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Brief Report

Outpatient antibiotic prescribing patterns in pediatric academic and community practices

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Little is known about antibiotic prescribing differences between academic and community outpatient settings. This retrospective, cross-sectional chart review compares compliance with Infectious Diseases Society of America and American Academy of Pediatrics prescribing guidelines for otitis media, sinusitis, and pharyngitis in academic and affiliated community practices. The study results for correct antibiotic prescribing rate in the academic setting (67%) compared with the community setting (21%) demonstrate the urgent need for stewardship in community outpatient clinics.

There are emerging efforts to improve antibiotic prescribing in the outpatient setting, the arena where most antibiotics are prescribed.[1-3] Understanding antibiotic prescribing patterns is key to stewardship. The Centers for Disease Control and Prevention recommends tracking and benchmarking of such patterns.[4] Substantial variation exists at the provider and setting levels.[2,3,5,6] More data is needed to assess compliance with prescribing guidelines in outpatient academic versus community settings. Gerber et al[5] reported on antibiotic use for respiratory infections in children, noting that academic clinicians had a stronger preference for narrow-spectrum antibiotics than community clinicians. Further, in a study by Parente et al[6] on prescribing for respiratory infections in veterans, US Department of Veterans Affairs (VA) teaching clinics had significantly lower rates of inappropriate prescribing compared with VA non-teaching clinics. The primary objective of our study is to compare antibiotic prescribing compliance with Infectious Diseases Society of America/American Academy of Pediatrics (IDSA/AAP) guidelines for otitis media (OM), pharyngitis, and sinusitis in a pediatric academic practice and affiliated community practices.[7-10] We hypothesize that guideline discordant prescribing is more prevalent in the community setting.

METHODS

We conducted a retrospective, cross-sectional chart review.

A human subjects study waiver was obtained from the Einstein Medical Center Institutional Review Board.

Settings

1. The first setting consisted of an academic pediatric practice with 18,184 annual visits, staffed, with 32 residents, and supervised by 10 attending physicians, serving an urban, low-income minority population (Medicaid, 85%).
2. The second setting consisted of 3 community practices affiliated with the academic center with 68,853 annual visits, with 23 providers (nurse practitioners [NPs] and physicians) serving a racially and income diverse population (Medicaid, 53.5%).

Both settings use an electronic medical record integrated database (Cerner EMR; Cerner EMR Software, Kansas City, MO) for charting and prescribing.

Data collection

We reviewed patient office visit encounters for patients ≤ 21 years of age from August 2014 to March 2015, with ICD-9-CM codes for OM (382.9, 381.4, 382.4, 381.4, 382.3, 381.3, 381.10, 381.00, 382.01, 382.00, 381.19, and 382.1, (exclude 382.3, chronic), pharyngitis (462, 034.0), and sinusitis (461.9, 473.9, 461.2, 461.1, 461.0, 461.8, 461.3), with an associated antibiotic prescription. We reviewed documentation for all encounters in the academic practice and every fifth chart for the community practices. Encounters with the same diagnostic codes for the same patient within 4 weeks were excluded.

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Data collected included demographics (eg, age, self-reported race/ethnicity, and gender), allergies and insurance, and antibiotic (eg, choice, dose, frequency, duration and point-of-care testing: Rapid Group A Streptococcal test). Clinical data collected included fever (≥ 100.4°F), symptoms > 48 hours, tympanic membrane bulging, presence of otalgia, and unilateral or bilateral ear disease. Provider type (physician or NP) and setting were collected.

Antibiotic indication parameters

Indications are defined by the prescribing guidelines and were validated by a manual chart review of the physical exam findings, Rapid Strep and/or throat culture testing results, and assessment and plan documented.[7-10] We further classified OM cases as 48-hour observation indicated or not.[9]

Statistical analysis

The percentage of antibiotic prescribing components compliant with the guidelines and corresponding 95% confidence intervals (95% CI) were calculated. The Fisher's exact test was used to assess differences. Statistical tests were 2-sided. All analyses were performed using Stata (version 15; Stat Corp LLC, College Station, TX).

Outcome measures

Primary: Rates of compliance were performed with 2012-2013 IDSA/AAP guidelines.

Secondary: Differences in compliance were based on practice setting, provider type, or insurance type.

RESULTS

We reviewed a total of 396 patient office visit encounters with an OM, sinusitis, and pharyngitis diagnosis and an antibiotic prescription (188 academic, 208 community). Patients in those settings differed in the % age < 2 years (38% academic; 11% community; $P < .001$) and race (73% African American academic, 21% community; $P < .001$).

The correct prescribing rate for the academic practice was 67% (95% confidence interval [CI], 61%-74%) versus 21% for the community practices (95% CI, 16%-27%) (Table 1). Compliance was higher by

Table 1
Compliance with IDSA/AAP guidelines in outpatient encounters in a pediatric academic practice and affiliated community practices (N = 396)

Disease	Academic practice N = 188	% Compliance (95% CI)	Community practice N = 208	% Compliance (95% CI)	Difference in compliance‡ (95% CI) *P* value
OM					
Indication	95/104	91.3%	53/79	67.1%	24.2% (12.6%-35.9%) *P* < .001
Drug	103/104	99%	74/79	93.7%	5.4% (0%-11.1%) *P* = .064
Dose	93/104	89.4%	33/79	41.8%	47.7% (35.3%-60.0%) *P* < .001
Frequency	104/104	100%	76/79	96.2%	3.8% (0%-8.0%) *P* = .077
Duration	76/104	73%	65/79	82.3%	−9.2% (−21.2%-2.3%) *P* = .13
Overall*	66/104	63.5% (53%-73%)	19/79	24.1% (14%-32%)	39.4% (26%-53%) *P* < .001
Sinusitis					
Indication	22/25	88%	23/69	33.3%	54.7% (37.8%-71.6%) *P* < .001
Drug	23/25	92%	51/69	73.9%	18.1% (3.2%-32.9%) *P* = .017
Dose	24/25	96%	22/69	31.9%	64.1% (50.7%-77.5%) *P* < .001
Frequency	25/25	100%	55/69	79.7%	20.3% (10.8%-29.8%) *P* < .001
Duration	25/25	100%	54/69	78.3%	21.7% (12.0%-31.5%) *P* < .001
Overall	21/25	84% (64%-95%)	5/69	7.2% (1%-14%)	77 % (61%-92%) *P* < .001
Pharyngitis					
Indication	55/59	93.2%	39/60	65%	28.2% (14.5%-41.9%) *P* < .001
Drug	55/59	93.2%	60/60	100%	−6.8% (−13.2 to −0.4%) *P* = .038
Dose	51/59	86.4%	33/60	55%	31.4% (16.1%-46.8%) *P* < .001
Frequency	53/59	89.8%	56/60	93.3%	−3.5% (−13.5-6.5%) *P* = .491
Duration	56/59	94.9%	60/60	100%	−5.1% (−10.7-0.5%) *P* = .075
Overall	39/59	66.1% (53%-78%)	20/60	33.3% (21%-46%)	32.8% (16%-50%) *P* < .001
Combined total†	126/188	67% (61%-74%)	44/208	21% (16%-27%)	46% (37%-55%) *P* < .001

AAP, American Association of Pediatrics; CI, confidence interval; *IDSA*, Infectious Diseases Society of America; OM, otitis media.
*Overall % correct for indication, drug, dose, frequency, and duration.
†Total % correct for OM, pharyngitis, and sinusitis.
‡Percentage point difference in compliance between the 2 groups.

46 percentage points in the academic than in the community setting (95% CI 37%-55%, $P < .001$).

In the academic practice, antibiotics were withheld in 4 of 18 (18%) cases of OM in which observation was indicated, compared with 2 of 41 (4.9%) of the community practices. Almost all patients in the academic (98%) and community practices (100%) underwent Rapid Strep testing. Of those with negative tests, 82.6% in the academic and 87.5% in the community practices sent throat cultures. For those with negative tests, 39% in the academic practice and 100% in the community practices were treated without awaiting throat culture results; 56% in the academic and 58% in the community practices discontinued antibiotics when throat cultures tested negative.

Underdosing for OM (amoxicillin < 80 mg/kg/day) was common (11 academic, 41 community). In the academic setting, durations for OM were frequently longer than recommended (n = 22), whereas in the community setting, they were shorter (n = 12). Overdiagnosis of sinusitis (n = 46) and overuse of azithromycin were prevalent in the community (n = 13). Overdosing of amoxicillin (> 90mg/kg/day) for sinusitis was common in the community (n = 29). For pharyngitis, exceeding the maximum daily dose of amoxicillin (> 1 g/day) (7 academic, 20 community) and increased frequency (Q6-Q8) were encountered in both settings.

In analyzing provider type and insurance, significant results were seen only for OM, where those privately insured received more incorrect doses ($P = .001$), and NPs prescribed a greater number of incorrect durations than physicians ($P = .003$).

DISCUSSION

In this study of antibiotic prescribing guideline compliance in children for OM, sinusitis, and pharyngitis, the academic practice performed significantly better than its affiliated community practices. Our study findings in the pediatric population are comparable to those described by Parente et al[6] in the adult VA population. Our study highlighted target areas for antibiotic stewardship, including refining the clinical diagnosis of sinusitis, identifying key exam findings of OM, observation when indicated for OM, tailoring duration based on age and disease, and awaiting testing results for pharyngitis prior to prescribing.

A strength of this study is the review of clinician documentation to assess the clinical indications prompting antibiotic prescriptions. The study did not assess other factors that may have contributed to noncompliance, such as parental pressure. Small sample size may have limited statistical significance.

CONCLUSIONS

Enhanced understanding of prescribing patterns across different settings can guide and strengthen stewardship strategies aimed at outpatient practices.

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