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Diagnosis, Natural History, and Late Effects of Otitis Media With Effusion

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Preface

The Agency for Healthcare Research and Quality (AHRQ), through its Evidence-Based Practice Centers (EPCs), sponsors the development of evidence reports and technology assessments to assist public- and private-sector organizations in their efforts to improve the quality of health care in the United States. The reports and assessments provide organizations with comprehensive, science-based information on common, costly medical conditions and new health care technologies. The EPCs systematically review the relevant scientific literature on topics assigned to them by AHRQ and conduct additional analyses when appropriate prior to developing their reports and assessments.

To bring the broadest range of experts into the development of evidence reports and health technology assessments, AHRQ encourages the EPCs to form partnerships and enter into collaborations with other medical and research organizations. The EPCs work with these partner organizations to ensure that the evidence reports and technology assessments they produce will become building blocks for health care quality improvement projects throughout the Nation. The reports undergo peer review prior to their release.

AHRQ expects that the EPC evidence reports and technology assessments will inform individual health plans, providers, and purchasers as well as the health care system as a whole by providing important information to help improve health care quality.

We welcome written comments on this evidence report. They may be sent to: Acting Director, Center for Practice and Technology Assessment, Agency for Healthcare Research and Quality, 6010 Executive Blvd., Suite 300, Rockville, MD 20852.

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Structured Abstract

Objectives. The purpose of this evidence-based report is to review the evidence on the natural history of otitis media with effusion (OME), the late effects of early life otitis media on hearing and speech and language development, and the operating characteristics of various methods of diagnosing OME. OME is defined as "fluid in the middle ear without signs or symptoms of ear infection." The evidence compiled in this report is intended to aid clinicians, health care provider organizations, and others to develop clinical practice guidelines or medical review criteria for OME. The report also identified areas for future research.

Search Strategy. The MEDLINE search strategy used both controlled vocabulary MeSH (Medical Subject Headings) terms and keywords to ensure that all relevant citations were retrieved. Search terms for otitis media with effusion were combined with search terms for natural history, speech and language development, hearing, and diagnosis. The otitis media module included otitis media, otitis media with effusion, suppurative otitis media, allergic otitis media, fluid ear, glue ear, middle ear effusion, mucoid otitis media, nonsuppurative otitis media, secretory otitis media, and serous otitis media. The natural history terms included natural course, natural history, placebo, placebos, resolution, self-limited, self-limiting, untreated, and a variety of terms for spontaneous resolution. The speech and language module included speech and language, speech and language disorders, child language, communication, communication disorders, language development and tests, voice, and voice disorders. The hearing module included hearing and hearing disorders and hearing aids and tests, as well as the text word hearing. The diagnosis module used diagnosis and diagnostic techniques and procedures, as well as the text words audiometry, diagnosis, diagnostic, otoscopy, tympanometry history, speech and language development, hearing, and diagnosis.

Selection Criteria. Excluded were studies on patients with immunodeficiencies, craniofacial anomalies (including cleft palate), primary mucosal disorders, or genetic conditions. Prospective cohort studies were included for questions that addressed natural history, speech, language, and hearing. Prospective diagnostic studies were used to evaluate the operating characteristics of diagnostic methods.

Data Collection and Analysis. Two physicians or one physician and one health services researcher independently screened all titles and/or abstracts for potential inclusion, evaluated the quality of the articles, and abstracted data from full-length articles onto pre-designed forms. The selection criteria included human studies that addressed a key question about OME in children. Excluded were case reports, editorials, letters, reviews, practice guidelines, and non-English language publications.

Main Results. We found that 22.5 to 42.7 percent of OME in children older than 3 years of age cumulatively resolves over a period of three months, depending on the definition of OME resolution. Based on a limited number of cohort studies, we found no evidence to support an impact of early life otits media, defined as a history of otitis media at less than 3 years of age, on expressive language, receptive language, or cognitive verbal intelligence at age older than 3 years. However, this evidence is insufficient to exclude the possibility that a clinically important effect does exist, therefore strong conclusions cannot be drawn about the effect of otitis media at

an early age on subsequent speech and language development. The generalizability of this finding on speech and language is suspect because the populations represented by the six cohorts utilized in the meta-analyses were primarily those of particular ethnic/racial origin. Moreover, the findings cannot be generalized to children with craniofacial defects, primary mucosal disorders, immunodeficiencies, genetic conditions, or pre-existing developmental disorders, and may not necessarily be generalized to children with persistent bilateral otitis media. Children with early life otitis media have a higher risk of conductive hearing loss, defined using a threshold greater than or equal to 20 dB at any frequency with or without treatment, at age 6 to 10 years than children without early life otitis media. The pooled relative risk of conductive hearing loss was 2.6 (95% CI: 1.6 to 4.2). We found insufficient data to assess early-life OM on permanent (or sensorineural) hearing loss. Among nine diagnostic methods, pneumatic otoscopy had the best apparent performance with a sensitivity of 93.8 percent (95% CI: 91.4%, 96.3%) and a specificity of 80.5 percent (95% CI: 75.1%, 86.0%). However, tester qualifications were reported inconsistently, and training was not specified.

Conclusions. Although these estimates must be viewed with great caution due to heterogeneity that arose from study design and documentation issues for which we could not adjust in our analysis, about 22.5 to 42.7 percent cumulatively resolved over a period of three months, depending on the definition of OME resolution. Our findings on the possible effects of early life otitis media on speech and language development are in general agreement with the 1994 Agency for Healthcare Research and Quality OME guideline conclusion that rigorous, methodologically sound research does not adequately support or refute the possible effect of otitis media on speech and language. We found that children with early life otitis media have a greater risk of conductive hearing loss at age 6 to10 years. In addition, we found that pneumatic otoscopy had the best operating characteristics among the nine alternatives examined, for diagnosing the presence of middle-ear effusion in OME at single points in time.

Considering the abundance of literature addressing otitis media, these findings concerning natural history, speech and language development, and hearing are very limited. Future research on the natural history of otitis media with effusion must focus on improving study quality. In particular, control of therapeutic intervention during the study and the distinction between OME persistence and recurrence needs to be addressed. For evaluation of long-term effects of early life otitis media on speech, language, or hearing, a coordinated approach that uses uniform definitions and considers the interactions of multiple risk factors, interventions, and outcome measures is recommended. Such an integrated approach is also important for the evaluation of diagnostic methods. Further, a systematic review of diagnostic studies that employ algorithms or aggregated scores may be useful.

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