

Nasopharyngeal rapid diagnostic testing to individualize management of acute otitis media



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BACKGROUND

- There are over 10 million annual antibiotics prescriptions for acute otitis media (AOM) in the US, most of which are unnecessary.
- The optimal management strategy likely differs based on otopathogens. Pathogen directed therapy based on tympanocentesis has been shown to improve outcomes.
- Nasopharyngeal (NP) organisms during AOM are correlated with middle ear fluid organisms with a negative predictive value of >92%. Absence of NP organisms can reliably exclude the presence of pathogens in middle ear fluid.

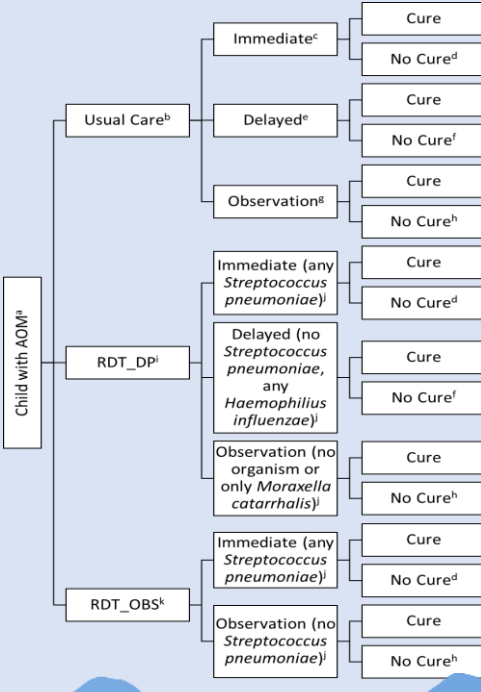
OBJECTIVE

To explore the potential cost-effectiveness and reduction in antibiotics with a NP rapid diagnostic test (RDT) to direct AOM management.

METHODS

- We developed two algorithms for AOM management based on NP bacterial otopathogens (Figure 1).
- The algorithms provide recommendations on prescribing strategy (immediate, delayed, or observation) and antimicrobial agent.
- We utilized a tiering system based on expected otopathogen-associated severity and penicillin resistance.
- The primary outcome was the incremental cost-effectiveness ratio (ICER) expressed as cost per quality adjusted life day (QALD) gained.
- We used a decision-analytic model to evaluate the cost-effectiveness of the RDT algorithms compared to usual care from a societal perspective over a 30-day time horizon.
- Secondary outcomes included the (1) cost at which a RDT would be cost-effective and (2) potential reduction in annual antibiotics used.

Figure 1: Flow diagram of usual care and RDT algorithms for management of uncomplicated AOM



RESULTS

- A RDT algorithm that used immediate prescribing, delayed prescribing, and observation based on pathogen (RDT-DP) had an ICER of \$1336.15/QALD compared with usual care and strongly dominated the RDT that used only immediate prescribing and observation (RDT-OBS). (Table 1)
- At a RDT cost of \$278.56, the ICER for RDT-DP exceeded the willingness to pay threshold (\$274 per QALD gained); however, if the cost of the RDT was <\$212.10, the ICER was below the threshold. (Figure 2)
- Both algorithms reduced annual antibiotic use, including broad-spectrum use, compared to usual care. (Table 2).

Table 1: Cost-effectiveness of RDT algorithms for management of AOM compared to usual care

Analytic components	Usual Care	RDT-DP	RDT-OBS
Total Costs	334.88	418.34	439.27
Total QALDS lost in 30 days	0.12	0.06	0.09
Total QALDS remaining in 30 days	29.88	29.94	29.91
ICER (total cost/QALD)	Reference	1336.15	Dominated

Table 2: Estimated reduction in annual antibiotic use for AOM with RDT use.

Antibiotic Prescriptions	Usual Care	RDT-DP	RDT-OBS
	N (%)	N (%)	N (%)
Narrow Spectrum (million)	5.72 (54.3)	3.13 (67.0)	3.50 (65.0)
Broad Spectrum (million)	4.81 (45.7)	1.54 (33.0)	1.89 (35.1)
Total Antibiotics (million)	10.53	4.67	5.38

CONCLUSION

An NP RDT could be a cost-effective strategy to individualize management and reduce unnecessary antibiotic use for uncomplicated AOM in children.

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