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Payment Analysis of Two Diagnosis and Management Approaches of Acute Otitis Media

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Abstract

We determined the cost of care for two diagnosis and management approaches for acute otitis media (AOM) among children 6 to 30 months old. A case control design was used. Cases included 208 children diagnosed with AOM based on a bulging tympanic membrane (TM) and treated with amoxicillin/clavulanate. Controls (5:1 ratio) included 1020 children with AOM diagnosed not requiring bulging of the TM and treated with amoxicillin. Fewer cases (49%) than controls (69%) were diagnosed with AOM ($p<0.001$); fewer were diagnosed with recurrent AOM or AOM treatment failure (0.34 vs 1.4/child) ($p<0.0001$) and fewer had insertion of tympanostomy tubes (6.3% vs. 14.8%) due to recurrent AOM ($p<0.0001$). The combined direct payments and indirect costs for management of AOM were $539/case vs. $954/control. Using Rochester NY payments generalized to the US birth cohort, this case diagnosis and treatment strategy could save $1.008 billion per year

Keywords

Guidelines; Acute Otitis Media; Payment Analysis; Antibiotics; Tympanostomy; Tubes

Introduction

The direct payments and indirect costs for management of otitis media in the United States during 1998–2008 have been estimated to exceed $5.3 - 6 billion annually[1, 2]. Included in direct payments are physician visits, antibiotics and surgery for insertion of pressure equalizing tubes (PETs). Indirect costs include parent's lost work income, travel expenses, and forfeited daycare costs. The 2004 AOM practice guidelines of the American Academy of Pediatrics (AAP) endorsed diagnostic criteria for acute otitis media (AOM) that did not require a full or bulging tympanic membrane (TM)[3] whereas the 2013 guideline did so[4]. The 2004 and 2013 AOM treatment guidelines endorsed amoxicillin, 80–100 mg/kg/day, as first line antibiotic treatment and amoxicillin/clavulanate as second line treatment. Since 1990

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the two authors used a bulging TM to diagnose AOM and used amoxicillin/clavulanate as a first line antibiotic since 2003 because tympanocentesis data in our practice show that amoxicillin would be unlikely to eradicate the otopathogens we identify[5–7].

Antibiotic consumption in pediatrics is an ongoing concern as a driver of antibiotic resistance among common bacterial pathogens[8]. AOM is the most common indication applied by pediatricians to prescribe antibiotics[9]. Insertion of PETs is the second most commonly performed surgery for children[10].

We postulated that stricter diagnostic criteria would reduce the frequency of AOM in practice; that antibiotic treatment directed at the most common otopathogens causing AOM in our community would result in fewer recurrent AOM and treatment failure cases; and that reductions in PET surgery would occur as a consequence of fewer recurrent AOM (rAOM) and AOM treatment failure (AOMTF) episodes. Here we describe an analysis of the costs of care for children diagnosed with AOM using bulging of the tympanic membrane (TM) as a requirement and treated first line with amoxicillin/clavulanate (cases) compared to children diagnosed and treated according to the American Academy of Pediatrics (AAP) 2004 AOM treatment guidelines (controls).

Methods

General Design

Cases were derived from a single private practice in suburban Rochester NY conducting a NIH National Institute of Deafness and Communication Disorders-sponsored prospective, longitudinal study during the 5-year time span July 2006 to July 2011. The physicians who enrolled and followed all cases were the authors (JC and MEP). Controls were derived from a different private practice in suburban Rochester NY enrolling children in the same study. Five pediatricians enrolled and followed all controls. All data was prospectively collected to document epidemiologic and risk factors for AOM, symptoms and signs at the time of diagnosis of AOM and at follow up. Enrollment of children occurred at age 6 months old and they were followed until 30 months old. Inclusion criteria were: healthy, full term birth, appropriate weight for age, up-to-date with all vaccinations. Exclusion criteria were: an AOM episode diagnosed prior to 6 months of age and any immunocompromised or anatomical defect that would make the child prone to AOM. The University of Rochester Medical Center and Rochester General Hospital Institutional Review Boards approved this study and written informed consent was obtained from parents for all children enrolled.

Case to control matching included age and year of enrollment (to assure similar exposure to respiratory viruses and otopathogens circulating each season), gender, and race as epidemiologic variables. For AOM risk factors, matching included breast feeding for > 6 months, day care attendance and cigarette smoke exposure.

Definitions

AOM diagnostic criteria. Cases diagnosed with AOM had recent, usually abrupt onset of symptoms of middle ear inflammation, presence of middle ear effusion (MEE), fullness/bulging of the TM, limited or absent mobility of the TM and distinct erythema of the TM.

Controls diagnosed with AOM had acute, usually abrupt onset of symptoms of middle ear inflammation, presence of MEE and signs of acute middle ear inflammation as indicated by distinct bulging or limited or absent mobility of the TM or air-fluid levels behind the TM or distinct erythema of the TM. AOM treatment failure (AOMTF) was defined by the persistence of symptoms and signs of AOM beyond 48 hours after the start of antibiotic treatment or before 14 days had passed since diagnosis and a change in antibiotic therapy was instituted[11, 12]. Recurrent AOM (rAOM) was defined as an AOM occurring 15–30 days after a previous AOM[11, 12]. An AOM event was considered a new event, and referred to as a "simple" AOM episode if the child presented with an AOM >30 days after the preceding AOM[3, 4]. All children were scheduled for follow up examination 3 weeks after diagnosis. Residual MEE was considered a normal finding at follow up.

Treatment regimen

Cases were empirically treated with high dose amoxicillin/clavulanate (80–100 mg/kg/day divided BID) or cefdinir (14 mg/kg/day divided BID) for 5 days according to prior publications[13, 14]. Controls were empirically treated with amoxicillin (80–100 mg/kg/day divided BID) for 10 days or cefdinir (14 mg/kg/day QD) for 10 days. Cases received 3 doses of ceftriaxone (50 mg/kg/dose) for any AOMTF or rAOM episodes. Controls received 10 days of high dose amoxicillin/clavulanate or cefdinir (doses as above) for the first episode of AOMTF or rAOM. A second AOMTF or rAOM resulted in treatment with 2–3 doses of ceftriaxone (50 mg/kg/dose).

Payment Analysis

We calculated costs for AOM management in the two groups using their respective treatment paradigms, the numbers of simple AOM episodes, rAOM and AOMTF episodes, and the numbers of children receiving PET surgery. All costs were taken from local Rochester NY payment rates provided by the two dominant HMOs in our community which cover >80% of children. The average of payment from those two payers across the 5 years of the study was used to calculate actual cost of care to health insurers. To estimate parental time spent associated with visits we collected data on time away from work, travel distance and time away from daycare from a sample of 100 parents. For income we used the median income of Monroe County, NY in 2010 obtained from the US Bureau of Labor Statistics.

Statistics

Comparisons between groups were accomplished with Student's t test, Chi-square test, and Test of proportions as appropriate and a p value < 0.05 was considered significant.

Results

Description of the Cohorts

There were 208 children in the case group and 1020 children in the control group. The groups were well matched. Mean age at enrollment was 5.8 months for cases and 5.9 months for controls. 88% of cases and 78% of controls were Caucasian; 56% and 52% were male; 34% and 28% were breast fed > 6 months; 85% and 83% had no tobacco smoke exposure in

the home and 66% and 56% never attended day care. All were health-insured, and all were up-to-date with 7-valent or 13-valent pneumococcal conjugate vaccine (PCV7 or PCV13).

49% of case children and 69% of control children had at least 1 episode of AOM diagnosed between 6 and 30 months of age (Table 1). There were a total of 203 AOM episodes in 208 case children (0.98 episodes/child) compared to 1817 AOM episodes in 1020 children (1.78 episodes/child) among controls ($p< 0.0001$). The frequency of simple episodes of AOM, AOMTF and rAOM for the two groups is shown in Table 1. 16 (7.7%) of 208 case children experienced a total of 49 episodes compared to 316 (31%) of 1020 control children experienced a total of 961 episodes of rAOM ($p<0.0001$). 14 (6.7%) of 208 children for a total of 22 episodes of AOMTF occurred in case children compared to 275 (27%) of 1020 control children for a total of 472 episodes of AOMTF ($p<0.0001$). Altogether, rAOM or AOMTF occurred in 0.34 episodes/child in cases and 1.4-episodes/child in controls ($p< 0.0001$). Insertion of PETs due to rAOM or AOMTF occurred in 6.3% of case children and 14.8% of control children ($p=0.001$).

Payment Saving Analysis

The payments of care and indirect costs in Rochester NY for diagnosis and management of AOM are shown in Table 2. The indirect payments of time lost by parents to bring their child to the pediatric office varied widely because of timing in the day when suspicion of AOM occurred (e.g. in the night or after parents had dropped their child at day care and had arrived at work and distance from the office and parent's home).

The direct payment and indirect cost for simple AOM episodes in case children was $283/child compared to $223/child in control children (Table 3). The direct payment and indirect cost for first episodes of AOMTF or rAOM in case children was $645/child compared to $289/child in the control group (Table 3). When control children had second and subsequent AOMTF or rAOM episodes the payment and indirect cost was $645/child. The indirect cost and payment for PET surgery incurred due to AOMTF or rAOM in 6.3% of case children and 14.8% of controls was $2221/child (Table 3). The total payment of care and indirect cost per child in cases was $539 compared to $954 in controls (Table 3).

The data shown in Table 2 allow generalization to other practices. Payment rates vary from one community to another. For example the national average payment for insertion of tympanostomy tubes is $3584[15] but in Rochester NY the payment is $1715. Oral antibiotic prices shown are for an average 10-day supply but prices in our community varied widely (Table 4). Prices for injection of ceftriaxone included payment for the drug and an administration fee of $12.00, although in Rochester NY an administration fee is not paid by the major insurers. Acoustic reflectometry was performed only for case children and billed in 12% of patient encounters but was used more frequently without charge to assist in diagnosis. A low complexity (CPT 99212) visit is shown for follow up visits but record review showed that compliance with a follow up visit occurred in about 40–50% of cases for simple AOM and 60–70% of cases of AOMTF and rAOM. During rAOM and AOMTF visits, the use of amoxicillin/clavulanate and cefdinir differed between groups and is reflected in Table 3. Three injections of ceftriaxone and an associated low complexity visit

are included in the calculations when they were chosen as treatment but control children were treated with 2 injections in about 90% of cases.

Discussion

This is a novel, contemporary evaluation of the frequency of diagnosis of AOM, rAOM and AOMTF and associated payments of care derived from a prospective, 5-year, longitudinal study. Uniquely, every AOM and its management were prospectively documented from two private pediatric practices in a single Upstate NY community. Cost of care was not taken from or derived from a large HMO or federal database. Instead we captured the real payments and indirect costs from parent time lost for care from the specific patient group studied.

The payment analysis shows that nearly a 50% difference in payment occurred in the care of the children studied by the two groups using differing diagnostic criteria and treatment paradigms for AOM. If the payments/child and indirect costs calculated for controls versus cases were generalized to the US birth cohort[16], using payments in Rochester NY, an annual payment savings of $1.008 billion per year might occur (Table 5). The reduction in antibiotic use and the ecological pressure that this might bring to young children would be an additional benefit.

When the strict requirement of a bulging TM was used as diagnostic criteria, 49% of children in the case group had at least one episode of AOM versus 69% of children in the control group using 2004 AAP diagnostic criteria. A difference of 20% in the diagnosis of AOM for every visit where symptoms compatible with AOM would result in more costs for management of AOM episodes due to more children reaching the threshold of rAOM and AOMTF and possibly leading to tympanostomy tube surgery.

The contribution of differences in diagnostic criteria application and differences attributable to the diagnostician cannot be determined in this study. All the pediatricians were board-certified and received residency training in the U.S.

Antibiotic treatment regimens differed. Control treatment was based on guideline recommendations while case treatment was based on the otopathogen mix and the antibiotic susceptibility of those bacteria determined by tympanocentesis routinely performed[5–7]. Physicians treating control children varied in their use of cefdinir predominantly based on their impressions of poor tolerability with amoxicillin/clavulanate[17]. Case children were treated with cefdinir less frequently because amoxicillin/clavulanate is more efficacious[18]. Control children were treated with 2 injections of ceftriaxone for recurrent AOM or AOMTF while case children received 3 injections on three separate visits[19].

The re-introduction of tympanocentesis into routine pediatric practice is unlikely to occur. However, in our previous publication regarding individualized care of children with AOM an intervention group had tympanocentesis for all AOM episodes[20]. We did a payment analysis of the individualized treatment paradigm and the payment was calculated to be $466/child (Table 6).

Control group outcomes reported here match closely the results of a prior study involving pediatric and family medicine practices in Rochester NY and the State of Tennessee[21]. Therefore we consider the care rendered to control children as representative of pediatricians and family physicians in our community in general. The frequency of children reaching the definition threshold of rAOM among controls was 31% and for the entire Rochester community study was 21%,

In 1997 Byrns et al examined utilization of services for otitis media by children enrolled in Medicaid in Colorado[22]. They found the average number of ambulatory visits per child for otitis media was 2.2, 3.0 and 2.5 for those ages < 1year, 1–2 years and 2–3 years respectively. Surgical procedures were performed in 5.4/100 children. They also found that 29.9% of children who had tympanostomy tube surgery went on to receive an adenoidectomy with or without a concurrent tonsillectomy by age 6 years old. Using claims data from a large New England health insurer, in 1999 Thompson et al[23] reported that children averaged 2.9 physician office visits for management of otitis media; among children < 2 years old 25% had 6 or more such visits. 4.6% of children < 2 years of age had a otitis media-related surgical procedure. In a study of costs of otitis media in a managed care population in Northern California in 1997, average costs of simple and complex episodes of otitis media in children < 14 years old were calculated[24]. A complex episode was defined similar to our study definition of rAOM and AOMTF. Interviews were conducted to establish work loss related to AOM care. The average number of work hours lost in the Northern California population was 5.9 and was assigned a cost of $120. They also tallied costs of days missed from prepaid day care, extra babysitting, travel-related expenses, co-payments and over–the-counter medications and assigned those costs an average of $13/family. Of the total medical costs, outpatient visits comprised $6.28 million (78%), hospitalizations comprised $1.08 million (14%) and antimicrobial treatments comprised 0.66 million (8%). For the average simple episode of otitis media work loss cost was $114 and medical care cost was $131. For the average complex episode work loss cost was $404 and medical care cost was $327. Bondy et al[1] evaluated the direct expenditures related to otitis media diagnoses and extrapolated their Colorado Medicaid data to create a national expenditure calculation. Total national expenditures were estimated at approximately $5.3 million in 1998 dollars. 40% of national expenditure was incurred for children 1–3 years old ($453 per capita in 1992 dollars). Examining trends in otitis media among children in the U.S., Auinger et al[31] found the prevalence of ever having an episode of otitis media from 1988–1994 for children < 6years old in the U.S. was 68.2% (95% confidence interval; 66.3; 70.1) and repeated otitis media was 38.0% (95% CI; 35.7; 40.4). In 2011 O'Brien et al projected benefits and cost-effectiveness of new vaccines against otitis media[2]. In that study, best-case assumptions for children to experience an AOM during age 7–12, 13–18, 19–24 and 25–36 months old was 50%, 44%, 37% and 31%, respectively based on AAP 2006 data. Tympanostomy tube insertion probability was 18%, among children with recurrent AOM, with 6% of surgeries resulting in complication and 75% effectiveness to prevent AOM for 1 year attributed. Costs were calculated in 2006 dollars. An outpatient visit cost was estimated to be $51.23; antibiotic cost for 1–2 year olds was $25.41 and for 2–3 year olds was $30.24 based on the Drug Topics Red Book[25]. Tympanostomy tube insertion cost was $1694 based on the Medicaid fee schedule. Parent

cost in time was based on an hourly wage of $19.90/hour. Parent time costs for work loss for an AOM visit was 3.9 hours and for tympanostomy surgery was 16 hours. Quality Adjusted Life Years (QALYs) were assessed and an AOM episode was estimated to cause a loss of 0.011 QALY (4 days) while tympanostomy tube surgery was estimated to cause a loss of 0.11 QALYs (40 days). In 2006 dollars O'Brien et al[2] estimated the total otitis-associated cost in the U.S. to be $3.828 billion.

There are limitations to this study. The prospective enrollment of children was with the intent of studying pathogenesis and immune responses to AOM, not diagnosis and treatment differences of AOM. Therefore, the study was neither randomized nor investigator-blinded. However, this analysis occurred after prospective enrollment of children. All AOM events and surgeries were documented in the medical record. Control children were matched 5:1 for the age and month of enrollment of case child. Therefore bias from lack of randomization or investigator blinding is lessened. The ecological impact of over diagnosis leading to unnecessary use of antibiotics was not assessed. The number of days that children had middle ear effusion was not studied. Data on the use of symptomatic pain relief medication prescribed or used was not collected. We did not capture several payments and consequences associated with care of AOM. Children who have one set of tubes are the most likely to receive more tube surgery[26]. About 50% of the children who had tympanostomy tube surgery went on to receive a second set of tubes and about 10% went on to have an adenoidectomy/tonsillectomy, similar to a previous study[22]. Some children require surgery to remove tympanostomy tubes. Data on complications from receiving antibiotics was not captured. The impact on QALYs was not calculated[2].

In conclusion, this study shows that using a bulging TM as a strict requirement for diagnosing AOM in young children would be payment effective. Moreover, the ecological benefit and financial savings from less frequent use of antibiotic therapy for AOM could be substantial.

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Table 1

AOM Episodes in the study population.

A. Total numbers of AOM episodes in Case and Controls		
	Cases N=208	**Controls N=1020**
Total # AOM	203	1817
No. with any AOM	102 (49%)	704 (69%)
1 AOM Episode	51 (25%)	175 (17%)
2 AOM Episodes	22 (11%)	146 (14%)
3 AOM Episodes	13 (6%)	182 (18%)
4 or more AOM Episodes	16 (8%)	204 (20%)

B. Break down of the 4 or more AOM episodes by group

Cases:

4 AOM episodes: 14 children

6 AOM episodes: 1 child

7 AOM episodes: 1 child

Controls:

4 AOM episodes: 79 children

5 AOM episodes: 68 children

6 AOM episodes: 42 children

7 AOM episodes: 5 children

8 or more AOM episodes 10 children

C. Recurrent AOM or AOMTF by group

Cases:

Number of children with rAOM: 16 for a total of 49 episodes of rAOM

Number of children with AOMTF: 14 for a total of 22 episodes of AOMTF

Number of children with insertion of Tympanostomy Tubes: 13

Controls:

Number of children with rAOM: 316 for a total of 961 episodes of rAOM

Number of children with AOMTF: 275 for a total of 472 episodes of AOMTF

Number of children with insertion of Tympanostomy Tubes: 151

Table2

Costs for an episode of AOM

Direct Costs	
99212 visit to care provider	$61.79
99213 visit to care provider	$82.08
99214 visit to care provider	$121.55
Amoxicillin 10 day supply	$14.98
Amoxicillin/Clavulanate (10 day)	$ 69.88
Ceftriaxone injection 1 gram	$20.42
Cefdinir 10 day supply	$100.97
Acoustic Reflectometry	$18.48
Tympanocentesis unilateral	$242.33
Tympanocentesis bilateral	$302.68
ENT physician consult	$135.00
Insertion tympanostomy tubes	$1,715.00

Indirect Costs			
	Lost Hours	Range (Hours)	Time Cost
Parent Time Costs Primary Care Visit	5.375	2.75 – 8.00	$125.83
Parent Time Costs Tympanocentesis visit	5.625	3.25–8.00	$131.68
Parent Time Costs ENT Visit	5.625	3.25–8.00	$131.68
Patient Time Costs Tympanostomy tubes	16	8.00–24	$374.56

Direct Costs Visit cost based on actual reimbursement rate average of 2 payers for designated CPT code;
Antibiotic cost based on average of 3 large chain retail pharmacies and 1 large supermarket chain pharmacy average for average child on weight based 6-36 month old; Ceftriaxone is reimbursed charge including administration;
Acoustic reflectometry and tympanocentesis cost based on actual reimbursement rate average for 2 payers for designated
CPT code applicable;
ENT physician consult cost based on actual reimbursement rate average for 2 payers per CPT code
Insertion of tympanostomy tubes cost includes facility fee, anesthesiology fee, surgeon fee and surgical follow up rate average for 2 payers per CPT code.
Indirect Costs Lost hours based on interview of 100 parents. Mean is shown along with range of lost hours that mostly depended on whether AOM visit occurred after parent had gone to work and distance/time needed to bring child to office and return to work or home. The mean was used for all calculations in Table 3. Time cost was based on $23.41/hour for hours lost and wage was taken from US National Bureau of Labor Statistics for all occupations, Monroe County NY, 2010.
The dollar amounts for antibiotic costs shown were derived by taking into account the frequency of prescription of the oral antibiotic in the group and the size of the bottle based on weight of the children.

Table 3

Calculation of Costs of Care

Cases		**n= 132**	**Controls**		**n=384**
99213 visit to care provider	$82.08		99213 visit to care provider	$82.08	
Amox/Clav 89% of cases	$62.2		Amox 10 day supply	$14.98	
Cefdinir 11% of cases	$11.11		Parent Time Costs Primary Care Visit	$125.83	
Acoustic reflectometry 12% of cases	$2.22		**Total/child**	**$222.89**	
Parent Time Costs Primary Care Visit	$125.83				
Total/child	**$283.43**				
Total Cost all episodes		**$37,413.00**	**Total Cost all episodes**		**$85,590.00**
Cost per episode		**$283.00**	**Cost per episode**		**$223.00**
Recurrent AOM or AOMTF		**n=71**	**Recurrent AOM or AOMTF**		**n=1047**
99213 visit to care provider	$82.08		99213 visit to care provider	$82.08	
Ceftriaxone injection 1 gram	$20.42		Amox/Clav 64% of cases	$44.72	
Ceftriaxone injection 1 gram	$20.42		Cefdinir 36% of cases	$36.36	
Ceftriaxone injection 1 gram	$20.42		Parent Time Costs Primary Care Visit	$125.83	
99212 visit to care provider	$61.79		**Total/child**	**$288.99**	
99212 visit to care provider	$62.79		**Total Cost all episodes**		**$302,573**
Parent Time Costs Primary Care Visit	$125.83		**Cost per episode**		**$289.00**
Parent Time Costs Primary Care Visit	$125.83				
Parent Time Costs Primary Care Visit	$125.83				
Total/child	**$645.41**				
Total Cost all episodes		**$45,824.00**	**Second Recurrent or AOMTF**		**n=386**
Cost per episode		**$645.00**	99213 visit to care provider	$82.08	
			Ceftriaxone injection 1 gram	$20.42	
			Ceftriaxone injection 1 gram	$20.42	
			Ceftriaxone injection 1 gram	$20.42	
			99212 visit to care provider	$61.79	
			99212 visit to care provider	$61.79	
			Parent Time Costs Primary Care Visit	$125.83	
			Parent Time Costs Primary Care Visit	$125.83	
			Parent Time Costs Primary Care Visit	$125.83	

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Cases		**n= 132**	**Controls**		**n=384**
			Total/child	**$645.41**	
			Total Cost all episodes		**$249,128**
			Cost per episode		**$645.00**
Surgery		**n=13**	**Surgery**		**n=151**
ENT physician consult			ENT physician consult		
Insertion tympanostomy tubes	$1,715.00		Insertion tympanostomy tubes	$1,715.00	
Parent Time Costs ENT Visit	$131.68		Parent Time Costs ENT Visit	$131.68	
Patient Time Costs Tympanostomy tubes	$374.56		Patient Time Costs Tympanostomy tubes	$374.56	
Total/child	**$2,221**		**Total/child**	**$2,221.00**	
Total Cost all episodes		**$28,876.00**	**Total Cost all episodes**		**$335,407**
Cost per episode		**$2,221.00**	**Cost per episode**		**$2,221.00**
GRAND TOTAL ALL COSTS		**$112,113**	**GRAND TOTAL ALL COSTS**		**$972,698**
GRAND TOTAL ALL COSTS/CHILD		**$539.00**	**GRAND TOTAL ALL COSTS/CHILD**		**$954.00**

Amox = Amoxicillin; Amox/Clav = Amoxicillin/Clavulanate

The dollar amounts for antibiotic costs shown were derived by taking into account the frequency of prescription of the oral antibiotic in the group and the size of the bottle based on weight of the children.

Table 4

Cost of antibiotics.

	Amoxicillin 400mg/5 ml		Augmentin 400mg/5 ml		Augmentin 600mg/5 ml		Cefdinir	
	100 ml	50 ml	100 ml	50 ml	100ml	75 ml	125/5 ml	250/5 ml
					(50ml not available anywhere)			
Pharmacy 1	$10.93	$5.65	$68.88	$55.99	$60.88	$39.99	$49.68	$85.99
Pharmacy 2	$17.99	$12.99	$79.59	$55.59 (75ml)	$78.99	$46.99	$45.00	$84.00
Pharmacy 3	$15.99	$11.99	$75.39	$39.99 or $54.99 (75 ml)	$60.79	$43.09	$57.89	$107.99
Pharmacy 4	$14.99	$11.09 (75ml)	$51.86	$39.09 (75ml)	$62.89	$43.39	$56.99	$105.99

Table 5

Cost of Management of AOM Extrapolation to U.S. Birth Cohort

Birth Cohort: 4,130,665		
	Cases (N=208)	**Controls (N=1020)**
% of population with any AOM episodes	49%	69%
Cost of First Episodes of AOM	$283	$223
Total costs of First Episodes of AOM	$572,799,316	$635,585,424
% of population with recurrent AOM	14.4%	57.9%
Cost of Recurrent Episodes of AOM First recurrence	$645	$289
Subsequent recurrences	$645	$645
Total cost of Recurrent AOM episodes	$383,656,165	$727,348,147
Surgical Care (Tympanostomy Tube surgery)		
% of population with Tympanostomy Tube surgery	6.3%	14.4%
Cost of Tympanostomy Tube surgery	$1,715	$1,715
Total Costs of Tympanostomy Tube surgery	$446,297,700	$1,048,445,390
Total Costs	$1,402,753,181	$2,411,378,960
Net Savings	$1,008,625,780	

Table 6

a	
AOM Data for Cost Savings Paper	
	Tympanocentesis Group N=254
Total # AOM	186
No. with any AOM	91 (36%)
1 AOM Episode	43 (17%)
2 AOM Episodes	24 (9%)
3 AOM Episodes	13 (5%)
4 or more AOM Episodes	11 (4%)

A. Total numbers of AOM episodes

B. Break down of the 4 or more AOM episodes

Tympanocentesis group:

4 AOM episodes: 4 children

5 AOM episodes: 3 children

6 AOM episodes: 3 children

7 AOM episodes: 1 child

C. Recurrent AOM or AOMTF

Tympanocentesis group:

Number of children with rAOM: 22 for a total of 25 episodes of rAOM

Number of children with AOMTF: 7 for a total of 8 episodes of AOMTF

Number of children with insertion of Tympanostomy Tubes: 6

b. Cost Analysis of Including tympanocentesis in the management paradigm

Legacy Intervention Costs		**Cases 143**
Tympanocentesis bilateral	$	302.68
Amox/Clavulanate 10 day supply Acoustic	$	69.88
Reflectometry	$	18.48
Tympanometry	$	9.74
Parent Tme Costs Primary Care Visit	$	131.68

b. Cost Analysis of Including tympanocentesis in the management paradigm

Legacy Intervention Costs			Cases 143		
TOTAL	**$**	**532.46**		**$**	**76,142**
Reccurent AOM or AOMTF			**33**		
Tympanocentesis bilateral	$	302.68			
Cefriaxone injection 1 gram	$	20.42			
Cefriaxone injection 1 gram	$	20.42			
Cefriaxone injection 1 gram	$	20.42			
99212 visit to care provider	$	61.79			
99212 visit to care provider	$	62.79			
Acoustic Reflectometry $18.48 × 12%	$	2.22			
Parent Time Costs Primary Care Visit	$	131.68			
Parent Time Costs Primary Care Visit	$	125.83			
Parent Time Costs Primary Care Visit	$	125.83			
TOTAL	**$**	**874.08**		**$**	**28,845**