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ARTICLE

The Use of Audiological Classification Systems

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ABSTRACT

The classification of deafness is used in audiological departments internationally. Reports are made about the levels of deafness and profiles of individual clients. These are used in many services throughout the world as thresholds to boundary access to services. Thresholds are also commonly applied in research methodologies.

This paper highlights the large variation between classification systems of hearing loss. This has wide ranging implications for access to services and the interpretation of research findings. Six commonly used classification systems of hearing impairment use the same descriptive terms (e.g. 'mild', 'moderate', 'severe', and 'profound') but all six apply differing decibel threshold criteria to define these terms.

This paper argues that practitioners, researchers, policy makers and service users need to have greater awareness of these differences and how they are used to gate keep services. Improved systems for gate keeping services should be developed. Audiological thresholds should be a small part of wider assessments of sensory profiles, quality of life and communication assessments and any functional consequences.

KEYWORDS

Hearing-loss, classification, thresholds, deafness access to services, deaf, nomenclature

Introduction

Many factors affect the quality of life of a deaf person beyond the audiological levels of deafness, and so recommended services should use more than audiological levels of deafness to gate keep access to services or benefits¹.

Various hearing thresholds are used by managers, clinicians and policymakers in the decisions that they make for access to services, and this is an international phenomenon. For example, thresholds are used for

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determining entry into early intervention programmes², entry into research studies³, as a mechanism for defining access to special education⁴ or access to benefits⁵. The commonest cause for rejection of cochlear implantation in one publication was audiological level of hearing⁶. Decisions about whether to fund unilateral or bilateral cochlear implants are also made using threshold ‘cut-off’ criteria in some countries⁷. When Disability Living Allowance (DLA) was in place in England, the person’s hearing threshold would have to be a minimum of 87dB for the deaf person to be eligible to receive the mobility component of the allowance⁸. Deaf people were requested to send in their audiogram when they claimed for DLA, although there was no mention of the thresholds for the care component of DLA. The replacement of the DLA with the Personal Independence Payment (PIP) includes “communicating verbally” as one of its 12 daily living descriptors⁹ despite British Sign Language being a recognised UK language. A survey of learning impaired support services in England showed that processes used to prioritise the limited resources tended to be based around impairment rather than child or family need or holistic assessment¹⁰. In the UK, eligibility for concessionary bus travel sets a 70dB decibel loss or above as a threshold for

the benefit¹¹. In America, deaf people’s hearing threshold needs to be a minimum of 90dB in their better ear (or they must obtain a maximum score of 40% in a speech discrimination test) in order for them to be eligible for a social security disability benefit¹². NICE guidelines in the UK currently recommend that the person’s hearing threshold must be a minimum of 90dB or more in both ears for eligibility for cochlear implantation⁷ (NIHCE, 2009). However, a London teaching hospital’s criteria for access to cochlear implantation stipulate severe to profound deafness, which is a minimum of 70dB¹³, showing some unexplained variability. In America, the current guideline by the Food and Drug Administration (FDA) allows for cochlear implants to be provided for deaf people with hearing threshold at a minimum of 70 dB¹⁴. In Australia, the minimum threshold for deaf children to be considered for cochlear implants is 80dB¹⁵. It is not clear what the justification is for these differences. For deaf people to participate in the Deaf Olympics, their hearing threshold must be a minimum of 55dB¹⁶. These are just some examples of how hearing thresholds that have been used internationally.

What makes this variability more problematic is that there is no single classification system. Indeed there are many

Table 1. Different systems of classification

Units = db	Mild	Moderate	Moderate to Severe	Severe	Profound
American Medical Association *	26-40	41-70		71-95	≥ 96
American Speech Language Hearing Association	26-40	41-55	56-70	71-90	≥ 91
British Society of Audiology *	20-40	41-70		71-95	≥ 96
Center for Disease Control hearing loss criteria for 2009 and 2010 surveys	21-40	41-70		71-90	≥ 91
Prevention Atlanta Developmental Disabilities Surveillance Programme **		40-64		65-84	≥ 85
World Health Organisation ***	26-40	41-60		61-80	≥ 81

*Taken in the better ear over 5 frequencies (0.25, 0.5, 1, 2 & 4 kHz)

** Taken as better ear average over 3 frequencies (0.5, 1, 2 Khertz)

*** Taken as better ear average over 4 frequencies (0.5, 1, 2, 4 Khertz)

different systems. To measure level of hearing loss, organisations such as the World Health Organisation¹⁷ (2011), the Center for Disease Control¹⁸ (2009) and the American Medical Association¹⁹ (1979) all publish systems and definitions for measurements and description of hearing loss. Both international and nationally based organisations such as the British Society of Audiology²⁰ (2004) and the American Speech-Language-Hearing Association²¹ (2011) all use different systems.

These are not small differences (See Table 1). For example, there is a 15 decibel difference in the definition of ‘profound’ deafness.

This is an area of some confusion, for example publications from the same organisation can use different thresholds in their different studies. The Center for Disease Control and Prevention (CDC) uses one set of thresholds for its surveys¹⁸ (2009), but this differs from that used by the CDC in the large Atlanta Developmental Disabilities Surveillance Programme²². This is undoubtedly related to the different needs of the differing studies, but generates confusion for the general population and professionals reading and interpreting published work.

This variability in the systems used for describing and defining hearing loss presents a number of difficulties. It means that clinicians and researchers are not comparing like with like. Clinicians need to hold subtle information in mind to be aware of the differences and what they mean, in order to represent nuances successfully in clinical discussions with service users. It also makes the task of interpreting medical and educational papers on the success or otherwise of various interventions (e.g. educational interventions, early intervention, and cochlear implantation) difficult. Furthermore, research into education needs will be difficult to apply across different systems and countries.

There is variation in terms of how deafness is defined and how thresholds are used variably as part of service access eligibility criteria. Whilst thresholds are not (nor should they be) the only factors used to influence these decisions¹, clinicians or policy-makers may be drawn to categories as a simple means of making decisions in preference to clinical, social or quality of life based judgements. Measuring a person's hearing is a poor way of assessing a person's needs. All people with a hearing threshold between 0dB to 20dB²³ are considered 'hearing' but one cannot assume that they all have the same needs. Their needs are influenced by functions and co-morbidities as well as their language development, environment, upbringing, support, preferences, culture and values. A qualitative holistic approach is a more helpful way of assessing each person so that their quality of life

and communication can be assessed before making a decision on whether they are eligible for various services or not. For deaf children to be referred to the National Deaf Child and Adolescent Mental Health Service (NDCAMHS), NHS England's service specification suggests that the hearing threshold service access should be at least 40dB²⁴, and if hearing threshold is below the 40dB threshold, the suggestion was that they should be referred to mainstream Children and Adolescents Mental Health Service (CAMHS). In practice the service has not found this stipulation helpful, instead preferring to assess children, consider their functional needs and focus on the relationship between the child's experience of deafness (in the fuller sense of culture and language as well as audiological estimations) and how this impacts on their mental health. In considering deafness in this way, the service logically extends its criteria to accept referrals for hearing children of Deaf adults.

The future implications for each person should also be considered. In particular, using decibel level in many services to boundary access is not helpful. This is because firstly there is no consistency in the way they are applied as described above. Secondly different audiological systems used by different organisations vary greatly, leading to a lack of clarity to descriptive labels such as 'mild', 'moderate', 'severe' or 'profound'. Finally, and most importantly, since quality of life is not closely correlated with hearing level²⁵ assessing a deaf person's needs in the real world is likely to be far more useful than hearing thresholds. It takes into account the environment, background, support and other needs of the person concerned.

In summary, organisations could be more explicit about why they are using different thresholds. There may be good reasons. For example, a prevalence study may need different thresholds than a study seeking to intervene with communication as its main outcome. If this is the case this needs to be more explicitly stated, and descriptive categories (e.g. 'moderate') avoided as they mean

different things in different systems. Secondly, if descriptive terms are used, in order for those people (professionals or service users) reading publications or guidelines should be aware what any particular term (e.g. moderate deafness) means. The notations used (e.g. 'Profound') could usefully be suffixed with the audiological level (e.g. 'Profound 90'). Thirdly, an international piece of work may hopefully be commissioned to better understand the reasons for current differences and explore if unification of some systems would be helpful. In-depth systematic reviews could be commissioned to explore the communication, quality of life, developmental, educational and interventional outcomes that are associated with different thresholds to explore whether they are justified in different domains, and if so where the thresholds might be best placed. This could inform an international approach and debate on these issues.

Finally, many professionals and systems are more sophisticated in the way that they boundary access to services using audiological threshold as only a small part of a more holistic assessment. Systematic review could yield important information about criteria for entry into various intervention programmes or services comparing outcomes against those criteria as a better way of justifying their use and dropping their use where no justification is possible.

Whilst organisations and health services may be wedded to the various systems that they use for a range of historical, pragmatic or other reasons, it would seem to be intuitively sensible to begin a process that openly discusses and sensitively addresses these issues. In particular any individual should be assessed holistically and individually to understand their needs, their quality of life and the ways that the environment needs to adapt to those needs, rather than relying on audiological thresholds.

REFERENCES

1. Lake R. A Review of Information Needs and Practice Relating to People with Sensory Impairments. Leeds, England: Information Centre for Health and Social Care; 2010.
2. National Screening Unit. Internet. Universal Newborn Hearing Screening and Early Intervention Programme: National Policy and Quality Standards. New Zealand: National Screening Unit. Internet. 2011 Jun, cited 2011 May 31. Available from: www.nsu.govt.nz/files/PQS_word.pdf
3. Sininger YS, Grimes A, Christensen E. Auditory development in early amplified children: factors influencing auditory-based communication outcomes in children with hearing loss. *Ear Hear.* 2011; 31:166-185.
4. Derbyshire County Council. Support Service for Children who are Deaf and Hearing Impaired, Derbyshire County Council. Internet. 2011. cited 2011 September 22. Available from: http://www.derbyshire.gov.uk/education/special_educational_needs/support_services/deaf-hearing-impaired/default.asp#criteria
5. National Research Council, Committee on Disability Determination for Individuals with Hearing Impairments. *Hearing Loss: Determining Eligibility for Social Security Benefits.* Dobie RA, Van Hemel SB, editors. Washington, DC: The National Academies Press; 2005
6. Nair SB, Abou-Elhamd KA, Hawthorne M. A retrospective analysis of high resolution computerised tomography in the assessment of cochlear implant patients. *Clinical Otolaryngology.* 2000; 25:51-61.
7. National Institute for Health and Clinical Excellence. Cochlear implants for children and adults with severe to profound deafness. London:

- National Institute for Health and Clinical Excellence; 2009.
8. Bradford Families Information Service. 2012. Internet, Disability Living Allowance. Accessed 24 April 15. Available from: http://fis.bradford.gov.uk/fis/Information_Advice/Money+and+Benefits/Disability+Living+Allowance.
 9. Houses of Parliament (2013) The Social Security (Personal Independence Payment) Regulations 2013. HMSO and Queens Printer of Arts of Parliament: London
 10. Rodd C, Young A (2009) Hearing Impaired (HI) Support Services and Caseload Prioritisation. *Deafness and Education International* 11(1), 2-20.
 11. Department for Transport 2013. Guidance to local authorities on assessing eligibility of disabled people in England for concessionary bus travel. London: Department for Transport.
 12. About Health. 2014. [Internet]. Social Security Disability Income for Deaf People [Accessed 24 April 15]. Available from: <http://deafness.about.com/od/employmentandworking/a/ssdi.htm>.
 13. Guy's and St Thomas' NHS Foundation Trust (2010). Cochlear Implant Referral Criteria. 1st ed. London: Guy's and St Thomas' NHS Foundation Trust, p.1. Available from: <http://www.guysandstthomas.nhs.uk/resources/our-services/surgery/audiology/cochlear-implant-referral-criteria.pdf>
 14. American Speech Language Hearing Association, Internet. Rockville MD: American Speech-Language-Hearing Association: C1997-2011, updated September 22, 2011. Available from: <http://www.asha.org/public/hearing/Degree-of-Hearing-Loss>
 15. Ching, T. Y. C., King, A., & Dillon, H. (2013). Evidence-based practice for cochlear implant referrals for infants. National Acoustic Laboratories <http://www.outcomes.nal.gov.au/papers.html> downloaded on, 29(7). AUSTRALIA DB.
 16. Deaflympics. 2009. Website. International Committee of Sports for the Deaf. Accessed 24 April 15. Available from: http://www.deaflympics.com/icsd.asp?deaflympics_regulations.
 17. World Health Organisation. Grades of hearing impairment. World Health Organisation. Internet. 2011 cited 2011 May 30. Available from: http://www.who.int/pbd/deafness/hearing_impairment_grades/en/
 18. Center for Disease Control. CDC EHDI Hearing Screening and Follow Up Survey; Revised December 2010. Center for Disease Control, Internet. 2009. cited 2011 September 22. Available from: www.cdc.gov/ncbddd/hearingloss/2009-Data/EHDI_Expl_2009_Rev_508_OK.pdf
 19. American Medical Association. Guide for the evaluation of hearing handicap. *Journal of the American Medical Association*. 1979; 241:2055-2059.
 20. British Society of Audiology. Pure Tone Air and Bone conduction threshold audiometry with or without marking and determination of uncomfortable loudness levels. Recommended procedure. British Society of Audiology. Internet. 2004 Mar; cited 2011 May 31. Available from: <http://www.thebsa.org.uk/docs/recpro/pta.pdf>

21. American Speech-Language Hearing Association, 2003. Website. Cochlear Implant. Accessed 24 April 15. Available from: <http://www.asha.org/policy/TR2004-00041/#sec1.5>.
22. Bhasin TK, Brocksen S, Avchen RN, Van Naarden Braun K. Prevalence of four developmental disabilities among children aged eight years – Metropolitan Atlanta Developmental Disabilities Surveillance Programme, 1996 and 2000 MMWR Surveillance Summaries 2006; 55(SS01):1-9.
23. Earinfo. 2015. Website Understanding Your Hearing Test. Accessed 24 April 15. Available from: <http://www.earinfo.com/how-to-read-a-hearing-aid-test/>.
24. Wright B, Walker R, Holwell A, Gentili N, Barker M, Rhys-Jones S, et al 2012. A New Dedicated Mental Health Service for Deaf Children and Adolescents. *Adv Mental Health*. 11(1):95-105.
25. Patrick DL, Edwards TC, Skalicky AM, et al. Validation of a quality-of-life measure for deaf or hard of hearing youth. *Otolaryngol Head Neck Surg*. 2011;145(1):137-45.