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Adherence to treatment guidelines for acute otitis media in children. The necessity of an effective strategy of guideline implementation

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ABSTRACT

Objectives: Acute otitis media is the single diagnosis responsible for most prescriptions of antibiotics in Sweden and the USA. The treatment of acute otitis media has significant impact on child health, healthcare costs, and the development of anti-microbial resistance. In the Swedish national guidelines from the year 2000, watchful waiting was recommended for most children over 2 years of age. The aims of the present study were to assess the degree of adherence to acute otitis media guidelines at a busy pediatric emergency department of a university hospital and to determine whether an information campaign changed the result.

Methods: Audit of 91 patient records before and 80 patient records after an information campaign consisting of an oral presentation, posting of flow charts, and sending of educational material to prescribing physicians. Four endpoints were studied: *choosing to use antibiotics*, *choice of antibiotic*, *dosage of antibiotic*, and *duration of treatment*.

Results: Before the information campaign, adherence to guidelines was between 70% (dosage) and around 90% (duration). No significant change was seen after the information campaign. The endpoint *choosing to use antibiotics* showed a large divergence in adherence in children under 2 years (96%) compared to older children (39%).

Conclusions: Overall adherence to recommendations was 70–90% but adherence to watchful waiting was poor. Information did not improve adherence, suggesting insufficient educational power or the existence of barriers other than lack of knowledge. Specific barriers should be identified, and implementation and follow-up should be part of producing guidelines in order to achieve the desired results.

1. Background

Our knowledge of how to treat diseases in the most beneficial way is always improving. Guidelines based on evidence and produced by expert panels are important means of achieving good medical quality. The difficulty in applying evidence-based conclusions to clinical practice and patient outcome is well acknowledged [1]. Acute otitis media (AOM) is the second-most common infectious diagnosis in children and the single diagnosis responsible for most prescriptions of antibiotics in children in Sweden and the USA [2,3]. The treatment of AOM has significant impact on child health, healthcare costs, and the development of anti-microbial resistance [4,5]. National recommendations for treatment of AOM in Sweden from 2000 introduced a recommendation of watchful waiting (WW) for most children over 2 years of age with AOM [6] (Table 1). Adherence to the recommendations in Sweden has been reported to be poor [7]. Similar experiences have been reported from the USA where the option of WW was added in the 2004 AOM guidelines [8]. Both the Swedish and the American AOM-guidelines have later been updated [9,10].

The aims of the present study were to assess how well the national guidelines for the treatment of AOM in children were followed at a busy pediatric emergency department and to determine whether an information campaign could change the results.

2. Methods

We first conducted a retrospective analysis of patient records from the pediatric emergency department at the Queen Silvia Children's Hospital in Gothenburg, Sweden between January 1, 2009 and June 30, 2009. This was followed by an information campaign on the recommended principles of treatment of AOM in January and February 2010. The study was completed with a

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Table 1
Treatment recommendations for acute otitis media regarding antibiotics, from the Swedish National Consensus Document 2000[a].

	Treatment recommendation
First-line antibiotic	Phenoxymethyl penicillin per os
Dosage	50 mg/kg/day
Duration of treatment	5 days
Patient <2 years of age	Treat
Patient ≥2 years of age, unaffected	Alternative 1: Watchful waiting. New assessment if symptoms increase or if symptoms persist after 2–3 days Alternative 2: Treat
Patient ≥2 years of age, risk-AOM[b]	Treat

[a] The recommendations were updated in 2010.
[b] High fever, tympanic membrane perforation, intense pain, or susceptibility to serious infection, i.e. immunosuppression, chromosomal or craniofacial anomalies, local surgery, or implant (other than ventilation tube).

renewed retrospective analysis of patient records on visits from March 1, 2010 until June 30, 2010, and differences in management of AOM between the periods were analysed. The university hospital clinic was staffed by physicians under pediatric training and by specialists in pediatrics.

2.1. Patients

From the computerized patient registry, we obtained chronological lists of all consecutive patients who visited the emergency department during the time intervals and were given an ICD 10 code of H66.0 (acute suppurative otitis media) or H66.9 (acute otitis media, unspecified). Next to date of visit the lists were ordered after the age of the child. To obtain an unbiased sample of practical size, every tenth patient in the first sample and every seventh patient in the second was selected and subjected to exclusion criteria. Patients were excluded if the otitis was recurrent, if another physician had been consulted during the same disease period, or if the patient had any additional condition that might have affected the choice of treatment. If the patient was rejected, the next one on the list was chosen and evaluated.

2.2. Data sampling

The electronic records of selected patients were screened for information on age and body weight, for the experience of the physician, and for certain factors regarding the treatment of the AOM. The compliance to recommendations was judged in four dimensions:

1. *Choosing to use antibiotics*. The prescription was considered adherent to guidelines if antibiotics were prescribed and the child was under 2 years of age, or above 2 years of age and appeared toxic, experienced intense pain, or showed perforation of the tympanic membrane. Safety-net antibiotic prescription (SNAP), i.e. prescribed antibiotics where the treatment was only initiated if symptoms became worse, or unresolved in 48–72 h, was also accepted if the patient was more than 2 years of age. The management was also considered adherent if antibiotics were not prescribed and the patient was over 2 years old and without toxic appearance, intense pain, or perforated tympanic membrane. All other scenarios were considered non-adherent regarding this endpoint.
2. *Choice of antibiotics*. The management was considered adherent if oral phenoxymethyl penicillin or – in the case of confirmed allergy to this drug – erythromycin was prescribed. If any other antibiotic was prescribed without valid motivation, the management was considered non-adherent.
3. *Dosage of antibiotics*. For phenoxymethyl penicillin, a daily dose of 40–80 mg/kg was required. A daily dose of 30–60 mg/kg was acceptable if erythromycin was prescribed.
4. *Duration of antibiotic treatment*. Five days of treatment was considered adherent when phenoxymethyl penicillin was prescribed, and 7–10 days for erythromycin.

The adherence to the endpoint *choice of antibiotics* could only be evaluated in the cases where antibiotics were prescribed. The adherence to the endpoints *dosage of antibiotics* and *duration of antibiotic treatment* could only be evaluated if an antibiotic was prescribed where the guidelines recommended dosage and duration of treatment.

2.3. The information campaign

In January and February of 2010, we carried out a campaign to inform all prescribing physicians at the Department of Pediatrics about the essence of the present recommendations for treatment of AOM. The key aspects of the existing guidelines were presented at a weekly meeting and the participants were informed that the adherence to the recommendations presented would be checked. A treatment flow chart of the key aspects of the present evidence was designed and posted at the emergency department, and at physicians' working stations, and the same information was e-mailed and put in the post box of every physician working at the department. Patient educational leaflets, produced and distributed in the guidelines of 2000, were demonstrated and usage encouraged.

2.4. Statistics

We anticipated an adherence rate of 70% before intervention and wanted to detect an increase to 90% with a significance level of $p < 0.05$ (two-tailed) and 80% power. This required 83 observations before and after intervention, respectively, if using a standard test of comparison between proportions based on the normal distribution.

3. Results

Ninety-one patients were included in the first investigation of patient records, from a total of 1041 for the period (Fig. 1). The characteristics of the patients are given in Table 2. The adherence differed between our four endpoints, from 70% for *dosage of antibiotics* to 90% for *duration of treatment* (Table 3).

The second investigation of patient records included 80 of the 652 AOM diagnoses over the period (Table 2 and Fig. 2). No significant improvement was found in any of the four endpoints compared to the first investigation (Table 2).

When analysed in subgroups of professional experience – specified as pediatric specialists or physicians under pediatric training – none showed a significant difference in the second investigation compared to the first; nor did the level of experience have any effect on any other result, except for the endpoint *duration of antibiotic treatment*, where physicians under pediatric training showed significantly better adherence to recommendations than the pediatric specialists in both the second investigation of records and the two investigations together (Table 4).

In both investigations of patient records, the first endpoint *choosing to use antibiotics* showed a greater adherence to guidelines for patients younger than 2 years of age than for patients who were 2 years or older (Table 4). SNAP was used in line with guideline