The Impact of a Clinical Practice Guideline and Educational Interventions on the Management of Children Hospitalized with Uncomplicated Community Acquired Pneumonia

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Background

- Infectious Diseases Society of America guidelines on Antimicrobial Stewardship Programs (ASP) recommend clinical practice guidelines (CPG) to improve the judicious use of antimicrobial agents
- Our institution developed a CPG for the inpatient management of pediatric patients admitted for uncomplicated community acquired pneumonia (CAP) based on the 2011 IDSA Guidelines for the Management of Uncomplicated CAP

Objective

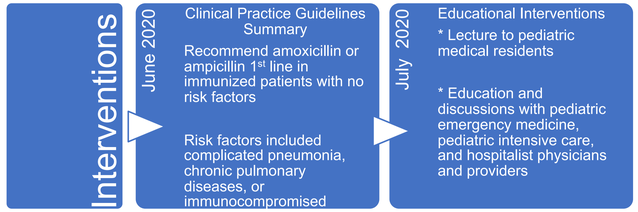
Evaluate improvement in appropriate antibiotic use through CPG and concomitant education to peer providers at a single institution to minimize unnecessary broad spectrum use in pediatric patients with CAP

Methods

- Single center, IRB-approved retrospective chart review

Inclusion criteria	Any pediatric patient 2 months - 21 years old admitted with a diagnosis of uncomplicated CAP - September 1, 2019-February 29, 2020 (pre-intervention phase) - September 1, 2020-February 28, 2021 and 2022 (post-intervention phase)
Exclusion criteria	- Complicated pneumonia or with comorbidities including sickle cell disease, chronic lung disease, neurologic conditions, congenital heart disease or patients who were immunocompromised

- Data collection included prescribing patterns of specific physicians and adherence to CPG recommendations
- The primary endpoint was to measure the reduction in the use of broad-spectrum antibiotics (vancomycin, clindamycin, ceftriaxone, levofloxacin and cefdinir) and appropriate use of narrow spectrum agents (ampicillin, amoxicillin, and amoxicillin-clavulanate) to assess effectiveness of CPG and educational interventions



Results

Table 1: Patient and Hospital Course Characteristics

Variable (mean, unless noted)	Pre N= 72	Post N=42	P-value
Age in years	5.41	6.55	0.26809
Number of days of symptoms	4.5	4.29	0.69766
CBC WBC	11.24	9.73	0.19036
% Neutrophils	68.38	67.29	0.74978
% Lymphocytes	20.51	21.82	0.64584
CRP (mg/L)	8.99	6.24	0.31777
Prior Antibiotic Use			
None (n)	39	28	
< 48 hours (n)	9	5	0.9099
>48 hours (n)	24	9	0.2932
Patient Location			
Gen Peds (n)	62	39	0.2827
PICU (n)	10	3	
Transfer to ICU			
No (n)	65	39	0.6399
Yes (n)	7	3	
Length of Stay (Days)	3.04	2.86	0.74883
Oxygen Supplementation (Days)	2.21	2.6	0.50100

Table 2: Prescence of Viral and Atypical Bacteria

RPP Results	Pre	Post	P-value
COVID-19	2	5	0.9976
Influenza	9	0	0.9918
Metapneumovirus	1	1	0.9992
Mycoplasma Pneumoniae	6	1	0.9976
Parainfluenza	0	3	0.9949
RSV	6	2	
>1	15	4	0.9985
>2	4	3	0.9997

Figure 1: Emergency Department Antibiotic Administration

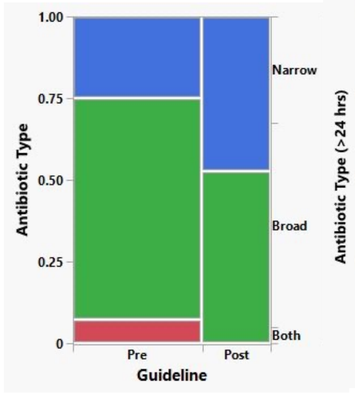
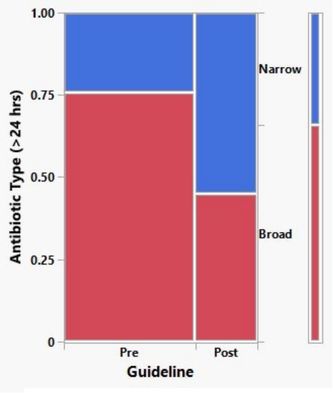


Figure 2: Antibiotic Administration – First 24 Hours After Admission



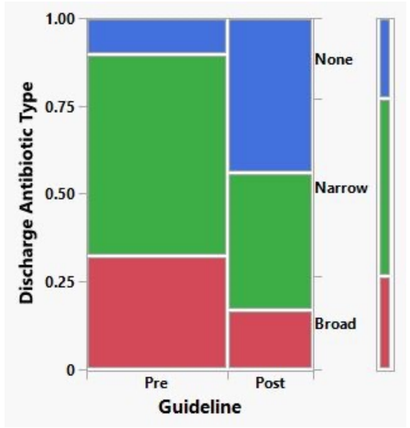


Figure 3: Discharge antibiotics

Results

- 114 patients were included in the study, 72 patients in the pre-implementation group and 42 in the post-implementation group
- Patient characteristics and concomintant detected pathogens are summarized in Table 1 and Table 2.
- An overall reduction of 23% in the utilization of combination, 4.7% reduction of broad spectrum and a 28% increase in the utilization of narrow spectrum antibiotics was observed
- A significant reduction in broad spectrum antibiotic use was noted in the ED (p=<0.0001), during the first 24 hours of admission (*p*=0.0034) and for discharge antibiotics (*p*=0.0003) (Figures 1-3) between the pre- and post-intervention groups.
- CPG plus educational interventions resulted in 100% reduction in inappropriate combination antibiotics, a 14.9% reduction of broad-spectrum antibiotics and a 22% increase in the utilization of narrow spectrum antibiotics (p=0.02) in the emergency department
- 15% decrease in the number of combination antibiotics upon discharge were observed and an 18% reduction of broad-spectrum antibiotics in the post-implementation group
  34% increase in narrow spectrum antibiotics upon discharge was observed in the post-implementation group
- No differences between groups were observed between ICU length of stay, overall hospital length of stay, treatment failure, need for supplemental oxygen, and days of clinical symptoms (Table 1)

Discussion

- The CPG and educational interventions had a positive impact on the antibiotic management of children hospitalized with CAP through decreasing inappropriate combination agents, decreasing unnecessary broad-spectrum antibiotics, and increasing narrow spectrum therapy
- Continuing to provide education and re-enforcing the CPG will improve adherence to the guideline

References

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