

Chapter 178

Non-necrotizing Infections of the Dermis and Subcutaneous Fat: Cellulitis and Erysipelas

Adam D. Lipworth, Arturo Saavedra, Arnold N. Weinberg, & Richard Allen Johnson

REFERENCES

1. Vinh DC, Embil JM: Rapidly progressive soft tissue infections. *Lancet Infect Dis* **5**:501-513, 2005
2. Edelsberg J et al: Trends in US hospital admissions for skin and soft tissue infections. *Emerg Infect Dis* **15**:1516-1518, 2009
3. Celestin R et al: Erysipelas: A common potentially dangerous infection. *Acta Dermatovenerol Alp Panonica Adriat* **16**:123-127, 2007
4. Damstra RJ et al: Erysipelas as a sign of subclinical primary lymphoedema: A prospective quantitative scintigraphic study of 40 patients with unilateral erysipelas of the leg. *Br J Dermatol* **158**:1210-1215, 2008
5. Wolfson JS, Sober AJ, Rubin RH: Dermatologic manifestations of infection in the compromised host. *Annu Rev Med* **34**:205-217, 1983
6. Chira S, Miller LG: Staphylococcus aureus is the most common identified cause of cellulitis: A systematic review. *Epidemiol Infect* **138**:313-317, 2010
7. Sendi P, Johansson L, Norrby-Teglund A: Invasive group B Streptococcal disease in non-pregnant adults: A review with emphasis on skin and soft-tissue infections. *Infection* **36**:100-111, 2008
8. Karppelein M et al: Factors predisposing to acute and recurrent bacterial non-necrotizing cellulitis in hospitalized patients: A prospective case-control study. *Clin Microbiol Infect* **16**(6):729-734, 2010
9. Vayalunkal JV, Jadavji T: Children hospitalized with skin and soft tissue infections: A guide to antibacterial selection and treatment. *Paediatr Drugs* **8**:99-111, 2006
10. Bocher S et al: Staphylococcus lugdunensis, a common cause of skin and soft tissue infections in the community. *J Clin Microbiol* **47**:946-950, 2009
11. Garcia-Lechuz JM et al: Streptococcus pneumoniae skin and soft tissue infections: Characterization of causative strains and clinical illness. *Eur J Clin Microbiol Infect Dis* **26**:247-253, 2007
12. Johansson L et al: Cathelicidin LL-37 in severe Streptococcus pyogenes soft tissue infections in humans. *Infect Immun* **76**:3399-3404, 2008
13. Kreikemeyer B, Klenk M, Podbielski A: The intracellular status of Streptococcus pyogenes: Role of extracellular matrix-binding proteins and their regulation. *Int J Med Microbiol* **294**:177-188, 2004
14. Thulin P et al: Viable group A streptococci in macrophages during acute soft tissue infection. *PLoS Med* **3**:e53, 2006
15. Mitchell PD et al: Panton-Valentine leukocidin-secreting Staphylococcus aureus causing severe musculoskeletal sepsis in children. A new threat. *J Bone Joint Surg Br* **89**:1239-1242, 2007
16. Jacobus CH et al: Prevalence and demographics of methicillin resistant Staphylococcus aureus in culturable skin and soft tissue infections in an urban emergency department. *BMC Emerg Med* **7**:19, 2007
17. David MZ et al: Predominance of methicillin-resistant Staphylococcus aureus among pathogens causing skin and soft tissue infections in a large urban jail: Risk factors and recurrence rates. *J Clin Microbiol* **46**:3222-3227, 2008
18. Tejada-Ramirez E, Behani M, Leggiadro RJ: Community-associated methicillin-resistant staphylococcal infection in an inner city hospital pediatric inpatient population. *South Med J* **102**:135-138, 2009
19. Rice LB: Antimicrobial resistance in Gram-positive bacteria. *Am J Infect Control* **34**:S11-S19; discussion S64-S73, 2006
20. Kirkland EB, Adams BB: Methicillin-resistant Staphylococcus aureus and athletes. *J Am Acad Dermatol* **59**:494-502, 2008

21. Antoniou T et al: Prevalence of community-associated methicillin-resistant *Staphylococcus aureus* colonization in men who have sex with men. *Int J STD AIDS* **20**:180-183, 2009
22. Popovich KJ, Hota B: Treatment and prevention of community-associated methicillin-resistant *Staphylococcus aureus* skin and soft tissue infections. *Dermatol Ther* **21**:167-179, 2008
23. Shittu A et al: Isolation and molecular characterization of multiresistant *Staphylococcus sciuri* and *Staphylococcus haemolyticus* associated with skin and soft-tissue infections. *J Med Microbiol* **53**:51-55, 2004
24. Mombach Pinheiro Machado AB et al: Distribution of staphylococcal cassette chromosome mec (SCCmec) types I, II, III and IV in coagulase-negative staphylococci from patients attending a tertiary hospital in southern Brazil. *J Med Microbiol* **56**:1328-1333, 2007
25. Davis SL et al: Epidemiology and outcomes of community-associated methicillin-resistant *Staphylococcus aureus* infection. *J Clin Microbiol* **45**:1705-1711, 2007
26. Shorr AF: Epidemiology and economic impact of methicillin-resistant *Staphylococcus aureus*: Review and analysis of the literature. *Pharmacoeconomics* **25**:751-768, 2007
27. Hulten KG et al: Hospital-acquired *Staphylococcus aureus* infections at Texas Children's Hospital, 2001–2007. *Infect Control Hosp Epidemiol* **31**:183-190, 2010
28. Sdougkos G et al: Community-associated *Staphylococcus aureus* infections and nasal carriage among children: Molecular microbial data and clinical characteristics. *Clin Microbiol Infect* **14**:995-1001, 2008
29. Patel M: Community-associated methicillin-resistant *Staphylococcus aureus* infections: Epidemiology, recognition and management. *Drugs* **69**:693-716, 2009
30. Patel JB, Gorwitz RJ, Jernigan JA: Mupirocin resistance. *Clin Infect Dis* **49**:935-941, 2009
31. Batra R et al: Efficacy and limitation of a chlorhexidine-based decolonization strategy in preventing transmission of methicillin-resistant *Staphylococcus aureus* in an intensive care unit. *Clin Infect Dis* **50**:210-217, 2010
32. Jones JC et al: Mupirocin resistance in patients colonized with methicillin-resistant *Staphylococcus aureus* in a surgical intensive care unit. *Clin Infect Dis* **45**:541-547, 2007
33. Mutnick AH, Enne V, Jones RN: Linezolid resistance since 2001: SENTRY Antimicrobial Surveillance Program. *Ann Pharmacother* **37**:769-774, 2003
34. Zirakzadeh A, Patel R: Vancomycin-resistant enterococci: Colonization, infection, detection, and treatment. *Mayo Clin Proc* **81**:529-536, 2006
35. Sood S et al: Enterococcal infections & antimicrobial resistance. *Indian J Med Res* **128**:111-121, 2008
36. Hook EW 3rd et al: Microbiologic evaluation of cutaneous cellulitis in adults. *Arch Intern Med* **146**:295-297, 1986
37. Lopez FA, Lartchenko S: Skin and soft tissue infections. *Infect Dis Clin North Am* **20**:759-772, v-vi, 2006
38. Chong FY, Thirumoorthy T: Blistering erysipelas: Not a rare entity. *Singapore Med J* **49**:809-813, 2008
39. Garner JS et al: CDC definitions for nosocomial infections, 1988. *Am J Infect Control* **16**:128-140, 1988
40. El Karoui K et al: *Escherichia coli* extensive cellulitis after laparoscopic radical prostatectomy. *Urology* **72**:778-779, 2008
41. Bluestein D, Javaheri A: Pressure ulcers: Prevention, evaluation, and management. *Am Fam Physician* **78**:1186-1194, 2008
42. Brook I: Management of human and animal bite wounds: An overview. *Adv Skin Wound Care* **18**:197-203, 2005
43. Conlon HA: Human bites in the classroom: Incidence, treatment, and complications. *J Sch Nurs* **23**:197-201, 2007
44. Koster JB, Kullberg BJ, van der Meer JW: Recurrent erysipelas despite antibiotic prophylaxis: An analysis from case studies. *Neth J Med* **65**:89-94, 2007
45. Kroshinsky D, Grossman ME, Fox LP: Approach to the patient with presumed cellulitis. *Semin Cutan Med Surg* **26**:168-178, 2007
46. Falagas ME, Vergidis PI: Narrative review: Diseases that masquerade as infectious cellulitis. *Ann Intern Med* **142**:47-55, 2005
47. Laube S, Farrell AM: Bacterial skin infections in the elderly: Diagnosis and treatment. *Drugs Aging* **19**:331-342, 2002
48. Eron LJ, Lipsky BA: Use of cultures in cellulitis: When, how, and why? *Eur J Clin Microbiol Infect Dis* **25**:615-617, 2006

49. Sachs MK: The optimum use of needle aspiration in the bacteriologic diagnosis of cellulitis in adults. *Arch Intern Med* **150**:1907-1912, 1990
50. Swartz MN: Clinical practice. Cellulitis. *N Engl J Med* **350**:904-912, 2004
51. Brook I, Frazier EH: Clinical features and aerobic and anaerobic microbiological characteristics of cellulitis. *Arch Surg* **130**:786-792, 1995
52. Lazzarini L et al: Erysipelas and cellulitis: Clinical and microbiological spectrum in an Italian tertiary care hospital. *J Infect* **51**:383-389, 2005
53. Mills AM, Chen EH: Are blood cultures necessary in adults with cellulitis? *Ann Emerg Med* **45**:548-549, 2005
54. Peralta G et al: Risk factors for bacteremia in patients with limb cellulitis. *Eur J Clin Microbiol Infect Dis* **25**:619-626, 2006
55. Bernard P et al: Streptococcal cause of erysipelas and cellulitis in adults. A microbiologic study using a direct immunofluorescence technique. *Arch Dermatol* **125**:779-782, 1989
56. Chao HC et al: Sonographic evaluation of cellulitis in children. *J Ultrasound Med* **19**:743-749, 2000
57. Hsiao CB et al: Staphylococcus aureus antimicrobial susceptibility of abscess samples from adults and children from the Kaleida Health System in western New York State, 2003–2006. *J Clin Microbiol* **48**(5):1753-1757, 2010
58. Goldstein EJ et al: Virulence characteristics of community-associated Staphylococcus aureus and in vitro activities of moxifloxacin alone and in combination against community-associated and healthcare-associated methicillin-resistant and -susceptible S. aureus. *J Med Microbiol* **57**:452-456, 2008
59. Phillips S, MacDougall C, Holdford DA: Analysis of empiric antimicrobial strategies for cellulitis in the era of methicillin-resistant Staphylococcus aureus. *Ann Pharmacother* **41**:13-20, 2007
60. Elliott DJ et al: Empiric antimicrobial therapy for pediatric skin and soft-tissue infections in the era of methicillin-resistant Staphylococcus aureus. *Pediatrics* **123**:e959-e966, 2009
61. Madaras-Kelly KJ et al: Efficacy of oral beta-lactam versus non-beta-lactam treatment of uncomplicated cellulitis. *Am J Med* **121**:419-425, 2008
62. Pokharna H, Haque N, Zervos M: Vancomycin vs beta-lactam – drug of choice for empiric treatment of cellulitis requiring hospitalization. Abstract 1238 in *Infectious Diseases Society of America 48th Annual Meeting*, Oct 23, 2010
63. Fish DN: Meropenem in the treatment of complicated skin and soft tissue infections. *Ther Clin Risk Manag* **2**:401-415, 2006
64. Beibei L et al: Linezolid versus vancomycin for the treatment of Gram-positive bacterial infections: Meta-analysis of randomised controlled trials. *Int J Antimicrob Agents* **35**:3-12, 2010
65. De Cock E et al: Cost-effectiveness of linezolid versus vancomycin for hospitalized patients with complicated skin and soft-tissue infections in France. *Med Mal Infect* **39**:330-340, 2009
66. Bliziotis IA et al: Daptomycin versus other antimicrobial agents for the treatment of skin and soft tissue infections: A meta-analysis. *Ann Pharmacother* **44**:97-106, 2010
67. Silverman JA, Perlmutter NG, Shapiro HM: Correlation of daptomycin bactericidal activity and membrane depolarization in Staphylococcus aureus. *Antimicrob Agents Chemother* **47**:2538-2544, 2003
68. Ziglam H: Daptomycin and tigecycline: A review of clinical efficacy in the antimicrobial era. *Expert Opin Pharmacother* **8**:2279-2292, 2007
69. Bailey J, Summers KM: Dalbavancin: A new lipoglycopeptide antibiotic. *Am J Health Syst Pharm* **65**:599-610, 2008
70. Crandon J, Nicolau DP: Oritavancin: A potential weapon in the battle against serious Gram-positive pathogens. *Future Microbiol* **3**:251-263, 2008
71. Attwood RJ, LaPlante KL: Telavancin: A novel lipoglycopeptide antimicrobial agent. *Am J Health Syst Pharm* **64**:2335-2348, 2007
72. Zhanel GG et al: Ceftaroline: A novel broad-spectrum cephalosporin with activity against methicillin-resistant Staphylococcus aureus. *Drugs* **69**:809-831, 2009
73. Anderson SD, Gums JG: Ceftobiprole: An extended-spectrum anti-methicillin-resistant Staphylococcus aureus cephalosporin. *Ann Pharmacother* **42**:806-816, 2008
74. Stevens DL: Treatments for skin and soft-tissue and surgical site infections due to MDR Gram-positive bacteria. *J Infect* **59**(Suppl 1):S32-S39, 2009
75. Ardanuy C et al: Molecular characterization of macrolide- and multidrug-resistant Streptococcus pyogenes isolated from adult patients in Barcelona, Spain (1993–2008). *J Antimicrob Chemother* **65**:634-643, 2010
76. Myers AL et al: Genetic commonality of macrolide-resistant group A beta hemolytic streptococcus pharyngeal strains. *Ann Clin Microbiol Antimicrob* **8**:33, 2009

77. Loeb M et al: Antimicrobial drugs for treating methicillin-resistant *Staphylococcus aureus* colonization. *Cochrane Database Syst Rev* (4):CD003340, 2003
78. Schaffer AC, Lee JC: Staphylococcal vaccines and immunotherapies. *Infect Dis Clin North Am* 23:153-171, 2009
78. Schaffer AC, Lee JC: Vaccination and passive immunisation against *Staphylococcus aureus*. *Int J Antimicrob Agents* 32(Suppl 1):S71-S78, 2008
79. McMillan DJ, Chhatwal GS: Prospects for a group A streptococcal vaccine. *Curr Opin Mol Ther* 7:11-16, 2005