

Acute Otitis Media in Children: Diagnostic and Therapeutic Dilemmas

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Otitis media is still a condition with a level of diagnostic confidence lower than physicians fresh from hospital training are accustomed to. Even with improved diagnostic criteria, there will still be other influences which will affect the physician's prescribing habits, especially in the treatment of early signs of otitis media. This study shows that the determinants of prescribing behavior by ambulatory care physicians are more complex than traditional teaching of students implies.

The appropriate use of antibiotics is discussed, and the importance of limiting additional medication is stressed. It is the author's contention that the outcome of care is frequently being measured without attempting to examine closely the dilemmas facing ambulatory care physicians in their day-to-day decisions. Otitis media has been used as the model in this report, but the complexities of clinical judgment are equally applicable to other common infections presenting to the primary care physician.

A recent comprehensive review by Rowe¹ summarized current thinking on the diagnostic criteria for and treatment of otitis media. It is generally accepted that acute suppurative otitis media refers to the presence of purulent fluid in the middle ear, whereas serous otitis media is a condition with fluid present but with no pathogenic bacteria in the middle ear. However, the above differentiation cannot specifically be made on clinical signs alone.

Since it is impossible to perform aspiration of the contents of all suspected middle ear infections, the physician has to assess a number of variables before deciding on management. The bacteriological probabilities have been defined,²⁻⁴ but, in addition to these probabilities and the clinical signs on examination, treatment will depend on factors including the age of the child, previous medical history, associated symptoms and signs and their duration, socioeconomic class of the patient, and the physician's training and attitudes. This paper will describe the treatment by a group of family practice residents of children in whom a diagnosis of otitis media had been made, and will examine the method of decision making used by these residents in prescribing drugs.

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Table 1. New Cases of Otitis Media

Age Group	Number
0-1 years	13
1-2 years	25
2-4 years	34
>5 years	18
Total	100

Table 2. Presenting Symptoms of 100 Children with Otitis Media
(N = 266 symptoms)

History and Symptoms	Number	Percent
Ear pain	86	32.3
Recent upper respiratory tract infection	44	16.5
Previous history otitis media	35	13.5
Cough	33	12.4
Fever	23	8.6
Nasal discharge	21	7.9
Vomiting/diarrhea	13	4.9
Sore throat	10	3.8
Total	266	100.0

Methods

In the clinics associated with the Family Practice Training Program at the University of Florida, the records of all physician-patient contacts are dictated and typed, and the information pertaining to diagnosis and treatment coded and retained on computer file. This computer-assisted record system acts as a morbidity index, and was used to identify a sample of 100 consecutive cases of children under the age of 12 years whose illness had been diagnosed as acute otitis media. Cases were excluded if more than one diagnosis had been made at the physician-patient contact, and the case records for study were limited to first visit cases, ie, rechecks for otitis media were not included.

The records of the 100 cases identified were then studied to extract the residents' descriptions of the presenting symptoms and signs, findings on examination, and treatment prescribed.

Results

The age groups of the 100 selected cases are shown in Table 1, where it is seen that 72 of the 100 children in the study were under the age of five years, reflecting the higher incidence of acute ear infections in preschool children.

The Family Practice Training Program encourages comprehensive description of presenting symptoms and signs. Table 2 summarizes the presenting symptoms and history of children in whom a diagnosis of acute otitis media had been made. A total of 266 symptoms were described, with ear pain and a history of recent upper respiratory tract infection the most frequently noted symptoms.

Table 3 summarizes the ear signs described. With regard to individual children, 49.6 percent had signs limited to the right ear, 26.2 percent had signs limited to the left ear, and 24.2 percent had a combination of right and left ear signs.

Findings on throat examination indicated that the throat appeared normal in 51 percent, moderately inflamed in 27 percent, and exudate was described in 22 percent.

It was not possible to identify from the records whether or not significant lymphadenopathy was present.

Regarding treatment, 23 drug preparations were used and a total of 227 drugs were issued for 100 visits by children with acute otitis media.

Table 4 shows the range of drugs used with 91 percent receiving antibiotic treatment. Ampicillin accounted for 62 percent of all antibiotic prescriptions. Tripolidine (Actifed), acetaminophen (Tylenol), and brompheniramine maleate (Dimetane/Dimetapp) accounted for 60 percent of other drugs prescribed. The majority of drugs were issued by prescription, but on questioning the residents, it was apparent that a number of the less commonly prescribed decongestant mixtures had been dispensed from the supplies in the office.

Table 5 outlines the range of drugs prescribed per visit, and highlights the fact that in 29 percent of visits three or more drugs were issued to the patients.

Discussion

The fact that 91 percent of children in the study received antibiotics would seem to imply that they

	Erythema	Loss of Reflex	Bulging Drum	Fluid	Other	Total
Right ear	59	17	15	11	10	112
Left ear	39	14	12	10	6	81
Total	98	31	27	21	16	193
Percent	50.8	16.1	13.9	10.9	8.3	100

had acute suppurative otitis media. The description of findings on examination does not strictly support this diagnosis in many cases. If one accepts the criteria for diagnosis as bulging of the ear drum accompanied by impaired mobility of the tympanic membrane,¹ critical analysis would classify only 40 percent of the children as having suppurative otitis media. The latter sign is one which may vary from observer to observer, and it was not possible to determine accurately from the records how much emphasis residents had placed on this particular sign. Retrospective analysis of what is described on examination is also fraught with difficulties, and omissions could easily have occurred. However, while accepting the inherent difficulties in all retrospective research, any form of chart audit is entirely dependent upon what has actually been written in the records. The use of antibiotics in many cases could be criticized if a narrow approach is adopted when considering residents' decision making.

The bacteriology of middle ear infection has been studied intensively and it is recognized that needle aspirates of middle ear infections in children grow one organism in 60 percent of cases, more than one in about 5 percent of cases, and no

organisms in 35 percent of cases. The organisms isolated have been pneumococci in 30 to 50 percent of aspirates, and *Hemophilus influenzae* in 22 percent of aspirates in children less than five years of age, 12 to 14 percent in older children.²⁻⁴ Group A beta hemolytic streptococcus and *Staphylococcus aureus* are uncommon, although it is important to remember that *Staphylococcus aureus* and coliforms are more common in the first few months of life.⁵ In addition, the role of viruses in middle ear infections cannot be ignored, but the family physician has no simple test at his disposal to accurately identify specific organisms.

In children under the age of five years, the importance of hemophilus infection is stressed.² Ampicillin, amoxicillin, and erythromycin were the drugs used in children under the age of five years in this study, but in over 50 percent of children over the age of five, ampicillin was the drug used. The continuing use of ampicillin in cases of otitis media in older children can be questioned when one is aware of the fact that there is an apparent increase in development strains of *H influenzae* resistant to ampicillin.⁶

Results in this study also pointed to the wide range of other drugs which were issued to children

Table 4. Drugs Used in Treatment of Children with Diagnosis of Otitis Media
(N = 100 children)

Antibiotics		
	Number	Percent
Ampicillin	57	62.6
Amoxicillin	13	14.3
Erythromycin	9	9.9
Penicillin V	7	7.7
Sulfisoxazole	3	3.2
Sulfamethoxazole	1	1.1
Penicillin G	1	1.1
Total	91	100.0
Decongestants/Antihistamines/Analgesics		
	Number	Percent
Actifed	31	22.8
Tylenol	27	19.9
Dimetane/Dimetapp	21	15.4
Auralgan	14	10.3
Sudafed	13	9.6
Miscellaneous	30	22.0
Total	136	100.0

with acute otitis media. Pain is probably the most distressing feature of otitis media, and the use of analgesics cannot be criticized. Products such as antipyrine have doubtful effectiveness and the value of decongestants remains unproven;¹ indeed, indications for many of the 97 prescriptions for a wide range of decongestant/antihistamine mixtures must be questioned.

In 29 percent of episodes, three or more drugs were prescribed. In the majority, this was an antibiotic plus decongestant or antihistamine, or a combination of these products. This finding points to the difficulties facing physicians dealing with a condition which, in addition to infection, causes considerable discomfort. One does not doubt the desire of the physician to relieve distressing conditions, and there is no doubt that these doctors in training were motivated to help children in pain, with associated cough, runny nose, and fever. However, one of the problems in teaching modern

prescribing is the question of "pharmacology vs therapy." The tendency to react to *all* problems presented by patients can result in over-prescribing, and in a child with *pain + congestion + red bulging ear drums*, there is a temptation to prescribe *analgesic + decongestant + antibiotic*.

When considering the drug treatment of acute short-lived illnesses, the question of patient comprehension and compliance cannot be ignored. Problems encountered in patient compliance in otitis media have been described,⁷ and the subject of compliance has been recently reviewed.⁸

It would seem reasonable to suggest that once a confident diagnosis of suppurative otitis media has been made, only one drug (ie, an antibiotic) is *definitely* required.

With hemophilus infection being more common in the preschool child, the choice lies between ampicillin and amoxicillin, and a strong case can be made for the latter in view of the fact that it is

Table 5. The Range of Drugs Issued per Visit for Cases of Otitis Media
(N = 100 children)
(N = 227 drug preparations)

Number of Drugs Issued per Visit	Visits	Total Number of Drugs
0	3	0
1	6	6
2	62	124
3	19	57
4	10	40
Total	100	227

better absorbed and has fewer side effects. In addition, the growing awareness of ampicillin-resistant H influenzae strains has to be borne in mind. The choice of antibiotic in the older child is still a matter of debate,⁹ and a strong case can again be argued for amoxicillin, although the use of penicillins may still be a justifiable first choice.

Rowe¹ has highlighted the lack of authoritative advice on the use of analgesics, decongestants, and combinations of these drugs. Additional therapy or advice to mothers will depend upon individual circumstances, but the merits of decongestants and antihistamines must be considered with the knowledge that many cases of otitis media resolve spontaneously. Demands by patients for relief of all symptoms exercise a continuous pressure on the medical profession, and even highly responsible physicians may succumb to this pressure. On the other hand, this is not a reason to condone over-prescribing.

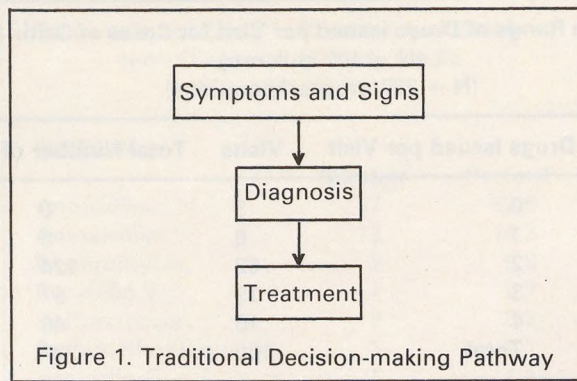
This small study has highlighted the complexities involved in the decision-making process in ambulatory care. A number of questions have to be answered in trying to understand how physicians behave in their day-to-day management of patients.

1. How many children with painful red ears but with no bulging of the ear drum and with normal pneu-mo-otoscopy will go on to develop acute suppurative otitis media?

2. What does one do with the child with minimal findings on ear examination, but with a previous medical history of otitis media?

3. If painful red ears are not to be treated with antibiotics, but only analgesics initially, how long should the observation period be?

4. If discharging ears in children are not found as often as in the past, to what extent has this been due to early treatment of otitis media with antibiotics?



5. If observation of patients is made over a number of days, patients may not return for checkup and the patients may also “shop around.” To what extent do these considerations affect physicians’ prescribing habits?

6. To what extent does a physician’s knowledge of a family’s current medical and social situation affect the prescribing for individual members of that family?

The traditional hospital approach to decision making concentrates on the importance of making a specific diagnosis, as illustrated by Figure 1. This policy is appropriate when dealing with acutely ill patients, but cannot always be justified in a family practice setting, where the physician is frequently dealing with a continuum of symptoms and signs, rather than specific diagnoses. By the use of simulated patient histories, Howie¹⁰ has shown how variations in social and psychological factors significantly affect physicians’ decisions to prescribe or not to prescribe antibiotics. A more

realistic illustration of decision making in ambulatory care is shown in Figure 2, which indicates the many factors affecting physicians’ decisions. In ambulatory care the physician is not dealing with conditions in isolation but with patients whose previous medical history is well known. He/she is aware of previous and current family history, and family reaction to illness, and knows the life-style of the family members.

Otitis media is only one example of a common condition in family practice, in which precision in traditional diagnostic terms is not always possible. This has implications for the family physician in his prescribing. There is no doubt that the prescribing habits of residents described in this study are a reflection of the “uncertainty” created by variables affecting physicians’ day-to-day activities. To ignore these variables would be unrealistic, and the study of the underlying determinants of prescribing behavior is one of the main challenges facing the specialty of family medicine.

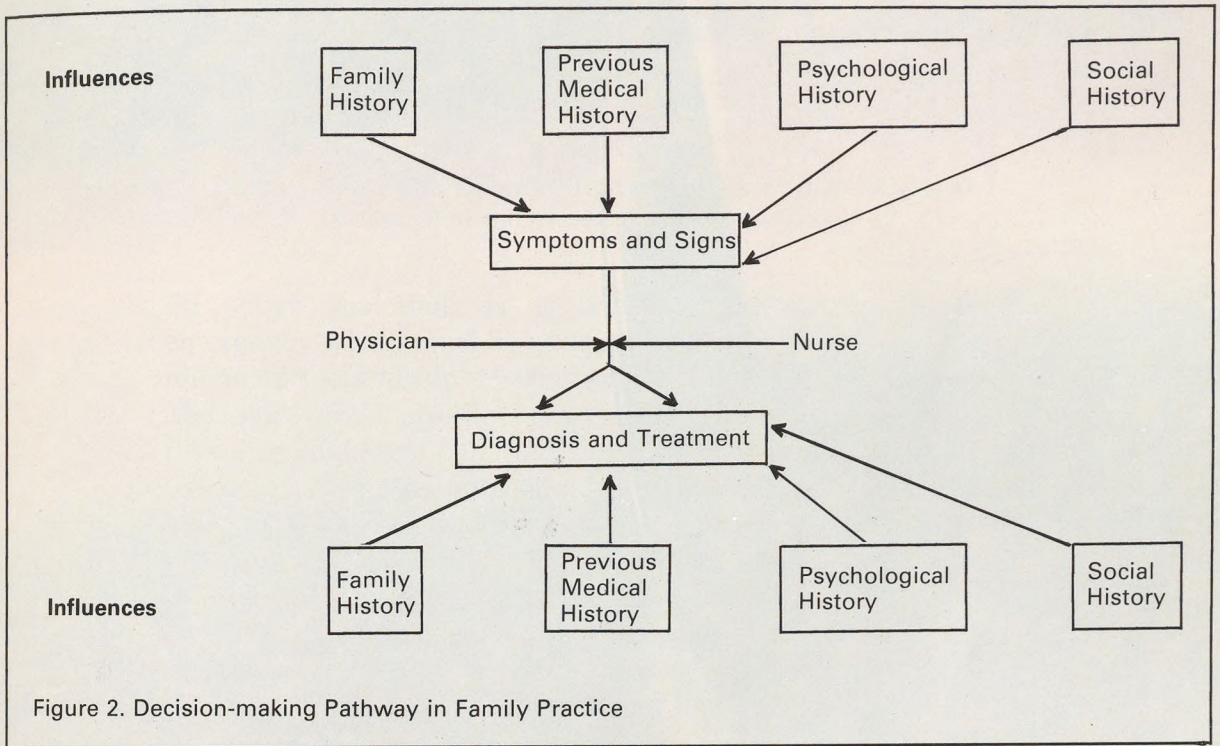


Figure 2. Decision-making Pathway in Family Practice

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