

Dermatology

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Disclosures

- I have no relevant relationships with ineligible companies to disclose within the past 24 months.

Objectives

- Recognize common bacterial infections of the skin and treatment (impetigo, cellulitis, erysipelas, erythrasma, folliculitis)
- Recognize common fungal infections of the skin, diagnosis and treatment
- Recognize malignant skin lesions, risk factors for development, diagnosis and treatment options

Common Bacterial infections of the skin

- **Impetigo**
- **Cellulitis**
- **Erysipelas**
- **Folliculitis**



Bacterial infection: Impetigo

- Superficial skin infection
- Caused by *Staphylococcus aureus* or *Streptococcus pyogenes*
- Erythematous vesicles or pustules, shallow erosions with honey colored crust
- Typical on the face, nose, mouth, extremities

Bacterial infection: Impetigo

- No systemic symptoms
- Localized treat topically with mupirocin, widespread treat with oral antibiotics based on culture results
- If you are treating with empiric antibiotics and MRSA is suspected or confirmed: doxycycline 100 mg BID or sulfamethoxazole-trimethoprim 1 or 2 DS tablets twice daily



Oral antimicrobial therapy for treatment of skin and soft tissue infections due to methicillin-resistant *Staphylococcus aureus* (MRSA) in adults

Treatment	Adult dose
Clindamycin	300 mg orally 4 times daily or 450 mg orally 3 to 4 times daily
Trimethoprim-sulfamethoxazole (cotrimoxazole)	1 or 2 DS tablets twice daily
Doxycycline	100 mg orally twice daily
Minocycline	200 mg orally once, then 100 mg orally twice daily
Linezolid	600 mg orally twice daily
Tedizolid	200 mg orally once daily
Delafloxacin	450 mg orally twice daily
Omadacycline	300 mg orally once daily

The doses recommended above are intended for patients with normal renal function; the doses of some of these agents must be adjusted in patients with renal insufficiency.

DS: double strength (ie, 160 mg trimethoprim with 800 mg sulfamethoxazole per tablet).

Data from:

1. Stevens DL, Bisno AL, Chambers HF, et al. Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. *Clin Infect Dis* 2014; 59:e10.
2. Liu C, Bayer A, Cosgrove SE, et al. Clinical Practice Guidelines by the Infectious Diseases Society of America for the Treatment of Methicillin-Resistant *Staphylococcus Aureus* Infections in Adults and Children. *Clin Infect Dis* 2011; 52:e18 (note: for TMP-SMX dose in osteomyelitis, refer to p e38).

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Bacterial infection: Cellulitis

- characterized by ill defined, erythema, pain, warmth, and swelling.
- Can present with lymphatic streaking and fevers and malaise
- Most common culprits:
 - Immunocompetent adults: *Staphylococcus aureus* and *Streptococcus pyogenes*.
 - Kids: *Staphylococcus aureus*
 - Immunocompromised: including those with diabetes and decubitus ulcers: mixture of gram-positive cocci and gram-negative aerobes and anaerobes.



Bacterial infection: Cellulitis

- Risk factors
 - minor skin trauma
 - intravenous drug use
 - tinea pedis infection
 - animal bites
 - peripheral vascular disease
 - immune suppression (chronic systemic steroid use, neutropenia, immunosuppressive medications, alcohol use disorder)
 - lymphatic damage lymph node dissection
 - radiation therapy
 - vein harvest for coronary artery bypass surgery
 - prior episodes of cellulitis





Bacterial infection: Cellulitis

- **Empiric oral therapy (covers MSSA and MRSA) and MRSA definitive therapy: for 5-10 days but should be individualized**
 - Trimethoprim-sulfamethoxazole (TMP/SMX) 1-2 double-strength tabs orally 2 times daily, OR
 - Doxycycline or minocycline 100 mg orally 2 times daily, OR
 - Clindamycin 300-450 mg orally 4 times daily

Bacterial infection: Erysipelas

- most often caused by beta-hemolytic group A streptococci (*Streptococcus pyogenes*).
- It involves the lymphatics of the superficial dermis.
- Risk factors for development:
 - extremes of age, debilitated patients, and patients with poor lymphatic drainage
 - Clinical presentation – well demarcated, abrupt onset of fever, chills, nausea, and malaise, lymphadenopathy
 - Can be anywhere on the body but think about it on the face, legs, penis



Bacterial infection: Erysipelas

- elevated WBC count , ASO titer can be positive
- DDX: cellulitis, contact dermatitis, angioedema, necrotizing fasciitis
- Immunocompetent patient, routine blood and tissue cultures are not recommended



Bacterial infection: Erysipelas

- Tx (Adults)
 - PCN 250-500 mg 4 times daily for 10-14 days
 - Dicloxacillin 250-500 mg four times daily for 10 days
 - Erythromycin 250-500 mg four times daily for 10 days
 - Penile (prednisone)
 - Consider daily prophylaxis with penicillin in patients with multiple recurrent bouts of erysipelas who have poor lymphatic drainage.



Bacterial infection: Erysipelas

- Treatment (Children)
- Mild (outpatient)
 - PCN G 25-50 mg/kg/day divided 3-4 times daily
 - Amoxicillin 25-50 mg/kg/day divided 3-4 times daily
- Moderate/severe (inpatient) (IV)
 - Ceftriaxone 50-75 mg/kg/day divided 1-2 times daily
 - Cefazolin 100 mg/kg/day divided 3 times daily
 - Clindamycin 30 mg/kg/day divided 3 times daily
- PCN allergy
 - Erythromycin 30-50 mg/kg/day divided 2-4 times daily (may not be adequate in areas with highly resistant beta hemolytic streptococci)
 - Clindamycin 30 mg/kg/day divided 3 times daily.

Folliculitis

- Common hair follicle inflammation
- Typically on the back, chest, can be on buttock or upper thighs
- Caused by bacterial or fungal
- Worsened by heat, sweat, friction



Folliculitis

- Can diagnose as bacterial or fungal from a culture of a pustule
- Topical antibacterial
 - Clindamycin lotion
 - Topical hibiclens
- Topical antifungal
 - Econazole cream
 - Selenium sulfide



Common fungal infections of the skin

- Tinea
- Majocchi's
- Tinea Versicolor
- Erosio interdigitalis blastomycetica

Tinea corporis (body), Capitis (head), beard area (barbae)
Tinea pedis (feet) Tinea Manus (hands)
Cruris (inguinal folds)

- + Skin infection caused by dermatophyte most commonly *trichophyton rubrum*
- + CP: annular, erythematous scaly plaques with central clearing, typically itchy
- + Tinea incognito – infection treated with topical steroids that can present with pustules and result in infection that tracts down follicle



Tinea corporis (body), Capitis (head), beard area (barbae)
Tinea pedis (feet) Tinea Manus (hands)
Cruris (inguinal folds)

- + Topical antifungals for 1-6 weeks, based on clinical response. Options include one of the following:
 - + Terbinafine 1% cream or spray – Apply once to twice daily.
 - + Clotrimazole 1% cream – Apply twice daily.
 - + Econazole 1% cream – Apply once to twice daily.
- + Extensive disease or hair bearing areas
 - + Terbinafine 250 mg once a day for 2-4 weeks.



Majocchi's granuloma (deep fungal infection)

- + Skin infection caused by dermatophyte most commonly *trichophyton rubrum* that involves the hair follicle
- + More common in immunosuppressed patients but can happen in young adults treated with topical steroids
- + Tx: Terbinafine 250 mg once a day for 2-4 weeks.



Tinea versicolor also known as Pityrosporum versicolor

- + Benign superficial skin infection caused by a yeast *Malassezia*
- + Most common in young adults and teenagers
- + CP: hyper or hypo pigmented oval shaped thin plaques with a fine dusty scale, can also be erythematous in lighter skin types found on the upper trunk and arms, neck, and face
- + **Topically, for large skin areas:** Imidazole creams (clotrimazole, econazole) applied once or twice daily for 1-4 weeks.



Erosio interdigitalis blastomycetica



- + interdigital candidiasis of the hands and feet
- + Clinical Presentation: macerated, round to oval shaped, and may extend onto the sides of the digits. Pustules may also be present
- + Risk factors: Working with hands in water (homemakers, dishwashers, bar tenders) Other predisposing factors include obesity, diabetes mellitus, and immunosuppression

Erosio interdigitalis blastomycetica



- + Treatment:
- + Gentamicin cream or ointment
AND econazole cream

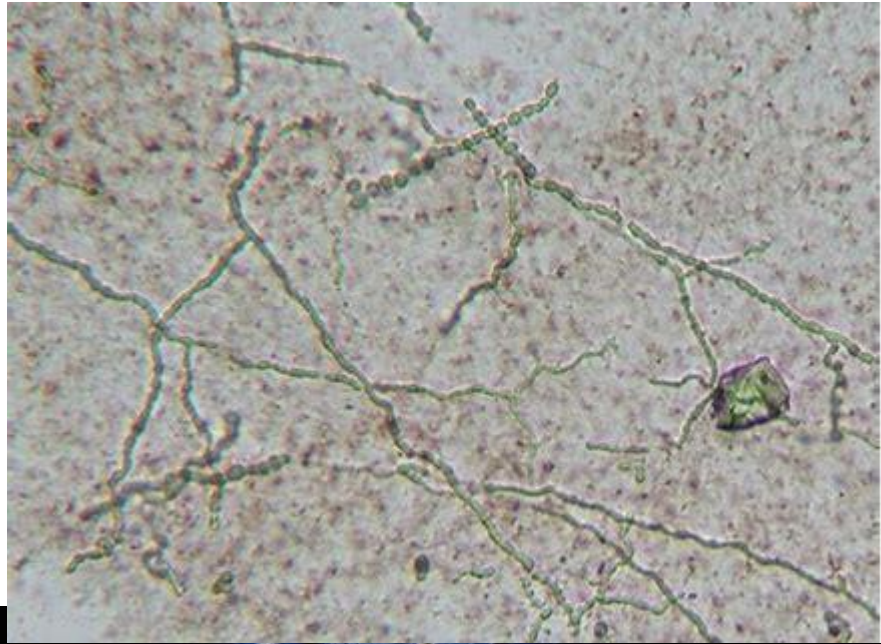
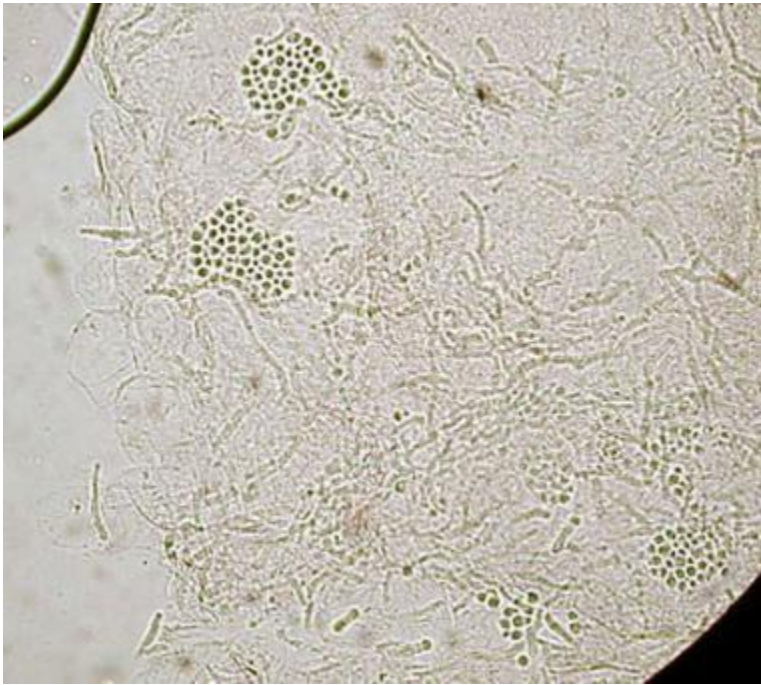
Procedural ways to distinguish between common culprits in dermatology

- + KOH can diagnose dermatophyte infection of the nail, tinea versicolor, tinea corporis, scabies, demodex rosacea
- + Culture can diagnose bacterial, fungal (nail, hair, tissue), viral infection



KOH – Potassium Hydroxide

- + Use 15 blade, Glass slide, solution of 10-20% KOH (potassium hydroxide), chlorazol black, cover slips
- + Scrape the leading edge of the scaling, burrow, or the subungual debris around a nail
- + Keep the blade perpendicular to the skin and scrape the blade onto the skin catching the scale with the glass slide
- + Add 2-3 drops of KOH and chlorazol black and cover slip, wait
- + Use low power and then higher power (10 objective) on the microscope to look for:



Culture – Bacterial, Viral, Fungal

- + Bacterial or viral culture:
 - + Use 15 blade to unroof a pustule, or vesicle and swab the bacterial swab or viral culture swab on the blade and the base of the lesion
- + Fungal culture -
 - + Nail: clip the nail down, use 15 blade or curette to obtain the chalky subungual debris, you can use nail clippings that also contain this debris
 - + These typically can take 3-4 weeks for results.
 - + Tissue for fungal culture obtained by doing a punch biopsy and placing the tissue in a sterile urine cup with saline soaked gauze

A microscopic view of skin tissue, showing a network of dark, branching structures (likely blood vessels or nerves) against a lighter, textured background. The text is overlaid on the lower-left portion of the image.

Recognize malignant skin lesions,
risk factors for
development, diagnosis and
treatment options

Actinic Keratoses

- Precursor to Squamous Cell Carcinoma
- Rough, scaly on sun exposed skin (scalp, dorsal hands, lower lip, ears, nose)
- Can self resolve in most cases



Actinic Keratoses

- frequency of actinic keratoses increases with age and cumulative lifetime sun exposure
- more common in immunosuppressed individuals (especially after solid organ transplantation) and in males
- Some medications (ie, capecitabine, sorafenib) may induce inflammation of existing actinic keratoses





Basal Cell Carcinoma

- most common type of skin cancer
- Typically in sites of intermittent sun exposure
- Pearly papules with rolled borders and telangiectasia



Basal Cell Carcinoma

- many subtypes of BCC, including superficial, nodular, pigmented, and infiltrating
- risk factors for BCCs include environmental exposure (ie, ionizing radiation, indoor tanning, chemicals such as arsenic, psoralen plus UVA, and coal tar), phenotype (freckling, red hair, fair skin that always burns and never tans), immunosuppression such as organ transplantation
- almost never fatal, local tissue destruction and disfiguration occur



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Squamous cell carcinoma a

- Commonly on chronically sun exposed skin, dorsal hands, lower lips, ears
- Scaly, hyperkeratotic papule



Squamous Cell Carcinoma

- Risk factors: ultraviolet (UV) exposure, solid organ transplantation, ionizing radiation exposure, cigarette smoking, human papillomavirus (HPV), chemical exposure (ie, arsenic, mineral oil, coal tar, soot, mechlorethamine, polychlorinated biphenyls, and psoralen plus UVA treatment), freckling, red hair, immunosuppression such as HIV disease / AIDS, and chronic nonhealing wounds



Melanoma

Aggressive malignancy of melanocytes, can present on skin, mucous membranes, nails or eye

Risk factors: family history or prior personal history of melanoma, a history of severe or blistering sunburns, a changing mole, a giant congenital nevus (greater than 20 cm), older age, lighter skin phototype, and multiple atypical nevi.

Primary prognostic feature of melanoma is the depth of invasion

Eval of pigmented skin lesions

- Asymmetric
- Borders that are irregular
- Colors, different colors specifically red, white, blue, pink within the mole
- Diameter greater than pencil eraser
- Evolving or changing over time



Skin Biopsy Principles

Provide complete, accurate clinical description and differential diagnosis to the pathologist → if this is not possible refer to avoid taking the wrong type of biopsy

Inflammatory conditions can involve the subcutaneous fat and blood vessels and need a punch biopsy

If melanoma is suspected in biopsy the entire lesion (depth is important for prognosis and treatment)

Ulcers should be biopsied from the edge of the lesion

Tumors should be sampled from the thickest portion when possible

Annular lesions biopsy from the leading edge



Skin Biopsy Principles

Prepare for bleeding in vascular areas like scalp

If possible avoid biopsies below the knee, especially in diabetics, as they are prone to infection and long healing times

Prepared patients for the type of scarring expected

Do not put multiple specimens in one container

Tangential Shave biopsy

- Materials required: alcohol prep swab, local anesthetic (xylocaine with epi), drysol, cotton tipped applicator, Vaseline, bandage, stainless steel blade
- Cleanse the area with alcohol prep swab
- Inject local anesthetic
- Remove the entire lesion by applying pressure to the ends of the blade to bend the blade and using a back and forth sawing motion to remove the lesion from the skin, you need at least pin point bleeding to ensure correct depth
- Apply drysol to the wound for bleeding
- Place specimen in formalin bottle for pathology



Punch Shave biopsy

- Materials required: alcohol prep swab, local anesthetic (xylocaine with epi), gauze, topical surgical prep swab, gloves, punch biopsy tool (2-8mm in size) forceps, scissors, needle holder, formalin, sutures, Vaseline, bandage, stainless steel blade
- Cleanse the area with alcohol prep swab
- Inject local anesthetic
- Surgical prep scrub applied to the skin in concentric rings from the lesion
- Stretch the skin perpendicular to the relaxed skin tension lines, punch instrument inserted into skin in a rotating fashion down to the subcutaneous fat. Forceps used to grab the specimen at the subcutaneous fat, curved sharp scissors used to cut the specimen at the fat.
- Suture with interrupted sutures
- Place specimen in formalin bottle for pathology



Treatment of Actinic keratoses

- Cryotherapy with liquid nitrogen
- Topical chemotherapy creams to treat one area of a field of disease
 - Imiquimod
 - 5-fluoururacil

Imiquimod

Selection of patients – Patients with field of disease (face, nose, ears, scalp, dorsal hands)

Pharmacokinetics

Metabolism: minimal systemic absorption

Excretion: urine and feces <1%; Half-life: 29h

Subclass: [Antineoplastics, Topical](#); [Immunomodulators](#); [Warts](#)

Mode of action - exact mechanism of action unknown; stimulates Toll-like receptor 7, modifying immune responses

Dosage-1 packet per application, limit treatment area to 25 cm² on face or scalp 2x per week for 16 weeks

Side effects – irritation at application site, flu like symptoms, photosensitivity, reactivation of HSV

Safety – no additional monitoring, No significant interactions known or found for this drug.

Imiquimod – use in pregnancy

Pregnancy

Clinical Summary

use alternative during pregnancy; inadequate human data available to assess risk

Lactation

Clinical Summary

may use while breastfeeding; no human data available, though risk of infant harm and adverse effects on milk production not expected based on minimal maternal systemic absorption

5- Fluorouracil

Selection of patients – Patients with field of disease (face, nose, ears, scalp, dorsal hands)

Pharmacokinetics

Metabolism: liver primarily, tissues; 6% systemic absorption

Excretion: expired CO₂, urine; Half-life: unknown

Mechanism of Action- inhibits DNA and RNA synthesis, used intravenous to treat breast and colon CA

Dosage forms: CRM: 0.5%, 5%; SOL: 2%, 5% apply 0.5% cream qd x1-4wk

Side effects – irritation at application site, flu like symptoms, photosensitivity, reactivation of HSV

Safety – no additional monitoring, No significant interactions known or found for this drug.

5- Fluorouracil – use in pregnancy

Pregnancy

Clinical Summary

avoid use during pregnancy; inadequate human data available, though risk of fetal harm low based on expected limited systemic absorption; risk of teratogenicity based on conflicting human data w/ systemic fluorouracil

Individuals of Reproductive Potential

avoid pregnancy by using effective contraception during tx and x1mo after D/C in female pts

Lactation

Clinical Summary

avoid use on nipple while breastfeeding, otherwise caution advised on other areas; no human data available to assess risk of infant harm, though possible drug excretion into milk if large application site; no human data available to assess effects on milk production

Treatment Basal and Squamous Cell Carcinomas

- This is dependent on the depth and type of skin cancer, for specifics use the NCCN guidelines treatment algorithms
- Electrodesiccation and curettage
- Excision
- Mohs surgery

Treatment of Melanoma

- Referral to dermatologist, med oncologist, surgical oncologist for treatment
- Excision
- Sentinel lymph node biopsy
- Chemotherapy/immunotherapy

Need for skin cancer screenings post cancer diagnosis

- Actinic keratosis – once yearly
- NMSC or Melanoma
 - skin examination should be performed at least every 6-12 months for 2 years and then annually

Patient education

Daily sun protection of the hand, ears, dorsal hands, forearms, v of the neck

- SPF 30 at least

Wide brim hats

Protecting children prior to age 18 from blistering sun burns



Take Home Points

- Recognize common bacterial infections of the skin and treatment
- Recognize common fungal infections of the skin, diagnosis and treatment
- Recognize malignant skin lesions, risk factors for development, diagnosis and treatment options



Questions?