The Longitudinal Outcomes of Children with Hearing Impairment (LOCHI) study

A brief overview of interim findings

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One to two children in every thousand under the age of 3 have a permanent bilateral hearing loss of greater than 40 dB HL and are fitted with hearing aids (Ching, Oong, & Van Wanrooy, 2006). Permanent childhood hearing loss impacts negatively on the communicative, educational, and social developmental outcomes of children. Several retrospective studies have established an association between intervention before 6 or 9 months of age and better language skills measured at 3 and 5 years of age (Moeller, 2000; Yoshinaga-Itano, Sedey, Coulter, & Mehl, 1998). Despite the frequent citing of these studies as evidence in support of the effectiveness of early identification in improving outcomes for children with permanent bilateral hearing loss, the United States Preventative Task Force (USPSTF; Thompson et al., 2001) conducted a systematic review of evidence in 2001 and found that the “evidence to determine whether earlier treatment resulting from screening leads to clinically important improvement in speech and language … is inconclusive because of the design limitations of existing studies” (reported in Helfand et al., 2001). More recent reviews (Nelson, Bougatsos, & Nygren, 2008; Wolff et al., 2009) revealed that the evidence on the efficacy of early intervention in improving language outcomes for children with permanent bilateral hearing loss is weak.

In Australia newborn hearing screening is now at above 80% coverage in all states except for Victoria, with five states now screening more than 95% of newborns.

Australian Hearing is the sole national service provider for all children diagnosed with permanent hearing loss. Several years ago, different Australian states were at different stages of implementing universal newborn hearing screening, and there was a narrow timeframe during which there were sufficiently large numbers of children who received early or later intervention from the same service provider (Australian Hearing) using consistent protocols. The National Acoustic Laboratories, the research arm of Australian Hearing, captured this unique research opportunity in 2005 to conduct a direct prospective comparison of outcomes for children who received early or later intervention.

References


The aims of this study are (a) to establish an evidence base for the development of speech, language, functional and psychosocial skills, and educational attainment of children with hearing aids and/or cochlear implants, and (b) to identify the extent to which outcomes in each dimension are affected by a range of child-, family- and device-related factors, including age of intervention.

Method

Children who were first fitted with hearing aids and/or cochlear implants before the age of 3 years at Australian Hearing in New South Wales, Queensland, and Victoria were invited to participate.

Currently there are 477 children enrolled in the study with the youngest child due to complete evaluations at 5 years of age in 2012. The children are assessed at multiple assessment intervals, including (a) 6 and 12 months after hearing aid fitting or cochlear implant switch-on, (b) at 3 years of age, and (c) at 5 years of age. An extended phase of the study will include additional assessments at 9 and 11 years of age. The impact of a range of child and family characteristics, auditory and device-related factors, and intervention related factors on child outcomes are examined, and changes are tracked over time.

Interim findings

Results on the language ability of 133 children who completed their assessment at 3 years of age have been reported in detail in Ching et al. (2010). In summary, participants were administered the Preschool Language Scale (PLS-4; Zimmerman, Steiner, & Pond, 2002), Peabody Picture Vocabulary Test (PPVT-4; Dunn & Dunn, 2007), and Diagnostic Evaluation of Articulation and Phonology (DEAP; Dodd, Zhu, Crosbie, Holm, & Ozanne, 2002). Parents were asked to complete the Child Development Inventory (CDI; Ireton, 2005) and the Parents’ Evaluation of Aural/Oral performance of Children (PEACH; Ching & Hill, 2007). This publication reported a significant effect of severity of hearing loss on results of the PLS-4 (language development) and on everyday functioning as measured by the PEACH. After allowing for the effect of hearing loss, children in families with maternal education greater than 12 years developed better language skills. Other factors, including age of first hearing aid fitting and socioeconomic status, were not significantly associated with speech and language outcomes of children at 3 years of age.

Results from 87 children with cochlear implants have been reported in Ching et al. (2009). On average, children who received a cochlear implant before 12 months of age developed language skills as measured on the PLS-4 within the range of their normal-hearing peers at 6 and 12 months after implantation. Children who received cochlear implants at a later age performed at 2 standard deviations below the normative mean on measures of language.

When further data becomes available, it will be possible to account for multiple factors on the long-term speech, language, and educational attainment as well as the rate of development in children with hearing loss. In 2011, the next phase of the study will commence with evaluations of children at 9 and 11 years of age. Progress on this study is available on the study website: www.outcomes.nal.gov.au.

Acknowledgements

We gratefully thank all the children and their families for participating in this study. Collaborating and supporting agencies include Aurora School, Catherine Sullivan Centre, Catholic Centre for Hearing Impaired Children, Cochlear Implant Clinic of the Royal Victorian Eye and Ear Hospital, Hear and Say Centre, Matilda Rose Early Intervention Centre, Royal Institute for Deaf and Blind Children, St Gabriel’s School for Hearing Impaired Children, The Shepherd Centre, Sydney Cochlear Implant Centre, Taigum ECDU, Taralay and Yeerongpilly ECDU. We also thank Julia Orsini and Cassandra Cook for their assistance in collecting some of the assessment data.

This study is supported by the National Institutes of Health Grant no. R01DC008080, Office of Hearing Services, Department of Health in Australia, Australian Hearing, New South Wales Department of Health and Oticon Foundation.

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