

Obesity contributes to failure of outpatient treatment of skin and soft tissue infections

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Background

- Skin and soft tissue infections have been increasing in incidence over the past 25 years from 8.6 million outpatient visits in 1997 to 14.2 million outpatient visits in 2005 and continuing to grow since
- Hospitalization rates due to the poorly managed or untreated skin infections have continued to rise in addition to antimicrobial resistance
- Choosing an appropriate oral antibiotic agent for outpatient skin infections can be challenging when assessing a patient's clinical presentation, pertinent history, and if bacterial cultures are unavailable
- Knowledge of risk factors for failure of uncomplicated skin infections in the outpatient setting is limited

Objectives & Methods

- Objective:**
- Quality improvement study to evaluate the risk factors of antibiotic failure in outpatients treated for cellulitis and abscesses in a WNY VA hospital
- Study Design:**
- Retrospective chart review of outpatients who received a diagnosis of cellulitis or abscess by primary care provider or ER physician and treated with an oral antibiotic
- Statistics:**
- Bivariate analysis was used to evaluate patient characteristics of those patients that failed antibiotic treatment and those that did not fail
 - Multivariate logistical regression was used to determine significant risk factors for failure
- Study Period:**
- January 1, 2006 to July 1, 2015

Outcomes

- Primary Outcomes:**
- Failure rate of the antibiotic, defined as another antibiotic prescribed or hospitalization within 30 days
 - Risk factors for failure of treatment

Inclusion Criteria

- Cellulitis and/or abscess diagnosis in Primary Care Office or Emergency Department
- ICD9 codes: 528.3, 681.10, 681.9, 682.0, 682.1, 682.2, 682.3, 682.5, 682.6, 682.7, 682.8, 682.9

Exclusion Criteria

- Skin infections including: impetigo, carbuncle, folliculitis, furunculosis, psoriasis, mastitis, bursitis
- Skin infections located in the hand, genital, perirectal, catheter site, prosthetic site, surgical site, or orbital infection
- Skin infections resulting from human or animal bite
- Hospitalization within previous 14 days
- Antibacterial therapy within previous 14 days

Results

Baseline Patient Characteristics

Parameter	Total cohort (n = 293)	Success (n = 224)	Failure (n = 69)	p-value
Age (yr)	60.5 ± 17.2	60.8 ± 17.5	59.7 ± 16.2	0.7
Male	276 (94.2%)	208 (92.9%)	68 (98.6%)	0.08
Race				1.0
African American	46 (15.7%)	36 (16.1%)	10 (14.5%)	
Caucasian	243 (82.9%)	185 (82.6%)	58 (84.1%)	
Other	4 (1.4%)	3 (1.3%)	1 (1.5%)	
Height (in)	69.8 ± 3.0	69.9 ± 3.0	69.6 ± 2.8	0.4
Weight (kg)	100.6 ± 26.5	98.9 ± 24.6	106.3 ± 31.5	0.04 **
Body mass index [BMI] (kg/m ²)	32.0 ± 7.9	31.3 ± 7.2	34.2 ± 9.5	0.01 **
Temperature (°F)	97.6 ± 0.9	97.6 ± 0.9	97.6 ± 0.9	0.6
Serum creatinine (mg/dL)	1.0 ± 0.4	1.0 ± 0.4	1.1 ± 0.3	0.7
CrCl (mL/min)	114.1 ± 53.2	112.0 ± 51.4	120.7 ± 58.3	0.3
Chronic kidney disease	26 (8.9%)	19 (8.5%)	7 (10.1%)	0.7
Diabetes	107 (36.5%)	74 (33%)	33 (47.8%)	0.03 **
Heart failure	27 (9.2%)	16 (7.1%)	11 (15.9%)	0.03 **
Charlson score	1 (0-2)	1 (0-2)	1 (0-3)	0.05 **
PCN allergy	29 (9.9%)	22 (9.8%)	7 (10.1%)	0.9
MRSA colonized (n=94)	8 (8.5%)	5 (7%)	3 (13%)	0.4

Clinical Characteristics of Skin Infections

Parameter	Total cohort (n = 293)	Success (n = 224)	Failure (n = 69)	p-value
Provider location				1.0
ED	127 (43.3%)	97 (43.3%)	30 (43.5%)	
PCG	166 (56.7%)	127 (56.7%)	39 (56.5%)	
Antibiotics				0.9
Cephalexin	87 (29.7%)	68 (30.4%)	19 (27.5%)	
Clindamycin	45 (15.4%)	35 (15.6%)	10 (14.5%)	
TMP/SMX	96 (32.8%)	71 (31.7%)	25 (36.2%)	
TMP/SMX + Cephalexin	8 (2.7%)	7 (3.1%)	1 (1.4%)	
Other	57 (19.4%)	43 (19.2%)	14 (20.3%)	
Duration of treatment	9.0 ± 1.9	8.94 ± 2.0	9.14 ± 1.6	0.4
Type of infection				0.8
Abscess	67 (22.9%)	49 (21.9%)	18 (26.1%)	
Cellulitis	182 (62.1%)	141 (62.9%)	41 (59.4%)	
Mixed	44 (15%)	34 (15.2%)	10 (14.5%)	
Anatomical location				0.7
Buttocks/Groin	20 (6.8%)	14 (6.2%)	6 (8.7%)	
Head/Neck	50 (17.1%)	38 (17%)	12 (17.4%)	
Lower Extremity	172 (58.7%)	129 (57.6%)	43 (62.3%)	
Trunk/Abdomen	13 (4.4%)	11 (4.9%)	2 (2.9%)	
Upper Extremity	38 (13%)	32 (14.3%)	6 (8.7%)	
Microbiology (n=45)				0.01 **
Gram Negative	1 (2.2%)	1 (3.23%)	0 (0%)	
MRSA	14 (31.1%)	5 (16.1%)	9 (64.3%)	
MSSA	16 (35.6%)	12 (38.7%)	4 (28.6%)	
Skin flora	11 (24.4%)	11 (35.5%)	0 (0%)	
No growth	3 (6.7%)	2 (6.4%)	1 (7.1%)	
Hospitalized within 30 days	1 (0.5%)	1 (0.5%)	14 (20.3%)	< 0.0001 **

Multivariate Logistic Regression Results

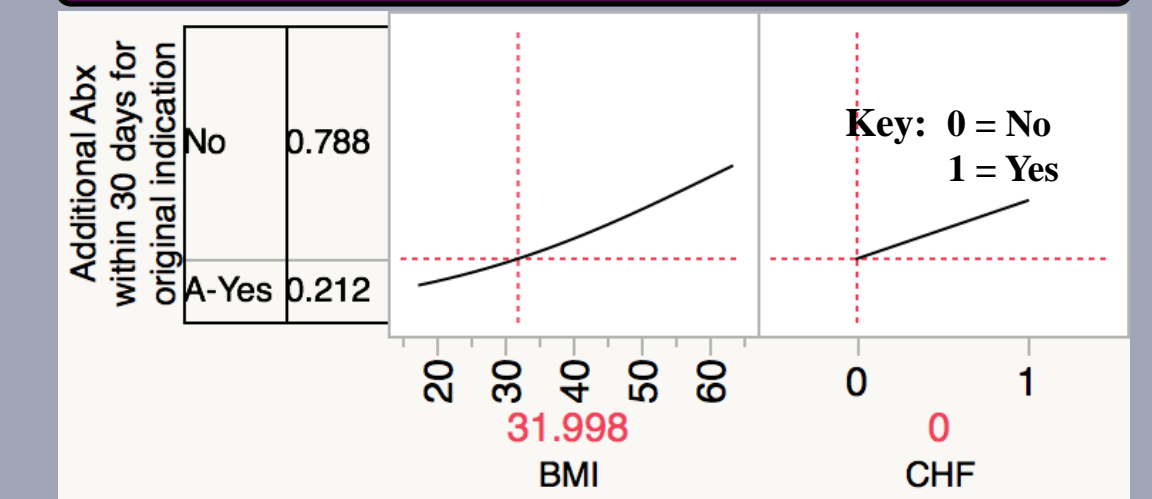
Risk Factors for Failure

Variable	Odds Ratio	Confidence Interval (95%)	p-value
BMI	1.05*	1.01 – 1.1	0.009 **
Heart Failure	2.56	1.1 – 5.8	0.03 **

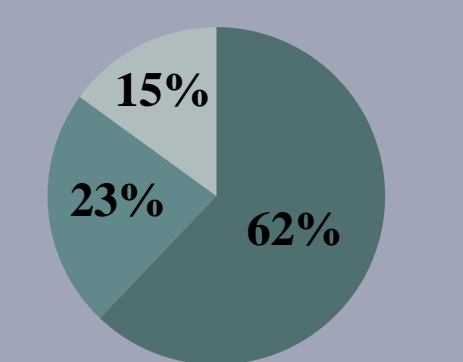
*Unit odds ratio

Without Heart Failure		With Heart Failure	
BMI: 20 kg/m ²	13.5%	BMI: 20 kg/m ²	28.7%
BMI: 30 kg/m ²	19.7%	BMI: 30 kg/m ²	38.7%
BMI: 40 kg/m ²	28.7%	BMI: 40 kg/m ²	49.7%
BMI: 50 kg/m ²	37.7%	BMI: 50 kg/m ²	60.8%
BMI: 60 kg/m ²	48.7%	BMI: 60 kg/m ²	70.9%

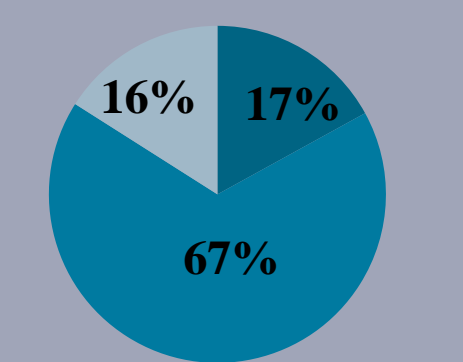
Prediction Profiler for Risk Factors for Failure



Type of Infection



Obesity Incidence



- Cellulitis
- Abscess
- Mixed
- Normal (< 25 kg/m²)
- Overweight/Obese (25 - 40 kg/m²)
- Extreme obesity (> 40 kg/m²)

Conclusions

- Patients with an elevated body mass index and/or a diagnosis of heart failure were more likely to fail their original course of antibiotics and require additional antibiotics for cellulitis/abscess within 30 days
- Further studies are needed in the subset of obese patients to determine solutions for the unacceptably high failure rates

Disclosures

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- The contents of this poster represent the work of the authors and are not intended to represent the views of the Department of Veterans Affairs or of the United States Government.