Evidence, evidence, evidence ... provided from audiological intervention

Joyce Sewell-Rutter and Trish Cope discuss the importance of gathering evidence from audiological practice

As Teachers of the Deaf we know that it is not enough to provide amplification equipment, check that it is working and ensure access to good signals. We need to measure its benefit and ensure its potential given that listening is a core and vulnerable skill in deaf children. Whilst gathering evidence from audiological practice is not new to Teachers of the Deaf, it does seem to be an area which can cause confusion or lack rigour. Given that so much time and money are expended on provision and management of equipment, and the current financial pressures on services, it seemed timely to show how one might gather evidence and use it for a variety of outcomes.

We delivered a workshop on speech perception testing at the BATOD National Conference to show one of the ways to gather and use evidence – speech in noise testing.

We began with the question, ‘Why speech perception tests?’

We want children and young people to understand their hearing loss and equipment and the use of both. We want them to be aware of their reliance on lip-reading and to understand the use of other strategies to access language. We want them to understand the impact of different contexts, when they experience different signal to noise ratios, and to confirm the benefit of a radio aid or other assistive listening devices.

We want our findings to be more widely understood and then acted upon, by families and mainstream teachers. In turn we can use that evidence to make changes for improving outcomes such as acoustic treatment, seating arrangement, classroom noise management, and provision of different or additional equipment.

So we began by asking and seeking to answer:

- What evidence do we want?
- How do we get it?
- How do we use it?

A discussion within the group revealed what happens in services currently and how evidence is gathered, recorded and more importantly used.

We considered some pointers and challenges that might be encountered when delivering speech perception tests:

- Historically, tests were developed to support clinical evaluation of hearing loss and complement pure tone audiology results; they were developed to evaluate listening not lip-reading
- Word lists employed are based on the acoustics and frequency of English speech sounds which are then balanced across the lists
- Some lists are phonemically balanced and scored, and some are not
- Originally, many more lists would have been used during testing to be sure of test retest sensitivity and statistical significance
- Critical differences for each test need to be understood
- Subjective improvements may be dependent on effort and age
- Responses from young children especially may vary making compromise sometimes necessary e.g. number of lists used
- If we use the tests in different ways from their intended use, we need to be cautious about interpreting results.
Ways to ensure more rigour when testing include:

- Use of tripods and/or careful positioning of loudspeakers at ear height
- Taking accurate measurement with sound level meter: ambient room noise and calibration of signals
- Using automated tests to ensure consistent delivery of speech in noise
- Establishing a procedure\(^2\) using Signal to Noise Ratio consistently over time and across a team
- Filming the tests for accuracy of scoring, noting effort, and as evidence.

So, having gathered the data we considered what to do with the results.

The results can inform us about:

- decisions around provision of radio aids
- verifying the set-up of radio aids
- the impact of noise
- measuring the benefit of radio aid in noise.

It can be powerful to do these tests when teachers and families are present or to make video clips available in reviews or training if wanting to show benefit of radio aid to mainstream teachers or the impact of noise at school and in the home.

All information should be considered as a part of a battery of assessments before making major changes in equipment and practice.

The data can also be used to provide evidence for quality of service delivery too:

- How well the service meets Quality Standards and good practice recommendations
- Needs of the child/required provision for Education, Health and Care Plan (EHCP)
- Outcomes – the impact of Assistive Listening Devices for learning and social interaction
- Use/pattern of faults leading to sharing information, target setting, teaching other strategies
- Value for money/cost effectiveness
- Compliance with Equality Act 2010.

Two case studies with video clips were presented to illustrate speech testing in noise, and the use of evidence in each context:

**Case Study One** concerned a Sensory Service that wished to review its procedures on the use of speech discrimination to ensure that there was more consistency and that they had evidence that could be used to improve audiological provision and outcomes. The Service was already using live voice to deliver speech discrimination testing and was reporting results to mainstream staff to enable them to understand residual difficulties and the degree of reliance on lip-reading. However, they were not following a consistent procedure to guide the sound levels used, neither were they evaluating results in the presence of background noise compared to those in quiet, nor considering the impact of radio systems. Some staff used a Parrot automated system (Soundbyte Solutions) but there was a lack of consistency in the placement of the speakers and signal levels used. Following a day trialling the use of another automated system (Ewing Foundation SiN Test) staff developed use of a consistent procedure based on that outlined in the original NDCS Quality Standards for use of a personal radio aid. They also began to evaluate the effect of personal radio systems and to make changes for some pupils and to introduce them for others.

**Case Study Two** concerned a peripatetic Teacher of the Deaf wishing to provide evidence in support of a re-submitted EHC plan for a 5-year-old deaf child in a mainstream setting, awaiting diagnosis as possibly dyspraxic. The child was using a privately funded assisted listening device, not designed for education, which was proving difficult to manage, and whose benefit had not been established. A new radio aid system was set up in the test box with optimum setting registering less than the default of the auto set up. The Parrotplus 2 and the Manchester Picture Test were selected to test speech in noise to see if there was sufficient evidence of benefit to provide a radio aid. The procedure used was from the Quality Standards for use of a personal radio aid Good Practice Guide. The child needed a practice as automated sound and impact of noise were both unsettling at first. During testing, a -5dBA SNR significantly affected responses. There was 100% improvement with the radio aid in the same noise. On a second visit the Parrotplus module with the Consonant Confusion Task was used in quiet with compressed babble noise delivered through a loudspeaker. This provided more evidence about his listening, and the results were considered in relation to his speech production.

With grateful thanks to colleagues and pupils.

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**References:**

2. NDCS QS for a personal radio aid: revised www.ndcs.org.uk/document.rm?id=9697
3. www.connevans.info/page/sintoolkit
7. Consonant Confusion Task available as a Parrot module and from www.chears.co.uk/files/Speech_Test_Order_Form.pdf

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