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Title

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Assessing Guideline Implementation for Community-Acquired Pneumonia (CAP) at UC Davis Children's Hospital

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BACKGROUND

In 2010, the UC Davis Children's Hospital Antimicrobial Stewardship Program (ASP) was established to assist providers with antimicrobial decision-making and promote optimal use of therapies. With this goal in mind, the ASP has developed institutional guidelines and protocols synthesizing national recommendations and incorporating resistance data from the local patient population.

In early 2023, the UC Davis Children's Hospital guidelines specific for the treatment of inpatient CAP underwent revision. Most notably, this edition incorporates more recent literature demonstrating that a shorter duration of antibiotic therapy (3-5 days) is non-inferior to a longer duration (7-10 days). While our guidelines are intended for use by all providers responsible for the care of pediatric patients with CAP at UC Davis, we postulate that there is incomplete adoption of our recommendations and consequently, considerable variation in antibiotic prescribing patterns.

We hypothesize that through various quality improvement interventions, adherence to the guidelines will increase, clinical outcomes for pediatric patients treated for CAP at UC Davis will improve, and resistance to broad-spectrum antibiotics will be mitigated.

SPECIFIC AIMS

We aim to assess implementation of our revised institutional guidelines pertaining to:

(1) Initial empiric antibiotic given

Ampicillin/amoxicillin are first-line for healthy, fully-immunized child; use of broad-spectrum antibiotic is dependent on various factors (Table 3)

(2) Time to antibiotic de-escalation

Appropriate de-escalation from a broad- to narrow-spectrum antibiotic is ≤72 hours

(3) Total antibiotic duration

Appropriate duration of antibiotic therapy is 5-7 days

DESIGN/METHODS

- Primary Inclusion Criteria:** Immunocompetent children 2 months of age or older who are admitted to the UC Davis Children's Hospital Pediatric Ward or Pediatric Intensive Care Unit (PICU) and have been identified by the ASP team to have a primary diagnosis of CAP
- Exclusion Criteria:** Being ventilator-dependent or having a history of colonization with drug-resistant organisms or Pseudomonas, tracheostomy, cystic fibrosis, aspiration pneumonia, sickle cell disease, malignancy, or other immunocompromising condition
- Assessing Guideline Adherence:** Chart review of all patients who met inclusion criteria from January 2022 – June 2023 to establish baseline adherence; from July 2023 – June 2024 for post-intervention period
- Quality Improvement Interventions:** Target provider knowledge and awareness of the institutional guidelines → Focus on improving guideline accessibility and usability, and increasing stewardship education for providers

Table 1. Intervention Implementation Log

Intervention	Date
Updated guidelines posted onto Ellucid	5/1/2023
Informational interviews with providers	6/21/2023
Updated guidelines posted onto new UCDH Department of Pediatrics Clinical Guidelines website	7/1/2023
QR code "badge buddies" distributed	8/1/2023
Meeting with pediatric residents	8/31/2023
Infographic poster in hospital workrooms	10/1/2023
Meeting with pediatric residents	11/6/2023



Scan to view a copy of the UC Davis CAP guidelines and infographic poster

RESULTS

In total, we included **150 patients** in the **Baseline** cohort and **25 patients** in the **Post-Intervention** cohort.

Table 2. Patient Characteristics

	Baseline	Post-Intervention
Age (years)	3.6 (Mean)	5.1 (Mean)
	4.1 (SD)	5 (SD)

Table 3. Variables Impacting Empiric Antibiotic Choice

Variables	Baseline	Post-Intervention
Immunization Status	N (%)	N (%)
Up-to-Date	121 (81%)	21 (84%)
Not Up-to-Date	15 (10%)	3 (12%)
Unknown	14 (9%)	1 (4%)
Respiratory Viral Panel		
Positive	119 (79%)	16 (64%)
Negative	29 (19%)	9 (36%)
Severe or Progressive PNA*		
Yes	100 (67%)	12 (48%)
Atypical Organisms		
Yes	13 (9%)	2 (8%)
Penicillin Allergy		
Serious w/ anaphylaxis	0 (0%)	0 (0%)
Non-serious w/o ANA	3 (2%)	2 (8%)

*Indicated by use of non-invasive ventilatory support (high-flow nasal canula, CPAP, or BiPAP) or invasive ventilatory support.

Figure 1. Run Chart Assessing Guideline Adherence Pertaining to Initial Empiric Antibiotic Prescribed (Aim 1)

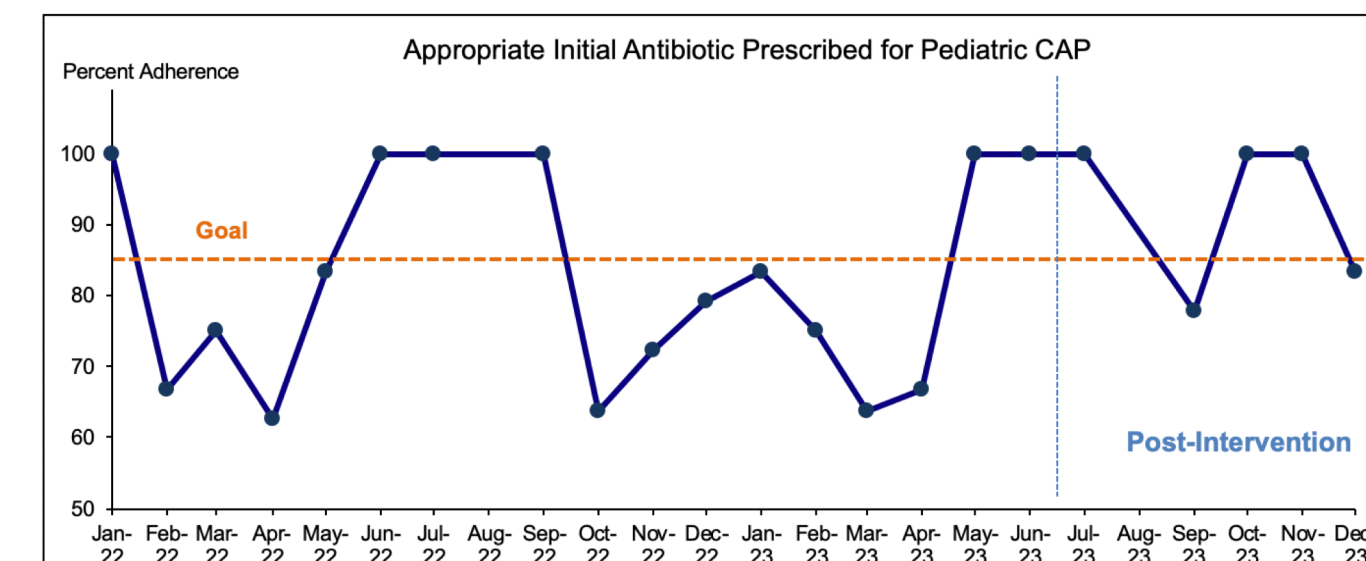


Figure 2. Run Chart Assessing Guideline Adherence Pertaining to De-Escalation from a Broad to Narrow-Spectrum Antibiotic (Aim 2)

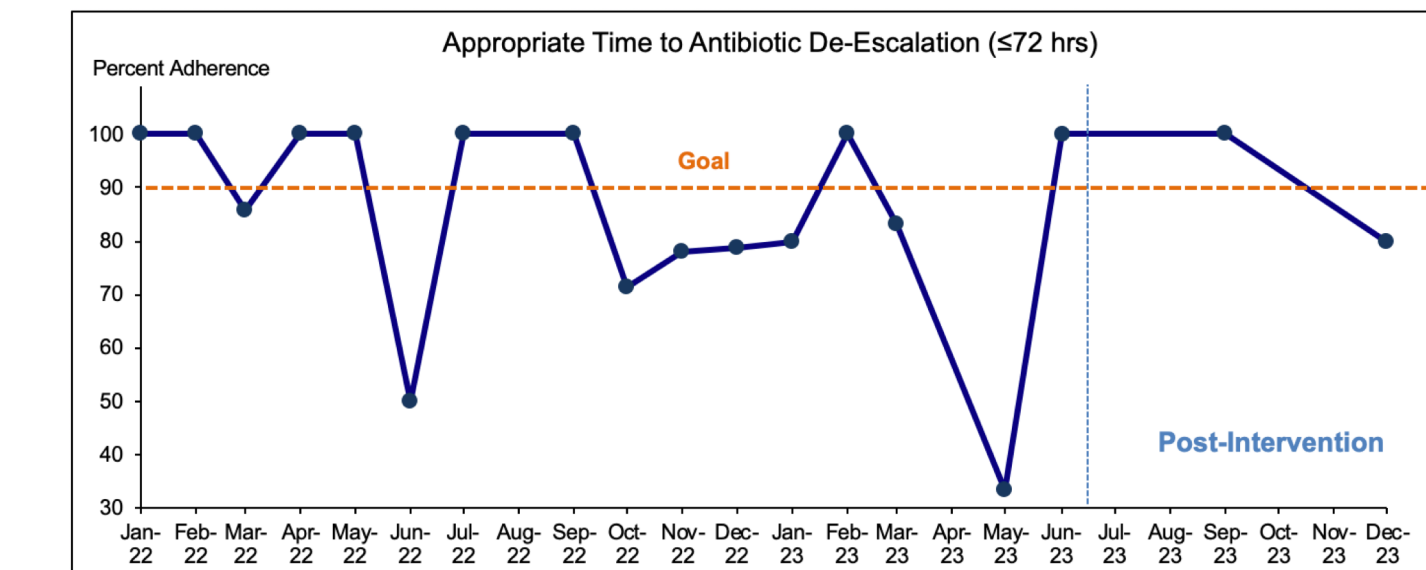
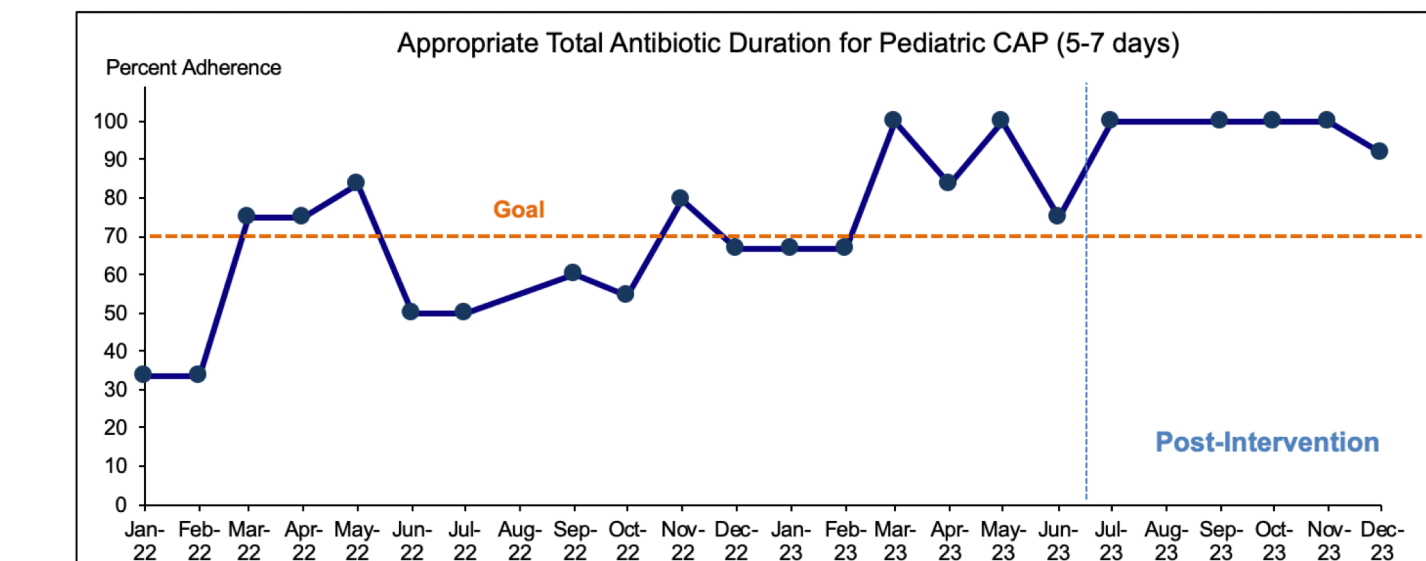


Figure 3. Run Chart Assessing Guideline Adherence Pertaining to Total Antibiotic Duration (Aim 3)



CONCLUSIONS

Pre-intervention, there was sub-optimal adherence to the institutional guidelines for the treatment of pediatric CAP. ~25% of patients received an inappropriate initial antibiotic. 17% of patients took longer than 72 hours to be de-escalated to a narrow-spectrum antibiotic. ~30% of patients completed an inappropriate course of antibiotic treatment outside of 5-7 days.

In the post-intervention cohort, we are currently seeing considerable improvement across all 3 aims. 84% of patients received an appropriate initial antibiotic, 89% were de-escalated in 72 hours or less, and 96% completed a 5 to 7-day antibiotic course.

Moving forward, we plan to implement more daily stewardship education and to discuss the guidelines at pre-existing educational conferences and meetings. Prospective data will continue to be collected in the post-intervention period until June 2024.