Impact Of Procalcitonin On Antibiotic Utilization In Community Acquired Pneumonia Patients

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Background

Procalcitonin is a hormone which is undetectable in healthy states but is upregulated in bacterial infections.[1] A more elevated procalcitonin level correlates with higher severity of infection and decreasing procalcitonin levels correlate with resolving infection.[2] Several recent clinical trials have reported reduced antibiotic exposure when procalcitonin is used to guide antibiotic therapy decisions, but there have been other studies which showed no difference in duration of antibiotics.[3-5] Additionally, non-infectious causes of inflammation including trauma, surgery, burns, metastatic cancer, and chronic dialysis can also induce procalcitonin production.[6]

At Northeast Georgia Medical Center (NGMC):

- Procalcitonin available for ordering by all providers at their discretion
- No formal guidance for providers on when to order repeat levels
- Current procalcitonin lab guidance is different from that found in literature

Recommended Lower Respiratory Tract Infection Algorithm
<0.1 mcg/L: Antibiotics strongly discouraged
0.1 – 0.25 mcg/L: Antibiotics discouraged
>0.25 – 0.5 mcg/L: Antibiotics encouraged
>0.5 mcg/L: Antibiotics strongly encouraged

Current NGMC Lab Report
<0.25 mcg/L: Bacterial infection unlikely. Antibiotic use probably ineffective
<0.5 mcg/L: Low risk for progression to severe systemic infection/sepsis
>2 mcg/L: High risk for progression to severe systemic infection/sepsis

Objective

To determine whether the use of procalcitonin in patients diagnosed with community acquired pneumonia (CAP) helps decrease antibiotic exposure at NGMC

Methods

- Retrospective chart analysis of 200 adult patients who were randomly selected using the EPIC electronic health record system

Inclusion Criteria
- Age ≥ 18 years
- Admitted to NGHS Gainesville or Braselton campuses between October 2018-October 2019
- CAP diagnosis

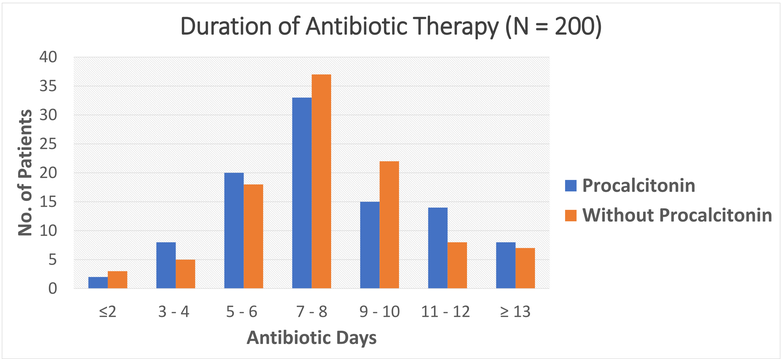
Exclusion Criteria
- Pregnancy
- Vulnerable subjects
- Chronic hemodialysis
- Metastatic cancer
- Surgery in previous 7 days

- Antibiotic day was defined as a 24-hour period from 0000 to 2359 in which any antibiotic was given
- Procalcitonin cutoffs were based on accepted FDA endorsed algorithms for lower respiratory tract infections[7]

Results

Baseline Characteristics (Total n = 200)	CAP with procalcitonin (n = 100)	CAP without procalcitonin (n = 100)	*P*-value
Age – year , median (IQR)	73 (60, 83)	66 (55, 78)	0.103
Male sex, %	50	55	0.479
Comorbid Condition, %			
COPD	39	36	0.661
Asthma	11	6	0.205
CKD	16	17	0.849
Current Smoker, %	32	27	0.438
CURB – 65 score, %			
0	17	23	0.289
1	25	30	0.428
2	39	26	0.05
3	16	14	0.692
4	3	7	0.194
CURB – 65 score, median (IQR)	2 (1, 2)	1 (1, 2)	0.33

Outcome	CAP with procalcitonin (n = 100)	CAP without procalcitonin (n = 100)	*P*-value
Primary Outcome			
Duration of Antibiotic Therapy - days, median (IQR)	8 (6, 10)	8 (6, 10)	0.594
Secondary Outcomes			
Length of Stay – days, median (IQR)	6 (4, 9)	4 (3, 6)	<0.001
In-hospital Mortality, %	6	1	0.054
Incidence of *C. difficile*, %	2	0	0.155



Disclosure

The authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities

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Conclusions

- No clinical or statistically significant difference in antibiotic duration between the procalcitonin group and the non-procalcitonin group
- Length of stay greater in procalcitonin group and difference statistically significant
- In-hospital mortality and incidence of *C. difficile* colitis greater in procalcitonin group but difference not statistically significant

Discussion

The length of stay and in-hospital mortality were higher in the procalcitonin group, but this difference may be due to the procalcitonin group having a higher CURB-65 score.

Main limitations of the study:
- Retrospective study
- NGMC has no detailed procalcitonin algorithm to follow
- Unable to determine whether lack of difference in antibiotic therapy between groups is due to lack of efficacy with procalcitonin assay or if there is lack of adequate guidance available for providers

Currently, NGMC performs about 700 procalcitonin assays per month. With each assay costing about $22, the total yearly cost is almost $200,000. This is a significant cost for a lab that does not seem to be providing benefit with how we are currently using it.

Future efforts will need to include:
- Educating providers on procalcitonin utilization data as well as the results from this study
- Updating how the NGMC lab reports procalcitonin results so that it is consistent with the most recent literature
- Adding procalcitonin guidance within the institution's CAP order-set so providers have a reference for when to order serial levels
- Comparing pre-education data with post-education data to further determine if procalcitonin provides a benefit as an antimicrobial stewardship tool at Northeast Georgia Medical Center

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