

## OTITIS MEDIA IN HIGH-RISK INFANTS

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**Keywords:**

Otitis Media, High Risk Infant,  
Teamwork

### Abstract

**Background:**

Delayed communication development is the most common symptom of developmental disability in children under three. Recurrent otitis media is an important contributing factor to a developmental communication delay. Young children under the age of three years who have a communication delay due to biological risk factors, for example prematurity, or established risk factors such as Down Syndrome, may be further at risk for developmental delays as a result of recurrent otitis media.

**Methods**

A retrospective study analysed the results obtained from individual hearing assessments conducted on 67 high-risk infants and toddlers ranging from 4 weeks to 37 months in age, over a 20-month period.

**Results**

68,6% of the subjects experienced otitis media at the time of testing, while the condition was undetected by 70,1% of the parents, even though 56,7% of the subjects had a history of otitis media.

**Conclusions**

Otitis media and its' far reaching sequelae can be treated effectively and preventatively in all young children, using a team approach. A series of activities are outlined to illustrate how this goal can be reached.

*S A Fam Pract 2002, 25(1): 4-8*

### Introduction

Delayed communication development is the most common symptom of developmental disability in children under 3 years, affecting approximately 5-10% of that population<sup>1</sup>. Any disorder that affects a young child's early communication development, is likely to have a significant impact on that child's later social, academic, and occupational functioning<sup>2</sup>.

Otitis media, specifically when this is a recurrent condition, is an important contributing factor in the delay of developmental communication. Accordingly, a model of "interaction effects" best describes otitis media as a risk factor in young children<sup>3</sup>.

### What is otitis media?

Otitis media is defined as an inflammation of the middle ear, which may or may not be infectious in origin. Middle ear effusion (MEE) is the liquid resulting from otitis media. This fluid may be serous i.e. a thin watery substance; purulent – a pus-like liquid; or mucoid – thick. The general categories of otitis media are (a) otitis media without effusion, (b) otitis media with effusion, and (c) otitis media with perforation. Each of these categories may be classified by duration into acute (0-21 days), subacute (22 days to 8 weeks) or chronic (longer than 8 weeks). According to research, children can be divided into three general groups with regard to incidence. Approximately one third may have no episodes, one third may have occasional episodes and the remaining third may have frequent episodes. This last group is also described as "otitis prone" because of recurrent otitis media. For the purpose of this paper otitis media will be used as an umbrella term referring to the general condition of middle ear inflammation.<sup>4</sup>

Recurrent otitis media during the first three years of life may affect development through the interaction of impaired hearing, reduced auditory attention and the experience of illness itself. Each of these avenues may play a role at different stages in the development of the child and, although conceptualised as distinct, these three avenues interact continually to influence language acquisition with many factors that involve the child, the caregiver and the physical environment. Young children with recurrent otitis media may be similar to other high-risk populations of children in their dependence on a care giving environment to help them overcome the challenges they face<sup>3</sup>.

It is exactly this similarity that becomes an important issue when working with other risk-groups (e.g. premature, low birth weight infants, infants with syndromes) who display otitis media in conjunction with their identified risk status. The presence of otitis media in high-risk infants and toddlers may place them at a double disadvantage and increase their risk for a delay in developmental communication.

Otitis media is still the most common reason for a young child to see a doctor and 75-95% of children have at least one incidence of otitis media before they reach school age.<sup>5,6</sup> Recurrent otitis media can lead to a dysfunction of the middle ear, and in this regard three important factors may influence the auditory processing abilities of high-risk infants and toddlers.<sup>4,7,8</sup>

- Slight conductive hearing loss. This has a "muffling effect" leading to the inability to hear short unstressed words and low intensity speech sounds like p, s, t, k and th. This may have far-reaching implications for the gestalt processing of auditory stimuli and the eventual successful processing of language.
- Distortion of sound. Because of

the physiological changes in the middle ear, caused primarily by the presence of fluid, the conduction of sound to the inner ear and the resultant integrated perceptual processes can be distorted.

- Fluctuating condition. The fluctuating nature of recurrent otitis media forces the child to continually change his/her perceptual strategies. When a child does not hear consistent speech sounds there is confusion in abstracting the meanings of words as a result of the inconsistent categorisation of speech sounds.

Research suggests that children with a history of otitis media in the first three years of life demonstrate disturbances in auditory processing, speech and language development, and subsequent problems in academic achievement.<sup>5</sup>

In acknowledgement of the far reaching impact of a communication delay on the development of young children, the Clinic for High Risk Babies (CHRIB), Centre for Early Intervention in Communication Pathology, Department of Communication Pathology, University of Pretoria, provides early communication intervention for high risk infants and toddlers and their families with the aim of facilitating their development and minimising the influence of risk factors on their development. Teamwork is a prerequisite to ensure that effective and accountable treatment is provided to young children who require early communication intervention.

Based on clinical experience of high-risk infants and toddlers, this team came to realise that recurrent otitis media appears to be an important issue in the communication development of these children. The question arises whether, in addition to established, biological and environmental risk factors exhibited by the infants and children assessed in CHRIB, otitis media presents a further risk for

developing a communication delay. The purpose of this study is to describe the hearing status and prevalence of otitis media in the high-risk infants and toddlers assessed in CHRIB and to provide guidelines for effective team management of such children.

## Methodology

### • Study design and subjects

A retrospective study involved the analysis of the results of hearing assessments performed on 67 high-risk infants in CHRIB over a 20-month period. The infants and toddlers ranged in age from 4 weeks to 37 months and had a mean age of 19 months. All of the subjects either exhibited risk factors or had a communication delay, necessitating the parents to seek an evaluation in CHRIB. The subjects are presented in Table I.

Each of these categories contributes to increased risk for communication delay and potential school difficulties<sup>1</sup>. Down syndrome and cranio-facial disorders are also characterised by a high incidence of otitis media<sup>6</sup>, increasing these children's risk for a communication delay.

### • Procedure

An early intervention team comprising a speech-language therapist specialised in early intervention; a speech-language therapist specialised in neonatal intervention; an audiologist and a clinical psychologist assessed each subject individually. The communication assessment consisted of an assessment battery targeting emerging communication development. The hearing assessment consisted of a case history, visual inspection of the ear including otoscopy, behavioural hearing test (consisting of visual reinforcement audiometry for children of 6 months and older or behavioural observation response audiometry for the younger children), tympanometry, using the procedures prescribed for infants and toddlers<sup>4</sup>,

**Table I: RISK FACTORS OF SUBJECTS N=67**

Categories of risk	Number of subjects	Percentage
Down syndrome	11	16%
Multiple births	8	12%
Low birth weight and prematurity	7	11%
Cleft lip and palate	28	41%
Specific speech and language disorder	6	10%
Pervasive Developmental Disorder	3	4%
Unknown genetic disorder	2	3%
Sensory-neural hearing loss	2	3%

**Table II: DESCRIPTION OF THE SUBJECTS' MIDDLE EAR AND HEARING STATUS N= 67**

Aspects investigated	Number of subjects	Percentage
History of Otitis Media as indicated by parents in case history	38	56,7%
No history of Otitis Media as reported by parents in case history	29	43,3%
Otitis media identified during CHRIB assessment and diagnosed by ORL	46	68,6%
Ventilation tubes at time of assessment	14	20,8%
Otitis media not detected by parents	47	70,1%
Reduced hearing sensitivity indicating slight (16-25dB) to mild (26- 40B) hearing loss	48	71,6%
Referral to ORL by CHRIB team	46	68,7%
No otitis media or hearing problems identified during CHRIB assessment	19	28,8%
Sensory-neural hearing loss	2	2,9%

and a listening scale. The case history consisted of medical reports, when available, and a questionnaire to the parents that included questions on ear infections, the frequency of these infections as well as a treatment history. The listening scale evaluates listening behaviour in two contexts, namely during the communication assessment and during the hearing test. Eight parameters of listening abilities are judged on a 3-point scale. The results were interpreted and recorded in each subject's file and on a central computer database.

## Results

Table II provides an overview of the 67 subjects' middle ear and hearing status.

According to the results obtained from 67 infants and toddlers over a 20 month period, it appears that 68,6% of the subjects experienced otitis media, which correlates closely with the findings of previous research indicating that approximately two thirds of all infants have at least one ear infection by their second birthday<sup>6,5</sup>. Although 28,8% of the subjects had no middle ear involvement at the time of the assessment, these parents were informed, as a preventative measure, about the disease and its possible negative influence on communication development.

Two subjects had sensory-neural hearing loss as a result of genetic disorders and middle ear functioning was normal at the time of the assessment, although they had moderate bilateral hearing loss.

The subjects all presented other risk factors – not including any auditory involvement - which have lead to their classification as either having an established risk or being at-risk for developing a communication delay or disorder, thus necessitating the parents to seek an early communication assessment (see Table I). The high incidence of otitis media in these subjects placed them under an even

greater risk for communication delay. This finding has important implications for the identification and management of such infants and toddlers.

It was found that 56,7% of the parents had reported a history of otitis media, while 68,6% of the subjects had otitis media at the time of the assessment. This may indicate that the majority of the subjects, who had otitis media at the time of the assessment, were in fact experiencing recurrent episodes. Of the 56,7% of subjects with histories of otitis media, 20,8% had ventilation tubes inserted before their assessment, indicating the seriousness of the middle ear involvement<sup>6</sup>

Furthermore, it is interesting to note that although 56,7% of the subjects had a history of otitis media, the middle ear condition at the time of the assessment, was undetected by the parents in 70,1% of the cases. This suggests that although many of the children had previous treatment, and many were at-risk for middle ear infections (e.g., subjects with cleft palate and Down syndrome), the parents were uninformed and uneducated regarding the symptoms indicative of otitis media that they should be aware of and pay attention to<sup>9</sup>. This has important implications for team members involved in the management of infants and toddlers with otitis media and necessitates the education of parents about the symptoms of otitis media with effusion.

All the subjects who had abnormal tympanograms or who failed the screening otoscopic evaluation and performed poorly on the test battery (behavioural hearing test, listening scale), were referred to medical practitioners as were the two subjects who had ventilation tubes inserted that appeared to be blocked at the time of the assessment (68,7%). The audiologists' identification of the possible otitis media was in all cases confirmed by the medical practitioners. This, first of all, emphasises the

importance of teamwork. It also implies that all early intervention programmes should include audiologists and medical practitioners as team members and that early assessment protocols should include not only physical tests of hearing, but also assessment of functional listening skills.

It appears that the battery used to assess the subjects' hearing abilities and listening behaviour was appropriate as it covered hearing acuity, middle ear functioning and listening behaviour.<sup>9</sup> The listening scale was found to distinguish between good and poor listeners and provided guidelines for intervention strategies. Inclusion of the assessment of the listening abilities of infants and toddlers prone to otitis media is important in making a complete assessment of the influence of the disease and for the prevention of disease complications.

## DISCUSSION AND PRACTICAL IMPLICATIONS

Since it has been proven that infants process and integrate the information in the speech signal into a basis for linguistic competence during the first year of life and that a mild hearing loss causes a breakdown in speech perception abilities, it is likely that a prolonged period of time with distorted speech input due to recurrent otitis media, could cause difficulty for infants in abstracting the phonetic inventory of the language to which they are exposed. This may even disrupt the development of syntax and semantics.

Until, and if, it is shown that infants and toddlers can overcome the effects of mild hearing loss due to otitis media, efforts to identify these young children and develop strategies for intervention should be encouraged. These infants and toddlers should be identified, monitored, and managed by using the team approach<sup>7</sup>.

Parents, health care providers and

child care personnel should work together to create the most propitious language learning environment possible for every child, to recognise the signs of otitis media, hearing loss and developmental delay, and to take steps to prevent infections, manage otitis media when it does occur, and minimise the effects on development.<sup>3</sup> The key team players are the parents and caregivers, medical practitioners, speech-language therapists, audiologists and paediatricians.

Based on the results obtained, and to meet the needs of young children who have a history of otitis media, team members should promote the following practical activities:

- Promote healthy practices to decrease the spread of infections in general, including the number of new episodes of otitis media. Encourage caregivers to adopt hand washing and hygienic habits to limit young children's exposure to environmental risks for otitis media, such as tobacco smoke and poor bottle feeding practices.<sup>3</sup>
- Identify children with recurrent otitis media as early in their development as possible. Predisposing factors are well documented (e.g., family history, male, poor socio-economic and social conditions, wintertime, viral respiratory tract infections, day-care, smoking environment, cleft lip and palate and Down Syndrome<sup>6,10,5</sup>). These factors should be taken into account in a screening protocol.
- Young children should be handled in a two-phase follow-up process. Follow-up of the first treatment is important to check that the infection is responding to the antibiotic, while the later follow-up is important to determine whether the middle ear fluid has resolved.<sup>6</sup>
- Disseminate information regarding otitis media as a disease, its symptoms and possible impact, to parents and caregivers. Material such as a printed brochure has been

found to be useful in disseminating this type of information.<sup>9</sup>

- Disseminate information about child speech and language development and the link between otitis media and communication problems. This type of information should be provided to parents, day-care personnel, personnel of primary health care clinics, paediatricians and the general public.<sup>11</sup>
- Ensure an optimal listening environment for young children prone to otitis media by providing information to caregivers on how to reduce environmental noise levels (e.g. closing doors, turning down the TV or music when communicating) and by providing guidelines to caregivers to make themselves easier to hear (e.g. proximity and eye level, speak slowly, use comprehension checks, provide visual cues, and use verbal redirection)
- Encourage ongoing audiologic screening and follow-ups as a preventative measure for young children with a history of otitis media. When problems or changes are suspected, parents should be

advised to seek medical and audiological assistance.<sup>11</sup>

- Refer young children (0-3 years) for early communication assessment. By assessing emerging communication development, hearing and listening abilities, the child's developmental level as well as the effect of a mild, fluctuating hearing loss caused by recurrent otitis media can be determined and rehabilitation measures can be instituted.<sup>8</sup>
- Provide appropriate early communication intervention to ameliorate or even prevent a communication delay or disorder. Early communication intervention has been proven to be effective<sup>12</sup> and can improve an infant's and toddler's listening skills, and facilitate their speech, language and cognitive development through a parent-centred approach.<sup>3,1</sup>

## Conclusion

Otitis media and its serious complications can be treated effectively and

even preventatively in all young children if team members work together and are vigilant regarding the identification, diagnosis and management of the disease.

In a climate of increasing fiscal accountability, it is not enough to state that parents and their children will benefit by services designed for their specific needs. Motivation for service delivery should also have a strong financial basis. It has been demonstrated that effective early intervention may produce long-term benefits to participants as well as to the general public and these benefits greatly exceed the overall costs of the programmes.

Early intervention is specifically relevant for the treatment of children at risk for developmental delay. By ameliorating the effects of otitis media in infants and young children with an established risk or those who are at-risk for communication delays and disorders, team members can make a significant contribution to improve the outcome of these children.

## References

- 1 Rossetti, L.M. Communication intervention: Birth to three. San Diego: Singular Publishing Group 1996.
- 2 Catlett, C. ASHA'S Early intervention projects. *ASHA* 1991; 33: 50-51.
- 3 Robberts, J.E. Otitis media, the caregiving environment, and language and cognitive outcomes at 2 years. *Pediatrics* 1998; 102 (2): 346-354.
- 4 Northern, J.L. & Downs M. P. Hearing in Children. Baltimore: Williams and Wilkins. 1991.
- 5 Klein, J.O. Lessons from recent studies on the epidemiology of otitis media. *The Pediatric Infectious Disease Journal* 1994; 13 (11): 1031-1034.
- 6 Curotta, J.H. Managing acute otitis media. *Modern Medicine of South Africa* 1997; 3: 27-36.
- 7 Nozza, R. J. The effects of mild hearing loss on infant auditory function. In Rossetti, LM & Kile, JE (eds) Early intervention for special populations of infants and toddlers 1997. San Diego: Singular Publishing Group.
- 8 Hugo, S.R., Louw, B. & Kritzinger, A. Development of a scale for the evaluation of listening behaviour of children with Down Syndrome. *Down Syndrome: Research and Practice* 1998; 5 (3): 138-142.
- 9 Hugo, S.R., & Pottas, L. Sekondêre voorkoming van kommunikasiegestremdheid as gevolg van herhaaldelike middelloorontsteking: 'n Inligtingstuk vir ouers. *Klinika: toepassings in kliniese praktyk van Kommunikasiepatologie* 1997: 37-52.
- 10 Klein, J.O. Prevention of otitis media. *Seminars in Hearing* 1991; 12 (2): 140-144.
- 11 Garrard, K.R., & Clark, B.S. Otitis media: The role of speech-language pathologists. *ASHA* 1985 July: 35-39.
- 12 Guralnick, M.J. The effectiveness of early intervention 1997. Baltimore: Paul H. Brookes.