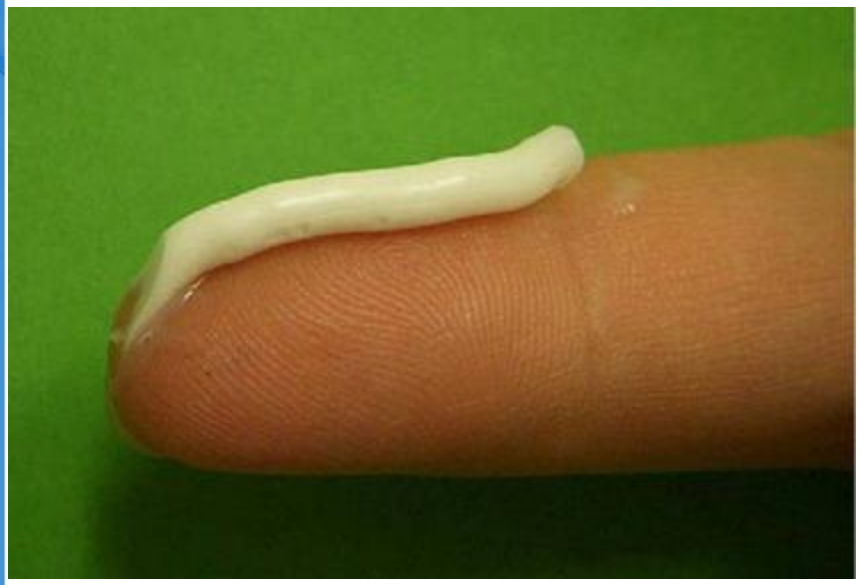
The following slides will review how to estimate the amount of medication to prescribe according to the affected body surface area (BSA)

Estimating BSA: Palm of Hand



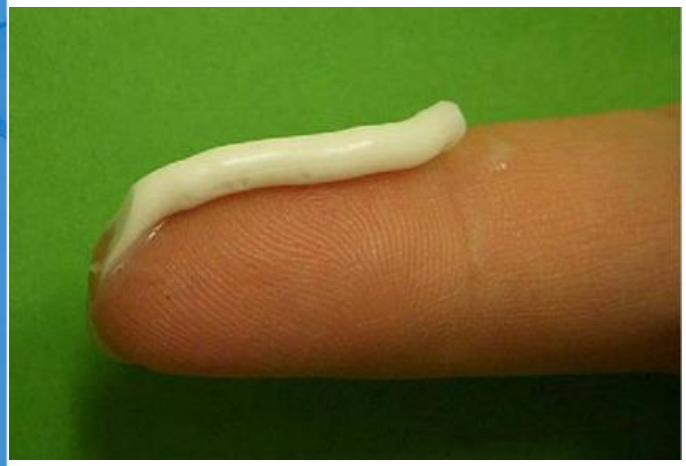
1 Palm = 1% BSA
Use the size of the patient's palm, not your own

Estimating Topicals: Fingertip Unit



- Quantity of topical medication (dispensed from a 5mm nozzle) placed on pad of the index finger from distal tip to DIP joint
- Fingertip unit (FTU) = 500 mg = treats 2% BSA

1 FTU (0.5 grams) = 2% BSA



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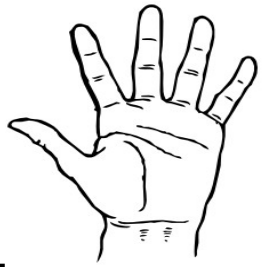
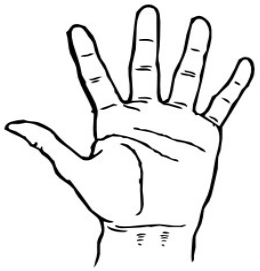


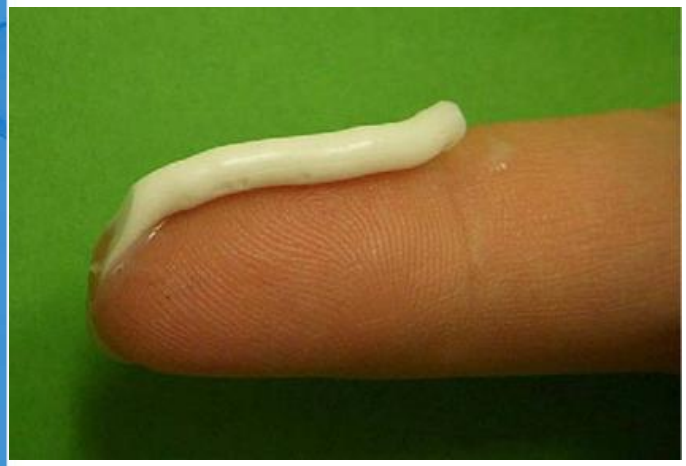
1 Palm = 1% BSA



1 Palm = 1% BSA

How much topical medication should you prescribe for 2% BSA BID x 30 days?

1 FTU (0.5 grams) = 2% BSA



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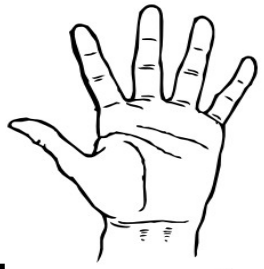

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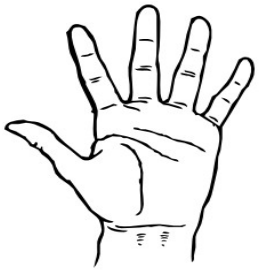


1 Palm = 1% BSA

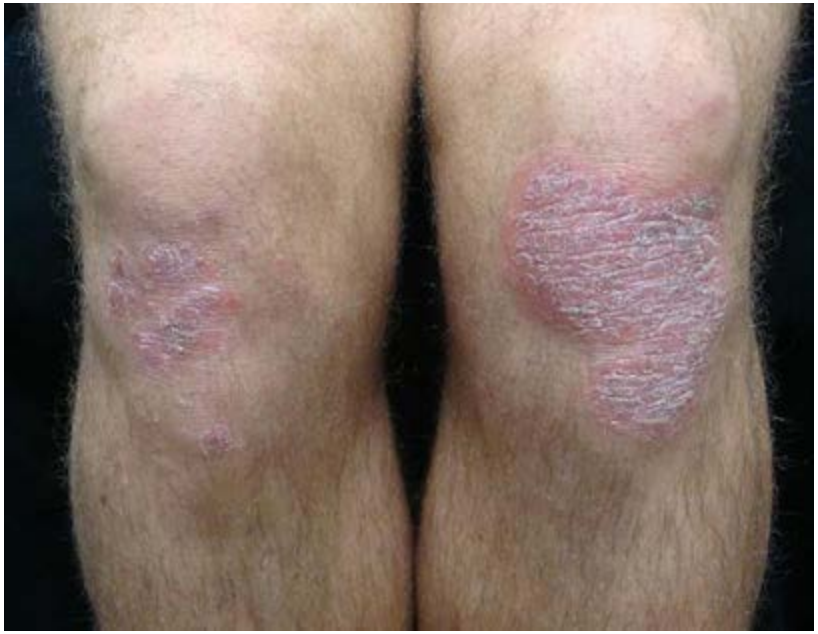
1FTU = 0.5 grams = 2% BSA

0.5 grams x 2 times per day = 1 gram

1 gram x 30 days = 30 grams

Practice Question

- Take a look at the following photograph and decide how much BSA is affected. Then try to answer the question on the following slide.



Practice Question

Which of the following prescriptions would you recommend for BID dosing for 1 month duration? Use 2% BSA.

a. Fluocinonide 0.05% ointment, apply to affected area (knees) BID, # 30 grams
b. Fluocinonide 0.05% ointment, apply to affected area (knees) BID, # 90 grams
c. Hydrocortisone 1% ointment, apply to affected area (knees) BID, # 30 grams
d. Hydrocortisone 1% ointment, apply to affected area (knees) BID, # 90 grams

Practice Question

Which of the following prescriptions would you recommend for BID dosing for 1 month duration? Use 2% BSA.

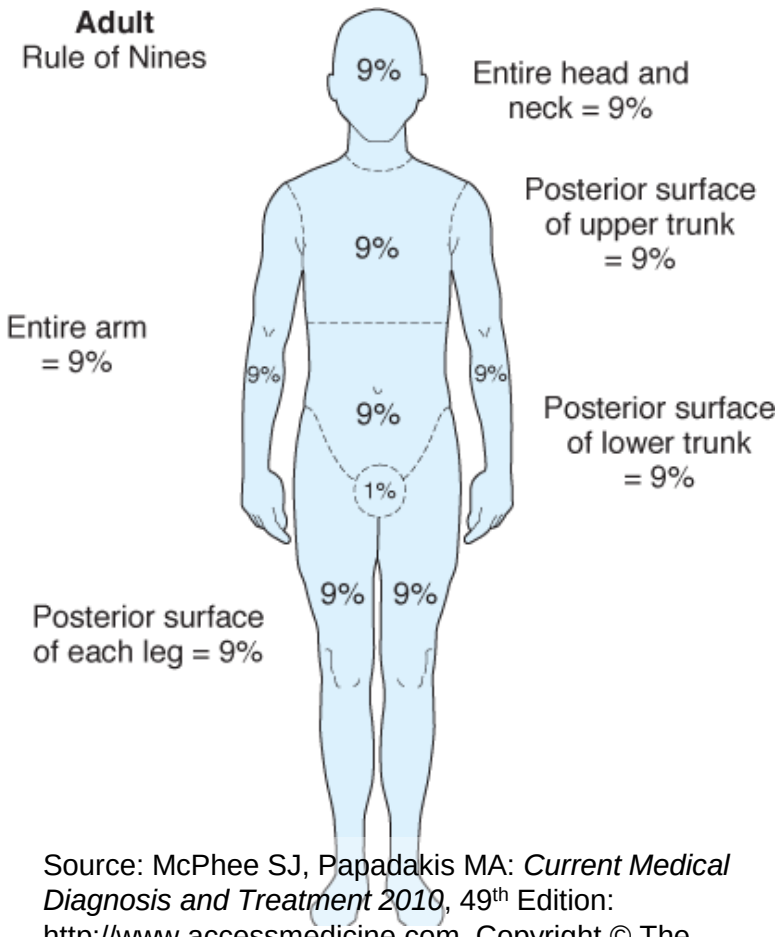
a. **Fluocinonide 0.05% ointment, apply to affected area (knees) BID, # 30 grams** (2 palms = 2% BSA = 30 grams for 1 mo BID)
b. Fluocinonide 0.05% ointment, apply to affected area (knees) BID, # 90 grams (for a 3 month supply)
c. Hydrocortisone 1% ointment, apply to affected area (knees) BID, # 30 grams (need a higher potency steroid for plaque psoriasis on the knees)
d. Hydrocortisone 1% ointment, apply to affected area (knees) BID, # 90 grams

Estimating Amounts: Reassess

- It takes ~**30 grams** to cover an average adult body (for one application)
- The best way to assure you are giving the right amount is to re-assess on follow-up
  - If your patient was given a 30-gram tube, confirm they are using it according to instructions, and ask how long that tube lasts
  - If a 30-gram tube only lasts them 2 weeks, they need 2 of them to last a month

Estimating BSA: Rule of Nines

- The “rule of nines” is a quick way of estimating the affected BSA
- Often used when assessing burns
- The body is divided into areas of 9%
- Pediatric versions exist and should be used when evaluating children



Source: McPhee SJ, Papadakis MA: *Current Medical Diagnosis and Treatment 2010*, 49th Edition: http://www.accessmedicine.com. Copyright © The McGraw-Hill Companies, Inc.

Pediatric Dosing

- Using pediatric BSA to calculate topical volume can be complex. Prescribing can be simplified by remembering the previous equations:

  2 adult palms = 0.5 grams

  OR

  2 adult palms 2 times a day = 30 grams / mo

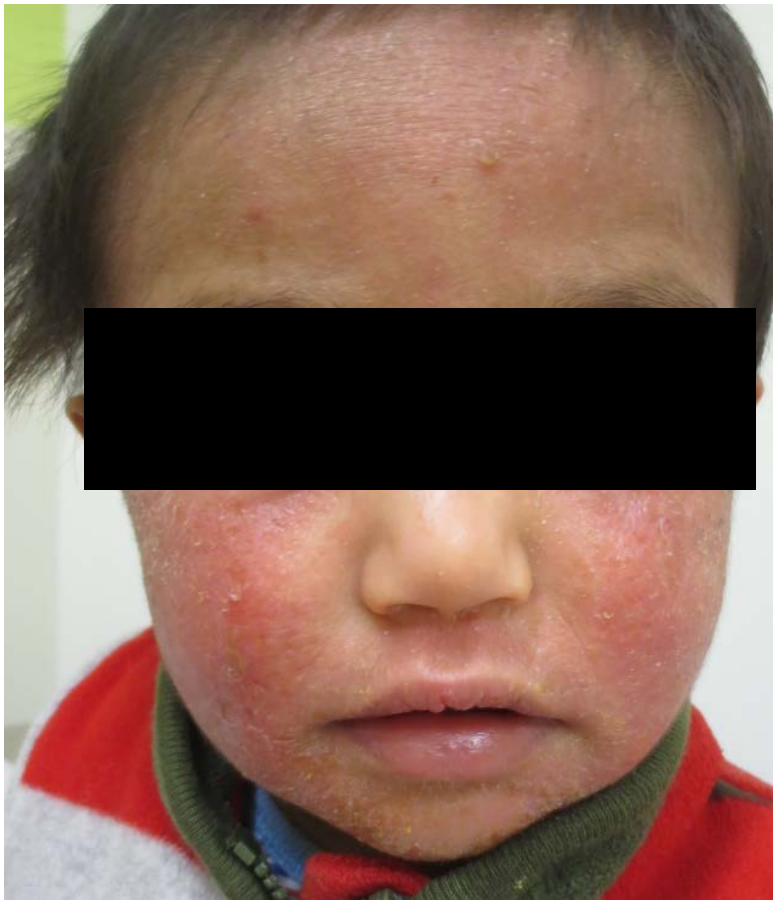
- Remember that children, especially infants have a high body surface area to volume ratio, which puts them at risk for systemic absorption of topically applied medications

Pediatric Dosing

- Low potency topical corticosteroids are safe when used for short intervals
  - Can cause side effects when used for extended durations
- High potency steroids must be used with caution and vigilant clinical monitoring for side effects in children
- Potent steroids should be avoided in high risk areas such as the face, folds, or occluded areas such as under the diaper

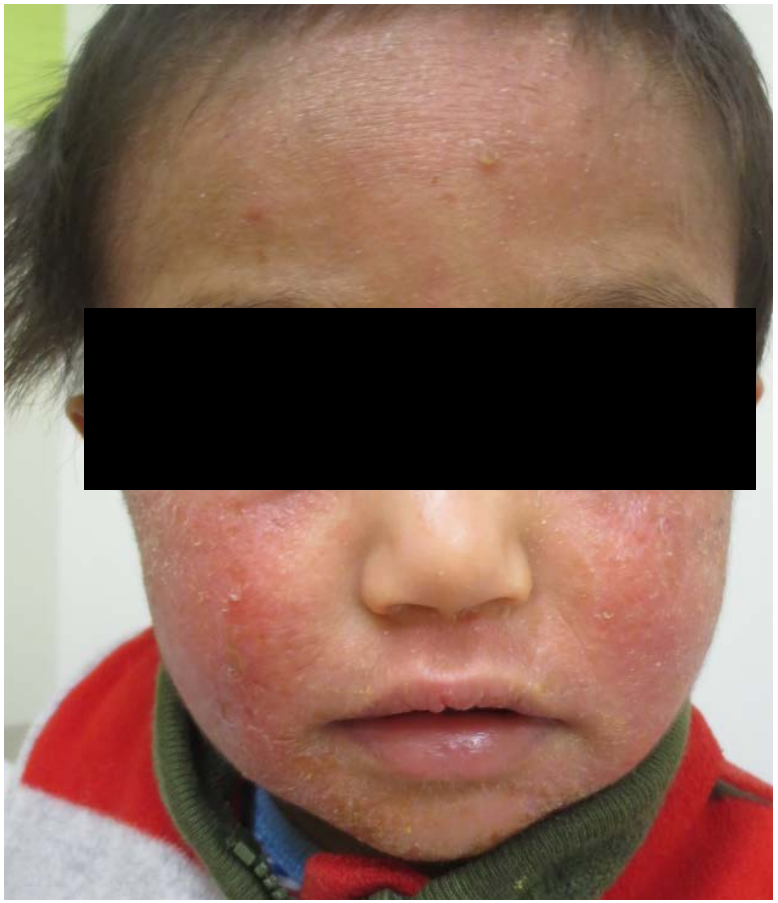
Which would you choose?

a. Clobetasol propionate 0.05% ointment
b. Fluocinonide 0.05% ointment
c. Hydrocortisone butyrate 0.1% ointment
d. Triamcinolone acetonide 0.1% ointment



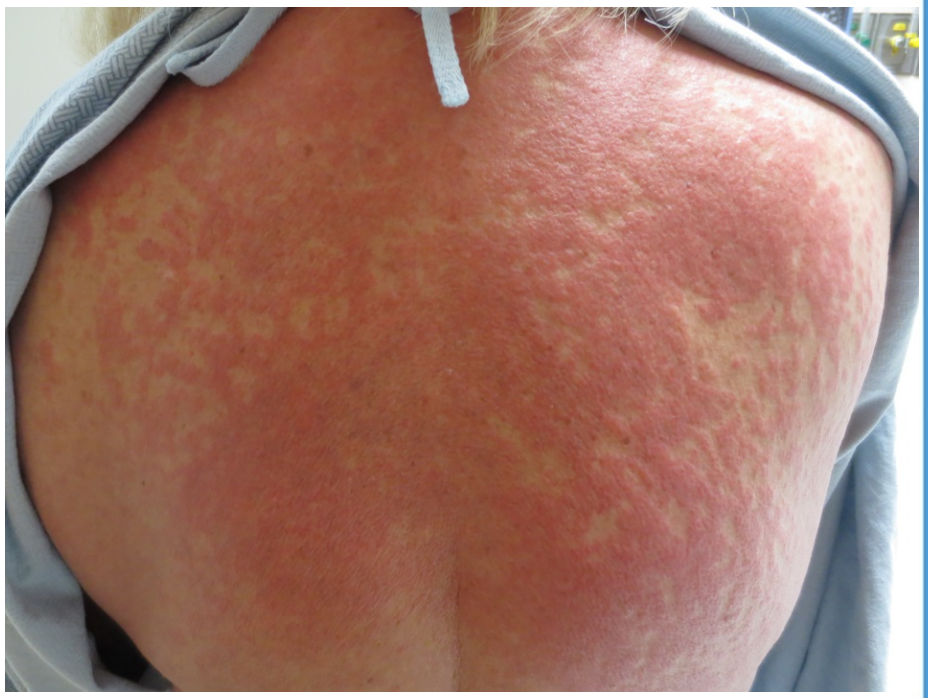
Which would you choose?

a. Clobetasol propionate 0.05% ointment (too strong)
b. Fluocinonide 0.05% ointment (too strong)
c. **Hydrocortisone butyrate 0.1% ointment**
d. Triamcinolone acetonide 0.1% ointment (too strong)



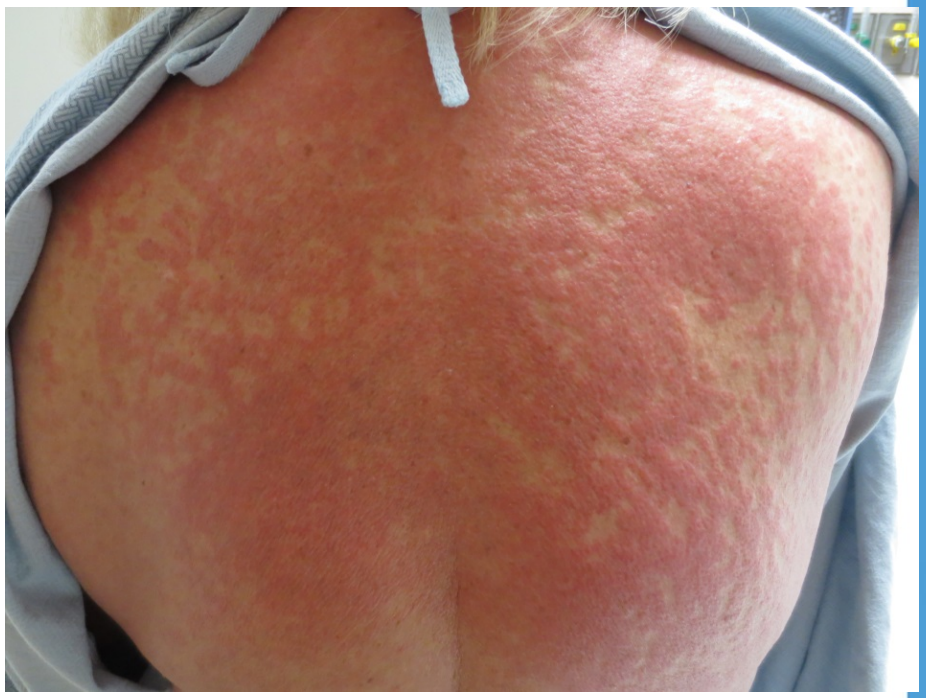
Practice Question

How much topical steroid would you prescribe for BID dosing for one month?



Practice Question

- BSA ~ 9% (rule of nines – posterior surface of upper back)
- 0.5 grams per 2% BSA = 1 gram per 4%
- 2.25 grams per application BID = 4.5 grams per day
- x 30 days = 135 grams



Let's move on to some topical medications used by dermatologists to treat

Acne vulgaris

Topical Retinoids

- **Mechanism**
  - Topical retinoids are vitamin A derivatives that act by normalizing the desquamation of follicular epithelium to prevent formation of new comedones and promote the clearing of existing comedones
- **Common Adverse Effects**
  - Dryness, pruritus, erythema, scaling
- **Available Forms**
  - Tretinoin, Adapalene, Tazarotene
  - Cream, gel, lotion, solution

Benzoyl Peroxide

- **Mechanism**
  - Benzoyl peroxide is a topical medication with both antibacterial and comedolytic properties
  - Acts via the generation of free radicals that oxidize proteins in the P. acnes cell wall
- **Available Forms**
  - Available as a prescription and over-the-counter, as well as in combinations with topical antibiotics
  - Cream, lotion, gel, or wash
- **Common Adverse Effects**
  - Bleaching of hair, colored fabric, or carpet
  - May irritate skin; discontinue if severe

Topical Antibiotics

- **Mechanism**
  - Reduce the number of P. acnes and reduce inflammation in inflammatory acne
- **Available Forms**
  - Erythromycin 2% (solution, gel)
  - Clindamycin 1% (lotion, solution, gel, foam)
- **Common Adverse Effects**
  - Topical acne treatments are often irritating and can cause dry skin
    - When using retinoids or benzoyl peroxide, consider beginning on alternate days
    - Use a moisturizer to reduce their irritancy
- **Additional Considerations**
  - Often used with benzoyl peroxide (versus monotherapy) to prevent the development of antibiotic resistance in the treatment of mild-to-moderate acne

Patient Education

- **Patient education and setting expectations are important components of effective acne treatment**
  - Physician and patient should develop a therapeutic regimen with the highest likelihood of adherence
  - Acne treatment targets new lesions, not present ones
- **Lack of adherence is the most common cause of treatment failure**
  - Patients will often stop their topical treatments too early without improvement in their acne
  - Topical agents take 2-3 months to see effect
  - Therapy should be continued for at least 8 weeks before a treatment response can be accurately evaluated

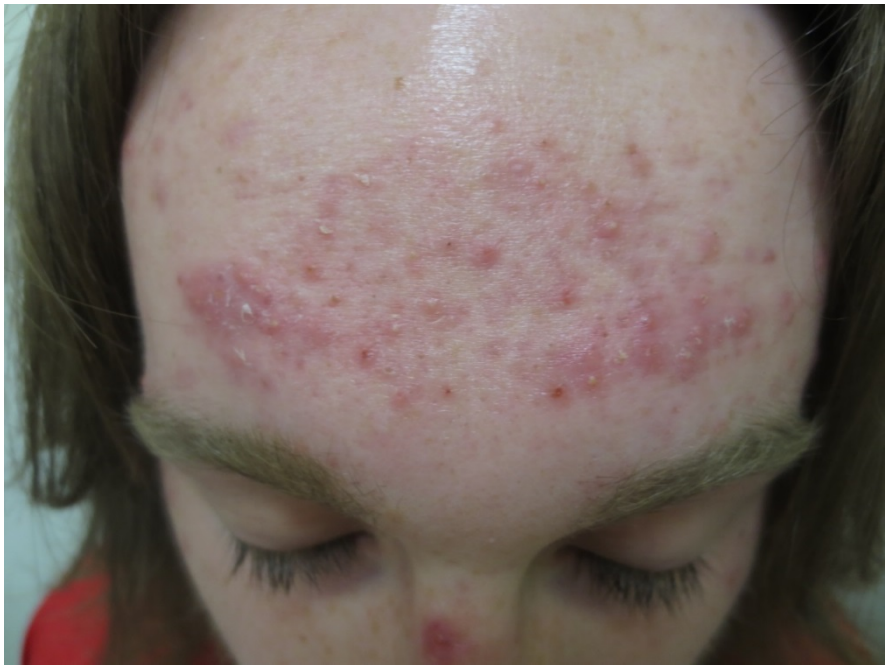
Address Side Effects

- **Many patients can be non-adherent to topical treatments due to adverse effects including skin dryness, peeling, redness, itching, burning, and stinging**
  - Acne-affected skin can be deficient in ceramides, which play an important role in maintaining the skin barrier and preserving its ability to prevent moisture loss
  - Daily use of ceramide-containing moisturizers may improve skin dryness and irritation by repairing and maintaining the skin barrier, leading to improved adherence

Acne Treatment Question

What would be an appropriate first-line treatment for this patient?

A. Oral isotretinoin
B. Salicylic acid 2% face wash
C. Topical benzoyl peroxide in the morning and tretinoin cream at night
D. Topical clindamycin lotion twice per day



Acne Treatment Question

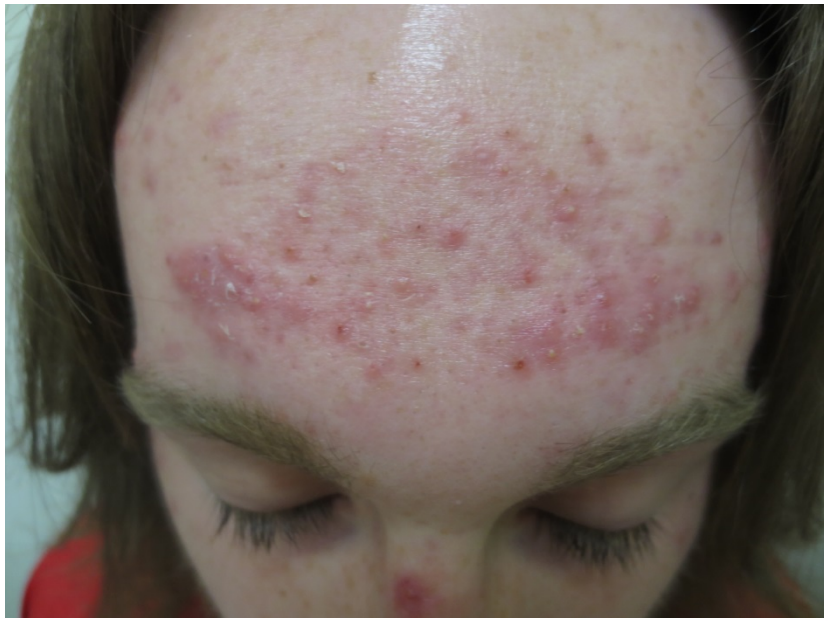
What would be an appropriate first-line treatment for this patient?

A. Oral isotretinoin (reserved for refractory cases of moderate/severe acne, not first-line)

B. Salicylic acid 2% face wash (less effective than benzoyl peroxide)

C. Topical benzoyl peroxide in the morning and tretinoin cream at night (topical antibiotic could also be added)

D. Topical clindamycin lotion twice per day (monotherapy not recommended due to possibility of bacterial resistance)



Common First-Line Treatments

Acne subtype	Management
Mild Acne	**Initial**: Topical retinoid or benzoyl peroxide (BP) **Alternative**: Combination therapy of BP + topical retinoid and/or topical antibiotic
Moderate Acne	**Initial**: Combination therapy with topical retinoid and BP +/- topical Antibiotic **Inadequate response**: Consider oral antibiotics, dermatology referral, and hormonal therapy for females
Severe Acne	**Initial**: Combination therapy with oral antibiotic, topical retinoid, and BP +/- topical antibiotic **Inadequate response**: Consider oral isotretinoin, dermatology referral, and hormonal therapy for females

Topical Antifungals

Topical Antifungals

- There are several classes of topical antifungal medications
- Some classes are **fungistatic** (stop fungi from growing), others are **fungicidal** (they kill the fungi)
- Not all conditions are treatable with topical antifungals
  - Hair and nail infections do not respond to topical treatment and require systemic treatment

Topical Antifungals

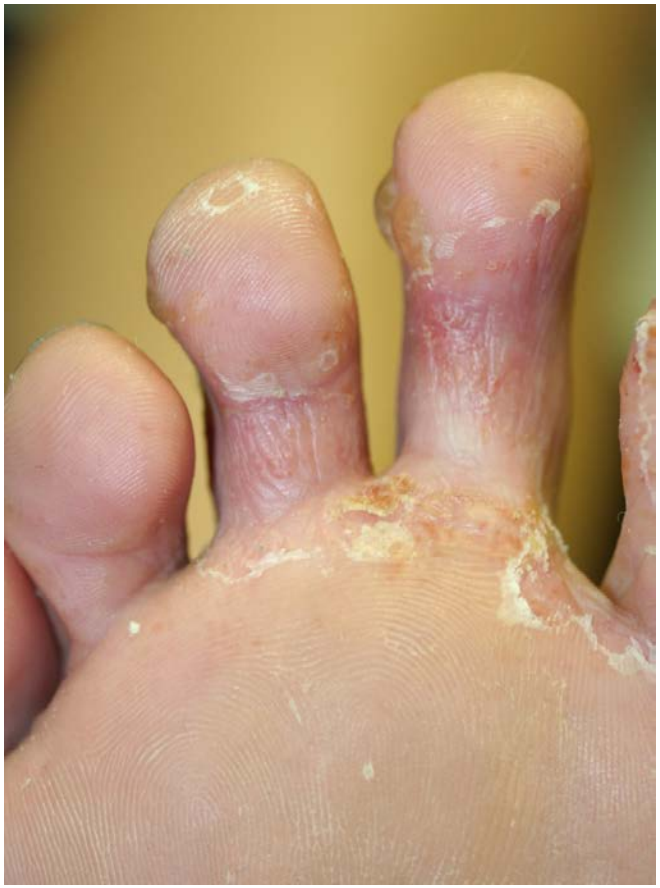
- The following are some examples of topical antifungals:
  - Imidazoles (fungistatic): Ketoconazole (Rx & OTC), Econazole, Clotrimazole (Rx & OTC), Miconazole (OTC)
    - Useful to treat candida and dermatophytes
  - Allylamines and benzylamines (fungicidal): Naftifine, Terbinafine (OTC), Butenafine
    - Better for dermatophytes, but not candida
  - Polyenes (fungistatic in low concentrations): Nystatin
    - Better for candida, but not dermatophytes

Advantages of Topical Antifungals

- Topical antifungals are preferred for most superficial fungal infections of limited extent
- Advantages include:
  - Relatively low cost
  - Acceptable efficacy
  - Ease of use
  - Low potential for side effects, complications, or drug interactions

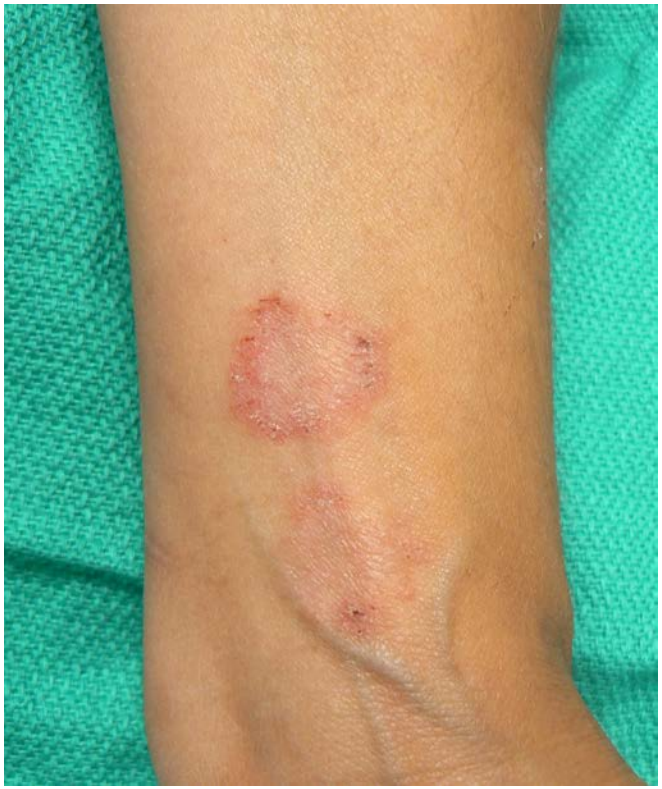
Example Treatment: Tinea Pedis

Topical terbinafine or miconazole cream. Apply to affected areas twice daily for 4-6 weeks.



Example Treatment: Tinea Corporis

- Imidazoles (e.g., miconazole) are first-line
  - Apply twice daily until resolution, then continue treatment for a minimum of two weeks; this usually takes 4-6 weeks total
- Allylamines (terbinafine) are second-line unless cheaper at your institution than imidazoles



Topical Medications used in Psoriasis

Psoriasis Treatment

- For localized psoriasis (less than 5% body surface area), topical treatment is appropriate
- First line agents: high potency topical steroid. May be used in combination or in rotation with a topical vitamin D analog.
- Other topical options: tazarotene, tar, calcineurin inhibitors

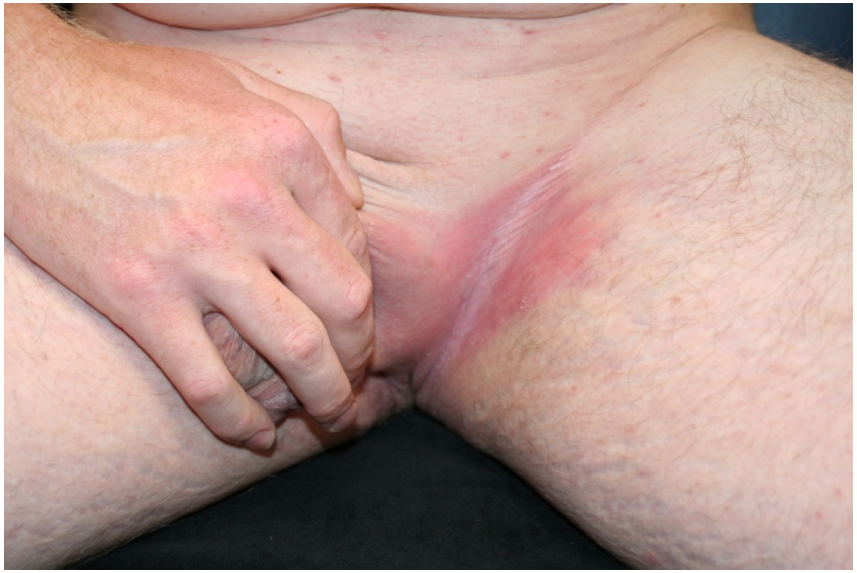
Topical Corticosteroids

- High efficacy and safety
- Use can be intermittent and long-term
- Also used adjunctively in patients treated with UV light or systemic medications
- Vehicle types are numerous (ointments, creams, solutions, gels, foams, tape, sprays, shampoos, oils, lotions)

Treatment Question

Which treatment regimen would you prescribe this patient?

a. Clobetasol 0.05% ointment BID
b. Desonide 0.05% ointment BID
c. Fluocinonide 0.05% ointment BID
d. OTC Hydrocortisone 1%



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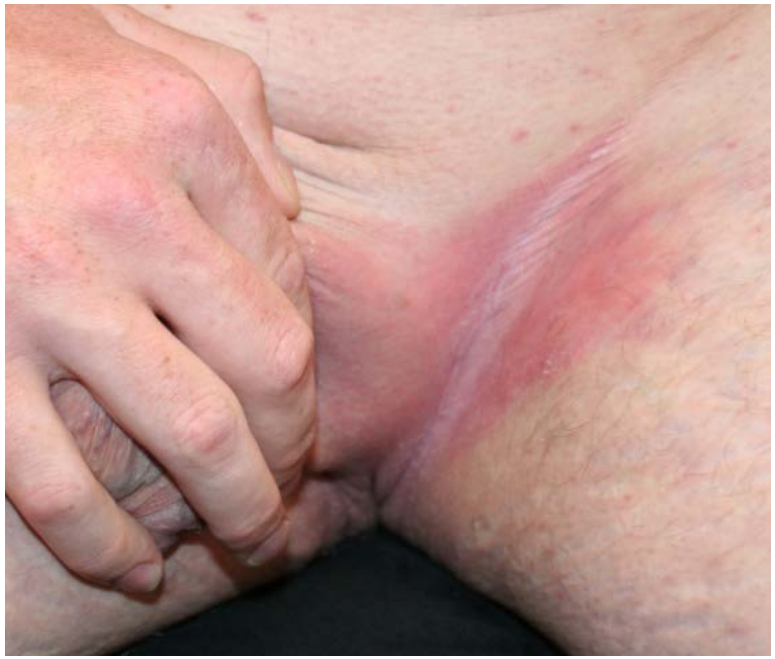

Greater caution regarding potency is needed when treating thin sites (face, neck and skin folds). For skin folds, use a low potency topical steroid. For longer-term use, recommend a steroid-sparing agent.

Topical Treatment

Medication	Uses in Psoriasis	Side Effects
Topical corticosteroids	All types of psoriasis	Skin atrophy, hypopigmentation, striae
Calcipotriene (Vitamin D derivative)	Use in combination or rotation with topical steroids for added benefit	Skin irritation, photosensitivity (but no contraindication with UVB phototherapy)
Tazarotene (Topical retinoid)	Plaque-type psoriasis. Best when used with topical corticosteroids.	Skin irritation, photosensitivity
Coal tar	Plaque-type psoriasis	Skin irritation, odor, staining of clothes
Calcineurin inhibitors	Off-label use for facial and intertriginous psoriasis	Skin burning and itching

General Tips Regarding Topical Therapies

- If a patient is not improved at their follow-up visit, consider asking yourself the following
  - Do I have the correct diagnosis?
  - Did I prescribe the correct treatment?
    - Correct potency?
  - Did I communicate the instructions in a way the patient could understand and remember?
    - Written instruction sheets are helpful to patients

General Tips Regarding Topical Therapies

- If a patient is not improved at their follow-up visit, consider asking **the patient** the following
  - Were you able to pick up the medication from the pharmacy?
  - How did you use it?
  - How much medication do you have left?
  - Did anything prevent you from using it?
  - Did you experience any side effects?
  - Do you have any concerns about your treatment?

Address Adherence

- Poor treatment outcomes from topical therapy regimens often result from poor adherence and ineffective use of the medication
- There are many potential factors that influence adherence
  - Medication efficacy
  - Inconvenience
  - Time constraints
  - Fear of side effects
  - Cost
  - The way a medication feels (vehicle)
  - Unclear instructions
- More frequent visits and interaction with the provider increases adherence

Take Home Points

- The efficacy of any topical medication is related to the strength, location, vehicle, and concentration
- Topical medications can be very expensive
- When writing a prescription for a topical medication, include: generic name, vehicle, concentration, directions, amount, # of refills
- Corticosteroids are organized into classes based on their strength (potency)
- Skin atrophy, acne, striae, and telangiectasias are potential local side effects of corticosteroid use
- It takes ~30 grams to cover an average adult body (for one application)

Take Home Points

- Use benzoyl peroxide with topical antibiotics to prevent the development of antibiotic resistance in acne treatment
- Lack of adherence is the most common cause of treatment failure in acne patients; patient education is crucial
- Topical antifungals are preferred for most superficial fungal infections of limited extent
- For localized psoriasis (less than 5% body surface area), topical treatment is appropriate
- There is one vehicle that is the best one to prescribe for a patient: the vehicle that the patient will use

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To take the quiz, click on the following link:

https://www.aad.org/quiz/dermatologic-therapies-learners