

VIEWPOINT

Redefining Success in Adult Cochlear Implant Outcomes

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Hearing loss (HL) in adults leads to communication difficulties, increased listening effort, fatigue, and cognitive load, as well as social isolation and loneliness, which contribute to decrements in patients' quality of life and social-emotional well-being. Cochlear implant (CI) candidacy criteria in adults include moderate to profound sensorineural HL on pure-tone audiometry and limited benefit from traditional amplification (defined as preoperative best-aided sentence recognition scores of 60% or less). Despite a high degree of outcome variability, once candidacy criteria are met, CIs are the most efficacious treatment and provide considerable gains in audibility and speech recognition abilities for most adult patients. However, it is becoming increasingly apparent that a narrow focus on audibility and sentence recognition scores provides a restricted view that neglects the everyday experiences of CI users. Indeed, as patient-centered models of health care are increasingly emphasized and rigorously developed, patient-reported outcome measures (PROMs) are being applied in clinical and research protocols. Adopting a whole-person approach to defining CI outcomes will support a greater understanding of the effects of HL and treatment models, provide reliable and meaningful prognostication of outcomes, and aid the development of targeted and personalized interventions for patients. Importantly, a whole-person approach may provide a novel framework for establishing satisfactory vs poor outcomes in adults after implantation.

Limitations of Current Behavioral Measures

CI-aided thresholds are a rudimentary measure of hearing ability and do not measure how auditory information is processed beyond the cochlea. Clinical speech recognition tests typically require patients to repeat a presented word or sentence as accurately as possible. Here, the presented material is usually "idealized speech," consisting of isolated words or simple contextual sentences spoken by a single or a small number of talkers using a clear voice with no discernible accent or dialect, in a sound-treated audiobooth. Background noise can be added to increase the difficulty of the task; however, clinical testing materials are limited in the noise conditions available.

Clinical measures also have limited ecological validity and often fail to represent patients' everyday speech communication needs. For example, clinical tests do not assess speech comprehension (understanding the meaning of utterances), auditory working memory, or spatial sound abilities, which are important for communication in the setting of everyday life. Similarly, reliable clinical measures of listening effort are not yet available despite this being a common issue for patients with HL.¹ Lastly, current clinical measures fail to account for listeners' perception of details of the speech signal such

as talker-specific features (eg, sex, age, accent, or dialect) or communicative intent (eg, emotional valence and verbal irony).² As a result, despite improvements in communication being a primary goal for most adult CI recipients, clinical measures of audibility and speech recognition fail to assess numerous communication abilities relevant to everyday life.

Novel Framework for Establishing CI Satisfaction

Further evidence that clinical testing fails to approximate real communication comes from studies demonstrating that patients' speech recognition scores only weakly correlate—if at all—with patients' self-reported communication abilities in everyday life.³ Moreover, clinical testing fails to correlate with abilities in other domains that contribute to critical, quality-of-life outcomes.³ Thus, routinely applied clinical measures do not represent the everyday experiences of CI users and ignore domains, such as social isolation and social-emotional well-being, that affect CI users' lives. PROMs provide a potential solution because they represent a means for patients to directly report their real-world experiences. For example, the Cochlear Implant Quality of Life (CIQOL⁴) instruments were developed within a patient-centered framework that included the extensive involvement of primary stakeholders and resulted in 6 functional domains deemed most relevant to adult CI users. The communication domain measures individuals' functional experiences in diverse listening environments, such as within a group, among strangers, or in noisy environments. The CIQOL also measures CI users' experiences regarding the emotional, entertainment, environment, listening effort, and social domains. Recent research has demonstrated that higher CI user satisfaction and lower levels of decisional regret are associated with improvements in CIQOL scores, with little association with speech recognition improvement. Older PROM instruments such as the Speech, Spatial and Qualities of hearing (SSQ⁵) are also popular in clinical settings, especially regarding spatial hearing after device fitting. Although these PROMs can provide insight into CI users' perceived functioning, it is important to consider the effects of patient personality factors, motivation, and other health factors when interpreting them.

Psychosocial and Cognitive Effects on CI Satisfaction

Although PROMs like the CIQOL and SSQ can provide a more comprehensive profile of outcomes in CI users, it is important to place HL and CI benefits within an even larger context of models of cognition and psychosocial functioning. Research is beginning to reveal important associations between HL-related stressors, coping responses, and social isolation in older adults

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with HL.⁶ In fact, older adults with HL are at higher risk for depression than their peers.⁷ Lastly, with growing recognition of the association between HL and cognition, a number of clinics are incorporating cognitive measures, such as the Hearing Impaired Montreal Cognitive Assessment (HI-MoCA); however, these screening measures are generally insensitive to longitudinal change and are too brief to provide detailed insight into the cognitive functioning of the patient. Appropriate clinical measures to assess cognition in adults with HL and CIs remain lacking.

Summary and Future Needs

Although CIs are an effective intervention for most adults with HL who meet criteria, the field of otolaryngology remains narrow-sighted in how we measure outcomes in this population. Clinical measures beyond CI-aided audibility and sentence recognition skills are needed, and despite their limitations, PROMs provide a significant step forward in assessing outcomes relevant to the

everyday functioning of adult CI users. Nonetheless, additional clinical measures of communicative, psychosocial, and cognitive functioning are necessary to provide a holistic evaluation of patient needs and CI device benefits. Of equal importance, developing clinically feasible and efficient measures will be essential, based on the ever-expanding demands placed on clinicians during ever-shrinking minutes per encounter. A potential solution may be to remove some assessments from the clinic entirely and allow patients to perform adjunctive testing at home or in the waiting room. For example, PROMs have been successfully collected for research purposes through digital patient interfaces. Similarly, remote-testing platforms are continually being developed to allow individuals to perform some forms of auditory or cognitive testing at home using their own smartphones, tablets, or computers. As remote-testing approaches continue to evolve, we will be able to develop a more comprehensive profile of the real functioning and rehabilitative needs of our patients.

ARTICLE INFORMATION

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