Using the 2004 AAP/AAFP Clinical Practice Guidelines on Diagnosis and Management of Acute Otitis Media

Case Studies and Commentary, Christopher J. Harrison, MD

Recent guidelines for treating uncomplicated acute otitis media (AOM) jointly issued by the American Academy of Pediatrics (AAP) and the American Academy of Family Physicians (AAFP) [1] (available at www.pediatrics.org/cgi/content/full/113/5/1451) pose new challenges to practitioners. These include a new stringency in diagnosis in all children, a new focus on pain control, and consideration for the option of observation (sans antibiotics) in less symptomatic older children with uncomplicated and infrequent AOM. The impetus for this was the apparent overuse of antibiotics triggered by the overdiagnosis of AOM [2,3] and the outmoded routine use of antibiotics to treat otitis media with effusion (OME) [4]. With the large number of otitis-related outpatient visits, which had been on the increase from 1975 to 1990 (9.9 million versus 24.5 million visits), estimated yearly costs for AOM treatment alone had exceeded $3 billion in the United States. With the recent introduction of heptavalent pneumococcal conjugate vaccine (PCV7), clinicians may find it easier to comply with the guidelines due to reduced incidence of difficult-to-treat AOM and re-emergence of nontypeable Haemophilus influenzae (ntHi) as the predominant otopathogen [5,6]. Clinicians should remember that the guidelines only address uncomplicated infrequent AOM and not recurrent, persistent, or recalcitrant AOM.

CASE STUDY 1

A 5-month-old previously healthy white male with a 2-day history of fever to 39.2°C, fussiness, decreased appetite, and sleep disturbance presents to your office. This child has had no previous history of AOM and has not been on antibiotics during the last 30 days. The mother is concerned about an ear infection because his 5-year-old sibling started with recurrent AOM at the same age. This child’s attendance at a day care facility with 22 other children, his father’s being a heavy smoker, and

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his mother’s childhood history of having 2 sets of tympanostomy tubes are other potential risk factors for recurrent AOM.

- What are the criteria for a “certain” diagnosis of AOM?

To meet the 2004 guidelines’ criteria for a “certain” diagnosis of AOM, 3 criteria must be met at the same time:

1. Acute (also designated as recent, rapid, or abrupt) onset of signs and/or symptoms
2. The presence of a middle ear effusion (MEE)
3. Signs and/or symptoms of middle ear inflammation.

Criterion 1: While no specifics are offered as to the first criterion, it seems reasonable to expect that acute should be less than 72 hours to be recent. Rapidity or abruptness should apply only to the ear symptoms because it will be rare that the clinician will have frequent enough interval examinations to determine that the tympanic membrane (TM) changes have been abrupt or rapid. However, the onset of otalgia can be quite abrupt. The difficulty with otalgia is that most AOM occurs in preverbal children, so clinicians can usually only infer that otalgia exists by signs of irritability or sleep disturbance.

Criterion 2: The TM signs of MEE include bulging or fullness, limited or absent mobility, air-fluid level or bubbles, or the presence of purulent discharge from the middle ear. Bulging or fullness may be difficult to identify per se. The easiest way to know that fullness or bulging exists is by judging how easily the bony landmarks of the TM are visible. A bulging TM will expand to surround the ossicles and reduce their visibility.

Confirming limited mobility requires pneumatic otoscopy, so the guidelines expect pneumatic otoscopy to be part of every attempt to diagnose AOM. If clinicians have not become skilled in this procedure, use of a specific Welch Allyn otoscope head (part #20200 or #23810) and a special set of specula (SofSpec®) with tapered soft tips can facilitate quick development of this skill. Opacity of the TM (a sign of TM edema) adds to the evidence for MEE but does not differentiate AOM from OME.

We propose that recent-onset (< 48 hours) mucopurulent otorrhea (mucopurulent drainage must originate in the middle ear because no mucous glands exist in the outer canal) is sufficient in and of itself to make a diagnosis of AOM. This is an area of disagreement with the 2004 guidelines as written. Placing a small swab on the accumulated moist drainage within the external canal and then slowly pulling the swab away can confirm that the ear drainage is mucopurulent. Mucopurulent drainage will be shiny, stick to the swab, and stretch before falling off, akin to spinnbarkeit of cervical secretions during ovulation.

Criterion 3: To meet the third criterion, ie, signs and symptoms of middle ear inflammation, one must observe TM bulging or fullness or distinct tympanic membrane erythema, or there must be a history of distinct otalgia. Distinct otalgia is defined as discomfort clearly referable to the ear(s) that interferes with or precludes normal activity or sleep.

Of interest, TM bulging or fullness fulfills criteria #2 and #3, being considered both a sign of MEE and a sign of middle ear inflammation. Bulging/fullness of the TM has been regarded as the most reliable and consistent finding in AOM, so this makes sense. Also of interest, there is no mention in the guidelines of bony landmark visibility as a tool to determine the presence of fullness. However, we strongly urge clinicians to use landmark visibility (diminished in AOM but excessively prominent in OME or with an effusion-less retracted TM) to help them in diagnosis. Use of landmarks is important because it is often difficult to “see” the third dimension of a TM, especially in children less than 6 months of age. TMs in the neutral (normal) state generally have clearly visible landmarks due to the bony prominences of the short process of the malleus visible through the upper third of a neutrally positioned TM. OME is almost always associated with negative middle ear pressure, which makes the short process of the malleus more prominent no matter the amount of MEE or the opacity of the TM due to TM edema. This prominence makes the umbo and malleus look something like a
“mini-elbow” pointing in the direction of the child’s eye (elbow-umbro sign) (Figure 1).

We find that a clearly visible short process of the malleus or the elbow-umbro sign is the clearest physical sign that definitively rules out AOM. Middle ears under negative pressure and often containing MEE that are not infected (and thus indicative of OME) most often have landmarks that are too prominent. This is due to the retraction of the tympanic membrane by the negative pressure in the middle ear. The negative pressure is due to inadequate ventilation of the middle ear through a eustachian tube that has become dysfunctional. In contrast, an acute inflammatory process consistent with a purulent infection produces positive pressure behind the TM and causes the TM to bulge out over the ossicles and limits the visibility of these ossicles imbedded in the TM. A physically obvious example of this is the distorted TM that looks like a little donut or bagel. Landmark visibility can be thought of as a “Goldilocks” phenomenon, ie, normal is not too much (seen in OME) and not too little (seen in AOM).

Physical Examination

On full visualization of the TM after removing cerumen from the external ear canal, the TM is full (less than normal visibility of landmarks), opaque with a yellow-red cast, and has restricted motion on pneumatic otoscopy. A confirmatory test, the tympanogram, reveals a type B curve (Figure 2). This tympanogram highly suggests a MEE [7]. Thus, the diagnosis is “certain AOM” per the 2004 guidelines. The first criterion is met by the recent onset of symptoms. The second is met by virtue of a MEE confirmed by a full TM with restricted motion and a type B tympanogram. The third, acute inflammation, is confirmed by the full TM and, in this author’s opinion, the yellow-red color of an opaque TM. This latter set of TM findings, however, is not within the strict criteria for inflammation from the guidelines, which would require distinct erythema. Thus we have all 3 criteria accommodated: recent onset of a MEE with middle ear inflammation.

• Is antibiotic treatment warranted in this patient?

This child meets the criteria for antibiotic use because the child is younger than 6 months of age (Table 1). Whether the diagnosis is certain or “uncertain,” or whether the AOM is severe or nonsevere, is not relevant in children under 6 months of age. The rationale for uniform antibiotic use in AOM in children younger than 6 months likely relates to the fact that these children are incompletely immunized against invasive disease due to pneumococcus. In the author’s mind, 6 months of age is not as precise a measure of reduced risk of invasive pneumococcal disease as would be 2 to 4 weeks past completion of the primary series of 3 PCV7 (to allow response to the third dose of PCV7).

However, age is not the only determinant for antibiotic use per the 2004 guidelines. This presentation at any age would require antibiotics because of the severity of the symptoms plus the certainty of the AOM diagnosis. Severe AOM is defined in the guidelines by moderate to severe otalgia (often only assumed to be present in preverbal children) and/or fever > 39°C. So, high fever or severe otalgia qualifies any child with certain AOM for antibiotic use per the 2004 guidelines.

Similarly, withholding antibiotics in children older than 6 months of age is also dependent on multiple factors, including older age, diagnostic uncertainty, and/or absence of severe AOM. For example, when AOM is “uncertain,” children become more likely candidates for withholding the antibiotics (but not the pain control) as they enter older age-groups. For those 6 to 24 months of age, withholding antibiotics is an option only for those with “uncertain” AOM that is also nonsevere. However, all children over 24 months of age with uncertain AOM and most with certain AOM will likely be candidates for withholding antibiotics (Table 1). The exception is the unusual child older than 24 months with certain AOM that is also severe.

The benefit of the observation option for the first 48 hours is that it allows natural host defenses to help resolve AOM without antibiotics. Other critical factors in invoking the observation option are the ability to provide close follow-up so that antibiotics can be instituted if symptoms worsen or do not abate and a parent/guardian who finds observation acceptable.

Table 1. Decision Table from the AAP/AAFP 2004 Guidelines for Use of Antibiotics in Patients with Acute Otitis Media

<table>
<thead>
<tr>
<th>Age</th>
<th>Certain Diagnosis*</th>
<th>Uncertain Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 6 mo</td>
<td>Antibiotics</td>
<td>Antibiotics</td>
</tr>
<tr>
<td>6–24 mo</td>
<td>Antibiotics</td>
<td>Antibiotics if severe illness; observation option†</td>
</tr>
<tr>
<td>&gt; 24 mo</td>
<td>Antibiotics if severe; observation option†</td>
<td>Observation option†</td>
</tr>
</tbody>
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*Certain diagnosis of acute otitis media = rapid onset plus middle ear effusion plus signs or symptoms of inflammation.
†Observation is an appropriate option only with assured follow-up so that antibiotics can be prescribed if signs or symptoms persist or worsen.
• What is “uncertain” AOM?

The authors of the guidelines did not intend for “uncertain” AOM to be a bail-out to allow any child to be given an AOM diagnosis. An uncertain AOM diagnosis should not mean that (1) the clinician has “no clue” as to whether the TM has signs that indicate AOM, or (2) the clinician has not seen any part of the TM and thus has no TM information, or (3) the clinician stretches to make an AOM diagnosis when middle ear signs indicate OME plus TM hypervascularity. Clinicians should use a good-faith effort to see as much of the TM as possible and make minimal use of uncertain AOM. Uncertain AOM should really have been called “nearly certain,” meaning that the TM has most of the characteristics needed for “certain” AOM but the AOM may be in evolution and has not yet developed complete criteria. This “uncertain” AOM diagnosis should not make up more than 5% of any clinician’s AOM diagnoses, so if clinicians find themselves invoking it more than once per day, they are likely using it too much and are overdiagnosing “uncertain” AOM. “Uncertain” AOM would likely become “certain” AOM if the TM were re-examined within the next 48 hours, so asking the patient to return for a second examination if the clinical schedule allows it may also clarify the AOM status.

• When using antibiotics for AOM, what is the appropriate first-line antibiotic? For how long should antibiotics be prescribed?

This 5-month-old penicillin-nonallergic child with certain severe AOM should receive amoxicillin-clavulanate (Table 2). A standard dose of 45 mg/kg/day in 2 divided doses is available, but the preferred option per the guidelines is high-dose amoxicillin-clavulanate at 80 to 90 mg/kg/day of the amoxicillin in 2 divided doses, unless the clinician knows that drug-resistant Streptococcus pneumoniae (DRSP) is not common or likely in that geographic practice area. High-dose is more effective in treating AOM due to DRSP (estimated clinical efficacy 95% for pneumococcal AOM) [8,9]. Standard-dose at 45 mg/kg/day in 2 divided doses has been estimated to be effective against only 55% to 70% of pneumococci in areas of the United States with high prevalence of DRSP. However, areas with low prevalence of DRSP may not require high-dose amoxicillin [10]. Higher efficacy may also be expected in DRSP high-prevalence areas if the child with AOM has been fully immunized against pneumococcus with PCV7. Duration of treatment for children younger than 2 years of age is 10 days due to increased failure rates if shorter courses such as 5 days are employed. In children older than 3 years of age, 5-day courses are an option, particularly if the AOM is nonsevere [11,12].

Caveat: It is unclear why amoxicillin/clavulanate is recommended here per the guidelines because more severe AOM is more likely to be due to pneumococcus than to ntHi [13]. High-dose amoxicillin is just as effective against DRSP as amoxicillin-clavulanate because pneumococci never produce β-lactamase. Thus, it seems that high-dose amoxicillin would be just as reasonable an option as amoxicillin-clavulanate and would likely cause fewer adverse effects and cost less as well. Serious invasive illness is almost unknown with ntHi but still might occur with pneumococcus. So, in severe AOM, pneumococcus remains the prime target, particularly in the child with infrequent, previously untreated AOM where β-lactamase–producing ntHi cause less than 15% of AOM [14].

• Is this child evidencing signs of pain?

The fussiness and sleep disturbance would suggest the presence of otalgia in the preverbal 5-month-old child. While one cannot be assured that these complaints indicate otalgia,
it is the best one can do in most clinical settings. Tugging at
the ears is considered nonspecific at indicating AOM.

If one has or highly suspects otalgia is present, pain relief
is as important per the guidelines as choosing an antibiotic.
It appears that ibuprofen may provide a longer effect (longer
half-life) in relieving the pain of AOM than acetaminophen.
Therefore, the author prefers full doses of ibuprofen for treat-
ing otalgia, but full doses of acetaminophen are also reason-
able. Topical agents containing local anesthetics produce
pain relief greater than placebo only for the first minutes
after application.

Parents should be advised that if a child does not im-
prove in 48 hours, a return visit is important to rule out
development of a complication or treatment failure. If
amoxicillin is the current drug, the most common cause of
failure is β-lactamase–producing nTHi [14,15]. So, if this
child returns 48 to 72 hours into amoxicillin treatment with-
out clinical or TM improvement and no complication is
identified, a β-lactamase–stable drug is warranted. The
guidelines suggest high-dose amoxicillin plus clavulanic
acid as the first choice for failures of 48 to 72 hours of first-
line therapy. We concur with this approach in penicillin-
nonallergic patients.

Treatment and Follow-up

The child develops a pruritic rash consistent with
urticaria 6 days after starting amoxicillin-clavulanate. This rash is relieved somewhat by diphenhy-
dramine prior to a return visit. You diagnose type I penicillin
allergy and per the guidelines switch to azithromycin, real-
izing that there is likely a 25% increase in clinical failures
compared to amoxicillin-clavulanate [16].

• What is the recommended approach in this setting?

Despite the guideline indication that cephalosporins not be
used here, some experts suggest cephalosporins because the
reaction here was only urticaria, not anaphylaxis, and no air-
way or respiratory effects were noted. Other experts recom-
end cephalosporin use only if the patient has negative peni-
cillin skin testing (reviewed in the Joint Council of Allergy,
Asthma and Immunology’s practice parameter on diagnosis
and management of anaphylaxis; available at www.jcaai.org/
pp/anaph_toc.asp). Oral cephalosporins would likely cause
only urticaria again in the 8% to 28% of penicillin-allergic
patients that cross-react with cephalosporins.

CASE STUDY 2

A 15-month-old previously healthy child with no
prior AOM or antibiotic use in the previous month
presents with irritability and a temperature of 38.6°C. He has
had no other symptoms. You see a prominent short process
of the malleus and a retracted TM. There is hypervascularity
and erythema over the upper pole of the TM just posterior to
the ossicles, with several small bubbles and nonpurulent-
appearing fluid. Landmarks are prominent yet TM move-
ment is restricted. A confirmatory tympanogram shows a
type B curve (Figure 3).

• What is the diagnosis and are antibiotics warranted?

This child does not meet the criteria for diagnosis of AOM
(certain or uncertain) because the TM is retracted. Despite
restricted movement and a type B curve, this is not AOM.
Movement can be restricted and a type B curve will occur in
both AOM and OME. Thus, neither restricted movement nor
a B tympanogram differentiate AOM from OME. However,
the retracted TM and the prominent landmarks indicate
OME.

While this child has recent onset of symptoms, they are
likely related to a viral infection superimposed on OME. The
restricted TM movement and the bubbles indicating an effu-
sion confirm the OME. The hypervascularity of the upper
pole of the TM might be engorgement of the vessels due to
negative pressure effects from the middle ear. This is not
AOM because this TM lacks signs of acute inflammation.
Thus, antibiotics are not warranted. This presentation has
been a common reason for antibiotic overuse.

CASE STUDY 3

An 18-month-old previously healthy male with no
prior AOM and no antibiotics within 30 days pre-
sents with a temperature of 38.7°C and a bulging TM that is
distinctly red over the whole TM and is also opaque. Land-
marks are barely visible on pneumatic otoscopy and motion
is distinctly restricted. Tympanogram shows a type B curve
(Figure 4). There is no apparent otalgia but he has gray rhin-
orrhea. The diagnosis is certain but nonsevere AOM.

• Are antibiotics or the observation option warranted in
this older child with AOM?

Despite being in an older but mid-range age-group, certain
AOM qualifies this child for antibiotics. The mother reports
that at 8 months of age he received amoxicillin and devel-
oped a maculopapular rash and was told he was “allergic.”
This is a non–type I allergy to penicillin. According to
Table 2, an alternative β-lactam antibiotic, a β-lactamase–
A reasonable choice would be cefdinir because the taste is superior and therefore adherence to the medication is more likely. The efficacy of all 3 drugs is likely to be similar if they are received as prescribed. However, these 3 drugs are less effective against DRSP than high-dose amoxicillin. In contrast, they are more effective against β-lactamase-producing ntHi. Thus, the clinical efficacy should not be very different from that of high-dose amoxicillin because the lower DRSP efficacy is balanced by the higher ntHi efficacy, totaling ~90% efficacy for infrequent AOM [17]. So, amoxicillin remains the initial drug of choice for infrequent AOM and any of the 3 cephalosporins are the initial choice for non-type I penicillin-allergic AOM patients. The rationale for these first-line recommendations is that...
the microbiology of infrequent AOM differs from recurrent/persistent AOM, with less resistance in the former. Also, the microbiology of infrequent AOM (the only form of AOM covered by the 2004 AAP/AAFP guidelines) has not changed as much as that of persistent/recurrent AOM since 2000 in the United States (the era of universal PCV7 immunization of infants). In infrequent AOM, S. pneumoniae remains the major pathogen (44%), with ntHi accounting for 32% of cases and *Moraxella catarrhalis* for 12% of cases [18–21].

The proportions of pathogens responsible for more difficult to treat recurrent/persistent AOM have changed with PCV7 use since 2000. In the 1990s, *S. pneumoniae* accounted for 48% and ntHi for 41% of such pathogens [15,21–24]. The overall proportions were not unlike those for infrequent AOM. However, these 1990s recurrent/persistent AOM pathogens were more often penicillin-resistant *S. pneumoniae* (54%), and ntHi were more often β-lactamase producers (55%) than were infrequent AOM pathogens (18% and 20%, respectively). Reports since 2000 indicate that fewer recurrent/persistent AOM are due to *S. pneumoniae* (31%), and 31% to 70% are penicillin-resistant; while 56% of recurrent AOM are due to ntHi, with more than 50% of ntHi being β-lactamase producers [5,6,24]. So, antibiotic choices do not need to change post-PCV7 for infrequent AOM, ie, the major focus being *S. pneumoniae*; but in recurrent or persistent AOM, the new focus should be β-lactamase–producing ntHi.

**CASE STUDY 4**

A 36-month-old previously healthy and fully PCV7-immunized white female presents with fever (38.4°C) and intermittent ear pain that does not seem to interfere with her activities. She has mild rhinorrhea. Her right TM is full, opaque, and distinctly erythematous with restricted mobility. This is certain but nonsevere AOM.

The child’s mother was reading on the internet about the option for observation. She asks whether this would be appropriate for her child. Per the guidelines (Table 1), observation is reasonable in this child older than 24 months of age with nonsevere AOM, but it is still necessary to treat the mild/moderate otalgia with full doses of ibuprofen. Reexamination is also needed if the child is not improved in 48 hours.

The mother calls 48 hours later and reports sleep disturbance, decreased appetite, and worsening otalgia over the last 12 hours. On reexamination, TM is now bulging, opaque, golden-yellow, and has restricted movement with a “donut” appearance (Figure 5). Landmarks are not visible.

You prescribe high-dose amoxicillin plus clavulanic acid because of severe otalgia, which also defines this now as severe AOM. The mother calls again 48 hours later because the child is still not improved and her fever has risen to 39.1°C. Her examination has not changed. She is not toxic-appearing.

**CASE STUDY 5**

A 14-month-old white female presents to the office with fever of 38.1°C, sleep disturbance, decreased appetite, and fretfulness. The child is 3 weeks post-amoxicillin for an AOM that resolved without difficulty. Now her right TM is bulging, distinctly red, relatively immobile, opaque and the ossicles are barely visible (Figure 6). Because of antibiotic use in the last 30 days, you prescribe high-dose (80–90 mg/kg day in 2 divided doses) amoxicillin plus clavulanic acid for this episode according to the Centers for Disease Control and Prevention (CDC) recommendations of 1999.

**CASE-BASED REVIEW**

- **How should this child be treated now?**

While ongoing symptoms may be due to a concurrent viral infection, the guidelines recommend intramuscular ceftriaxone in 1 to 3 doses. One approach that appears to be effective is to give the first dose (50 mg/kg) but withhold committing to the second dose unless symptoms continue another 48 hours. Then, withhold the third dose unless symptoms persist for a second 48 hours. The author’s experience is that ~one third of children require only 1 dose and another ~one third of patients require only 2 doses [25–27]. Some clinicians would offer tympanocentesis at this point to relieve any discomfort and identify the offending pathogen for directed antibiotic therapy.

- **Do the 2004 guidelines offer treatment guidance for this patient?**

This child does not qualify to be considered under the AAP/AAFP 2004 guidelines because those guidelines only apply to children with uncomplicated infrequent AOM. Because this child has recurrent AOM, the CDC recommendations are the pertinent recommendations to follow. The most likely pathogen here in 2005–2006 is ntHi producing β-lactamase (~60%) and, less likely, DRSP (~30%) [4,5].

If this child had non–type I penicillin allergy, cefdinir would be the appropriate drug. One would expect ~10% less clinical efficacy due to the lower efficacy versus DRSP by oral cephalosporins compared to high-dose amoxicillin found in the combination drug [18]. For type I penicillin allergy, azithromycin or trimethoprim-sulfamethoxazole could be used. Here one would expect 25% less clinical efficacy compared to high-dose amoxicillin-clavulanate because of less efficacy against both DRSP and ntHi for both alternative drugs [16,17,28].
SUMMARY

The 2004 AAP/AAFP guidelines apply only to infrequent AOM in previously healthy children with no anatomic or immunologic underlying condition. The challenge is to be stringent in making a certain diagnosis of AOM and not to overuse the “uncertain” AOM diagnosis. Antibiotics are not recommended for OME. Observation without antibiotics is an option for older children with minimal symptoms. Pain control is paramount when withholding antibiotics, as is the requirement for the capability to re-examine the child if symptoms persist or worsen.

When antibiotics are warranted, high-dose amoxicillin is the preferred initial option in areas where DRSP persists despite PCV7 universal immunization. The guidelines suggest cephalosporin alternatives for non-type I penicillin-allergic patients. Patients with recurrent or frequent AOM, or with underlying anatomic/immunologic conditions, or with antibiotic use in the prior 30 days should still be managed according to modifications of the CDC recommendations of 1999, with the addition of cefdinir as an alternative to cefuroxime axetil for non-type I penicillin-allergic patients.

Antibiotic choices for patients included in the 2004 guidelines remain unchanged in 2005–2006 despite PCV7’s effect on recurrent/frequent AOM microbiology since 2000, because these changes have not occurred in infrequent AOM. Tighter criteria for AOM diagnosis and the option to observe without antibiotic in select patients should reduce antibiotic use for AOM and may help reduce resistance among otitis media pathogens.

References


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CME EVALUATION: Using the 2004 AAP/AAFP Clinical Practice Guidelines on Diagnosis and Management of Acute Otitis Media

DIRECTIONS: Each of the questions below is followed by 4 possible answers. Select the ONE lettered answer that is BEST in each case and circle the corresponding letter on the answer sheet.

1. The most reliable and consistent tympanic membrane (TM) finding in acute otitis media (AOM) is:
   (A) Air-fluid level visible behind the TM
   (B) Prominent short process of the malleus
   (C) Bulging or fullness of the TM
   (D) Retraction of the TM

2. The AAP/AAFP 2004 clinical practice guideline for diagnosis and management of AOM recommends universal use of antibiotics to treat AOM below which age?
   (A) 1 Year
   (B) 2 Years
   (C) 9 Months
   (D) 6 Months

3. Since universal use of pneumococcal conjugate vaccine, the most common pathogen in recurrent or persistent AOM has switched from:
   (A) *S. pneumoniae* to nontypeable *H. influenzae*
   (B) *S. pneumoniae* to nontypeable MRSA
   (C) Nontypeable *H. influenzae* to *S. pneumoniae*
   (D) Nontypeable *H. influenzae* to *M. catarrhalis*

4. The AAP/AAFP 2004 clinical practice guideline for diagnosis and management of AOM was designed to address:
   (A) Recalcitrant AOM
   (B) Chronic draining otitis
   (C) Uncomplicated infrequent AOM
   (D) Recurrent AOM

5. Observation is an acceptable strategy in managing AOM when
   (A) AOM is nonsevere
   (B) The patient is older than 6 months
   (C) Follow-up is assured
   (D) All of the above
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