Improving management of hospitalized adults with cellulitis or cutaneous abscess

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- Objective: determine if the implementation of the Clinical Practice Guideline for the Management of Hospitalized Adults with Cellulitis or Cutaneous Abscess is effective at improving patient care

- Retrospective, observational, chart review

- A guideline was developed by the Infectious Diseases division and the Antimicrobial Stewardship Committee
  - Differentiates between cutaneous abscess and uncomplicated cellulitis
  - Antimicrobial stewardship education sessions scheduled for emergency medicine practitioners, medicine residents, and hospitalists
  - Guideline made available on the hospital website

- Inclusion Criteria
  - Discharge diagnosis of cellulitis or cutaneous abscess
  - Inpatient at BMC January 2011 – December 2011 (pre-implementation)
  - Inpatient at BMC April 2013 – April 2014 (post-implementation)
- Exclusion Criteria
  - Age < 18 years
  - Transfer from an outside hospital
  - Left against medical advice
  - Necrotizing fasciitis
  - Complicated cellulitis
    - Diabetic or chronic ulcer
    - Surgical wound
    - Periorbital/orbital cellulitis
    - Perirectal abscess or cellulitis
    - Sepsis
    - Bacteremia
    - Human or animal bites
    - Burns
    - Severe Immunosuppression

Baseline Characteristics

	Overall n=482		Pre n=259; 53.7%	Post n=223; 46.3%	No Abscess n=290; 60.2%	Abscess n=192; 39.8%
Age						
Mean(sd)	53.9 (20.9)		53.2 (19.1)	54.7 (20.9)	62.0 (17.9)	41.6 (16.2)
Median (range)	53 (18-98)		53 (18-94)	55 (18-98)	61 (18-98)	38.5 (18-91)
Race						
White	336 (69.7)		175 (67.6)	161 (72.2)	223 (76.9)	113 (58.9)
Hispanic	104 (21.6)		58 (22.4)	46 (20.6)	47 (16.2)	57 (29.7)
Black	34 (7.1)		20 (7.7)	14 (6.3)	17 (5.9)	17 (8.9)
Unknown	8 (1.7)		6 (2.3)	2 (0.9)	3 (1.0)	5 (2.6)
Female	223 (46.3)		118 (45.6)	105 (47.1)	141 (48.6)	82 (42.7)
Comorbidities						
BMI >=30	249 (51.7)		141 (54.4)	108 (48.4)	168 (57.9)	81 (42.2)
Cirrhosis	13 (2.7)		8 (3.1)	5 (2.2)	10 (3.5)	3 (1.6)
Diabetes Mellitus	151 (31.3)		83 (32.0)	68 (30.5)	103 (35.5)	48 (25.0)
Hemodialysis	5 (1.0)		1 (0.4)	4 (1.8)	5 (1.7)	0
HIV	6 (1.2)		4 (1.5)	2 (0.9)	1 (0.3)	5 (2.6)
IV Drug Use	48 (10.0)		19 (7.3)	29 (13.0)	6 (2.1)	42 (21.9)
MRSA	43 (8.9)		23 (8.9)	20 (9.0)	20 (6.9)	23 (12.0)
Prior SSTI	134 (27.8)		72 (27.8)	62 (27.8)	91 (31.4)	43 (22.4)
Primary Diagnosis						
Finger and Toe (681.x)	24 (5.0)		12 (4.6)	12 (5.4)	4 (1.4)	20 (10.4)
Other (682.x)	457 (94.8)		247 (95.4)	210 (94.2)	286 (98.6)	171 (89.1)
Erysipelas (0.35)	1 (0.2)		0	1 (0.5)	0	1 (0.5)
Primary Location						
Upper Extremity	109 (22.6)		59 (22.8)	50 (22.4)	28 (9.7)	81 (42.2)
Lower Extremity	297 (61.6)		155 (59.9)	142 (63.7)	238 (82.1)	59 (30.7)
Trunk	24 (5.0)		13 (5.0)	11 (4.9)	8 (2.8)	16 (8.3)
Groin/Buttock	11 (2.3)		8 (3.1)	3 (1.4)	3 (1.0)	8 (4.2)
Face, Head, Neck	30 (6.2)		17 (6.6)	13 (5.8)	10 (3.5)	20 (10.4)
Multiple	11 (2.3)		7 (2.7)	4 (1.8)	3 (1.0)	8 (4.2)
Duration of Symptoms prior to presentation (days)						
Mean(sd)	5.7 (5.8)		5.9 (6.3)	5.5 (5.1)	5.9 (6.0)	5.4 (5.4)
Median (range)	4 (0-50)		4 (0-50)	4 (0-30)	4 (0-45)	4 (0-50)
Missing: n(%)	2 (0.4%)		0	2	2	0
Prior Outpatient Therapy	200 (41.5)		117 (45.2)	83 (37.2)	121 (41.7)	79 (41.2)
Duration of Prior Outpatient Therapy (days) [n=187]						
Mean(sd)	4.5 (4.0)		4.8 (4.5)	4.0 (3.1)	5.0 (4.5)	3.7 (2.8)
Median (range)	3 (1-33)		3 (1-33)	3 (1-14)	3.5 (1-33)	3 (1-14)
Fever at Presentation	40 (8.3)		18 (7.0)	22 (9.9)	28 (9.7)	12 (6.3)
Leukocytosis at Presentation	213 (44.2)		116 (44.8)	97 (43.5)	107 (36.9)	106 (55.2)

Outcomes (95% CI) over Time by Presence of Abscess

	Overall	Pre (n=259; 53.7%)		Post (n=223; 46.3%)		p-value
		No Abscess	Abscess	No Abscess	Abscess	
Vancomycin Use: (%)	419 (86.9)	92.9 (88.8 – 96.9)	86.7 (80.2-93.2)	80.1 (73.4-86.9)	87.4 (80.4-94.3)	0.032*
Broad Spectrum Antibiotic Use: (%)	173 (86.9)	43.5 (35.7-51.3)	46.7 (37.1-56.2)	25.7 (18.4-33.1)	25.3 (16.2-34.4)	0.709*
Incision and Drainage: n(%)*	161 (33.4)	0	89 (84.8)	2 (1.5)	70 (80.5)	0.709*
Adverse Events: (%)	42 (8.7)	n=12 7.8 (3.6-12.0)	n=7 6.7 (1.9-11.4)	n=10 7.4 (3.0-11.7)	n=13 14.9 (7.5-22.4)	0.148*
Nephrotoxicity*	13 (2.7)	2 (1.3)	4 (3.8)	4 (3.0)	3 (3.5)	--
Infusion Related Reactions*	25 (5.2)	7 (4.6)	3 (2.9)	5 (3.7)	10 (11.5)	--
Phlebitis*	8 (1.7)	3 (2.0)	1 (1.0)	4 (3.0)	0	--
Clinical Failure: n(%)*	8 (1.7)	2 (1.3)	1 (1.0)	4 (3.0)	1 (1.2)	0.700*
Recurrence: n(%)*	28 (5.8)	12 (7.8)	3 (2.9)	12 (8.8)	1 (1.2)	0.391*
30 Day Re-hospitalization*	39 (8.1)	16 (10.4)	1 (1.0)	19 (14.2)	3 (3.5)	0.432*
Duration from D/C to Readmission (n=39)* Mean(sd)	14.0 (8.7)	17.0 (9.0)	13.1 (-)	12.1 (8.4)	6.0 & 10.5	-
Median (range)	10.9 (2.1-28.4)	21.2 (3.1-27.7)	-	10.1 (2.1-28.4)	-	
Duration of IV Therapy Mean(sd)	3.1 (2.0)	3.2 (2.9-3.5)	3.0 (2.6-3.4)	3.1 (2.7-3.4)	2.8 (2.4-3.2)	0.809**
Median (range)	2.6 (0-16.7)					
Duration of Antimicrobial Therapy Mean(sd)	10.0 (3.1)	9.9 (9.4-10.3)	10.8 (10.3-11.4)	9.3 (8.8-9.8)	10.5 (9.9-11.2)	0.636**
Median (range)	10 (0-20.4)					
Length of Stay (days) Mean(sd)	3.7 (2.1)	3.9 (3.6-4.3)	3.5 (3.1-3.9)	3.9 (3.5-4.2)	3.3 (2.8-3.7)	0.737**
Median (range)	3.2 (0.5-16.6)					

*Interaction term from logistic regression model
**Interaction term from linear regression model
***Limited events, therefore numbers and percentages are presented

Differences (95% CI) over Time by Presence of Abscess

	Pre-Post Change			
	No Abscess	p-value	Abscess	p-value
Vancomycin Use: (%)	-12.7 (-21.7 to -3.7)	0.002	0.7 (-10.2 to 11.6)	0.887
Broad Spectrum Antibiotic Use: (%)	-17.8 (-30.1 to -5.5)	0.001	-21.4 (-36.5 to -6.3)	0.002
Adverse Events: (%)	-0.4 (-7.4 to 6.5)	0.887	8.3 (-1.9 to 18.4)	0.068
Mean Duration of IV Therapy (Days):	-0.12 (-0.64 to 0.40)	0.596	-0.21 (-0.85 to 0.43)	0.458
Mean Duration of Antimicrobial Therapy (Days):	-0.59 (-1.40 to 0.22)	0.102	-0.32 (-1.31 to 0.68)	0.471
Mean Length of Stay (Days)	-0.05 (-0.61 to 0.50)	0.831	-0.18 (-0.87 to 0.50)	0.545

Impact

- Following provider education and implementation of a guideline for the treatment of uncomplicated non-purulent cellulitis and cutaneous abscess, there was a significant decrease in
    1) vancomycin use for non-purulent cellulitis
    2) broad-spectrum antibiotic use for both non-purulent cellulitis and cutaneous abscess
- Decreases in broad-spectrum antibiotics did not increase rates of recurrence, readmission, or adverse effects
- Decreases exposure to unnecessary broad-spectrum antibiotics and their potential risks: nephrotoxicity, phlebitis, *C.difficile* infection and antibiotic resistance