
Inpatient dermatology consultation aids diagnosis of cellulitis among hospitalized patients: A multi-institutional analysis

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Background: Given its nonspecific physical examination findings, accurately distinguishing cellulitis from a cellulitis mimicker (pseudocellulitis) is challenging.

Objective: We sought to investigate the national incidence of cellulitis misdiagnosis among inpatients.

Methods: We conducted a retrospective review of inpatient dermatology consultations at Massachusetts General Hospital, University of Alabama at Birmingham Medical Center, University of California Los Angeles Medical Center, and University of California San Francisco Medical Center in 2008. All consults requested for the evaluation of cellulitis were included. The primary outcomes were determining the incidence of cellulitis misdiagnosis, evaluating the prevalence of associated risk factors, and identifying common pseudocellulitides.

Results: Of the 1430 inpatient dermatology consultations conducted in 2008, 74 (5.17%) were requested for the evaluation of cellulitis. In all, 55 (74.32%) patients evaluated for cellulitis were given a diagnosis of pseudocellulitis. There was no statistically significant difference in the rate of misdiagnosis across institutions ($P = .12$). Patient demographics and associated risk factor prevalence did not statistically vary in patients given a diagnosis of cellulitis versus those with pseudocellulitis ($P > .05$).

Limitations: This study was unable to evaluate all patients admitted with cellulitis and was conducted at tertiary care centers, which may affect the generalizability of the results.

Conclusions: Cellulitis is commonly misdiagnosed in the inpatient setting. Involving dermatologists may improve diagnostic accuracy and decrease unnecessary antibiotic use. (J Am Acad Dermatol 2015;73:70-5.)

Key words: antibiotics; cellulitis; contact dermatitis; internal medicine; medical dermatology; skin and soft-tissue infections; stasis dermatitis.

Cellulitis is a significant problem affecting hospitalized patients. In the United States in 2010, over 600,000 patients were admitted to the hospital for the evaluation and management of cellulitis, costing the health care system \$3.7 billion in 2004.^{1,2} In addition, patients admitted to the hospital

with cellulitis stay a mean of 7.1 days.³ Despite efforts made by hospitals and physicians to decrease infectious disease admissions, the incidence of cellulitis has steadily increased over the past decade.⁴ Distinguishing cellulitis from a pseudocellulitis (a noninfectious, nonnecrotizing,

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inflammatory condition of the dermis or subcutis)⁵ may be challenging, as both may present with the warmth, erythema, edema, pain, fever, and leukocytosis typically ascribed to cellulitis.

In the current health care climate, much attention is focused on reducing health care costs while maintaining patient safety. The misdiagnosis of cellulitis results in unnecessary hospital admissions, thereby exposing patients to unnecessary antibiotics (possibly increasing the potential for antibiotic resistance), extended hospital stays, and iatrogenic complications. This study sought to better assess the national incidence of cellulitis misdiagnosis among hospitalized patients by examining inpatient dermatology consultations at 4 large, geographically diverse academic medical centers. We hypothesize that inpatient dermatologic evaluation and management may be helpful for evaluating and treating the mimickers of cellulitis.

METHODS

Patient population

This retrospective study was approved by the institutional review boards at all participating institutions. All inpatient dermatology consultations conducted at Massachusetts General Hospital, University of Alabama at Birmingham Medical Center, University of California Los Angeles Medical Center, and University of California San Francisco Medical Center in 2008 were recorded. Each institution is staffed with 1 or more full-time inpatient dermatologists who evaluated each consult with a resident team. Those consults that were requested for the evaluation of cellulitis by the primary medical team were included for analysis. All final diagnoses at the time were made based on clinical history, physical examination findings, and any related laboratory testing. Skin biopsy was occasionally performed for further assessment.

Data and statistical analysis

Each patient's demographics, medical history, laboratories, rash duration, reason for admission, and associated risk factors (eg, active cancer, diabetes mellitus, history of skin disease) were recorded. The final diagnoses made by the

dermatology consultation teams were also recorded. Patients who were evaluated for cellulitis by the dermatology consultation team were compared across institutions using χ^2 analysis for proportions and single variable analysis of variance test for means. The Mantel-Haenszel test was applied to compare the associated risk factors found in the true

cellulitis and pseudocellulitis groups across institutions. Given that no statistically significant difference was noted, the patients from each institution were analyzed together in their respective groups (true cellulitis vs pseudocellulitis). For between-group comparisons of the true cellulitis and pseudocellulitis populations, *t* test was used for comparing means, the Wilcoxon rank sum test was used for comparing rash duration, and Fisher exact test was applied to compare propor-

tions. Statistical significance for all comparisons was defined as *P* less than .05.

RESULTS

In 2008, 1430 inpatient dermatology consultations were conducted at Massachusetts General Hospital, University of Alabama at Birmingham Medical Center, University of California Los Angeles Medical Center, and University of California San Francisco Medical Center with approximately equal numbers of consults conducted at each institution (Table 1). A total of 74 (5.17%) consults were for the evaluation of cellulitis. Across all institutions, the mean age of the cellulitis population was 56.20 years (*P* = .96) and 54.05% of the patients were male (*P* = .08). In all, 65 (87.84%) patients were admitted to the hospital for evaluation and treatment of their rash (*P* = .55). Given these results, we confirmed the null hypothesis that the populations at each institution were similar demographically.

Among the 74 patients who were seen by dermatology for the evaluation of cellulitis, 55 (74.32%) were given a diagnosis of a cutaneous condition mimicking cellulitis (pseudocellulitis), and therefore given a misdiagnosis of cellulitis. The percentage of misdiagnoses at each institution ranged from 55.56% to 93.33% (*P* = .12).

The population of patients given a diagnosis of true cellulitis was then compared with the population of patients given a diagnosis of pseudocellulitis.

CAPSULE SUMMARY

- Given its nonspecific findings of pain, erythema, and edema, cellulitis is challenging to distinguish from pseudocellulitis.
- In this study, 74.32% of patients who received a dermatology consultation for cellulitis were given a diagnosis of pseudocellulitis.
- Inpatient dermatology consultation for patients with presumed cellulitis improves diagnostic accuracy and reduces unnecessary antibiotic use.

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