Common Skin Infections & Infestations

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LEADERSHIP AND LEARNING ACADEMY

No Relevant Commercial Relationships to Disclose

Learning Objectives

At the conclusion of this session, participants should be able to:

- Describe the clinical presentation of common skin infections and infestations seen in primary care settings
- Discuss the differential diagnosis and management of common skin infections and infestations
- Recognize life threatening skin infections and appropriately refer patients to specialized dermatology care

Common Cutaneous Infections & Infestations

- **Bacterial**
  - Cellulitis
  - Erysipelas
  - Impetigo
  - Staph Scalded Skin Syndrome (*SSSS*)
- **Fungal**
  - Candidiasis
  - Dermatophyte infections
  - Tinea corporis, pedis, capitis and onychomycosis)
  - Tinea versicolor

- **Parasitic**
  - Lice
  - Scabies
- **Viral**
  - Condyloma acuminatum
  - Herpes simplex
  - Molluscan contiagiosum
  - Varicella-zoster virus infections
  - Verrucae
  - Viral exanthems
- **Envenomations and arthropod bite reactions**
  - Spider bites

Let’s start with a few real cases

Case 1:
A 55-year-old woman with a history of uncontrolled diabetes and intravenous drug abuse comes to your outpatient office complaining of severe pain, fever, and rapidly progressing redness on the face. Her temperature is 38°C, heart rate is 105 beats per minute, respiration rate is 21 breaths per minute, her blood pressure is 142/90 mmHg. Skin examination reveals tense edema, bullous changes, grayish to brown discharge, necrosis and crepitus.

Which of the following is the next best step in the management of this patient?

a) Inpatient management with parenteral antimicrobials and surgical debridement
b) Inpatient management with topical antibiotics and surgical debridement
c) Outpatient management with incision and drainage
d) Outpatient management with oral antimicrobials and follow up in 7 days
e) Outpatient management with topical antimicrobials and follow up in 7 days

Case 2:
A 25-year-old rural farmer presents with a red scaly rash on the chest that has been getting worse since the beginning of summer three weeks ago. A picture of the rash is shown below. He denies any history of allergies or recent travel and has no previous history of skin or other systemic diseases.

a) **What is the most likely diagnosis?**
b) **What would one expect to see on microscopic examination of the skin scrapings?**
c) **What is the initial treatment of choice for this patient?**

Red, scaly, annular patch on the chest with central clearance

Case 3:

A 4-year-old boy was brought to the clinic with a maculopapular rash that has spread from face to the back in the past 3 days. In addition to the rash (shown in the figure below), the boy also complained of cough, coryza, conjunctivitis, and white spots inside his mouth. Vital signs were stable. He was afebrile, denied nausea or vomiting. No known sick contacts. The family lives around Disneyland in California and does not believe in vaccination.

Which of the following is the most likely diagnosis for this boy's illness?

a) Erythema Infectiosum
b) Hand-foot-mouth disease
c) Kawasaki disease
d) Measles
e) Molluscum contagiosum
f) Tinea versicolor

Bacterial Skin Infections

Common Skin Infections- Impetigo

Most common <u>etiology:</u> *Staph aureus* & *Strep pyogenes*

<u>Presentation:</u> Red papules to honey- crusted erosions

The golden yellow crusts are arranged as scattered discrete lesions that may become confluent over time

<u>Management:</u> Based on severity, location, comorbidity

*Topical: mupirocin (Bactroban): For mild, localized infection without systemic involvement

*Oral: cephalexin, dicloxacillin x 7-14 days

Staphylococcal Scalded Skin Syndrome

Etiology: ***Staph aureus:*** ***The*** **bacteria release poison (toxins) that cause the skin to blister and peel**

Presentation: **-Erythema and tenderness**

-Exfoliation

-Perioral and periorbital crusting

-Children may have fussiness (irritability), fever

-Blisters: fluid-filled blisters that break easily leaving an area of moist skin that soon becomes tender and painful

Peeling: large sheets of the top layer of skin may peel away

DDX: Toxic epidermolysis bullosa (TEN)

Mortality is about 4% and can be higher in newborns and immune compromised adults

Staphylococcal Scalded Skin Syndrome

Evaluation and diagnosis: ***Bacterial cultures +/- skin biopsy***

Nikolsky sign: SSSS can cause "wet tissue paper" like exfoliation

Management: Treatment usually requires hospitalization

Cornerstone of therapy: IV Antibiotics, replacing fluids & skin care

Initial antibiotics therapy may include nafcillin, oxacillin or cephalosporin

In areas with a high prevalence of MRSA, vancomycin may be considered

Complications: Fluid loss, dehydration and shock, scarring, death

Common Skin Infections- Cellulitis

Most common <u>etiology:</u> *Strep, Staph, H. influ* (face) lead to acute inflammation of skin & subcutaneous tissue

<u>Presentation:</u> Erythema, warm, tender patches or plaques

<u>Management:</u> Based on severity, location, comorbidity which dictates P.O. or I.V. 1st – 3rd gen cephalosporin

*Incision & drainage for abscesses, furuncles or carbuncles

*Oral antimicrobials: If no systemic signs & no comorbidities

*IV agents: When there is evidence of systemic infection

*Include limb elevation and address risk factors

Example of Systemic Manifestations

Cutaneous Signs of Bacterial Endocarditis.

Seen in ~20% of Subacute Bacterial Endocarditis (SBE)

Endocardial valvular infection such as *S aureus, Streptococci spp*.

Risk Factors: heart defects, IVDA, vascular catheters, artificial valves

Presentation:

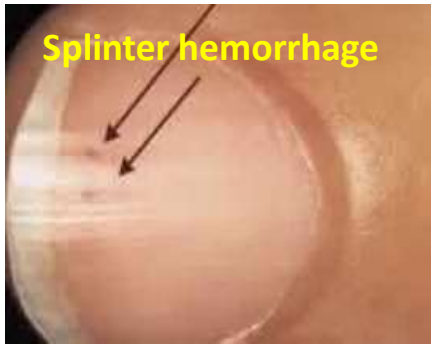
-Petechiae - most common

-Splinter hemorrhages- nonspecific, linear & red

-Osler nodes: tender red-purple nodules of digital tips lasting up to ~2 days (immune-mediated vasculitis)

-Janeway lesions – red, painless, 1- 4 mm macules on thenar, hypothenar eminences

(reflecting vasculitis of acute bacterial endocarditis from *S aureus)*



Skin Infections leading to Osteomyelitis

Infection of bone characterized by progressive inflammatory destruction and apposition of new bone

S. aureus is the most common organism

Presentation: Pain, fever, erythema, tenderness, edema, drainage, Elevated WBC, ESR, CRP, X-rays show lytic lesions,

Management:

*IV or oral antibiotic therapy for 4-6 weeks

*hyperbaric oxygen therapy

*Irrigation & debridement then organism specific antibiotics

Before moving on to fungal infections, let's review what we have covered so far.

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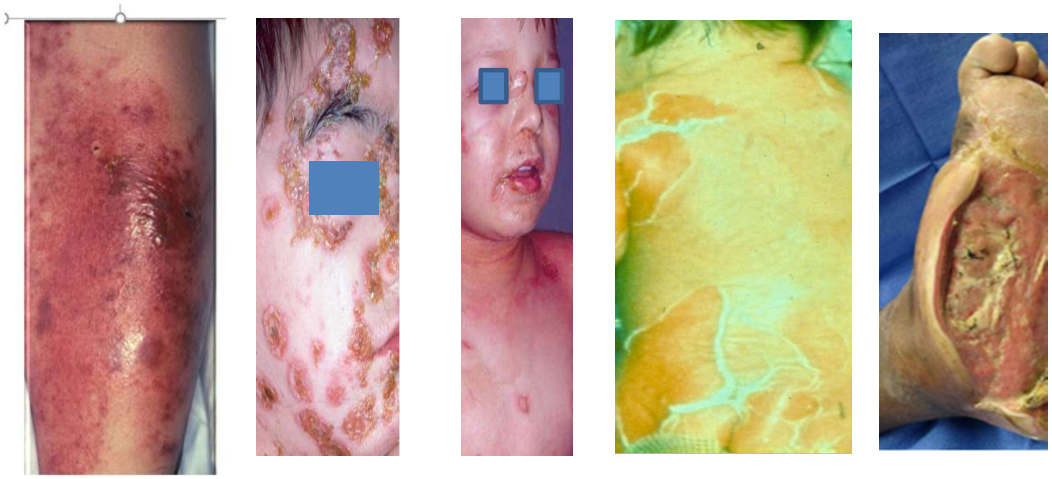


Here is a bonus Question: Which skin disorders are usually associated with a positive Nikolsky's sign?

Fungal Skin Infections

Tinea Corporis (ringworm)

Etiology: Fungal infection of the superficial epidermis

Trichophyton species

Presentation: ***Red, scaly, annular patch with central clearing***

Diagnosis: KOH prep/microscopy. Showing long branch-like tubular structures (hyphae)

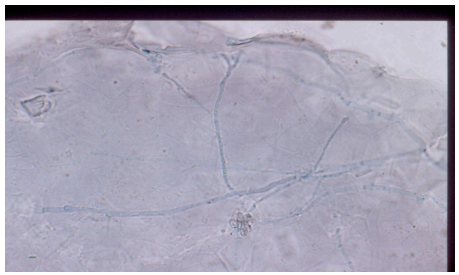
Management:

-Selenium Sulfate shampoo and oral grisofulvin to reduce fungi on hair

-Topical antifungal agents - e.g., Imidazole/Miconazole, clotrimazole, ketoconazole, econazole

-Apply BID for 2-4 weeks

-2nd line topicals: terbinafine, naftifine, butenafine, ciclopirox



Tinea Pedis

Etiology: Two common variants

*Interdigital - scale, redness, maceration of 3rd, 4th toe web spaces

*Moccasin type - soles diffuse red and scaly

Risk factors: Exacerbated by increased moisture

Management:

-Topical antifungal agents - e.g., Miconazole, clotrimazole,

-2nd line topicals: terbinafine, naftifine, butenafine,

ciclopirox

Tinea Capitis

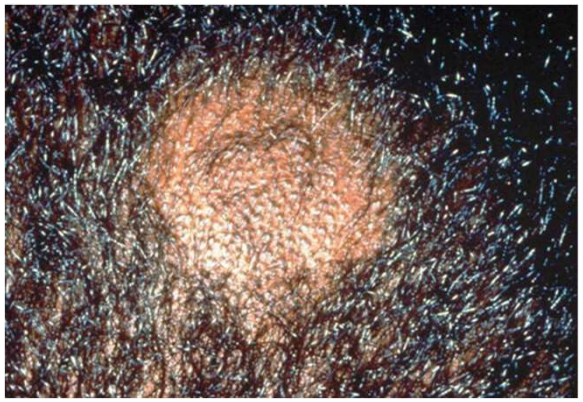
Etiology: fungal infection of *hair shaft*, primarily in children

African Americans > Caucasians

Presentation: Patchy hair loss and/or multiple "black dots"

Scale, lymphadenopathy, scarring may rarely result

Evaluation: KOH prep of broken hair, fungal culture if needed



Management:

-Oral griseofulvin *20-25 mg/kg/day* in a single daily dose with fatty food

-Treat for 6-12 weeks

-Wash fomites like combs, hats, etc

-Adjunctive use of selenium sulfide (Selsun Blue), ketoconazole, or ciclopirox shampoo decreases fungal shedding

Tinea Versicolor

Etiology: Lipophilic yeast flora- Malassezia furfur

Adolescents, adults > children (face)

Presentation: Hypopigmented, well-demarcated macules with fine scale on neck, chest, back, < face

Evaluation: KOH prep of skin scrapings

Management:

-Selenium sulfide/solution shampoo 2.5%;
-Apply for 20 min and rinse,
-Once daily x 1 week then weekly x 1 month

Candidiasis

Etiology: ***Candida albicans*** **is the common pathogen, leading to infection of skin and mucous. Candida spp are normal flora of mouth, GI tract, vagina, but** ***not skin:*** **Predisposing factors include endocrine disorders, immunosuppression, cancer, HIV, antibiotics, steroids, and some genetic disorders**

Presentation: ***intertriginous*** **areas, diaper area bright erythematous glistening skin in folds, pustulovesicular,** ***satellite*** **lesions, red macules with collarette of scale, adherent white plaques of thrush typically seen in mouth.**

Evaluation: KOH prep of skin scrapings -will show pseudohyphae

Management:

-Address predisposing condition (dry)

-Topical nystatin cream/powder, ketoconazole, clotrimazole BID-QID

-Oral candidiasis – thrush gray-white plaques w/ red base

-Treatment: nystatin susp (100,000 U/ml) swish and spit

Cutaneous Infestations

Scabies

Etiology:

-Sarcoptes scabei, usually transmitted by skin to skin contact, clothing, & linens can act as fomites

-Mites can live up to 5 days off skin

-2-4 week incubation period

-Multiple family members are often infected

Presentation: Burrows, linear scaly lesions:
distributed axillae, inner aspect of upper arms areolae, penis, wrists and interdigital webs ankles

Evaluation & diagnosis:

-Ask for Hx of intractable itching, Hx of possible exposure

-Note the character and distribution of lesions

-Microscope exam of skin scraping from a burrow

Management: 5% permethrin cream (Elimite), total body. Wash clothing & bedding >120°F next a.m.
Treat all close contacts

Pediculosis Capitis (head lice)

Etiology: -*Pediculus humanus capitis*

Transmission: head- to-head contact, fomites

Presentation: Pruritus, red macules, eggs (nits) can be noted stuck to the hair shaft, usually in the area behind the neck. Nits are whit, ovoid tightly adherent to hair shaft

Management:

-First line: 0.3% pyrethrins (RID), permethrin 1% (Nix)

-Apply to damp scalp 10 min and rinse

-Repeat 8-10 days

-To dissolve the cement formed by the nits, soak hair with a 1:1 white vinegar - water solution. Cover the hair with a warm moist towel for 30-60 minutes, then Comb out nits with metal nits comb

-Re-examination after 8-10 days

-Second line: If live lice still present after two treatments with first line OTC

-Apply malathion lotion 0.5% (Ovide®)

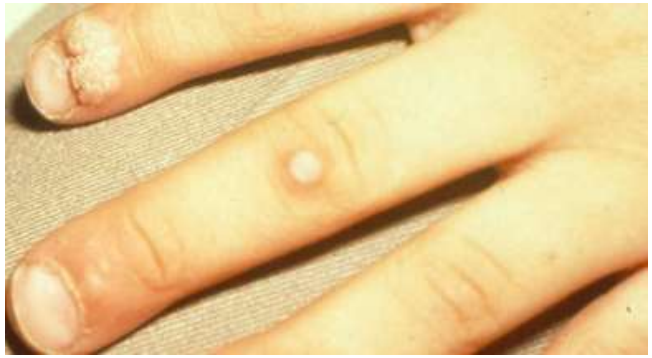
Viral Skin Infections

HPV- Warts/condyloma acuminatum

Etiology: Various types Human papilloma virus (HPV)

Presentation: Common warts, small, grainy skin growths

25% disappear in 3-6 months, 65% disappear in 2 years



Management:

-Freezing (cryotherapy) with liquid nitrogen

-Topical salicylic acid

(peeling medicine, more effective when combined with freezing)

-Duct tape – apply for 6.5 days/week x 8 week

-Pulsed Dye Laser

-Aldara (imiquimod 5% cream), not so effective

-

Molluscum Contagiosum

Etiology: Poxvirus: Contagious, autoinoculable. Commonly found in 3-16 years of age.

Presentation: 2-5 mm firm, umbilicated, pearly papules +/- surrounding redness that may be itchy or become infected,

Untreated cases may last 2-48 months (avg 18 months)

Management:

-Papules may fade away without medical intervention

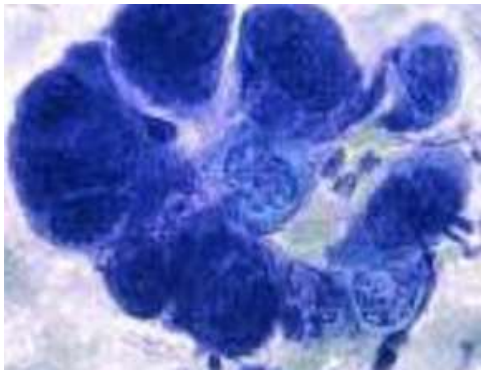
-Liquid nitrogen, curettage, cantharidin, RetinA gel, imiquimod cream

Herpes Simplex Virus (HSV 1 & 2)

Presentation: Grouped vesicles on erythematous base usually on lips, fingers, face or genitals . HSV-1 herpes labialis (90% of adults Ab +)
HSV-2 genital herpes (STD), 30% of adults in US, 60% asymptomatic shedding

Diagnostics: Tzanck, direct fluorescent antibody test, viral culture.
Tzanck Preparation involves the following steps
-Unroof vesicle then gently scrape floor of vesicle to obtain keratinocytes, stain the with Wright, Geimsa and observe on high power.

Virally-infected keratinocytes appear as multinucleated giant cells w/ nuclear molding and balloon cells. Please note: Tzanck cannot differentiate between HSV and VZV



Management: Acyclovir (Zovirax), valacyclovir, famciclovir. IV treatment is indicated in neonatal HSV, severe eczema herpeticum, immunocompromised hosts

Varicella Zoster Virus Infections-Shingles

Etiology:

- Primary etiology is HHV-3 (Varicella-zoster Virus VZV) leading to chicken pox
-Reactivation of chicken pox leads to herpes zoster, (shingles)
-Common in older individuals, weakened immune system , stressors

Presentation:

-Primary disease will present with fever, malaise, myalgia
Pruritic red macules → papules→ vesicles → pustules → crusts over 10 days
Scalp, face → trunk → extremities
Rash often described as "Dew drops on a rose petal"

-Reactivation (shingles) Usually affects a nerve root ganglion (dermatome or nerve line)
-Pain, burning, numbness or tingling, sensitivity to touch
-Unilateral erythematic rash that begins a few days after the pain along a dermatome
-Fluid-filled blisters that break open and crust over itching

Management: Systemic therapy should be initiated within 72 hours: Goal: reduce pain, & stop reproduction of viral disease and complications : Acyclovir (Zovirax), valacyclovir, famciclovir.

Viral Exanthems

Etiology: Various causes that include enteroviruses, respiratory viruses

Roseola (HHV-6,HHV-7), Erythema infectiosum (parvovirus B19), Hand-foot-Mouth Disease (Coxsackie), measles,

Presentation:

-Morbilliform/ maculopapular rash
-Blanchable erythematous macules and papules
-Cover trunk/extremities > face
-Generally diffuse, self-limited
-Patients may have fever, headache, myalgias, URI or GI symptoms

Roseola	HHV6 (HHV-7), erythema , papules surrounded by white halos , high fever, infant-preschool
Erythema Infectiosum	Parvovirus B19, slapped chick appearance, low grade fever, school age
Hand-Foot-Mouth Disease	Coxsackie, Oval vesicles on palms, mouth erosions, and foot/soles, infant-to preschool, fever
Measles	Measles virus, red macules, papules, head down spread, cough, coryza, conjunctivitis, Koplik spots

Brown Recluse Spider Bites

Etiology:

-Brown Recluse spiders: Note the dark brown pattern on the cephalothorax
-These spiders have very small fangs & their bite is usually painless
-The Brown Recluse's venom can destroy blood vessels, tissue & nerves.
-When the venom destroys blood vessels, ischemia occur leading to lack of oxygen and poor blood flow to the tissue. Eventually the skin tissue dies.

Presentation:

-Initially: red, tender, blue lesions & inflamed area about 3 to 8 hours after the bite
- Over the course of several hours, the irritation may cause a burning sensation
-signs of dermal necrosis centrally
-Systemic reactions: shock, hemolysis, disseminated intravascular coagulation (DIC)

Treatment

rest, ice, elevation
-Topical antibiotics to prevent infections
-Special wound dressings or ointments to promote healing and reduce pain
-Skin grafts or wound debridement may be needed to repair larger areas of damaged skin

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Take Home Points

1. Cutaneous infectious diseases & infestations are common causes of mortality & morbidity.

   PAs in all settings should be able to recognize, triage and refer patients appropriately.

2. Early diagnosis and treatment save lives.

3. Treatment options should be individualized while following national guidelines.

4. Prescribers should use antibiotics responsibly to minimize resistance.

5. Clinicians need to be aware of the systemic involvement and long term complications.

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Case 1.

A 55-year-old woman with a history of uncontrolled diabetes and intravenous drug abuse comes to your outpatient office complaining of severe pain, fever, and rapidly progressing redness on the face. Her temperature is 38°C, heart rate is 105 beats per minute, respiration rate is 21 breaths per minute, her blood pressure is 142/90 mmHg. Skin examination reveals tense edema, bullous changes, grayish to brown discharge, necrosis and crepitus.

Which of the following is the next best step in the management of this patient?

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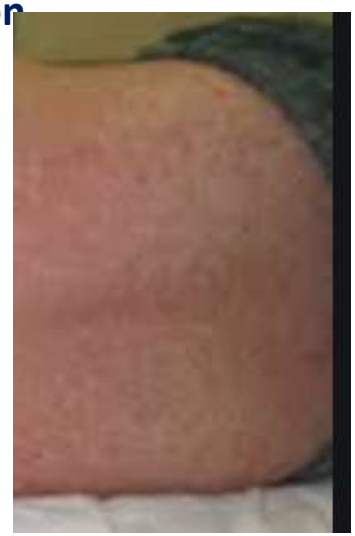
e)Outpatient management with topical antimicrobials and follow up in 7 days

Case 2: A 25-year-old rural farmer presents with a red scaly rash on the chest that has been getting worse since the beginning of summer three weeks ago. A picture of the rash is shown below. He denies any history of allergies or recent travel, and has no previous history of skin or other systemic diseases

a) What is the most likely diagnosis?
b) What would one expect to see on microscopic examination of the skin scrapings?
c) What is the initial treatment of choice for this patient?

Red, scaly, annular patch on the chest with central clearance

Case 3. A 4-year-old boy was brought to the clinic with a maculopapular rash that has spread from face to the back in the past 3 days. In addition to the rash (shown in the figure below), the boy also complained of cough, coryza, conjunctivitis, and white spots inside his mouth. Vital signs were stable. He was afebrile, denied nausea or vomiting. No known sick contacts. The family lives around Disney land in California, and does not believe in vaccination.



Which of the following is the most likely diagnosis for this boy's illness?

a) Erythema Infectiosum
b) Kawasaki disease
c) Hand-foot-mouth disease
d) Measles
e) Molluscum contagiosum
f) Tinea versicolor

Solutions to Questions:

Case1. A 55-year-old woman with a history of uncontrolled diabetes and intravenous drug abuse comes to your outpatient office complaining of severe pain, fever, and rapidly progressing redness on the face

The correct answer is a (Inpatient management with parenteral antimicrobials and surgical debridement). The Initial management of skin infection should be determined by severity, location, comorbidities, type of infection and presence or absence of purulence. The clinical features are suggestive of a necrotizing soft tissue infection in the face with systemic involvement in a patient with uncontrolled diabetes. This type of infection requires inpatient management, parenteral antibiotics and surgical debridement. Outpatient management with topical or oral antimicrobials is ideal for simple infections with no systemic signs or symptoms of spread and no uncontrolled comorbidities.

Case 2. A 25-year-old rural farmer presents with a red scaly rash on the chest that has been getting worse since the beginning of summer three weeks ago

This patient most likely has a fungal skin infection. The red, scaly, annular patch with central clearing is typically seen in Tinea Corporis (ringworm): This patient's outdoor farming activities and the summer climate could make him more likely to present with fungal disease. KOH prep/microscopy will show long branch-like tubular structures (hyphae).

Management:

-Selenium Sulfate shampoo and topical antifungal agents such as *Miconazole, clotrimazole, ketoconazole, econazole*

-Apply BID for 2-4 weeks

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A viral exanthem accompanied by cough, coryza, conjunctivitis, and white spots inside the mouth of a pre-school boy is more likely to be measles. In the US, measles outbreaks are common in unvaccinated communities. The other likely condition is erythema infectiousum but this would present with a slapped chick appearance. Hand-foot-mouth disease due to Coxsackie virus would present as oval vesicles on palms, mouth erosions, and foot/soles. Molluscum contagiosum rash presents as papules firm, umbilicated, pearly papules. Tinea versicolor causes hypopigmented, well-demarcated macules with fine scale. Kawasaki disease ioften causes systemic vasculitis, with a high fever (>102.2 F, 39 C), and lymph node enlargement.

For Questions and Follow up Dialogue

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