The Journal of Emergency Medicine, Vol. 43, No. 4, pp. 605–611, 2012
Published by Elsevier Inc.
Printed in the USA
0736-4679/$ - see front matter

ELSEVIER

doi:10.1016/j.jemermed.2011.09.037

Original Contributions

CLINICAL AND EPIDEMIOLOGIC CHARACTERISTICS AS PREDICTORS OF TREATMENT FAILURES IN UNCOMPLICATED SKIN ABSCESSES WITHIN SEVEN DAYS AFTER INCISION AND DRAINAGE

Cameron K. Olderog, MD,* Gillian R. Schmitz, MD,† David R. Bruner, MD,‡ Rebecca Pittoti, RN,§ Justin Williams, MD,|| and Ken Ouyang, MS¶

*Department of Emergency Medicine, Brooke Army Medical Center, Fort Sam Houston, Texas, †Department of Emergency Medicine, Georgetown University Medical Center, Washington, DC, ‡Department of Emergency Medicine, Portsmouth Naval Medical Center, Portsmouth, Virginia, §Department of Emergency Medicine, Wilford Hall Medical Center, San Antonio, Texas, ||Department of Emergency Medicine, University of Texas Health Science Center, San Antonio, Texas, and ¶Department of Epidemiology and Biostatistics, University of Texas Health Science Center, San Antonio, Texas

Reprint Address: Cameron K. Olderog, MD, Department of Emergency Medicine, DeWitt Army Hospital, 9501 Farrel Rd., Fort Belvoir, VA 22060

☐ **Abstract—Background: Community-acquired methicillin-resistant *Staphylococcus aureus* (MRSA) is now the leading cause of superficial abscesses seen in the Emergency Department. Study Objectives: Our primary aim was to determine if an association exists between three predictor variables (abscess size, cellulitis size, and MRSA culture) and treatment failure within 7 days after incision and drainage in adults. Our secondary aim was to determine if an association exists between two clinical features (abscess size and size of surrounding cellulitis) and eventual MRSA diagnosis by culture. Methods: Logistic regression models were used to examine clinical variables as predictors of treatment failure within 7 days after incision and drainage and MRSA by wound culture. Results: Of 212 study participants, 190 patients were analyzed and 22 were lost to follow-up. Patients who grew MRSA, compared to those who did not, were more likely to fail treatment (31% to 10%, respectively; 95% confidence interval [CI] 8–31%). The failure rates for abscesses ≥ 5 cm and < 5 cm were 26% and 22%, respectively (95% CI −11–26%). The failure rates for cellulitis ≥ 5 cm and < 5 cm were 27% and 16%, respectively (95% CI −2–22%). Larger abscesses were no more likely to grow MRSA than smaller abscesses (55% vs. 53%, respectively; 95% CI −22–23%). The patients with larger-diameter cellulitis demonstrated a slightly higher rate of MRSA-positive culture results compared to patients with smaller-diameter cellulitis (61% vs. 46%, respectively; 95% CI −0.3–30%), but the difference was not statistically significant. Conclusion: Cellulitis and abscess size do not predict treatment failures within 7 days, nor do they predict which patients will have MRSA. MRSA-positive patients are more likely to fail treatment within 7 days of incision and drainage. Published by Elsevier Inc.**

☐ **Keywords—MRSA; cellulitis; abscess; antibiotics**

This article does not reflect the views of Brooke Army Medical Center, the United States Army, the Department of Defense, or the Federal Government.

INTRODUCTION

Skin and soft tissue abscesses are a frequent complaint in the Emergency Department (ED), and more than 50% of these infections are with community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) (1,2). Previous studies have demonstrated no significant difference between patients receiving antibiotics and those receiving placebo after incision and drainage (3–5). Few studies explored whether there are subsets of patients who are at higher risk of treatment failure after incision and drainage with or without adjunctive

RECEIVED: 1 November 2010; FINAL SUBMISSION RECEIVED: 8 June 2011;
ACCEPTED: 27 September 2011

antibiotic therapy. One pediatric study examined abscess size and found that abscesses < 5 cm were more likely to heal in pediatric immunocompetent patients regardless of antibiotic therapy, but abscess size > 5 cm was a significant predictor of hospitalization (6). To our knowledge, no previous studies have prospectively evaluated abscess size or the amount of surrounding cellulitis in adults to predict treatment failures. Many physicians use their own discretion and prescribe antibiotics for the presence of cellulitis or larger abscesses. Our primary aim was to determine if an association exists between three predictor variables (abscess $\geq$ 5 cm, cellulitis diameter $\geq$ 5 cm, and culture showing MRSA) and treatment failure within 7 days of incision and drainage in adults. Our secondary aim was to evaluate if an association exists between two clinical features (abscess size and size of surrounding cellulitis) and eventual MRSA diagnosis by culture.

MATERIALS AND METHODS

Study Design

This was a prospective cohort study and a secondary analysis of a previously reported randomized, double-blinded, placebo-controlled trial evaluating trimethoprim/sulfamethoxazole in the treatment of uncomplicated abscesses presenting to the ED. Two hundred twelve patients were enrolled by convenience sampling at four military academic EDs between November 2007 and June 2009. The inclusion criteria were all patients over 16 years of age who presented with uncomplicated abscesses that required incision and drainage. Patients who were hospitalized in the prior month, had taken antibiotics in the previous week, had a sulfa allergy, had a fever or signs of systemic illness, were pregnant, had a complicated abscess requiring surgical drainage by General Surgery with suspected tracks or fistulas, or who were immunosuppressed (i.e., had human immunodeficiency virus, cancer, diabetes, or use of chronic steroids) were excluded.

Study Protocol

Data were recorded by the treating ED provider (Emergency Physician or Physician Assistant) on a standardized data collection form that collected the following data: largest diameter of abscess, largest diameter of surrounding cellulitis, location of abscess, and patient demographic information. The size of the abscess was defined as the largest diameter of palpable fluctuance or induration. The measurements were taken with a standardized ruler included in the study packet. The primary outcome for the initial study was treatment failure rates within 7 days after incision and drainage. A clinically significant difference was defined as a 15-percentage-point difference in treatment failure rates between groups.

All patients received incision and drainage of the abscess by an Emergency Medicine resident or attending. The borders of the largest diameter of palpable fluctuance or induration and surrounding cellulitis were outlined with a permanent marker, measured with a ruler, and recorded. Incision and drainage was performed based on standard practice of the performing physician. Needle aspiration was not used to treat any abscesses. Length of incision, use of ultrasound, and amount of irrigation was left to the discretion of the physician. The cavity was explored and wound cultures were sent for culture and antimicrobial sensitivity. The wound was drained, packed with gauze, and covered with a dressing. No patients received intravenous or intramuscular antibiotics in the ED during their initial visit to the ED. Patients received either a 7-day supply of trimethoprim/sulfamethoxazole (160 mg/800 mg) taken twice daily or matched placebo from the hospital, based on block randomization by the hospital pharmacist. Patients were asked to return for follow-up at 48 h and again after 1 week for recheck by a physician blinded to the treatment arm. At the return visit, physicians blinded to the treatment arm evaluated the patient and filled out a data collection form evaluating clinical criteria including diameter of abscess, diameter of cellulitis, presence of fever or new lesions, and need for further intervention. Those patients who did not return for follow-up were contacted by telephone, and medical records were searched for documentation of treatment failure or clinical improvement. Treatment failure was defined as any patient with either no improvement at 48 h (i.e., no change in size of abscess or cellulitis from earlier measurements and skin markings) or any clinical worsening (i.e., increased diameter of abscess or surrounding cellulitis, presence of fever or systemic illness, or new lesion development within 7 days) that required further intervention. The size of the abscess and cellulitis were measured with the standardized ruler on each visit. Patients who were noted to have some clinical improvement or no improvement after 48 h, but who received an intervention, were considered treatment failures. Intervention was any change in management by the treating physician, including repeat incision and drainage, change in antibiotic management, or admission to the hospital. All patients with treatment failure within 7 days, including patients who failed at 48 h, were considered treatment failures as the primary endpoint. For the purpose of maintaining the study blinding, treatment failures were presumed to be on trimethoprim/sulfamethoxazole, and alternative antibiotic regimens were then chosen, if needed.

Data Analysis

Descriptive statistics were used to describe demographic variables, and percentages were used to summarize