Assessment of the Clinical Approaches Being Used to Manage Purulent and Non-purulent Cellulitis

Ashmita Chakraborty, BS • Kathleen Kenny, MD

Division of Primary Care and Population Health • Department of Medicine, Stanford University School of Medicine • Stanford, California

Background

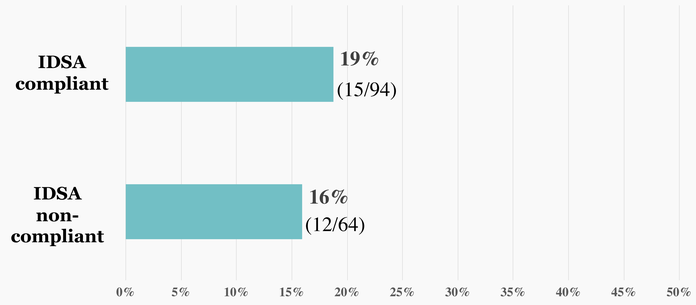
- Cellulitis is a bacterial skin and soft tissue infection (SSTI) commonly seen in primary care settings and can be managed by a variety of antibiotic treatment modalities depending on its clinical presentation, severity, location, and patient comorbidities.
- The Infectious Diseases Society of America (IDSA) updated their guidelines for the management of SSTIs in 2014, which match infection severity and type to antibiotic therapy. However, there is limited literature examining clinical outcomes where treatments adhered to or departed from these guidelines. It is also unclear how closely this algorithm is followed in practice at Stanford.
- Due to an increased risk of infection with methicillin-resistant *Staphylococcus aureus* (MRSA) in the immunocompromised population, empiric treatment for SSTIs should include coverage for MRSA.
- Broad-spectrum treatment of non-purulent cellulitis in immunocompetent hosts is often used excessively, in contrast to IDSA guidelines.
- Cellulitis patients at Stanford are most commonly seen in the internal medicine department (SIMW), emergency department, and Express Care.

Methods

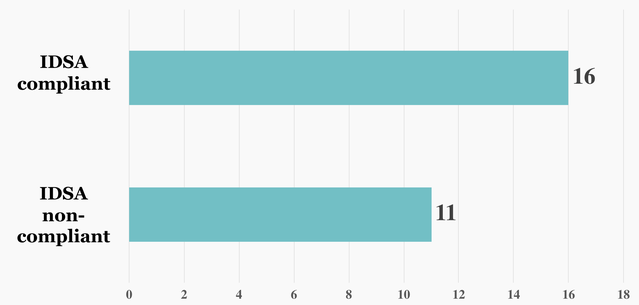
- A retrospective chart review of 158 patients seen for cellulitis by Stanford providers from Oct. 2014 - Oct. 2019 was conducted.
- The primary outcome was IDSA-guideline adherence in choice of antibiotics. Secondary outcomes included treatment failures and therapeutic choices per department.
- Treatment selections were assessed based on whether immunocompetent patients were diagnosed with purulent or non-purulent cellulitis, and whether patients with purulence presented with purulent drainage or abscesses.
- Antibiotic therapies for patients with immunocompromising conditions were evaluated for anti-MRSA activity.
- Details of follow-up for treatment failures or cellulitis recurrence were reviewed for patients who did not experience resolution after their initial clinic visit.

Results

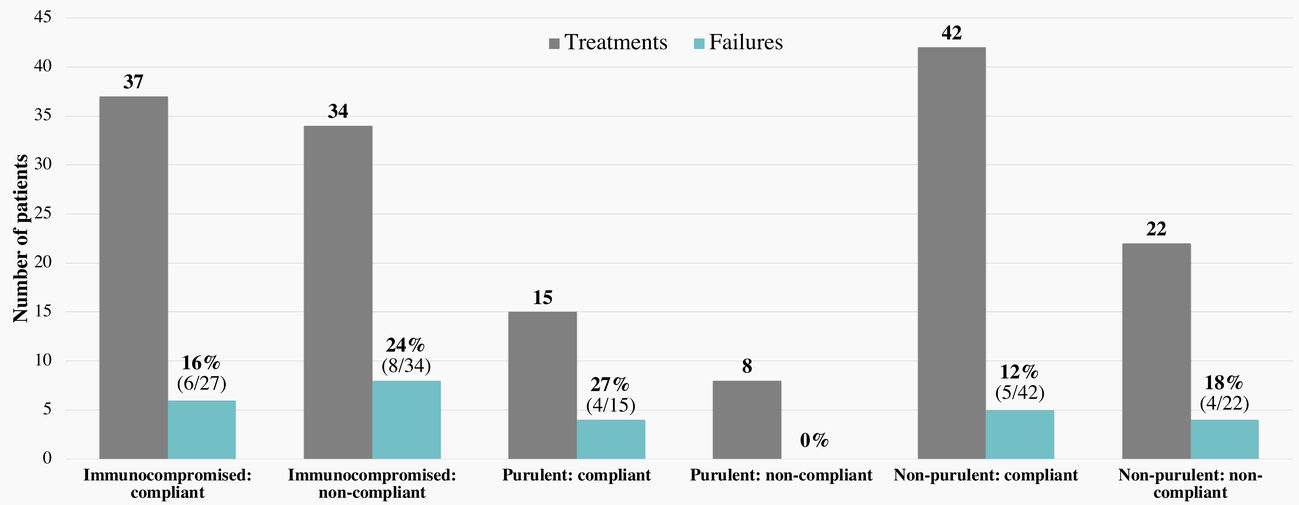
Treatment failures based on IDSA guideline compliance



Resolution of initial treatment failures



Selected treatment modalities and associated failure rates



Treatment adherence in immunocompetent patients

Clinical presentation	IDSA non-compliant treatments	Failure rate in non-compliant treatments
Purulent	**8** (35% of purulent cases)	0%
Non-purulent	**22** (34% of non-purulent cases)	14%

Treatment adherence by department

Department	IDSA compliance		Treatment failure rate
	Compliant treatments	Non-compliant	
SIMW	30	19	14%
ED	26	12	27%
Express Care	22	20	17%

Conclusions & Discussion

- This study identified Stanford providers' choice of antibiotic therapy for cellulitis patients and the effectiveness of these therapies in cellulitis management.
- First, the overall rate of compliance with the SSTI management algorithm was **59%**, which represents opportunity for antibiotic stewardship at Stanford.
- Treatment failure and disease recurrence rates were comparable between patients whose initial treatments adhered by IDSA guidelines and those whose treatments didn't meet requirements.
- For immunocompetent patients with non-purulent cellulitis, **34%** of treatments utilized inappropriate use of broad-spectrum antibiotics. The overuse of broad-spectrum antibiotics poses risks such as antibiotic resistance, increased cost, and increased rates of *C. difficile*. Thus, narrow-spectrum antibiotics should be implemented in most cases of non-purulent cellulitis in immunocompetent patients.
- Immunocompetent patients with purulent cellulitis who received therapy with anti-MRSA activity showed higher rates of recurrence than patients whose treatments didn't cover MRSA. This suggests that MRSA colonization may not be implicated in most cases of purulent cellulitis.
- Similar numbers of immunodeficient patients receiving IDSA-compliant and non-compliant treatment experienced treatment failures. This finding warrants re-evaluation of cellulitis treatment recommendations for the immunocompromised host.

References

- Carey, C F, and L Dall. "Diagnosis of cellulitis in the immunocompromised host." The Canadian journal of infectious diseases = Journal canadien des maladies infectieuses vol. 1,4 (1990): 133-5. doi:10.1155/1990/649417
- Dennis L. Stevens, Alan L. Bisno, Henry F. Chambers, E. Patchen Dellinger, Ellie J. C. Goldstein, Sherwood L. Gorbach, Jan V. Hirschmann, Sheldon L. Kaplan, Jose G. Montoya, James C. Wade, Practice Guidelines for the Diagnosis and Management of Skin and Soft Tissue Infections: 2014 Update by the Infectious Diseases Society of America, Clinical Infectious Diseases, Volume 59, Issue 2, 15 July 2014, Pages e10–e52, https://doi.org/10.1093/cid/ciu296
- Gunderson CG, Overtreatment of Nonpurulent Cellulitis. J. Hosp. Med 2016;8;587-590. doi:10.1002/jhm.2593
- Haran, J P et al. "Deviating from IDSA treatment guidelines for non-purulent skin infections increases the risk of treatment failure in emergency department patients." Epidemiology and infection, vol. 147 1-7. 5 Dec. 2018, doi:10.1017/S0950268818003291
- Kamath, Rahul S et al. "Guidelines vs Actual Management of Skin and Soft Tissue Infections in the Emergency Department." Open forum infectious diseases vol. 5,1 ofx188. 12 Jan. 2018, doi:10.1093/ofid/ofx188
- Ramakrishnan K, Salinas RC, Agudelo Higuita NI. Skin and Soft Tissue Infections. Am Fam Physician. 2015;92(6):474-483.