

# Measuring audiological outcomes in the paediatric setting

BY MARLENE BAGATTO

In this article **Marlene Bagatto** argues that a range of outcome measures and instruments need to be implemented when working with children and families. She demonstrates how these support both clinicians and families.

The primary goal of early hearing detection and intervention (EHDI) programmes is to provide effective intervention by six months of age to maximise the infant's natural potential to develop language and literacy skills. Intervention with hearing aids is a common choice among families and paediatric audiologists have access to scientifically-based strategies and clinical tools to ensure the hearing aids are fitted appropriately to the infant [1]. In combination with good audibility through the consistent use of hearing aids, high quality and abundant linguistic exposure are essential for positive outcomes for children who wear hearing aids. Measuring outcomes of infants and young children involved with EHDI programmes was identified as a key goal by the JCIH in 2013. Monitoring the child's progress on a variety of skills through standardised, norm-referenced, developmental evaluations is becoming a routine part of the intervention process. It allows audiologists to track how individual infants are doing during the early stages of intervention, as well as gather information about overall EHDI programme effectiveness. Additionally, outcome measures involve the family and other team members which may support their

engagement in the intervention process.

Important items are worth considering when implementing outcome measures in a paediatric audiology setting. The age and developmental capabilities of the child will determine which tools can be applied. Subjective outcome measures such as questionnaires can be completed by the parent regardless of the child's developmental level and provide rich and important real-life information that can support the more objective tests that clinicians may perform, as well as being more applicable to children with complex needs. An example is the LittLEARS Auditory Questionnaire which is a brief tool that measures auditory development in young children. For the 30 to 40% of the paediatric patients with hearing loss who have complex needs, the LittLEARS is suitable if the child's developmental capabilities are not matched to clinical tasks requiring reliable observed responses [1, 2]. Objective outcome measures provide a glimpse of the child's capacity in an ideal clinical setting, such as a sound-treated room with calibrated stimuli. An example is the Ling 6 (HL) detection task which offers calibrated phonemes that can be presented through an audiometer [3]. These tasks are suited to directly observing the child's aided hearing performance. An important drawback is that care must be taken to select appropriate stimuli and tasks that are suited to the child's developmental capabilities. Regardless of the chosen tool, it must have the necessary psychometric properties to support the JCIH recommendations as well as the clinical feasibility and utility to be used routinely.

Outcome measures that are valid, reliable, norm-referenced, avoid floor and ceiling affects, and offer low respondent and administrative burden have been shown to be successfully implemented and sustained clinically. Furthermore, when

scored the result must be meaningful to the audiologist and team. It is this component that facilitates uptake and sustainability. Finally, within an outcome measurement protocol, it is critical to track the quality of the hearing aid fitting. This can be accomplished by examining the goodness of fit of the hearing aid output to the prescribed evidence-based targets (e.g. DSL v5.0) or by comparing the Speech Intelligibility Index (SII) values to published norms [4]. The SII provides an indication of the amount of audibility provided by the hearing aids compared to the child's hearing level. Documenting the quality of the hearing aid fitting supports appropriate interpretation of functional outcomes.

An example of a well-validated, clinically feasible outcome measurement protocol to track auditory development and performance is the University of Western Ontario Pediatric Audiological Monitoring Protocol (UWO PedAMP) [2]. It consists of several tools that aim to measure:

- 1) Subjective assessment of early auditory development (LittLEARS)
- 2) Subjective ratings of auditory performance in daily life (PEACH)
- 3) Acceptance and use of hearing aids
- 4) Effectiveness of service delivery.

The caregiver-report functional outcomes are supported by each child's hearing aid fitting information [i.e. real-ear-to-coupler difference (RECD), SII]. Questionnaires were targeted in this version of the UWO PedAMP because objective measures of speech detection and recognition may be difficult to obtain in cases of children with complex factors (e.g. difficult to test due to developmental level).

For children who can participate in objective outcome measures, the Ling 6(HL) and the UWO Plurals task offer calibrated stimuli which can be presented through

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loudspeakers in a clinical environment. Along with the PedAMP, these outcome measures are validated and support meaningful interpretation by paediatric audiologists by displaying norms and performance ranges on straightforward score sheets. Keeping administrative burden low, these tools take a few minutes of clinical time to score and displaying the result on a norm-referenced score sheet offers meaningful interpretation. Recently, the Pediatric Minimum Speech Test Battery [5] was developed to offer a standardised protocol for the assessment of speech perception abilities for children with hearing loss. Application of this exciting innovation is underway to determine its clinical feasibility. This is true of cortical auditory evoked potentials which have been the focus of outcome measurement applications. These may be useful for challenging clinical scenarios, such as infants who have auditory neuropathy spectrum disorder, in addition to developmental challenges which preclude them from participating in the behavioural hearing assessment required for safe hearing aid intervention.

Irrespective of the outcome measures used, they should be balanced in statistical properties as well as in clinical feasibility, utility, and acceptability. Outcome

measures are considered a routine part of the paediatric hearing aid fitting process by facilitating the evaluation of the impact of the hearing fitting as well as continued monitoring. Access to visual tools to permit rapid scoring supports clinical feasibility and implementation on a regular basis. The success of infants and children with hearing loss managed through EHDI programmes relies on astute measurement of their progress to apply appropriate interventions.

**References**

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