Guideline Adherence in Pediatric Ambulatory Visits for Acute Otitis Media

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Background

- Acute otitis media (AOM) is the most common outpatient pediatric condition treated with antibiotics in the United States
- Over 30% of children receive inappropriate antibiotics for AOM
- Strict adherence to diagnostic and treatment guidelines has been proposed by the American Academy of Pediatrics (AAP) Committee on Infectious Diseases as one strategy to combat inappropriate antibiotic use
- In March 2013 the AAP published an updated guideline for the diagnosis and treatment of AOM with new diagnostic criteria and treatment recommendations
- Despite widely accepted definitions and recommendations, little is known about how well pediatricians adhere to these recommendations.
- Our primary objective for this study was to describe guideline adherence with regards to recorded history and physical exam findings supporting AOM diagnosis and to treatment decisions

Methods

Study Design: cross-sectional retrospective chart review

Setting/Population

- 80+ independently-owned pediatric practices affiliated with Boston Children's Hospital, included 400+ clinicians taking care of > 400,000 children
- Randomly selected, problem-focused, in-person encounters between Sep 2017 and Aug 2018
- Patients aged 3 to 59 months diagnosed with AOM based on ICD-10-CM codes and treated with systemic antibiotics
  - Included ICD-10-CM codes H65 (nonsuppurative otitis media), H66 (suppurative and unspecified otitis media) and H67 (otitis media in diseases classified elsewhere)

Data: 24 variables were extracted manually from the note text

- HPI: signs and symptoms like otalgia, irritability and fever
- ROS: GI, ophthalmic, respiratory, throat and urinary symptoms
- Physical exam: position and color of the tympanic membranes (TM), middle ear effusion description, presence of otorrhea, tympanostomy tubes, concurrent conjunctivitis, and utilization of pneumatic otoscopy or tympanometry was noted
- Current systemic antibiotic use, recent receipt of amoxicillin or amoxicillin-clavulanate (within the last 30 days), recurrent AOM, and discussion of watchful waiting was also extracted

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Outcomes

- 3 step classification process was employed (see table)
- First, each unilateral TM exam was classified based presence of descriptors meeting AOM criteria
- Second, bilateral findings were combined to classify the overall exam
- Third, global adherence determined by classification of ear exam and antibiotic choice
- Finally, calculated proportion of charts "fully adherent" to the AAP guideline, "partially adherent", and "not adherent"

Step 1 - TM exam	Definitions
Full AOM criteria	- Acute otorrhea not due to otitis externa, or - Moderate to severe bulging of the TM, or - Mild bulging of the TM with acute onset of otalgia (less than 48 hours), or - Mild bulging of the TM and intense (severe) erythema of the TM
Partial AOM criteria	- Any bulging of the TM, or - Purulent effusion
OME	- Retracted TM, or - Serous effusion
Normal TM	- Normal position, normal color and no effusion
Non-specific/unclear	- Any other description not fitting the above definitions

Step 2 - Combined ear exam	Definitions
Definite AOM	- At least one TM with full AOM criteria
Likely AOM	- At least one TM with partial AOM criteria
Definite OME	- Two TMs describing OME, or - One TM describing OME + one normal TM
Normal TMs	- Two normal TMs
Non-specific/unclear	- At least one TM describing non-specific/unclear findings and not fitting above definitions

Step 3 - Global adherence	Definitions
Fully adherent	- "Definite AOM" + appropriate antibiotic
Partially adherent	- "Definite AOM" + inappropriate antibiotic, OR - Not "definite AOM" + appropriate antibiotic
Not adherent	- Not "definite AOM" + inappropriate antibiotic

Analysis

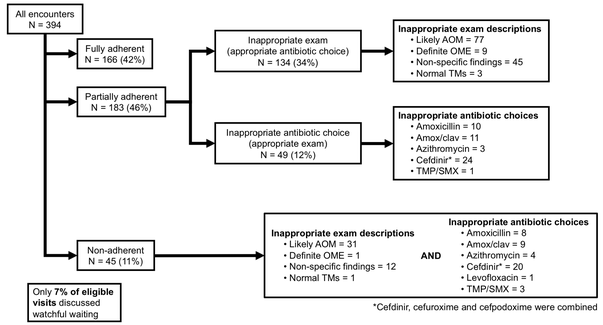
- Frequencies, proportions, and summary statistics calculated for all variables
- Multinomial logistic regression model constructed using the three levels for the primary outcome
- The "fully adherent group" was used as the reference category.
- Analysis completed using R 4.0.0

Results

Table 1. Patient, visit and clinician characteristics

	All groups (n = 394)	Fully adherent (n = 166)	Partially adherent (n = 183)	Not adherent (n = 45)
Patient Characteristics				
Age, median (IQR), y	1.75 (1.00-2.92)	1.92 (1.1-3.17)	1.58 (0.96-2.79)	1.33 (0.83-2.17)
Females, No. (%)	197 (50.0)	83 (50)	91 (49.7)	23 (51.1)
Antibiotic allergy present, No. (%)	39 (9.9)	17 (10.2)	15 (8.2)	7 (15.6)
Visit Characteristics				
Chief complaint, No. (%)				
Ear problem	129 (32.7)	59 (35.5)	53 (29.0)	17 (37.8)
Fever	92 (23.4)	40 (24.1)	50 (27.3)	2 (0.4)
Cough	75 (19.0)	32 (19.3)	36 (19.7)	7 (15.6)
Diagnosis code H66.xxx, No. (%)	357 (90.6)	150 (90.4)	168 (91.8)	39 (86.7)
Used order set, No. (%)	23 (5.8)	15 (9.0)	7 (3.8)	1 (2.2)
Clinician Characteristics				
Age, mean (SD), y	45.6 (12.0)	44 (11.5)	46.5 (12.4)	47.9 (12.0)
Females, No. (%)	308 (78.2)	127 (76.5)	142 (77.6)	39 (86.7)
Clinician Type, No. (%)				
Physician	241 (61.2)	99 (59.6)	113 (61.7)	29 (64.4)
Nurse Practitioner	149 (37.8)	66 (39.8)	67 (36.6)	16 (35.6)
Physician Assistant	4 (1.0)	1 (0.6)	3 (1.6)	0 (0)

Fig 1. Primary outcome - adherence to the AAP AOM guideline



*Cefdinir, cefuroxime and cefpodoxime were combined

Table 2. Cross-table of indicated and prescribed antibiotics

Antibiotic Prescribed \ Indicated Antibiotic	Amoxicillin	Amox-clav	Cefdinir*	Ceftriaxone
Amoxicillin	232	18		
Amox-clav	20	41		
Cefdinir*	18	25	27	1
Ceftriaxone				
Azithromycin	1	1	5	
Levofloxacin			1	
TMP-SMX	1		2	1

*Cefdinir, cefuroxime and cefpodoxime were combined

Table 4. Multinomial logistic regression examining factors associated with guideline adherence (significant results highlighted)

	Estimate, Odds Ratio (95% CI)			
	Partially adherent		Not adherent	
Factors	Unadjusted	Adjusted	Unadjusted	Adjusted
Patient Characteristics				
Age*	0.83 (0.69-0.98)	0.84 (0.70-1.00)	0.67 (0.49-0.90)	0.65 (0.48-0.90)
Female	0.98 (0.65-1.51)	0.91 (0.59-1.42)	1.05 (0.54-2.02)	0.84 (0.42-1.68)
No antibiotic allergy present	0.78 (0.38-1.62)	1.13 (0.53-1.60)	1.61 (0.63-4.17)	0.61 (0.21-1.73)
Visit Characteristics				
Order set not used	2.50 (0.99-6.29)	2.58 (1.00-6.64)	4.37 (0.56-34.01)	4.14 (0.51-33.64)
Clinician Characteristics				
Age*	1.02 (0.99-1.04)	1.02 (1.00-1.04)	1.03 (0.99-1.06)	1.04 (1.01-1.07)
Female	1.06 (0.65-1.7)	1.28 (0.73-2.26)	2.00 (0.79-5.07)	3.02 (1.08-8.43)
NP or PA clinician type	0.92 (0.60-1.41)	0.96 (0.58-1.60)	0.82 (0.41-1.62)	0.82 (0.38-1.78)

Conclusions

Our analysis of independent pediatric practices showed moderate adherence to the AAP guidelines for AOM. Substantial room exists for improvement in diagnosing and treating AOM in young children, especially regarding the potential for watchful waiting.