Analysis of categorical variables

	Pre-intervention period		Post-intervention period		Mantel-Haenzael common odds ratio	Breslow-Day test	Clinic * Variable		Clinic * Variable
	Intervention clinics (N=569)	Control clinics (N=862)	Intervention clinics (N=433)	Control clinics (N=826)			Pre-Intervention	Post-Intervention	Combined periods
					P	*P*	*P*	*P*	*P*
Male sex N (%)	310 (54.5)	434 (50.3)	223 (51.5)	442 (53.5)	0.499	0.125	0.126	0.497	0.515
Antibiotic allergy N (%)	18 (3.2)	34 (3.9)	17 (3.9)	42 (5.1)	0.231	0.920	0.440	0.355	0.203
Hispanic ethnicity N (%)*	334 (61.6)	740 (87.1)	261 (62.4)	733 (89.4)	<0.001	0.349	<0.001	<0.001	<0.001
Parkland financial assistance N (%)*	316 (55.5)	503 (58.4)	242 (55.9)	482 (58.4)	0.179	0.930	0.292	0.401	0.177
Physician prescriber N (%)	496 (87.2)	784 (91)	388 (89.6)	705 (85.4)	0.914	0.002	0.023	0.034	0.992
First-line antibiotic prescribing N (%)	426 (74.9)	670 (77.7)	360 (83.1)	642 (77.7)	0.589	0.011	0.211	0.024	0.664
Antibiotic modifications N (%)	6 (1.1)	10 (1.2)	5 (1.2)	13 (1.6)	0.578	0.769	0.852	0.552	0.552

*Patients with unknown ethnicity and primary payer were not counted in the denominators.

Analysis of continuous variables

	Pre-intervention period		Post-intervention period		ANOVA			Bonferroni post-hoc test	
								Intervention clinics vs. control clinics	
	Intervention clinics (N=569)	Control clinics (N=862)	Intervention clinics (N=433)	Control clinics (N=826)	Clinic * Period	Clinic	Period	Pre-intervention	Post-Intervention
					P	*P*	*P*	*P*	*P*
Age (years) - mean ±SD	4.43 ±4.03	5.02 ±4.28	4.32 ±3.70	4.94 ±3.70	0.849	<0.001	0.760	0.014	0.070
Weight (kg) - mean ±SD	20.90 ±17.46	24.38 ±20.20	20.13 ±16.96	23.14 ±19.17	0.758	<0.001	0.188	0.004	0.049
Overall antibiotic duration (days) - mean ±SD*	9.69 ±0.96	9.63 ±1.07	9.28 ±1.56	9.79 ±0.75	<0.001	<0.001	0.007	>0.999	<0.001
Antibiotic duration for OM (days) - mean ±SD	9.67 ±0.99	9.66 ±1.05	9.24 ±1.60	9.79 ±0.74	<0.001	<0.001	0.004	>0.999	<0.001
Antibiotic duration for CAP (days) - mean ±SD	9.81 ±0.69	9.24 ±1.42	9.55 ±1.06	9.68 ±0.93	0.032	0.183	0.578	0.050	>0.999

Abbreviations - SD: standard deviation, OM: otitis media, CAP: community-acquired pneumonia.
* Overall antibiotic duration was measured after excluding prescriptions for azithromycin, IM antibiotics, antibiotics for mixed infections, and antibiotics for streptococcal pharyngitis.

Distribution of the antibiotic prescriptions among the 3 bacterial acute respiratory infections

	Pre-intervention period		Post-intervention period	
	Intervention clinics (N=569)	Control clinics (N=862)	Intervention clinics (N=433)	Control clinics (N=826)
OM N (%)	424 (74.5)	614 (71.2)	320 (73.9)	590 (71.4)
Strep pharyngitis N (%)	72 (12.7)	111 (12.9)	75 (17.3)	136 (16.5)
CAP N (%)	69 (12.1)	125 (14.5)	35 (8.1)	89 (10.8)
Mixed N (%)	4 (0.7)	12 (1.4)	3 (0.7)	11 (1.3)

Abbreviations - OM: otitis media, CAP: community-acquired pneumonia, Strep: streptococcal.

Conclusion: A computerized CDSS involving treatment pathways in the form of order sets coupled with educational sessions was associated with a higher rate of first-line antibiotic prescribing and shorter antibiotic duration for the outpatient treatment of bacterial ARIs. More studies are needed in order to assess the utility of multimodal approaches in pediatric outpatient antimicrobial stewardship.

Disclosures. **All Authors**: No reported disclosures

1348. Indirect Standardization to Improve Comparison of Children's Hospitals' Antimicrobial Use

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Pediatric Health Information System Antimicrobial Stewardship Research Group

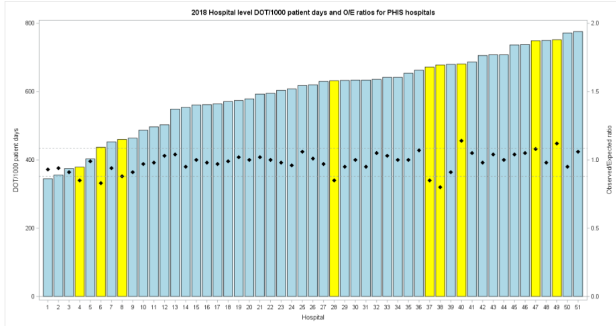
Session: P-60. Pediatric Antimicrobial Stewardship (inpatient/outpatient pediatric focused)

Background. Antimicrobial use (AU) measured by days of therapy per 1000 patient-days (DOT/1000pd), the most established metric, varies widely between children's hospitals despite robust adoption of antimicrobial stewardship. Differences in diagnoses and procedures (case mix) between hospitals are a source of AU variation not included in adjustment methods such as the Standardized Antimicrobial Administration Ratio. In this study, we evaluated an indirect standardization method to adjust children's hospital AU for case mix.

Methods. This multicenter retrospective cohort study included 51 children's hospitals participating in the Pediatric Health Information System database from 2016-2018. All inpatient, observation, and neonatal admissions were included, with a total of 2,558,948 discharges. Hospitalizations were grouped into 83 strata defined based on All Patients Refined Diagnosis Related Groups (APR-DRGs). Observed to expected (O:E) ratios were calculated by indirect standardization of mean antibiotic DOT per case, with expected values from 2016-2018 and observed values from 2018, and compared to DOT/1000pd. Outlier hospitals were defined by O:E z-scores corresponding to below 10th percentile (low outlier) and above 90th percentile (high outlier).

Results. Antibacterial DOT/1000pd ranged from 345 to 776 (2.2-fold variation from lowest to highest), whereas O:E ratios ranged from 0.8 to 1.14 (1.4-fold variation from lowest to highest) (Figure 1). O:E ratios were moderately correlated with DOT/1000pd (correlation estimate 0.45; 95% CI 0.19-0.64; p=0.0008). Three high outlier hospitals and 6 low outlier hospitals were identified. Examining hospitals with comparably high DOT/1000pd but discordant O:E ratios, differences could be explained by variation in both case mix and condition-specific AU within strata defined by APR-DRGs.

Figure 1. Individual hospitals labeled on the X-axis, ordered by level of antibacterial DOT/1000pd (left axis), represented by bars. Diamonds represent O:E ratios derived by indirect standardization (right axis). Outlier hospitals (low and high) are highlighted in yellow. Dashed horizontal lines represent 10th percentile (lower) and 90th percentile (upper) limits of the O:E ratio distribution.



Conclusion. The observed variation in DOT/1000pd between hospitals is reduced when indirect standardization is applied to account for case mix differences. This approach can be adapted for more specific uses including clinical conditions, patient populations, or antimicrobial agents. Indirect standardization may enhance stewardship efforts by providing adjusted comparisons that incorporate case mix differences between hospitals.

Disclosures. **All Authors**: No reported disclosures

1349. Institutional Antibiograms Are Insufficient to Guide Clindamycin Use in Pediatric Skin and Soft Tissue Infections

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Session: P-60. Pediatric Antimicrobial Stewardship (inpatient/outpatient pediatric focused)

Background. Clindamycin (CLN) is a common empiric antimicrobial for pediatric skin and soft tissue infections (SSTI) despite decreasing susceptibility of *Staphylococcus aureus* (SA) to CLN on institutional antibiograms. This study inquired whether institutional antibiograms are an accurate representation of susceptibility for these infections. It also attempted to find patient and infection characteristics associated with being clindamycin susceptible (CLN-S).

Methods. This was a retrospective chart review of children with community-acquired (CA) SA infections in 2016 and 2017. A *Staphylococcus aureus* antibiogram was created based on infection type. Various patient and infection characteristics were compared between CLN-S and clindamycin-resistant (CLN-R) isolates to identify predictors of being CLN-S via binary logistic regression. Characteristics with p < 0.2 from a univariate analysis (chi-square or Fisher's exact test) were included in the regression; p < 0.05 after the regression was considered statistically significant.

Results. 362 SA infections were included. These were 76% CLN-S, similar to the institutional antibiogram (79% CLN-S, p = 0.168). MSSA CLN susceptibility was lower than the antibiogram (71% vs. 79% CLN-S, p = 0.042). MRSA susceptibility was similar (79% vs. 80% CLN-S, p = 0.859). Infection types assessed were abscess (n = 264, 81% CLN-S), osteomyelitis (n = 40, 75% CLN-S), lymph node (n = 16, 75% CLN-S), staphylococcal scalded skin syndrome (n = 9, 56% CLN-S), eczema superinfection (n = 17, 53% CLN-S), bullous impetigo (n = 7, 40% CLN-S), and non-bullous impetigo (n = 7, 29%). Characteristics found to be associated with being CLN-S included abscess (OR 3.883, p = 0) and high white blood cell count (OR 2.482, p = 0.001). Characteristics associated with CLN-R included contact to person with abscess (OR 0.468, p = 0.035) and hypotension during infection (OR 0.312, p = 0.005).

Conclusion. The use of institutional antibiograms to guide CLN susceptibility in CA SA infections may be limited by the type of infection, patient characteristics, and the likelihood of MSSA vs. MRSA infection. In our patients, having an abscess was associated with CLN-S. Empiric therapy of CA SA infections in children should not be driven solely by institutional antibiograms.

Disclosures. **All Authors**: No reported disclosures

1350. Optimizing Blood Culture Use in Critically Ill Children: Year One of a Multi-Center Diagnostic Stewardship Collaborative

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Bright Star Authorship Group

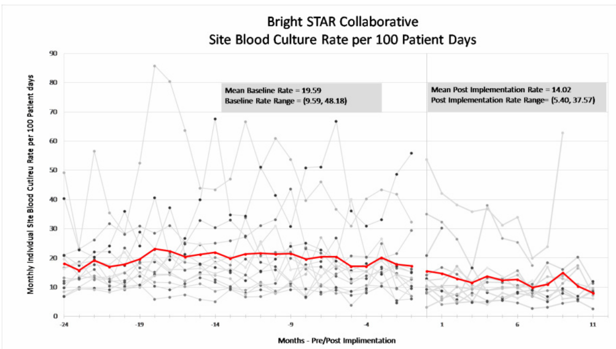
Session: P-60. Pediatric Antimicrobial Stewardship (inpatient/outpatient pediatric focused)

Background. Overuse of blood cultures can lead to false positives and unnecessary antibiotics. Our objective was to describe the implementation and 12-month impact of a multi-site quality improvement collaborative to reduce unnecessary blood cultures in pediatric intensive care unit (PICU) patients.

Methods. In 2018, 14 PICUs joined the Blood Culture Improvement Guidelines and Diagnostic Stewardship for Antibiotic Reduction in Critically Ill Children (Bright STAR) Collaborative, designed to understand and improve blood culture practices in PICUs. Guided by a multidisciplinary study team, sites 1) reviewed existing evidence for safe blood culture reduction, 2) assessed local practices and barriers to change, and 3) developed and implemented new blood culture practices informed by local context. We facilitated and monitored project progress through phone calls, site visits, and collaborative-wide teleconferences. We collected monthly blood culture rates and monitored for delays in culture collection as a safety balancing metric. We compared 24 months of baseline data to post-implementation data (2-14 months) using a Poisson regression model accounting for the site-specific patient days and correlation of culture use within a site over time.

Results. Across 14 sites, there were 41,986 pre-implementation blood cultures collected over 238,182 PICU patient days. The mean pre-implementation site-specific blood culture rate was 19.42 cultures/100 patient days (range 9.59 to 48.18 cultures/100 patient days). Post-implementation, there were 12,909 blood cultures collected over 118,600 PICU patient days. The mean post-implementation rate was 14.02 cultures/100 patient days (range 5.40 to 37.57 cultures/100 patient days), a 23% decrease (relative rate 0.77, 95% CI: 0.60, 0.99, p = 0.04). In 12 months post-implementation, sites reviewed 463 positive blood cultures, and identified only one suspected delay in culture collection possibly attributable to the site's culture reduction program.

Bright STAR Collaborative Site Blood Culture Rate 100 Patient Days



Conclusion. Multidisciplinary teams facilitated a 23% average reduction in blood culture use in 14 PICUs. Future work will determine the impact of blood culture diagnostic stewardship on antibiotic use and other important patient safety outcomes.

Disclosures. **James C. Fackler MD, MD**, **Rubicon Health LLC** (Other Financial or Material Support, Founder)

1351. Pediatric Antibioitic Use in the North Carolina Medicaid Population

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Session: P-60. Pediatric Antimicrobial Stewardship (inpatient/outpatient pediatric focused)

Background. Antimicrobial resistance is increasing in the United States, with antibiotic use as the main driver. The majority of antibiotic use occurs in the outpatient setting. 6 of the 7 highest prescribing states are located in the Appalachian region of the country. Overall, the state of North Carolina (NC) has prescribing rates that are at the national average, but the geographic, patient and provider-level characteristics associated with antibiotic prescribing within the state are unknown.

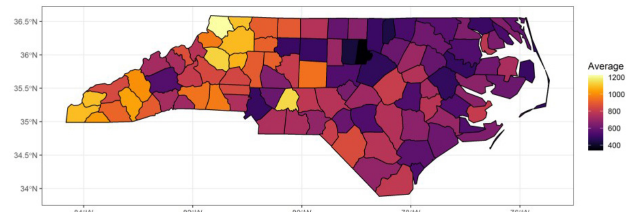
Methods. We used NC Medicaid claims from 2013-2018 to identify oral antibiotics prescribed to children, defined as individuals < 21 years. Antibiotics were identified using National Drug Codes. Overall rates of antibiotic prescribing were reported as the number of prescriptions per 1000 children overall and stratified by age, sex, race/ethnicity and residence in a metropolitan area. Provider characteristics and setting type were identified using existing variables in the Medicaid dataset. A geographic information system was used to graphically depict rates of antibiotic use by county.

Results. Rates of prescribing decreased from 724/1000 children in 2013 to 578/1000 children in 2018. Across all study years there were differences in prescribing rates by sex, race/ethnicity, age and residence in a metropolitan area. (Table) Prescriptions were more common in children who were younger (0-2), white non-Hispanic, female and living in non-metropolitan areas. Prescribing rates were geographically heterogeneous, with the highest rates in the western mountain region and declining across a west to east gradient. (Figure) Most (62%) antibiotic prescriptions were written in the primary care setting. Pediatricians prescribed 48% of all antibiotic courses.

Antibiotic Prescriptions Per 1000 Children, by Demographic Group (2013-2018)

	2013	2014	2015	2016	2017	2018
Overall	723	646	643	642	632	578
Sex						
Male	694	616	611	609	596	544
Female	753	678	676	676	669	614
Age (years)						
0-2	1076	953	948	951	936	881
3-9	793	712	714	717	702	635
10-20	525	474	472	472	474	435
Race/Ethnicity						
White non-Hispanic	897	804	801	802	787	722
Black non-Hispanic	528	477	473	480	474	434
Hispanic	668	583	573	549	538	493
Residence						
Metro	662	588	583	586	570	526
Non-metro	851	770	773	768	771	699

Antibiotic Prescriptions per 1000 Children, by County (2013-2018)



Conclusion: Although NC is not a high-prescribing state in general, we found notable difference in prescribing based on key demographic characteristics. These results are consistent with prior reports from other Appalachian states including Kentucky, West Virginia and Tennessee. Rates of prescription were highest in non-metropolitan areas overall but GIS mapping revealed a marked west-east gradient. These data suggest that specific Appalachian characteristics, rather than rurality alone, may be associated with excessive antibiotic prescribing.

Disclosures. Michael J. Smith, MD, MSC.E, Kentucky Medicaid (Grant/Research Support)Merck (Grant/Research Support)

1352. Pediatric azithromycin prescriptions in a healthcare system from 2016-2018

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Session: P-60. Pediatric Antimicrobial Stewardship (inpatient/outpatient pediatric focused)

Background. In 2017, the Centers for Disease Control and Prevention (CDC) estimated that 30% of all antibiotics prescribed in outpatient clinics are unnecessary, with children receiving more antibiotics than any other age group. Among those antibiotics being prescribed, azithromycin is one of the most commonly prescribed antibiotics.

Methods. We reviewed antimicrobial prescribing data of children 0 to 19 years of age who visited West Virginia University (WVU) Health system which is the flagship institution for the state. We reviewed information of patients who were prescribed azithromycin by healthcare providers between January 2016 and December 2018. We included prescribing data from urgent care centers, outpatient clinics and emergency departments. The primary visit diagnosis associated with the visit was reviewed.

Results. During the study period there were 29,983 visits identified during which antibiotics were prescribed and azithromycin was prescribed in 40.6% of those visits. The majority of visits occurred between the months of October through February (54.4%), with December having the most visits. There were 11,934 unique patients identified and only 26.5% of these patients were marked as allergic to penicillin (PCN) or amoxicillin. The distribution of the age groups for azithromycin prescriptions is shown in figure 1. The age group of 11-19 years had the highest azithromycin prescription rate (38.7%) and the most common diagnosis for this group was pharyngitis. The distribution of the common diagnoses associated with azithromycin prescriptions can be seen in figure 2 and acute otitis media (AOM) was the most common diagnosis (23.6%).