

Submission regarding
Support Measures for Deaf and Hard-of-Hearing Children
to the
Subcommittee on Children's Rights

BACKGROUND

It is our understanding that the Subcommittee on Children's Rights will be discussing issues relating to children with hearing impairment on 20 Jun 2017. It is important for the discussion and decisions to be based on research evidence that integrates aggregate findings from research conducted using stringent methodologies and having accounted for confounding variables, rather than individual studies or anecdotal experience. This paper will therefore highlight findings from a few systematic reviews and guidelines that emphasise the role of early intervention and based on these, relevant suggestions are made.

RESEARCH EVIDENCE

Newborn Hearing Screening

Systematic reviews have found newborn hearing screening results in an improvement of speech development for children in the screening group, compared to the group that does not receive newborn hearing screening. Early treatment was associated with better language development in comparison to children with later treatment (Wolff et al., 2010). Reviews have also indicated that infants identified with hearing loss through universal newborn screening have earlier referral, diagnosis, and treatment than those not screened (Nelson, Bougatsos, & Nygren, 2008).

Early Intervention

Based on a systematic review of studies on cochlear implantation performed in Chinese speaking population in mainland China, early intervention plays an important role in ensuring proper language development (Chen & Wong, 2017). This is similar to findings previously reported in the USA. Furthermore, spoken language development is directly related to the level of speech perception provided by hearing devices (Chen, Wong, Zhu, & Xi, 2016). In order to ensure good auditory skill development, it is critical that early hearing screening and appropriate follow-up be implemented, so that early diagnosis is made before 3 months of age, and hearing devices are fitted before 6 months of age. Parents and family members should be provided with support and

training to give the children the best possible language environment (Chen, Wong, Zhu, & Xi, 2015).

Education

An extensive literature review led by (Kumar, 2008) found the following factors contribute to better outcomes in children aged 0 to 3 years, which research has found is the most critical period for all types of development, including speech and language. They found consistent and robust evidence showing better outcomes with early detection and intervention. Mainstream education results in better speech and language outcomes than those in special education.

There are very few studies that have compared the impact of auditory versus auditory plus visual modes of communication. The evidence so far has not provided convincing evidence that one method is better than the other. However, there is much more evidence that consistently shows good speech and language inputs, in particular oral language inputs, are important to develop spoken language skills.

Binaural Hearing

Where hearing loss is present in both ears, hearing aid fitting in both ears is the norm and there is well-established evidence that binaural hearing is necessary for optimal speech perception and speech and language development. Recent advocacy focuses on binaural cochlear implantation and while stronger evidence is still required, a recent systematic review has found that bilateral cochlear implantation results in improved speech perception in quiet and noise (Lammers, Heijden, Pourier, & Grolman, 2014; Sparreboom et al., 2010).

Hearing Device Technology

There is moderate level evidence that suggests the efficacy of the use of hearing aids with sophisticated speech processing algorithms (e.g., using directional microphones) and emerging evidence that some other new algorithms (i.e., frequency lowering) assist with better speech perception (McCreery, Venediktov, Coleman, & Leech, 2012a; McCreery, Venediktov, Coleman, & Leech, 2012b). Devices with these algorithms should be made available to meet the hearing needs of children, although they may be more expensive than less advanced devices.

Cost Analysis

Most importantly, it has been estimated that severe to profound hearing loss costs society US\$297,000 over the lifetime of an individual in an

American study (Mohr et al., 2000). The majority of these monetary losses (67%) are due to reduced work productivity, although the use of special education resources by children contributes an additional 21%. Life-time costs for those with prelingual onset of hearing impairment exceed US\$1 million. The particularly high costs associated with prelingual onset of severe to profound hearing impairment suggest interventions aimed at young children, such as early identification and aggressive medical / device intervention, will result in a substantial societal payback.

SUGGESTIONS

Based on these evidence, we have the following suggestions:

- 1.** Newborn hearing screening should continue to be implemented. Resources should be devoted to making sure that results are communicated clearly, and follow-up diagnostic testing is performed as soon as possible.
- 2.** Hearing devices should be fitted as early as possible, and those with appropriate speech processing algorithms should be made available to children. The process to hearing device provision should be expedited.
- 3.** Therapy to enhance listening skills and speech and language development should be provided as soon as possible. Parents should be trained to work with their children to enhance their speech and language as well as improve educational outcomes.
- 4.** In order to allow the above recommendations to be implemented effectively, appropriate infrastructure should be in place. These include universal hearing screening, prompt diagnosis of hearing loss by audiologists and ENT specialists, fitting of hearing devices and continuous monitoring of their effectiveness, availability of therapy to enhance audition and speech and language development, vigilant monitoring of rehabilitation progress and outcomes, curriculum adaptation and learning support in schools.

We hope that these recommendations will result in public funds being appropriately allocated to enhance the outcomes in children with hearing impairment. Currently, these services are not always being provided at the optimal level. For example, the maintenance and replacement of cochlear implants, which are vital to the daily life of children with severe to profound hearing loss, are not covered by public funds. The resources spent on providing listening skill development and speech and language training are also very limited, so that families have to spend a large

amount of money from their own pocket, hoping for better outcomes for their children.

Thus, the government should consider establishing a panel of experts to review and recommend infrastructure and procedures that would in particular streamline provision of hearing aid / cochlear implant and related services to children with hearing impairment, and ensure optimal outcomes from these provisions. Reference could be made to (Moeller, Carr, Seaver, Stredler-Brown, & Holzinger, 2013) for an international best practice consensus statement.

Signed by:

Professor Lena L. N. WONG, Associate Dean, Faculty of Education,
University of Hong Kong

Professor Bradley McPHERSON, Programme Director (MSc Audiology),
Faculty of Education, University of Hong Kong

Dr Iris H. Y. NG, Chairperson (2016-2018), Hong Kong Society of
Audiology Ltd

Ms Annabelle C. W. WONG, Vice Chairperson (2016-2018), Hong Kong
Society of Audiology Ltd

Mrs Bessie S. M. PANG, Executive Director, Suen Mei Speech and Hearing
Centre

References

- Chen, Y., & Wong, L. L. N. (2017). Speech perception in mandarin-speaking children with cochlear implants: A systematic review. *International Journal of Audiology*, , 1-10. doi:10.1080/14992027.2017.1300694
- Chen, Y., Wong, L. L., Zhu, S., & Xi, X. (2015). A structural equation modeling approach to examining factors influencing outcomes with cochlear implant in mandarin-speaking children. *PloS One*, *10*(9), e0136576.
- Chen, Y., Wong, L. L., Zhu, S., & Xi, X. (2016). Early speech perception in mandarin-speaking children at one-year post cochlear implantation. *Research in Developmental Disabilities*, *49*, 1-12.
- Kumar, S. (2008). A systematic review of the literature on early intervention for children with a permanent hearing loss. *Brisbane: Centre for Allied Health Evidence Review Team*,
- Lammers, M. J., Heijden, G. J., Pourier, V. E., & Grolman, W. (2014). Bilateral cochlear implantation in children: A systematic review and best-evidence synthesis. *The Laryngoscope*, *124*(7), 1694-1699.
- McCreery, R. W., Venediktov, R. A., Coleman, J. J., & Leech, H. M. (2012a). An evidence-based systematic review of directional microphones and digital noise reduction hearing aids in school-age children with hearing loss. *American Journal of Audiology*, *21*(2), 295. doi:10.1044/1059-0889(2012/12-0014)
- McCreery, R. W., Venediktov, R. A., Coleman, J. J., & Leech, H. M. (2012b). An evidence-based systematic review of frequency lowering in hearing aids for school-age children with hearing loss. *American Journal of Audiology*, *21*(2), 313. doi:10.1044/1059-0889(2012/12-0015)
- Moeller, M. P., Carr, G., Seaver, L., Stredler-Brown, A., & Holzinger, D. (2013). Best practices in family-centered early intervention for children who are deaf or hard of hearing: An international consensus statement. *Journal of Deaf Studies and Deaf Education*, *18*(4), 429-445.
- Mohr, P. E., Feldman, J. J., Dunbar, J. L., McConkey-Robbins, A., Niparko, J. K., Rittenhouse, R. K., & Skinner, M. W. (2000). The societal costs of severe to profound hearing loss in the united states. *International Journal of Technology Assessment in Health Care*, *16*(4), 1120-1135.

doi:10.1017/S0266462300103162

Nelson, H. D., Bougatsos, C., & Nygren, P. (2008). Universal newborn hearing screening: Systematic review to update the 2001 US preventive services task force recommendation. *Pediatrics*, *122*(1), e276.

doi:10.1542/peds.2007-1422

Sparreboom, M., Schoonhoven, J. v., Zanten, B. G. v., Scholten, R. J., Mylanus, E. A. M., Grolman, W., & Maat, B. (2010). The effectiveness of bilateral cochlear implants for severe-to-profound deafness in children: A systematic review. *Otology & Neurotology*, *31*(7), 1062-1071.

doi:10.1097/MAO.0b013e3181e3d62c

Wolff, R., Hommerich, J., Riemsma, R., Antes, G., Lange, S., & Kleijnen, J. (2010). Hearing screening in newborns: Systematic review of accuracy, effectiveness, and effects of interventions after screening. *Archives of Disease in Childhood*, *95*(2), 130-135.

doi:10.1136/adc.2008.151092