

# Treatment of Skin and Soft Tissue Infections in the Elderly: A Review

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## ABSTRACT

**Background:** Skin and soft tissue infections (SSTIs) have become the second most common type of infection among persons residing in long-term care facilities.

**Objective:** The purpose of this article was to review the latest information on SSTIs among the elderly, including age-related changes, challenges, and treatment strategies in the era of emerging bacterial resistance.

**Methods:** Relevant information was identified through a search of MEDLINE (1970–April 2010), International Pharmaceutical Abstracts (1970–April 2010), and Google Scholar using the terms *skin and soft tissue infection*, *skin and skin structure infection*, *cellulitis*, *treatment guidelines*, and *elderly*. Additional publications were found by searching the reference lists of the identified articles. Trials published since 1970 were selected for this review if they prospectively evaluated mostly adults ( $\geq 18$  years of age), included  $>50$  patients, and reported diagnostic criteria as well as clinical outcomes in patients treated for simple or complicated SSTIs.

**Results:** Fifty-eight of 664 identified studies were selected and included in this review. A search of the literature did not identify any prospective clinical trials that were conducted exclusively in the elderly. Information on the treatment of SSTIs in the elderly was based solely on clinical studies that were conducted in adults in general. As recommended by the Infectious Diseases Society of America (IDSA) 2008 update, SSTIs should be suspected in elderly patients who have skin lesions and present with a decline in functional status, with or without fever. Patients who present with symptoms of systemic toxicity should be hospitalized for further evaluation. Current challenges in the management of SSTIs include the rapid emergence of community-acquired, methicillin-resistant *Staphylococcus aureus* (CA-MRSA), the emergence of macrolide-resistant streptococci within the past decade, and the lack of a reliable algorithm to differentiate potentially life-threatening SSTIs that require aggressive interventions and prompt hospitalization from those that can be managed in an outpatient setting. *S aureus* was the most common cause of SSTIs, being isolated in 42.8% (5015/11,723) of wounds, followed by streptococci. Common SSTIs in the elderly such as shingles, diabetic foot infections, infected pressure ulcers, and scabies, and their treatment were also discussed. Based on reviews of published trials, treatment of simple SSTIs generally consisted of administration of agents with activity against *S aureus* and *Streptococcus* species such as a penicillinase-resistant  $\beta$ -lactam, a first-generation cephalosporin, or clindamycin. Broadening of the antimicrobial spectrum to include gram-negative and anaerobic organisms should be implemented for complicated SSTIs such as diabetic foot infections and infected pressure ulcers. Local rates of MRSA, CA-MRSA, and macrolide-resistant streptococci should be considered when selecting empiric therapy.

**Conclusions:** A search of the literature did not identify any prospective clinical trials on the treatment of SSTIs in the elderly; therefore, it is recommended to follow treatment based on the current IDSA guidelines. More research and publications are needed to establish proper selection of antimicrobial agents, treatment strategies, and duration of therapy of SSTIs in the elderly population. (*Am J Geriatr Pharmacother.* 2010;8:485–513) © 2010 Elsevier HS Journals, Inc.

**Key words:** skin and soft tissue infection, elderly, community-acquired methicillin-resistant *Staphylococcus aureus*, diabetic foot infections, infected pressure ulcers, shingles.

Accepted for publication November 18, 2010.

Published online December 21, 2010.

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doi:10.1016/j.amjopharm.2010.12.003

1543-5946/\$ - see front matter

## INTRODUCTION

Skin and soft tissue infections (SSTIs, also referred to as skin and skin structure infections) encompass a spectrum of illnesses with variable presentations and etiologies, ranging from mild, self-limited impetigo to life-threatening necrotizing fasciitis. They involve microbial invasions of the epidermis and underlying soft tissues, which induce an inflammatory host response, resulting in the characteristic manifestations of erythema, edema, warmth, and pain or tenderness.<sup>1-3</sup>

Given the variability in presentation and severity of SSTIs, accurate estimates of their incidence and prevalence have been difficult to establish. SSTIs confirmed by positive cultures accounted for ~0.66% of all hospital admissions between January 1, 2002, and December 31, 2003, with a mortality rate of 1.14%, a mean length of stay of 6.8 days, and an average hospital charge of \$18,382 according to a retrospective analysis of a multi-institutional database of 134 acute care hospitals in the United States (Cardinal Health Research Database).<sup>4</sup> Most patients with SSTIs (>70%; data not provided) are managed in the outpatient setting.<sup>1</sup>

Based on an analysis of data from the 1993–2005 National Ambulatory Medical Care Survey, SSTIs resulted in ~82 million (95% CI, 75 million–89 million) physician office visits, corresponding to 23 (95% CI, 21–25) office visits per 1000 US population-years for the study period.<sup>5</sup> This is in line with an estimate by Ellis Simonsen et al,<sup>6</sup> who reported a rate of 24.6/1000 person-years for cellulitis and its complications using a medical insurance claims database (Deseret Mutual Benefit Administration) between January 1, 1997, and December 31, 2002. The estimated number of annual office visits increased with age: patients 60 to 69 years of age had 28 visits/1000 US population-years (95% CI, 23–33), patients 70 to 79 years of age had 32 visits (95% CI, 25–40), and those ≥80 years of age had 46 visits (95% CI, 36–57).<sup>5</sup>

SSTIs occur in the elderly due to age-related changes in the skin, a progressive decline in immune function, and the presence of chronic, comorbid conditions.<sup>7</sup> Based on recent surveys,<sup>8,9</sup> SSTIs have become the second most common infection among persons residing in long-term care facilities, following either urinary tract infections or upper respiratory tract infections, depending on observed data. Based on data from a survey that was conducted in 2005 in 11,475 residents of 113 US Department of Veterans Affairs nursing home care units (age <60 years, 18.7%; 60–79 years, 43.4%; ≥80 years, 37.9%), the 5 most frequently reported infections, in order of prevalence, were urinary

tract infection (point prevalence, 1.58%), SSTI (0.83% [skin infection, 0.51%; soft tissue infection, 0.32%]), pneumonia (0.52%), gastroenteritis (0.39%), and osteomyelitis (0.26%).<sup>9</sup> In a similar survey conducted in 2008,<sup>8</sup> the most frequently reported infection among 1603 residents living in homes for the elderly in Hong Kong (mean age, 83 years; range, 60–107 years) was the common cold/pharyngitis (1.9%; 95% CI, 0.9%–3.0%), followed by SSTI (1.4%; 95% CI, 0.5%–2.4%), urinary tract infection (0.6%; 95% CI, 0.2%–0.9%), and lower respiratory tract infection (0.5%; 95% CI, 0.1%–0.9%).

With this noted increase in the incidence of SSTIs, the objective of this article was to review the latest information on SSTIs among the elderly (>65 years of age), including age-related changes, challenges, and treatment strategies in the era of emerging bacterial resistance.

## METHODS

Relevant information was identified through a search of MEDLINE (1970–April 2010), International Pharmaceutical Abstracts (1970–April 2010), and Google Scholar using the terms *skin and soft tissue infection*, *skin and skin structure infection*, *cellulitis*, *treatment guidelines*, and *elderly*. National treatment guidelines were obtained through a search of the home page of the Infectious Diseases Society of America (IDSA) Web site.<sup>10</sup> Additional publications were found by searching the reference lists of the identified articles. Trials published since 1970 were selected for this review if they prospectively evaluated mostly adults (≥18 years of age), included >50 patients, and reported diagnostic criteria as well as clinical outcomes in patients treated for simple or complicated SSTIs.

## RESULTS

Fifty-eight of 664 identified studies were selected for further evaluation and included in this review.

### Age-Related Changes

Aging affects all components of the skin, including the epidermis, dermis, and subcutaneous layer. The proliferative activity of the skin diminishes with age, leading to decreased epidermal renewal and thinning of the epidermis (data not reported).<sup>11-14</sup> This results in a less effective barrier, delayed wound healing, and greater opportunities for microorganisms to invade.<sup>12-14</sup> Intradermal macrophages or Langerhans cells, which are responsible for cellular immunity, decrease by almost 50% as the skin ages (specific age ranges not reported).<sup>14,15</sup> The resultant impaired cellular immunity

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