Bacterial Skin and Soft Tissue Infections in Older Adults

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KEYWORDS

• Skin infection • Aging • Cellulitis • Fasciitis • Epidermis • Soft tissue • Surgical site • Pressure ulcer

KEY POINTS

- The skin is a physical barrier to the invasion of pathogenic microorganisms and a first line of defense. The epidermis has a resident micro flora that adds additional protection. Aging alters both defense mechanisms.
- Bacterial skin and soft tissue infections (SSTIs) are the most common outpatient dermatologic diagnoses presenting to emergency departments and generalist office practice.
- Surgical site infections are common complications of hospitalization, occurring in approximately 2% to 5% of all patients undergoing surgery in the United States in spite of optimal care.
- Red, hot skin often indicates infection, but not always. Understanding the common SSTIs will enhance the clinician's ability to create a complete differential diagnosis.
- Secondary skin infections develop on preexisting lesions and are typically polymicrobial and caused by microorganisms that usually are not pathogenic. When immune defenses are impaired, these secondary infections can cause serious, life-threatening infection.
- Differentiating true chronic wound infection from colonization is important in determining the proper local care.
- Assessing for signs of serious or deep-seated infection is tantamount in the evaluation of all skin infections.

INTRODUCTION

Bacterial skin infections are the most common outpatient dermatologic diagnoses presenting to emergency department and to primary care providers. Skin and soft tissue infections (SSTIs) are a growing threat to the health of the aging population. SSTIs are a common complication of hospitalization, occurring in 2% to 5% of all patients undergoing surgery in the United States.[1]

Humans are colonized by complex communities of microorganisms that are part of a beneficial resident microbiota.[2] In commensal relationships, the microbe and host benefit without causing harm to the other. This interaction is fundamentally important to human biology. Human skin and mucosa are colonized at birth and have a lifelong

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codependent relationship with indigenous microbiota.[3] The capacity of invasive microorganisms to cause disease in healthy hosts is a result of fundamental biologic differences in their virulence factors from those of opportunistic and commensal species that rarely cause disease.

DEFINITION OF SKIN AND SOFT TISSUE INFECTION

A clinician, facing a patient with skin inflammation or infection, has to evaluate the dermatologic signs, construct a differential diagnosis, and initiate empiric therapy. An understanding of the skin flora, the nature of the skin findings, and the immunologic status of the patient, all play a role in the choice of initial therapy. Inflammatory skin disorders must be distinguished from skin infections. Colonization also must be distinguished from infection.

The medical literature unfortunately use the term "infection" imprecisely or interchangeably with the term colonization. The American Heritage Dictionary of the English Language defines infection as "Invasion by and multiplication of pathogenic microorganisms in a bodily part or tissue, which may produce subsequent tissue injury and progress to overt disease through a variety of cellular or toxic mechanisms."[4] Colonization is defined as the establishment of a microorganism or a community of microorganisms on or within a host. It can be short lived such as *Staphylococcus* aureus on the skin or of long duration, such as biocommunities in a biofilm in a pressure ulcer. Colonization is most often asymptomatic and the host is generally better off for the encounter with the microorganism. "Heavy colonization" is a term that applies to wounds. The open bed of a heavily colonized wound may be accompanied by subtle signs of inflammation, such as friable granulation tissue or excessive exudate.

The term infection or infectious disease applies when there is an interaction with a microbe that causes damage to the host. The altered physiology results in clinical signs and symptoms of disease. A pathogen is defined as any microorganism that has the capacity to cause disease.[2] These definitions are used throughout the article (**Box 1**).

Virulence provides a measure of pathogenicity or the likelihood of causing disease. Whether pathogen or a commensal, a microorganism must also possess properties that promote its interaction with the host.[2] Virulence factors refer to the array of genetic properties that enable a microorganism to establish itself and replicate on or within a specific host, and thereby cause disease. For a given microorganism, these factors define the unique attributes of each organism that enables it to invade the skin or mucosa and cause infection.[5]

In general, skin infection can be grouped into 1 of 3 different categories:

1. Direct invasion of the skin or a mucosal surface with or without a preexisting skin lesion.
2. Skin manifestations of systemic infections that spread through the blood from the site of infection to the skin.

Box 1
Attributes of microbial pathogens

What are the distinguishing characteristics of microbes that live on skin or mucosa in humans? A successful pathogen must do the following: (1) enter the human host; (2) become established; (3) acquire nutrients; (4) avoid or circumvent the host's innate defenses and a powerful immune system; (5) above all, replicate; (6) disseminate if necessary to a preferred site; and eventually (7) be transmitted to a new susceptible host.[2,5]