

Skin Infections Among Elderly Living in Long-term Care Facilities

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Introduction

In the U.S. today, the population of individuals who are 65 years of age and older is increasing (U.S. Census Bureau, 2018), and nurses, as frontline health care providers, are increasingly becoming a conduit for healthy senior living. This module therefore focuses specifically on adults ≥ 65 years of age with skin infections, a healthcare concern that is especially important among those who are living in long-term care facilities (LTCF). Recent articles on cutaneous infections among those in LCTF are few; indeed more studies of skin infections have been conducted in Europe and Asia than in the U.S. Cutaneous infections are the third most common infection diagnosed in LTCF, preceded only by respiratory infections and infections of the urinary tract (Jump et al., 2008). The cutaneous infections commonly mentioned are cellulitis, angular cheilitis, folliculitis, fungal infections, impetigo, herpes simplex/zoster, and scabies (de Castro & Ramos-e-Silva, 2018). In addition, the skin reflects individuals' internal health, with a unique and sensitive ability to present manifestations of underlying diseases and even malignancy (Hall, 2006). As a result, the information provided here may lead to additional questions, but it will facilitate our ability to recognize the early signs and symptoms of skin infections so that we can make a difference. Prevention is one of the best defenses. Of course the many health issues associated with the aging process and the immune system's decline can be a challenge as well (de Castro & Ramos-e-Silva, 2018). This module is therefore designed to establish a better understanding of skin infections in the maturing population, because a comprehensive approach will result in better outcomes and a decrease in morbidity and mortality.

Objectives

To have a better understanding of:

- the complexities of the aging body;
- the different effects of aging on the integument;
- skin infections encountered in long-term care facilities;
- the signs and symptoms of infections;
- prevention, diagnoses, and treatment of skin infections among the elderly in LCTF.

Population

Worldwide, the population of individuals ≥ 65 years of age is increasing; in the U.S. in 2016, their number was estimated at 49.2 million (Administration for Community Living [ACL], 2018). This breaks down as follows:

- 28.7 million (58%) ages 65 to 74
- 14.3 million (29%) ages 75 to 84
- 6.3 million (13%) ages 85 and older
- 81,896 (0.2%) ages 100 and older

By 2060, 98 million Americans will be 65 years and older, 24% of the population. People reaching 65 years have an average life expectancy of an additional 20.6 years for females and 18 years for males. Women outnumber men by 27.5 million to 21.8 million. Today, older adults are more educated, with less poverty than at any time in the past 50 years; they are more racially and ethnically diverse; and they remain in the work force longer. Furthermore, about one in five 65- to 74-year-olds live alone, with the number doubling to about 4 of 10 among those 85 years of age and older (U.S. Census Bureau, 2018). More than one fourth of women aged 65 to 74 lived alone in 2014, jumping to 42% among aged 75 to 84 and 56% for those 85 years and older (ACL, 2018). All people 85 and older are more likely to live in group quarters such as nursing facilities (U.S. Census Bureau, 2018). Thus Americans ≥ 65 years old who need nursing home care are predicted to be 2.3 million in 2030, up from 1.3 million in 2010 (U.S. Census Bureau, 2018). There are 15,600 nursing homes in the U.S., with 1.7 million licensed beds and 1.4 million residents (ACL, 2018).

Statistics from November 2018 have estimated skin and soft tissue infections (SSTIs) at 2.4 million people in 2000 and 3.3 million in 2012, a 40% increase (U.S. Census Bureau, 2018). SSTI incidence for children and adolescents declined by 50%. Among adults, the incidence did not change significantly, but among older adults (≥ 65 years) the incidence increased almost two-fold. During the same period, the total estimated direct healthcare cost of SSTIs increased three-fold from \$4.8 billion to 15.0 billion, largely driven by an eight-fold increase in ambulatory expenditures for SSTIs. Added to the overall cost, total population-based antimicrobial prescription rates for SSTIs increased four-fold. Further reported among older adults in nursing facilities and hospitals was an increase in SSTIs likely due to colonization by drug resistant pathogens. However, the increase may be due to the increase in this age group (ACL, 2018).

Elderly

As the body matures, it goes through many changes. Some of the changes that are more understood include stem cell exhaustion, altered intercellular communication, protein homeostasis loss, genomic instability and telomere attrition, epigenetic alterations, altered nutrients and growth factor sensing, mitochondrial dysfunction, and cellular senescence (de Castro & Ramos-e-Silva, 2018). These all have in common low chronic inflammation, often referred to as *inflamm-aging* (de Castro & Ramos-e-Silva, 2018). Together, these phenomena result in an overall weakened immune response system, allowing invasion by organisms (de Castro & Ramos-e-Silva, 2018). Jump et al. (2018) have reported that the response system can be hindered by other sensory changes as well: neurogenic, auditory, and gustatory declines, as well as declines in acuity. Thus, the elderly's capacity to recognize changes via their senses and to send messages to the brain are altered (de Castro & Ramos-e-Silva, 2018).

History Taking

Obtaining a patient's in-depth history is vital for the delivery of good health care. Prior to interacting with the LCTF patient, completing an in-depth medical history/chart review and establishing baselines can lay a foundation for identifying trends and patterns. Early recognition of changes can preempt problems. A holistic approach is best, because the elderly can have atypical presentations (Jump et al., 2018). Understanding this cause and effect will improve outcomes through prompt treatment and management, using evidenced-based protocols.

Integument: Assessment

The integument, our largest organ, serves as the barrier between the external environment and the internal organs. It is constantly exposed to toxins and trauma, which in the elderly can result in damaging consequences (Hall, 2006). An astute provider can identify changes and trends in order to optimize timely diagnosis, treatment, and management and thus decrease morbidity and mortality. In addition, as mentioned before, the skin reflects internal health (Hall, 2006): cutaneous clues can be the key to recognizing more advanced disease sequelae.

Normal skin comprises heavily colonized bacterial flora (Wolff & Johnson, 2009). An overgrowth of residential flora can result in irritations and skin breakdown and can provide potential pathways for secondary infections (Hall, 2006). Intertriginous sites—skin folds or creases—are colonized more heavily (Wolff & Johnson, 2009). Sites under occlusions (braces, bandages, clothing) can also promote bacterial and fungal growth. Practitioners must be thorough in assessing the patient, taking extra time to examine hidden sites. This may be difficult, given the challenges presented by this age group—altered mental status, disease sequelae, clothes and devices, or a combination thereof.

The first step in infection prevention includes good hand-washing techniques. Other precautions, such as the wearing of gloves, gowns, or masks, may be necessary at times in accordance with appropriate protocols. Hygiene is important in the maintenance of good skin health. Implementation of the fundamentals of patient assessment cannot be overly emphasized. Simple observation of the patient's posture; breathing pattern; skin color, temperature, and texture; and sclera (jaundice/injected) provide clues that aid in calculating the patient's status (Bates, 1987).

An example of the skin presenting its unique ability to indicate underlying disease can be witnessed in seborrheic dermatitis. A new onset of seborrheic dermatitis, better known as dandruff, may be an indication of Parkinson's or severe HIV disease (Wolff & Johnson, 2009). Another dermatological condition, pruritus, can have numerous etiologies. A thorough work-up is warranted to rule out underlying causes such as malignancy or psychological issues (Wolff & Johnson, 2009). The same is true for a sudden eruption of truncal seborrheic keratoses (benign skin lesions), referred to as the *Leser-Trélat sign*. This is a cutaneous marker for adenocarcinoma of the stomach, uterus, breast, or lung, or for hematopoietic malignancies (Wolff & Johnson, 2009). Early recognition of these changes can enable timely treatment and disease management.

Multiple medications or polypharmacy, often seen in the elderly, can also result in adverse cutaneous reactions. Medication reconciliation, based on a complete medication history, is vital. Before treating cutaneous infections, one must know the medication's effect on absorption, distribution, metabolism, and elimination in the elderly. In some individuals, this may be complicated by other comorbidities or simply the aging process. Other considerations for treatment include finances, living conditions, mental and physical abilities, or the individual's perception of the importance of the infection (Roberts, Ogunwole, Blakeslee, & Rabe, 2018). These variables can influence treatment and challenge even the seasoned provider.

Skin layers

The skin is made up of three layers: the subcutaneous tissue, dermis, and epidermis. The innermost layer, subcutaneous tissue, constitutes the largest volume of adipose tissue. Blood

vessels, lymphatics, and nerves are located in the adipose lobules. This layer is a reservoir for the formation and storage of fat and is the location for lipid metabolism for nutrition (Hall, 2006). It also provides protection from physical trauma, and it is the insulator for temperature, both of which play a vital role in aging. Simple insults can result in tears/breaks in the skin and become pathogenic pathways. Subcutaneous tissue varies in thickness depending on location, but the skin becomes thinner with age, thus diminishing innate protection (Hall, 2006).

The middle layer, the dermis, contains a rich blood and nerve supply as well as hair and oil glands. Decreases in oil production associated with aging result in dryer, more pruritic skin. The blood vessels also become more fragile with age, resulting in easier bruising and bleeding (Hall, 2006). In addition, the dermis has “disordered, sparse collagen and elastin fibers, and there is a gradual decrease in nerve endings, microcirculation, and sweat glands, predisposing the elderly to increased risk of pressure ulcers, thermal injury and longer healing time after injury or surgery” (Wey & Chen, 2010).

The outer or most superficial layer of skin cells and pigment, the epidermis, is itself divided into four layers, inner to outer: basal, spinous, granular, and keratin (Hall, 2006). Its thickness is approximately <1 mm. Epidermal replication slows with age (Wey & Chen, 2010), taking 3-4 weeks (Saunders, 2006).

Among the elderly, these differences translate into longer times for open wounds, potential secondary infections, and overall delayed healing (Wey & Chen, 2010). Complicated with other diminishing factors and impaired immune response, this results in increase “susceptibility to infection” (Wey & Chen, 2010).

Skin Infections

Good skin care and hygiene are essential in mitigating infections. Regularly practiced hygiene and good emollients like a ceramide-containing cream can aid in healthy skin care. Before review of specific infections, providers must keep in mind that LTCF are common places for *Staphylococcus aureus* and methicillin-resistant *Staph aureus* (MRSA) (Montoya & Mody, 2011). Guidelines for clinical practice established by the IDSA suggest treatment for nasal culture positive *Staph aureus* and MRSA with 2% mupirocin ointment twice daily for 5-10 days. In addition, recommendations include a body decolonization regimen with a skin antiseptic solution (Chlorohexidine) for 5-14 days or dilute bleach baths (1 teaspoon per gallon or 1/4 cup per 1/4 tub or 13 gallons of water) for 15 min twice weekly for 3 months (Stevens et al., 2014).

Cellulitis

(ICD 10 code: unspecified, L03.90; more specific ICD codes depend on site)

Definition

Non-necrotizing inflammation of the skin and surrounding tissue as a result of a breach in integument viewed microscopically or more notable from trauma, bite, abrasion, or dermatoses (Stevens et al., 2014).

Etiology

Cellulitis is a spreading bacterial infection caused by beta-hemolytic streptococcus and staphylococcus species. *Staph aureus* is one of the most common pathogens; however, MRSA is becoming a common pathogen as well (Wey & Chen, 2010).

Older adults are especially more susceptible to skin infections when the following factors are present:

- Smoking
- Alcohol abuse
- Diabetes
- Obesity
- Malnutrition
- Asplenia
- Immune system weakened by disease or medications
- Living in long-term care facilities
- Prolonged hospitalization/rehab
- Post-surgery

Signs and Symptoms

Erythema, pain, swelling, and warmth.

More severe infections present as violaceous color and possible bullae accompanied by malaise, chills, fever, and toxicity; lymphangitic spread and pain disproportionate to examination findings (Barankin & Freiman, 2006).

Laboratory Studies

Depending on severity and patient's history, one should obtain a bacterial culture for identification as well as test for sensitivity. If co-infection is suspected, one should obtain a herpetic and/or fungal culture.

The IDSA recommends the following blood test in elderly patients with soft tissue infection and signs and symptoms of toxicity who present with fever, altered mental status, tachypnea, tachycardia, hypotension, and weakened immune system with overall debility (Stevens et al., 2014):

- Blood cultures
- CBC with differential
- Creatinine
- Bicarbonate
- Creatine phosphokinase
- C-reactive protein

The following should be noted as well:

- Imaging may be needed to determine underlying abscess.
- A strong suspicion for necrotizing fasciitis should prompt surgical consultation.

- The IDSA recommends hospitalization for patients with hypotension and elevated creatinine level, creatine phosphokinase level (2-3x upper normal values), C-reactive protein greater than 13 mg/l, low serum bicarbonate, and marked left shift on complete blood count with differential (Stevens et al., 2014).

Differential Diagnosis

Stasis dermatitis

Necrotizing fasciitis

Cutaneous metastasis from neoplasm (especially adenocarcinoma)

Inflammatory carcinoma of the breast or other malignancy

Sweet syndrome

Treatment (Stevens et al., 2014; Wolff & Johnson, 2009)

Treatment for 5 days unless infection has not improved and according to results from culture and sensitivity test (culture and susceptibility [C&S] from wound site). Cellulitis for lower extremities should include thorough examination of the feet, including interdigital exam for scale/fissures/maceration to rule out other potential underlying infections. A positive wood lamp examination will reflect bright coral pink highlights that indicate erythrasma. If positive, it is prudent to assess the groin and axilla as well.

Renal function should be checked, using the Cockcroft-Gault equation to estimate creatinine clearance, and antibiotic dosage should be adjusted:

Cephalexin 250 mg qid po

Erythromycin 250 mg qid (GI issues)

Clindamycin 300-400 mg qid (higher risk for clostridium difficile)

Amoxicillin-clavulanate 875/125 mg bid po

For methicillin-resistant *Staph aureus*:

Doxycycline 100 mg bid po (take with food, non-calcium containing; avoid sun exposure).

Trimethoprim sulfamethoxazole 1-2 double strength tablets bid po (caution with patients taking Coumadin; higher incidence for Steven-Johnson syndrome).

Angular Cheilitis

(ICD 10 Code: K13.0)

Definition

A form of oral candidiasis commonly known as thrush (Barankin & Freiman, 2006).

Etiology

The most common among Candida yeasts is *Candida albicans*, seen frequently in elderly patients, especially the following:

Diabetics

Mouth-breathers

Denture wearers (important to disinfect)
 C-PAP users
 Patients who are immunocompromised (HIV, stem/solid organ recipients)
 Patients undergoing chemotherapy/radiation
 Those receiving pharmacotherapy (antibiotics or steroids, oral or inhaled)
 Denture wearers or patients with gingivitis/dental issues

This infection may also have scalp/hands/nail involvement (Wolff & Johnson, 2009).

Signs and Symptoms

Inflammatory reaction with erythema; sore, fissured corners of the mouth; chapped lips; white coated tongue and/or buccal membranes; in addition, burning of tongue/mouth, dysphasia, dysgeusia (Wolff & Johnson, 2009).

Laboratory Studies

KOH preparation from oral white mucosal lesions/patches for fungal elements (Wolff & Johnson, 2009).

Differential Diagnosis

Herpes simplex
 Perioral dermatitis
 Impetigo
 Eczema
 Dermatitis vs allergic contact dermatitis
 Actinic keratosis (precancer), early squamous cell carcinoma (skin cancer)
 Lichen planus

Treatment (Wolff & Johnson, 2009)

Oral nystatin suspension 100,000 units/ml, 5 ml po; swish, gargle, swallow or spit postprandial and high sucrose.
 Nothing to eat or drink for 30 min posttreatment x 1-2 weeks.
 Clotrimazole 10 mg po lozenge, dissolved in mouth slowly 5 times a day for 14 consecutive days.

Note: Depending on patient's abilities, the treatments above may not be appropriate and should be adjusted to systemic antifungal agents. "Azoles are less toxic, but they must be used with caution, since older adults are usually under a number of medications and the risk of serious drug interactions is more likely to appear" (Flevari, Theodorakopoulou, Velegraki, Armaganedis, & Dimopoulos, 2013).

Complications

This condition is important given its prevalence among the elderly and the impact that it has on nutrition/hydration leading to anorexia, malnutrition, and weight loss. One should consider further investigation for concomitantly vulvovaginitis in females and balanitis in males (Wolff & Johnson, 2009).

Erythrasma

(ICD 10 code: L08.1)

Definition

A chronic bacterial infection of major skin folds (crural area, axillae, and toe webs) (Barankin & Freiman, 2006).

Prevention

Keep skin clean and dry.

Wear clean clothes.

Use antibacterial soaps.

Treat underlying medical conditions.

Etiology

Causative agent is *Corynebacterium minutissimum* (Wolff & Johnson, 2009).

Signs and Symptoms

Chronic erythema and maceration in skin folds unresponsive to antifungal treatment. Often manifestations are considered fungal, given their location (a KOH microscopic exam will be negative for hyphae). Positive wood fluorescent lamp examination will illuminate bright coral pink color (Wolff & Johnson, 2009).

Erythrasma is seen with immunosuppression; recurrent episodes may suggest diabetes.

Differential Diagnosis

Allergic or irritant contact dermatitis

Cutaneous candidiasis; “one hand, two feet dermatitis”

Irritant contact dermatitis

Inverse psoriasis

Tinea pedis

Treatment (Kibbi & Sleiman, 2018)

Topical therapy, First-line therapy (along with diligent foot care/washing with antibacterial soap or benzoyl peroxide washes, will accelerate healing):

Erythromycin 2% solution, cream or gel bid 14 days

Clindamycin phosphate 1% solution, gel or lotion bid 14 days

Systemic therapy, Second-line therapy (extreme caution in using systemic therapy in elderly patients):

Erythromycin (E.E.S., E-mycin, Ery-tab) 250 mg q 6 hr po, 7-14 days

Single-dose clarithromycin 1gm

Folliculitis

(ICD 10 Code: L73.9)

Definition

Folliculitis is an infection of the upper portion of the hair follicles (Wolff & Johnson, 2006).

Etiology

Agents include bacteria (most common is *Staph aureus*), fungi, virus, or parasites/arthropods (Wolff & Johnson, 2009).

Signs and Symptoms

Papule, pustule, erosion or crust surrounding hair follicle.

Laboratory Studies

Based on clinical findings/history, one should obtain a bacterial and/or fungal culture (or KOH preparation). A biopsy may be needed if the infection is recalcitrant to treatment, to rule out arthropods or other dermatoses (i.e., Grover's disease, transient acantholytic dermatosis). One should rule out *Staph aureus* by obtaining a nasal carriage bacterial culture and submitting for C&S (Wolff & Johnson, 2009).

Prevention

Use of antibacterial soaps, good hygiene

Loose clean clothing

Avoidance of hot tub, friction, occlusive clothing/devices, etc.

Differential Diagnosis (Wolff & Johnson, 2009)

Dermatological manifestations of renal disease

Insect bites

Irritant contact dermatitis

Papular urticaria

Grover's disease, transient acantholytic dermatosis

Id reaction (autoeczematization)

Scabies

Treatment (Stevens et al., 2014)

Topical therapy:

Antibacterial soap or benzoyl peroxide wash

Clindamycin 1% topical solution q 12 hr 5-7 days

Erythromycin 2% solution or gel q 12 hr 5-7 days

Mupirocin 2% ointment q 12 hr 5-7 days

Doxycycline 100 mg q 12 hr 5-7 days

Pending culture results, avoid Bactrim if possible, due to increased risk for Steven-Johnson syndrome and interference with Coumadin levels.

Impetigo

(ICD 10 code: L01.00)

Definition (Wolff & Johnson, 2009)

Infection of the epidermis: impetigo, noted with honey colored crusted lesion(s)/erosions.

Infection of the dermis: ecthyma, noted with deep crusted erosions or ulcers.

Etiology

Staph aureus and/or beta-hemolytic streptococcus pyogenes. Ecthyma is usually an infection from trauma, seen more in elderly or immunocompromised patients (Wolff & Johnson, 2009).

Impetigo may be bullous or nonbullous and may be treated topically or orally; however, with multiple lesions or in outbreaks with several patients, oral therapy is recommended (Stevens et al., 2014).

Signs and Symptoms

Impetigo: Honey crusted lesions 1-3 cm single or clustered with localized erythema, may be pruritic; secondary impetiginized (affected with impetigo on top of an underlying dermatological condition).

Ecthyma: this infection is more involved with pain and tenderness.

Laboratory Studies

One should obtain a bacterial culture; fungal, if co-infection is a concern; if painful, a viral culture to rule out herpes.

Treatment (Stevens et al., 2014)

Oral therapy should be a 7-day regimen against *Staph aureus* until pathogen is identified (bacterial culture and sensitivity):

Dicloxacillin 250 mg q 6 hr po

Cephalexin 250 mg q 6 hr po

Erythromycin 250 mg q 6 hr po (GI issues)

Clindamycin 300-400 mg q 6 hr po (high incidence of *Clostridium difficile*)

Amoxicillin-clavulanate 875/125 mg q 12 hr po (GI issues)

Mupirocin 2 % topical ointment - apply to lesions q 12 hr

Consider decolonization for 5 days with intranasal mupirocin bid, bleach baths (1/4 cup of bleach per full bath x 10 min), or Chlorhexidine washes daily. In addition, daily decontamination of clothing, towels, sheets, or other personal items.

For impetiginized cases, one may consider a short course of oral prednisone (caution for diabetics or if otherwise contraindicated).

Seborrheic Dermatitis

(ICD 10 code: L21.9)

Definition

Common chronic and recurrent inflammatory condition affecting the face—especially the brows, glabella, nasolabial crease, and ears—and the midchest.

Etiology

The specific cause of seborrheic dermatitis is uncertain; however, genetic, environmental, hormonal, and immune system factors may play a role. Seborrheic dermatitis has been linked to *Malassezia furfur* (*Pityrosporum ovale*). Flares may be aggravated by many variables, such as

stress, fatigue, sleep deprivation, seasonal changes, and illnesses including Parkinson’s disease, Down syndrome, or severe HIV (Wolff & Johnson, 2009).

Signs and Symptoms

Inflammation, erythema, pruritus, and scale—especially on eye brows/lids, glabella, nasolabial crease, midchest, midback, axilla, and groin.

Patients should be informed that there is no cure, but that it can be controlled/managed with antifungal shampoos and creams. Some providers may treat with topical steroids. One should suggest avoidance of topical steroid on face, which may have a rebound effect. For severely inflammatory cases, one should recommend topical calcineurin inhibitors (TCIs: Tacrolimus or Pimecrolimus ointments). Topical steroids can exacerbate fungal infections and thin the skin (Barankin & Freiman, 2009).

Note: Conditions worsened by topical steroids are an indication of fungal infections!

Differential Diagnosis

Eczema

Contact allergic dermatitis

Drug reaction

Rosacea

Psoriasis

Treatment

Over-the-counter (OTC) antifungal shampoos containing selenium sulfide or zinc pyrithione as face/scalp/body wash are helpful: Suggested daily use for up to 2 weeks, followed by washes 1-3 times per week for maintenance. Certain hair types are unable to tolerate frequent shampooing; therefore, longer lathering periods are suggested.

OTC anti-fungal creams that reduce pityrosporum yeasts include clotrimazole, miconazole, and terbinafine.

Prescriptive medications:

Ketoconazole 2% cream: apply to affected sites up to 2 weeks; prn flares.

Ketoconazole 2% shampoo: lather, rinse, re-lather for 5 min before rinsing out daily for 2 weeks; prn flares (certain hair types may not permit daily shampoos).

Note: TCIs like tacrolimus, pimecrolimus, and crisaborole are nonsteroidal, anti-inflammatory, anti-pruritic agents (Wolff & Johnson, 2009).

Fungal Infections

Superficial fungal infections are the most common of mucocutaneous infections. Onset is from an overgrowth of “transient or residential flora associated with a change in the microenvironment of the skin” (Wolff & Johnson, 2009).

“In 2013, the FDA announced ketoconazole tablets should no longer administered as first line therapy for fungal infections due to severe hepatic injury, adrenal insufficiency, and adverse drug reactions” (Flevari, et al., 2013).

Tinea Corpus

(ICD 10 code B35.4)

Definition

Dermatophyte infection of trunk, arms, or neck—not hands, feet, or groin; commonly referred to as “ringworm.” Reassurance may be needed, informing the patient that the condition is fungal-related and not a worm residing under the skin (Wolff & Johnson, 2009).

Tinea Cruris

(ICD 10 code B35.6)

Definition

Dermatophyte infection of groin and surrounding area; commonly referred to as “jock itch”; usually accompanied by tinea pedis (Barankin & Freiman, 2006).

Note: Apply socks before underclothing to prevent fungal transmission to groin.

Etiology (Wolff & Johnson, 2009)

Dermatophytes invade keratin of skin, nails and hair; incubation 1-3 weeks.

Transmission:

- Human to human, anthropophilic
- Animal to human, zoophile
- Soil to human, environmental, geophilic

Risk Factors (Wolff & Johnson, 2009)

- Hot, humid conditions
- Tight and/or occlusive clothing
- Hyperhidrosis
- Diabetes mellitus
- Obesity
- Immunosuppression

Signs and Symptoms (Wolff & Johnson, 2009)

Mild pruritus, scaling with raised erythematous borders in annular macules, patches or confluent plaques, with possible central clearing depending on duration and size.

Note: Males, uncircumcised, may develop a yeast infection, balanitis, especially if diabetic or on medication such as antibiotics and/or oral steroids, resulting in inflammation of the foreskin and head of the penis

Laboratory Studies

KOH preparation: collect scale with #15 blade on glass slide with potassium hydroxide 5% to 20% solution; heat slide gently until bubbly (lighter or hotplate); positive microscopic examination for hyphae—numerous slender, segmented tube-like structures (Wolff & Johnson, 2009).

Using a disposable toothbrush, one can also collect scale to be sent for fungal culture.

Treatment

Apply topical antifungal cream to affected site and 3 cm beyond, up to 4 weeks or at least 1 week after lesions have cleared. In some cases, treatment may take up to 6 weeks. Do not share clothing, towels, hats with others until lesions have healed. Tinea corporis is contagious. Often other sites of the body may be affected; examine thoroughly. For example, toenails or feet may be involved; hence apply socks before underwear.

Example: Tinea manuum (fungal infection of the hands) usually will indicate tinea pedis (fungal infection of the feet), better known as “one hand, two feet dermatitis”

OTC preparations include terbinafine, clotrimazole or miconazole creams.

Prescriptive medications (Wolff & Johnson, 2009):

Imidazoles inhibit the enzyme that converts lanosterol to ergosterol, resulting in an unstable fungal cell membrane, and cause leakage of the membrane; in the weakened state, the dermatophyte is unable to reproduce and is slowly killed by the fungistatic action:

- Clotrimazole 1% cream: apply q 12 hr
- Econazole 2 % cream: apply q 12 hr
- Ketoconazole 2% cream: apply q 12 hr

Allylamines inhibit the enzyme biosynthesis, resulting in decreased sterols and causing cell death:

- Ciclopirox 1% cream: apply q 12 hr
- Terbinafine 1% cream: apply q 12 hr
- Naftifine 1% & 2% cream: apply q 12 hr

Tinea Versicolor

(ICD 10 code B36.0)

Definition

Common chronic overgrowth of resident cutaneous flora seen under warm conditions presenting as discolored (pinkish brown) scaly macules/patches or confluent plaques (Wolff & Johnson, 2009).

Etiology

Lipophilic yeast, *Malassezia furfur*: a superficial overgrowth that occurs especially in hot, humid seasons or climates in patients who have hyperhidrosis; noncontagious (Wolff & Johnson, 2009).

Signs and Symptoms

Pigmented, well-demarcated scaling macules on trunk and/or arms spreading into confluent plaques.

Laboratory Studies

KOH preparation: a round yeast with elongated pseudo-hyphae; may be referred to as “spaghetti and meatballs” (Wolff & Johnson, 2009).

Differential Diagnosis

Pityriasis rosea (presentation will have a “herald patch” preceded by a feeling of not well, similar to signs and symptoms experienced with upper respiratory infection).

Seborrheic dermatitis (if localized to central chest).

Treatment (Wolff & Johnson, 2009)

OTC topical antifungal agents:

Selenium sulfide 2.5% shampoo: apply to affected sites for 10-15 min, followed by shower; repeat daily for 1 week. For maintenance, apply 1-2 x weekly.

Ketoconazole 1% shampoo: application same as for selenium sulfide.

Prescriptive antifungal agents:

Ketoconazole 2% shampoo: apply to affected sites for 10-15 min, followed by shower, repeat daily 1 week.

Ketoconazole 2% cream: apply twice daily for 2 weeks.

Econazole 2% cream: apply twice daily for 2 weeks.

Notes:

Do not administer ketoconazole tablets, an inappropriate treatment banned by FDA since 2013. Hyperpigmentation/dyspigmentation often persist beyond infection eradication, may offer KOH preparation and reassurance.

Tinea Pedis

(ICD code B 35.3)

Definition

Dermatophyte infection of the feet (“athlete’s foot”).

Etiology (Wolff & Johnson, 2009)

Trichophyton rubrum is the most common causative agent (Wey & Chen, 2010).

T. mentagrophytes: moist, macerated presentations.

T. rubrum, *T. floccosum*, *T. mentagrophytes*, and *Candida albicans*: ulcerative presentations.

T. mentagrophytes: inflammatory or bullous presentations.

Signs and Symptoms

Feet will have erythema, pruritic scaly patches or plaques, or moccasin-like distribution with interdigital erythema, scales, and peeling. A positive wood lamp examination for erythrasma will illuminate bright coral pink color (Wolff & Johnson, 2009).

Laboratory Studies

A KOH microscopic exam will be positive for hyphae (Wolff & Johnson, 2009). However, one may need to submit both fungal and bacterial cultures in severe cases to rule out other organisms such as pseudomonas (Wolff & Johnson, 2009).

Prevention

One should use shower shoes, avoid going barefoot; wash feet daily and dry thoroughly, with a blow dryer on low heat if possible; avoid wearing shoes made of synthetic materials; consider antifungal powders inside shoes (e.g., an OTC antifungal powder such as Zeasorb AF, less than \$8 at Wal-Mart).

Treatment

OTC topical antifungal creams such as clotrimazole, miconazole, or terbinafine. The prescription creams listed below should be applied twice daily for 2-6 weeks after washing and drying well, and at least 1 week beyond eradication of lesions (Wolff & Johnson, 2009):

- Clotrimazole 1% cream
- Econazole 2% cream
- Ketoconazole 2% cream
- Ciclopirox 1% cream
- Miconazole 1% cream
- Naftifine 1% cream
- Terbinafine 1% cream

Note: Patient should remember to dress with socks first so as not to transmit fungal elements to genital area.

Onychomycosis

(ICD 10 code B35.1)

Definition

A dermatophyte infection of the nail, often referred to as tinea unguium (Barankin & Freiman, 2006).

Etiology

Dermatophyte infection of the nail, less often from a yeast or non-dermatophyte mold (Barankin & Freiman, 2006).

Signs and Symptoms

Thickened, brittle and discolored nails; erythema of surrounding cuticle indicates *paronychia*. Pain may be associated with nail deformity. Pincer nails are common horizontal curvature deformities of the nail.

The nail can offer many clues to underlying diseases such as pulmonary/cardiac issues, anemia, eczema, HIV, psoriasis, Reynard's—to name a few. Medications can interfere with nail growth,

especially in patients with recent chemotherapy or on antivirals for HIV (Barankin & Freiman, 2006).

Notes:

“One hand, two feet” dermatitis is also seen with onychomycosis of the toenail (Wolff & Johnson, 2009).

Nails/hands/feet should always be assessed for any hyperpigmentation. Dates, measurements, and photos should always be documented at baseline when evaluating for trauma vs. a more menacing process.

Acral melanomas are aggressive and warrant immediate dermatological consult for biopsy (Hall, 2006).

Laboratory Studies

KOH microscopic examination will be positive for hyphae. Periodic acid–Schiff (PAS) stain and/or a fungal culture (nail clipping) provide the most reliable diagnosis (Wey & Chen, 2010).

Oral therapy must be addressed before considering this route of treatment, in order to prevent drug–drug interactions. Onychomycosis is not life threatening, but it can cause pain, discomfort, and disfigurement. In addition, it can cause psychosocial and emotional issues that may affect quality of life (Tosti, 2018).

Treatment

Apply daily to affected nail for 48 weeks (the average toenail takes a year to grow from the nail plate outward; fingernails, 6 months) (Tosti, 2018):

Ciclopirox olamine: 8% nail lacquer solution.

Efinaconazole: 10% topical solution, first FDA-approved triazole for toenail onychomycosis.

Herpes Zoster

(ICD Code B02.39; more specific codes may be applied to specific sites)

Definition

Herpes zoster, or shingles, is a reactivation of the virus that causes chickenpox (after primary infection lies dormant in the sensory nerves for life). Reactivation can result from a stressor or may be idiopathic. Stressors may be emotional or physical, or they may be due to advanced age, immunosuppression, HIV, or malignancies; but they are not limited to these factors. The diminishing immune systems of residents in LTCF have been reported as causes of herpes zoster reactivation, resulting in 10,000-20,000 cases (Jump et al., 2018). People with weakened immune systems are at greater risk (Centers for Disease Control and Prevention [CDC], 2017).

According to the CDC (2017), “herpes zoster cannot be passed from one person to another; however, the virus that causes herpes zoster can spread to cause chickenpox in someone who has never had chickenpox or has not received the chickenpox vaccine.” A person can spread the virus when the rash is in blister form, through direct contact with fluid from the vesicles. A person is not infectious prior to the vesicular eruption or once the lesions have become dried and crusted. Shingles are less contagious than chickenpox, and viral spread is low if lesions are covered. The CDC suggests hand washing to prevent viral spread and recommends avoiding

contact with people who are pregnant and those who have never had the chickenpox or the vaccine.

Signs and Symptoms

Localized sensitivity, or paresthesia, may be accompanied by fatigue, headache, nausea, and other vague reported symptoms. This prodrome is usually followed by a vesicular eruption in a unilateral dermatome corresponding to the sensory nerve. New groups of lesions may follow over a 2- to 4-week period (CDC, 2017).

Nasal tip involvement: vesicles on the tip or side of the nose precede Hutchinson's sign, or herpes zoster ophthalmicus. This condition requires an *urgent ophthalmology consult*, because ocular involvement can result in blindness. In addition, herpes zoster oticus, which invades the facial nerve affecting the external ear canal and pinna, can result in decreased hearing and warrants an ENT consult. When facial paralysis is a result of the zoster infection, it is referred to as the Ramsay Hunt syndrome (CDC, 2017).

Prevention

The CDC (2017) recommends that healthy adults 50 years of age and older receive 2 doses of the shingles vaccine Shingrix to prevent herpes zoster and protect against complications caused by the reactivation process.

Treatment

Antiviral therapy should be started within 72 hr of rash; this decreases the risk of long-term pain from postherpetic neuralgia (PHN).

Check renal function, creatinine clearance, and adjust dosage according to the Cockcroft-Gault equation (CDC, 2017):

Acyclovir 800 mg 5x a day for 7 days

Valacyclovir 1000 mg q 8 hr for 7 days

Complications

PHN: depending on severity, some providers may offer gabapentin to ward off the "ghost pain" that can last for months to years (CDC, 2017).

For bacterial (secondary) infection, apply the topical antibiotic mupirocin (2% ointment) to the site twice daily for 5-7 days.

For inflammation and pruritus, apply the topical steroid triamcinolone (0.05% ointment), twice daily for 3-5 days (never apply to face or skin folds).

For face or skin folds, apply topical calcineurin inhibitors (tacrolimus or pimecrolimus) as a thin film twice daily for 3-5 days.

Herpes Simplex (HSV-1)

(ICD 10 code B00.9)

Definition

Viral infection affecting oral-mucosal area (Barankin & Freiman, 2006).

Etiology

Herpes simplex virus type 1 usually affects the lip vermilion and surrounding area; however, statistics also indicate the genital area as a result of sexual practices.

Signs and Symptoms

Painful lesions/vesicles near oral orifice or vermilion; recurrent outbreaks are less painful and may go unnoticed. Reactivation may be a result of stressors emotional and/or physical (Barankin & Freiman, 2006).

Treatment (Barankin & Freiman, 2006)

Topical antivirals:

Penciclovir 1% cream, applied every 2 hr while awake x 4 day; it is best to treat as soon as signs and symptoms are noticed.

Acyclovir 5% ointment, applied 5 times a day for 4 days.

Oral antivirals:

Acyclovir or Valacyclovir, based on renal function.

Herpes Simplex (HSV-2)

(ICD 10 code - A60.00)

Definition

Viral infection affecting genital area; in younger people, an increasing prevalence, with infection changing with sexual practice between HSV-1 and HSV-2 (Barankin & Freiman, 2006).

Signs and Symptoms

Primary outbreak: painful lesions/erosion occurring in genital mucosal, considered to be sexually transmitted. Recurrent infections are less painful and subclinical.

Herpetic infections of the fingertips referred to as herpetic whitlow: painful lesions with no history of trauma (Wolff & Johnson, 2009).

Treatment

Oral antivirals such as Acyclovir or Valacyclovir are dependent on renal functions and based on initial vs. recurrent vs. chronic episodes.

Scabies

(ICD 10 code - B86)

Definition

A contagious, very pruritic cutaneous infection resulting from an infestation of mites (CDC, 2017).

Etiology

A parasitic infection: *Sarcoptes scabiei var. hominis* mite. The mite burrows into the epidermis and lays eggs. The infection is transmitted through skin-to-skin contact with a person who has scabies; incubation, 3-6 weeks. This infection is found in overcrowded living conditions, in

nursing homes/long-term care centers, and among the elderly, immunosuppressed, malnourished, and sexually active adults (Wolff & Johnson, 2009).

Signs and Symptoms

Pruritic erythematous papules often seen on hands/finger webs, wrist, arms, buttocks, nipples—sparing the head and neck. Burrows may be traced (Wolff & Johnson, 2009).

Laboratory Studies

An oil emersion microscopic exam will be positive for mites or mite parts. However, microscopic exams are often negative. Diagnosis may be based on clinical findings and symptoms.

Treatment

Permethrin 5% cream should be applied neck down, including trimmed nail undercarriages and all creases and feet; should be washed off in 8-14 hr; this should be repeated in 1 week even if the reported eradication rate is 90% with the first treatment. All household members and sexual partners should be treated simultaneously to prevent “ping-pong” reinfection. All towel/clothing/bed linen within 2 days prior to treatment must be washed in hot water or dry cleaned. Items that cannot be treated thus should be placed in a plastic bag for 72 hr. All carpets, rugs, and furniture should be vacuumed and vacuum bags should be disposed (pets are unaffected, since the mite can only exist on humans) (CDC, 2017).

Oral Ivermectin, given once and repeated 1-2 weeks later, has become a more popular treatment regimen due to high efficacy, safety, and friendly administration.

Note: Patients may report itching for 2 months post eradication. OTC antihistamines are helpful, but should be used cautiously in the elderly, given the somnolence effect. Topical triamcinolone 0.05% cream (1-pound jar, 454 g) can be helpful for stubborn itchy spots (*but never applied to face or to skin folds*— i.e., axilla, AC fossa, breast crease, posterior knees) (CDC, 2010).

Other Spots of Concern in the Elderly

Actinic keratosis: A precancer; pink scaly non-healing macule(s)/patch(es) in sun-exposed sites. If left untreated over a long period, actinic keratosis can morph into a squamous cell carcinoma (Barankin & Freiman, 2006). Any new non-healing lesion must be evaluated to rule out a neoplasm of uncertain behavior from basal cell carcinoma to melanoma to a metastatic lesion.

Blistering disorders: All blistering disorders warrant a dermatological consult to rule out bullous pemphigoid or pemphigus (Wolff & Johnson, 2009).

Erosive pustular dermatosis of scalp: A chronic skin disease affecting the crown in the elderly, characterized by keratotic, erosive, and purulent plaques. Management includes high-potency topical steroids like Clobetasol 0.05%; biopsy may often be warranted to rule out skin cancer. Debridement of the area after softening with petrolatum allows for better absorption of the topical steroid. Other nonsteroidal agents may be used, but cost more, e.g., tacrolimus (Robles &

Mickelson, 2016). It is best to evaluate for secondary infection with bacterial C&S. Adding mupirocin 2% ointment mixed with the topical steroid can be beneficial.

Fixed drug eruption: A cutaneous adverse reaction to medication. May be one or more annular or oval erythematous patch(es) on the skin as a result of systemic exposure to a drug. Hyperpigmentation will reoccur in the same place with re-exposure. Medications commonly known to cause such reactions include pain medications, tetracyclines, sulphonamides, ASA, NSAIDS, OTC supplements, laxatives, stool softeners, Fluconazole.

Nummular eczema: Dry itchy coin-size (hence “nummular”) patches found in any location—often on legs, the driest part of body. Daily use of good moisturizer like ceramide containing cream for prevention; for stubborn itch, apply Triamcinolone 0.05% cream/ointment (never on face or skin folds) twice daily or topical calcineurin inhibitor (Wey & Chen, 2010).

Pressure sores/ulcers: Consult wound care for institution’s evidence-based protocol.

Senile pruritus: Itchy skin, the most common dermatological complaint in the elderly. Symptoms can be chronic and should be evaluated for underlying causes. A systemic cause can reflect iron deficient anemia, thyroid disease, diabetes, liver disease, renal dysfunction, drug reaction, and/or malignancy. Emotional or psychosocial issues seen in anxiety, depression, or increased stress can also contribute to chronic itch. While the preceding factors are being thoroughly assessed, application of a ceramide cream or petrolatum can be helpful. Many OTC creams containing menthol, camphor, phenol, or doxepin can offer some relief, as can an oral antihistamine (strong consideration should be given before administering, due to somnolence side effects, dehydration, and renal issues). In addition, a topical steroid—triamcinolone 0.05% cream/ointment—may be applied twice daily to stubborn itch (never on face or skin folds) for 7-10 days. Use of topical calcineurin inhibitor can be used for face and skin fold sites (Wey & Chen, 2010).

Note: Ointments are more potent and purer than creams.

Senile excoriations: Multiple lesions appearing dug out, usually in reachable areas and likely in a background of post-inflammatory macules/papules. One should rule out *Staph aureus*; may be psychological or may reflect an underlying disease process. Mupirocin 2% ointment should be applied to sites and nasal carriage, implemented per IDSA protocol (Stevens et al., 2014).

Senile purpura: Common, benign red or purple patches post trauma on extensor surfaces of forearms; self-resolving. In case of tear, apply large dollop of petrolatum and secure with non-adhesive bandage; change daily till healed (Norman, 2008).

Stasis dermatitis: Caused by chronic venous insufficiency, resulting in edema of lower legs. Pruritic irritation from the edema can activate the itch/scratch cycle and result in integument breakdown, which can be a path for infection. The legs are the most distal from the heart, and they are the driest part of the body and the slowest to heal, creating an environment for non-healing. Measures to help with edema are as follows:

- Support stocking, worn daily (if PCP approves).
- Elevating the legs equal to or above the heart while resting.

- Good skin care: mild soaps, petrolatum, or good moisturizing cream (ceramide containing creams); for stubborn itch, Triamcinolone 0.05% cream (454 g as opposed to a 45 g tube) applied twice daily for up to 2 weeks (never on face or skin folds).
- See cellulitis for possible secondary infection: obtain bacterial culture and assess for fungal infection if infection is suspected; consult wound care for non-healing, multiple lesions; may need Una boot or other wound care measures (Wolff & Johnson, 2009).

Xerosis: Better known as dry skin. The use of mild soaps and application of a ceramide containing moisturizing cream applied neck down after bathing can be helpful (Norman, 2008).

Closing

Our integument is a complex system, and providing dermatological care in the mature patient can be daunting. Often the elderly present atypically, and given the dynamics of aging along with immune system decline, dermatological care for the elderly is a challenge even for the seasoned provider. This module is intended to provide a better understanding of pathophysiological issues and to better equip providers on the frontline. Early recognition of skin infections can lead to prompt and more appropriate treatment(s), mitigating disease progression and allowing a more comprehensive, compassionate delivery of health care through the golden years.

Terms in Dermatology

The following glossary of dermatological terms is adapted from Barankin and Freiman (2006) and Wolff and Johnson (2009).

Abscess: Accumulation of pus in the dermis or subcutaneous tissue.

Annular: Ring-shaped.

Atrophy: Depressed surface due to thinning epidermis and/or dermis and/or subcutis.

Bulla: A large, circumscribed fluid, elevation >5 mm.

Burrow: Linear S-shaped elevated channel in epidermis.

Carbuncle: Inflammatory nodules or abscess of numerous contiguous hair follicles.

Crust: Dried serum, pus, or blood.

Cyst: Nodule containing fluid, cells, or keratin.

Ecchymosis: Large confluent area of purpura.

Erosion: Partial loss of epidermis that heals without scarring.

Excoriations: Shallow abrasion due to scratching; linear pinpoint erosions or crusts.

Exudate: Serum, blood, or pus accumulated on skin surface.

Fissure: Linear split and/or crack in epidermis.

Furuncle: Deep necrotizing folliculitis.

Lichenification: Focal area of thickened skin with accentuation of skin lines due to rubbing/scratching.

Linear: Straight line.

Macule: Flat circumscribed area of altered skin color <5 mm.

Nodule: Solid round circumscribed elevation >5 mm.

Papule: Raised solid lesions <5 mm.

Patch: Raised pigmented lesions >5 mm.

Plaque: >5 mm flat topped raised lesion.

Purpura: Visible epidermal collection of free red blood cells (red, purple, brown), non-blanchable.

Scale: Thick stratum corneum due to increased proliferation or cohesion of keratinocytes.

Ulcer: Loss of tissue affecting the entire epidermis and part of the dermis. Surface exudate and/or crusting.

Vesicle: A small clear fluid containing papule.

Skin Lesion Descriptions

(Barankin & Freiman, 2006)

Location & distribution: symmetrical/asymmetrical, sun-exposed, flexures/extensors, acral (hands/feet).

Erythema: erythematous or non-erythematous lesions &/or underlying skin.

Surface features: crusty, rough, smooth, scaly.

Type: cyst, macule, papule, ulcer, pustule, vesicle.

Color: blue, brown, pink, purple, etc.

Arrangement: single, multiple, discrete, unilateral, annular, linear, generalized, disseminated.

Border & shape: well or poorly defined, round, oval, irregular, pedunculated.

Sites/systems: scalp, mouth, nails, arms, etc.

Taking Medical History

Identification: age, race, gender, eye/hair color, past occupation/hobbies.

History of present illness (HPI): when, where, symptoms, evolution—how; what makes it better or worse; previous treatments (may require interviewing family/caregivers); review of outside records, essential in history taking.

Contacts: new exposures—travels, visits; new medications/treatments; any change in lifestyle.

Past medical history (PMHx): diabetic, HTN, Atopic, cancers, HIV, blood transfusions, other immunocompromise—organ transplant, etc.

Medications: specific list of all prescriptive and OTC medications, including supplements—start/stop, prn dates.

Allergies: drugs, foods, plants, seasonal and specific reactions.

Habits: smoking, drug use, alcohol abuse; wood working or painting, etc

Family Hx: atopic, staph carrier, psoriasis, melanoma, genetic conditions.

Constitutional: fever, headaches, altered mental status, diaphoresis, fatigue, weakness, change in appetite, weight loss; recent infections or history of malignancy.

Review of systems: inquire about autoimmune connective tissue disorder, arthralgias, myalgias, aphthous ulcers, eye issues, neurologic or renal problems.

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