Treating Children for Acute Otitis Media (AOM)

In the United States, antibiotics are prescribed more for acute otitis media (AOM) than for any other childhood infection.1

Even though annual OM rates decreased by 33% and antibiotic prescription rates decreased by 36% between 1995/1996 and 2005/2006, the proportion of OM visits that resulted in antibiotic prescriptions remained at approximately 80%. Additionally, prescription rates for azithromycin increased and it became the most commonly prescribed macrolide for acute respiratory tract infections (ARTI) and OM (10% of OM visits).1

According to a meta-analysis of placebo-controlled trials of AOM over 30 years that was included in the 2004 American Academy of Pediatrics (AAP) and the American Academy of Family Physicians (AAFP) Clinical Practice Guidelines for the Diagnosis and Management of AOM:

- Most children do well, and have no adverse effects, without antibiotic therapy.
- For one child to benefit, between 7 and 20 children must be treated with antibiotics.
- 61% of children have decreased symptoms within 24 hours whether treated with antibiotics or placebos.
- Within 7 days, approximately 75% of children have resolution of symptoms.
- When ampicillin or amoxicillin was prescribed, compared with the initial use of placebo or observation, there was only a 12.3% reduction in clinical failure rate within 2 to 7 days of treatment. (In other words, clinical failure rate goes from 25% to 22% with the use of ampicillin or amoxicillin.)2

2004 AAP/AAFP Guidelines for AOM Treatment

These guidelines apply only to otherwise healthy children without underlying conditions that could negatively affect the course of AOM.

1. Accurately diagnose AOM and differentiate it from otitis media effusion (OME) which needs different treatment.
2. Relieve pain, especially in the first 24 hours (ibuprofen or acetaminophen).
3. Minimize antibiotic side effects by giving parents of select children the option of fighting the infection on their own for up to 72 hours, and starting antibiotics then if they haven't improved.
4. Use observation as an option only if follow-up can be ensured and antibiotics started if symptoms persist or worsen.
5. Prescribe amoxicillin for most children, if antibiotic treatment is necessary.
6. Prescribe antibiotics initially for children who are likely to benefit the most from treatment.
7. Treat all children under 2 years of age with antibiotics if diagnosis is certain.
8. Encourage families to prevent AOM by reducing risk factors. For babies and infants, breastfeed for at least 6 months, avoid bottle proping, and eliminate exposure to passive tobacco2.

The AAP/AAFP Guidelines provide an option to observe select children and only start antibiotic treatment if symptoms have not improved in 48 to 72 hours. Children who do not have their ear infections treated immediately with antibiotics are not likely to develop a serious illness. Antibiotics do not relieve symptoms in the first 24 hours and have only a small effect on symptoms after that.5

Years after these guidelines were published, physicians are still prescribing antibiotics as much as they did before the guidelines according to a study published online January 25, 2010 in Pediatrics. However, in accordance with the guidelines, the prescribing of amoxicillin and analgesics has increased. Contrary to the guidelines, prescriptions for amoxicillin/clavulanate have decreased and prescriptions for cefdinir have increased.5

Diagnosis of AOM

(2004 AAP/AAFP Guideline Recommendations)*

A diagnosis of AOM requires:

1. History of acute onset of signs and symptoms of middle ear inflammation and middle ear effusion (MEE).
2. Presence of middle-ear effusion (MEE) indicated by any of the following:
   - Bulging of the tympanic membrane (TM)
   - Limited or absent mobility of tympanic membrane
   - Air-fluid level behind the tympanic membrane
   - Otorrhea
3. Signs and symptoms of middle ear inflammation as indicated by either:
   - Distinct erythema of the tympanic membrane
   - Distinct otalgia that interferes with/precludes normal activity/sleep

* Diagnosis of AOM is often difficult. Controversy over AAP/AAFP diagnostic criteria started soon after publication and continues. Many commentators in various journals have stated that significant bulging of the TM is the most reliable sign of AOM. Authors of the Guidelines agree that bulging may be correlated with middle ear inflammation but do not believe the studies were conclusive in defining the true relationship of bulging to the diagnosis. Whether or not erythema of the TM should be included in diagnostic criteria is also controversial.3,4
Treating Patients for Acute Otitis Media (continued)

Fact Sheets for Parents: Available in English, Russian, Spanish, and Vietnamese at http://here.doh.wa.gov/materials/antibiotic-resistance-education-fact-sheet-ear-infections

Other Treatment Options

Topical Analgesic Drops

A Cochrane review of four randomized controlled trials evaluating topical anesthesia for AOM concluded that evidence was insufficient to know whether ear drops are effective or not. However, "if future trials ever find ear drops to be even moderately effective for pain management, treatment is likely to be safer, cheaper, and more accessible than antibiotics."7

Typanocentesis

Typanocentesis was commonly performed by both otolaryngologists and pediatrics before the discovery of antibiotics and was often the only effective way of treating an ear infection. Recently there has been a resurgence in the use of diagnostic and therapeutic typanocentesis. Draining fluid from the middle ear can provide immediate relief from symptoms such as pain, irritability and fever, and does not contribute to the growing resistance to antibiotics.

A Georgetown School of Medicine University professor has reported that he encountered no major complications (only minor self limiting bleeding) in fewer than 5% of the 1000 tympanocentesis procedures he performed over 25 years.8

Mark Grubb, MD, a local pediatrician, has found typanocentesis to be an effective tool in his management approach for AOM. As an adjunct to the observation option, typanocentesis alleviates pain without the use of analgesics while providing aspirate for culture analysis which supports targeted antibiotic therapy for children who remain symptomatic after the observation period.

Robert M. Siegel, MD of Cincinnati Children’s Hospital Medical Center in Ohio believes that educating families about antibiotic use and ensuring the child’s pain is managed will lead to decreased antibiotic use and patient satisfaction.9

Resources


AOM Pathogen Culture and Susceptibility Data from Puyallup WA Pediatrician*

<table>
<thead>
<tr>
<th>Respiratory Season</th>
<th>2005/06</th>
<th>2006/07</th>
<th>2007/08</th>
<th>2008/09</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. pneumoniae</td>
<td>16 (48%)**</td>
<td>15 (41%)</td>
<td>12 (35%)</td>
<td>13 (54%)</td>
</tr>
<tr>
<td>H. influenzae</td>
<td>14 (42%)</td>
<td>15 (41%)</td>
<td>20 (59%)</td>
<td>9 (38%)</td>
</tr>
<tr>
<td>M. catarrhalis</td>
<td>3 (9%)</td>
<td>7 (19%)</td>
<td>2 (6%)</td>
<td>2 (8%)</td>
</tr>
<tr>
<td>Other otopathogens</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>No growth</td>
<td>13</td>
<td>19</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Total number of isolates</td>
<td>46</td>
<td>57</td>
<td>47</td>
<td>34</td>
</tr>
</tbody>
</table>


**Percentage of isolates positive for an AOM pathogen. The percentage values in the tables do not include non-AOM pathogens and negative cultures.

Age Distribution: 94% from age 2 to 24 months; 6% age 25 to 36 months Vaccine Status: 84% received 3 or more PCV pneumococcal vaccine doses
2008 Antimicrobial Susceptibility Summary
Pierce County, Washington

All civilian and military hospital laboratories within Pierce County reported antibiotic susceptibility testing results for the time period between January 1, 2008 and December 31, 2008. Inpatient and outpatient data have been included. Data represents only bacterial isolates that were collected for diagnostic purposes; no surveillance cultures are included.

Starting in 2008, all isolates will be reported as long as there are >3 days separating isolates. Previous to 2008, no standard mechanisms for eliminating duplicate isolates were agreed on across hospitals which may have negatively impacted the reliability of percent susceptible data prior to 2008.

A county-wide antibiogram may be most useful in providing context to individual hospital susceptibility trends. This would be especially important when small numbers of certain pathogens are reported by individual facilities making the percent susceptible/resistant appear artificially inflated due to the small denominators (e.g. S. pneumoniae).

Percent (%) Susceptible (Remainder are non-susceptible, resistant or intermediate)

<table>
<thead>
<tr>
<th>Gram Negative Organisms*</th>
<th>No. Tested</th>
<th>Ampicillin</th>
<th>Augmentin</th>
<th>Pip/Taz</th>
<th>Cefazolin</th>
<th>Ceftriaxone</th>
<th>Ceftazidime</th>
<th>Imipenem</th>
<th>Gentamicin</th>
<th>Tobramycin</th>
<th>Nitrofurantoin</th>
<th>Ciprofloxacin</th>
<th>Levofloxacin</th>
<th>Tetracycline</th>
<th>Trimeth/sulfa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrobacter freundii</td>
<td>394</td>
<td>16</td>
<td>‡</td>
<td>95</td>
<td>4</td>
<td>86</td>
<td>83</td>
<td>100</td>
<td>95</td>
<td>99</td>
<td>83</td>
<td>83</td>
<td>91</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>Enterobacter aerogenes</td>
<td>325</td>
<td>0</td>
<td>‡</td>
<td>93</td>
<td>0</td>
<td>91</td>
<td>88</td>
<td>100</td>
<td>99</td>
<td>99</td>
<td>14</td>
<td>97</td>
<td>98</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>Enterobacter cloaceae</td>
<td>689</td>
<td>1</td>
<td></td>
<td>86</td>
<td>2</td>
<td>75</td>
<td>66</td>
<td>100</td>
<td>91</td>
<td>92</td>
<td>33</td>
<td>75</td>
<td>75</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>20,362</td>
<td>58</td>
<td></td>
<td>99</td>
<td>92</td>
<td>97</td>
<td>96</td>
<td>100</td>
<td>95</td>
<td>94</td>
<td>95</td>
<td>80</td>
<td>85</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>Klebsiella pneumoniae</td>
<td>2,924</td>
<td>0</td>
<td></td>
<td>98</td>
<td>93</td>
<td>96</td>
<td>95</td>
<td>100</td>
<td>96</td>
<td>96</td>
<td>34</td>
<td>86</td>
<td>88</td>
<td>87</td>
<td></td>
</tr>
<tr>
<td>Proteus mirabilis</td>
<td>1,719</td>
<td>66</td>
<td></td>
<td>100</td>
<td>90</td>
<td>97</td>
<td>97</td>
<td>97</td>
<td>85</td>
<td>87</td>
<td>0</td>
<td>62</td>
<td>77</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>Serratia marcescents</td>
<td>356</td>
<td>0</td>
<td></td>
<td>97</td>
<td>0</td>
<td>97</td>
<td>99</td>
<td>99</td>
<td>97</td>
<td>96</td>
<td>0</td>
<td>88</td>
<td>96</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td>Acinetobacter baumannii</td>
<td>219</td>
<td>0</td>
<td></td>
<td>62</td>
<td>0</td>
<td>0</td>
<td>38</td>
<td>71</td>
<td>76</td>
<td>83</td>
<td>45</td>
<td>39</td>
<td>39</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>2,239</td>
<td>0</td>
<td></td>
<td>94</td>
<td>86</td>
<td>87</td>
<td>87</td>
<td>92</td>
<td>72</td>
<td>67</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† The actual number of isolates tested against each agent may vary
‡ Blank indicates not tested against that drug

a Susceptibility increased 5-9% from 2007
b Susceptibility increased 10-16% from 2007
c Susceptibility decreased 5-9% from 2007
d Susceptibility decreased 10-14% from 2007
2008 Antimicrobial Susceptibility Summary
Pierce County, Washington (continued)

Percent (%) Susceptible (Remainder are non-susceptible, resistant or intermediate)

<table>
<thead>
<tr>
<th>Gram Positive Organisms</th>
<th>No. Tested†</th>
<th>Penicillin</th>
<th>Augmentin</th>
<th>Oxacillin</th>
<th>Cefazolin</th>
<th>Clindamycin</th>
<th>Erythromycin</th>
<th>Gentamicin</th>
<th>Nitrofurantoin</th>
<th>Levofoxacin</th>
<th>Tetracycline</th>
<th>Rifampin</th>
<th>Trimeth/sulfa</th>
<th>Vancomycin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterococcus species</td>
<td>2,175</td>
<td>87</td>
<td></td>
<td>19</td>
<td>86</td>
<td>89</td>
<td>65</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staphylococcus aureus‡</td>
<td>18,391</td>
<td>3</td>
<td>49</td>
<td>53</td>
<td>83</td>
<td>44</td>
<td>99</td>
<td>100</td>
<td>56</td>
<td>98</td>
<td>99</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staphylococcus coagulase neg.</td>
<td>824</td>
<td>5</td>
<td>34</td>
<td>0</td>
<td>54</td>
<td>37</td>
<td>89</td>
<td>99</td>
<td>41</td>
<td>81</td>
<td>99</td>
<td>66</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

† The actual number of isolates tested against each agent may vary.
‡ Staph aureus isolates not sensitive to oxacillin are considered resistant to other beta-lactams, including cephalosporins.
a Susceptibility increased 10% to 30% from 2007.
b Susceptibility decreased 14% from 2007

Streptococcus pneumoniae

<table>
<thead>
<tr>
<th>Invasive Isolates (Blood, CSF)</th>
<th>No. Tested</th>
<th>% Susceptible</th>
<th>% Intermediate</th>
<th>% Resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin</td>
<td>95</td>
<td>78.95%</td>
<td>79.89%</td>
<td>3.16%</td>
</tr>
<tr>
<td>3rd gen Cephalosporin</td>
<td>74</td>
<td>95.95%</td>
<td>4.05%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Macrolide†</td>
<td>95</td>
<td>85.26%</td>
<td>0.00%</td>
<td>14.74%</td>
</tr>
<tr>
<td>Levofoxacin</td>
<td>95</td>
<td>100.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>59</td>
<td>88.14%</td>
<td>3.39%</td>
<td>8.47%</td>
</tr>
<tr>
<td>Trimeth-Sulfa</td>
<td>60</td>
<td>100.00%</td>
<td>0.005</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

† Macrolides include erythromycin and azithromcyin
a Susceptibility increased 4-9% from 2007
b Susceptibility decreased 4-6% from 2007

Clindamycin susceptibility in MRSA skin & soft tissue infections by age group*
Pierce County, WA

*Does not include known surgical site infections
Does not include military data.

Source: Tacoma-Pierce County Health Department