Datalogging findings in adult cochlear implant recipients who never developed intelligible speech.

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Introduction

Cochlear implants (CI) are beneficial to most recipients' communication abilities, but questions remain as to how beneficial they are in recipients who never developed intelligible speech. The lower speech perception outcomes when compared to traditional CI recipients present questions as to whether these patients are good candidates for implantation. Often, there are also fears of sound aversion, non-use of device and appropriate management of expectations. Datalogging history of these patients, however, reveals significant daily usage of the devices, which could be an indicator of benefit.

Research Questions

1: Is speech intelligibility a predictor of long-term usage?
2: Is speech perception a predictor of long-term usage?
3: Is the time spent in each sound environment a predictor of high usage?
4: Are high hours of usage at early-stage post-implantation a good indicator that the candidate will remain a long-term user?

Methods

Non-traditional CI recipient is described as someone who was implanted in adulthood and scored 3 or below on the SIR test as an adult, irrespective of aetiology, of having prelingual or perilingual deafness, of being HA user prior to implantation and of communication mode.
A retrospective medical notes and clinical sessions review was performed. Simple linear regressions, multiple linear regression and logistic regressions were used to assess significance of predictive factors.

Results & Discussion

The results suggest NT CI recipients tend to wear their sound processors regularly (M = 8.7 hours/day, 95% confidence interval of 7.6 to 9.7) and favour specific listening environments (SiQ: M = 76.69%, 95% confidence interval of 71.15 to 82.22%; quiet: M = 51.56%, 95% confidence interval of 45.42 to 57.70%). These factors combined would imply most benefit from their sound processor in those environments.

*Graph 1 - Long-term usage grouped by SIR*
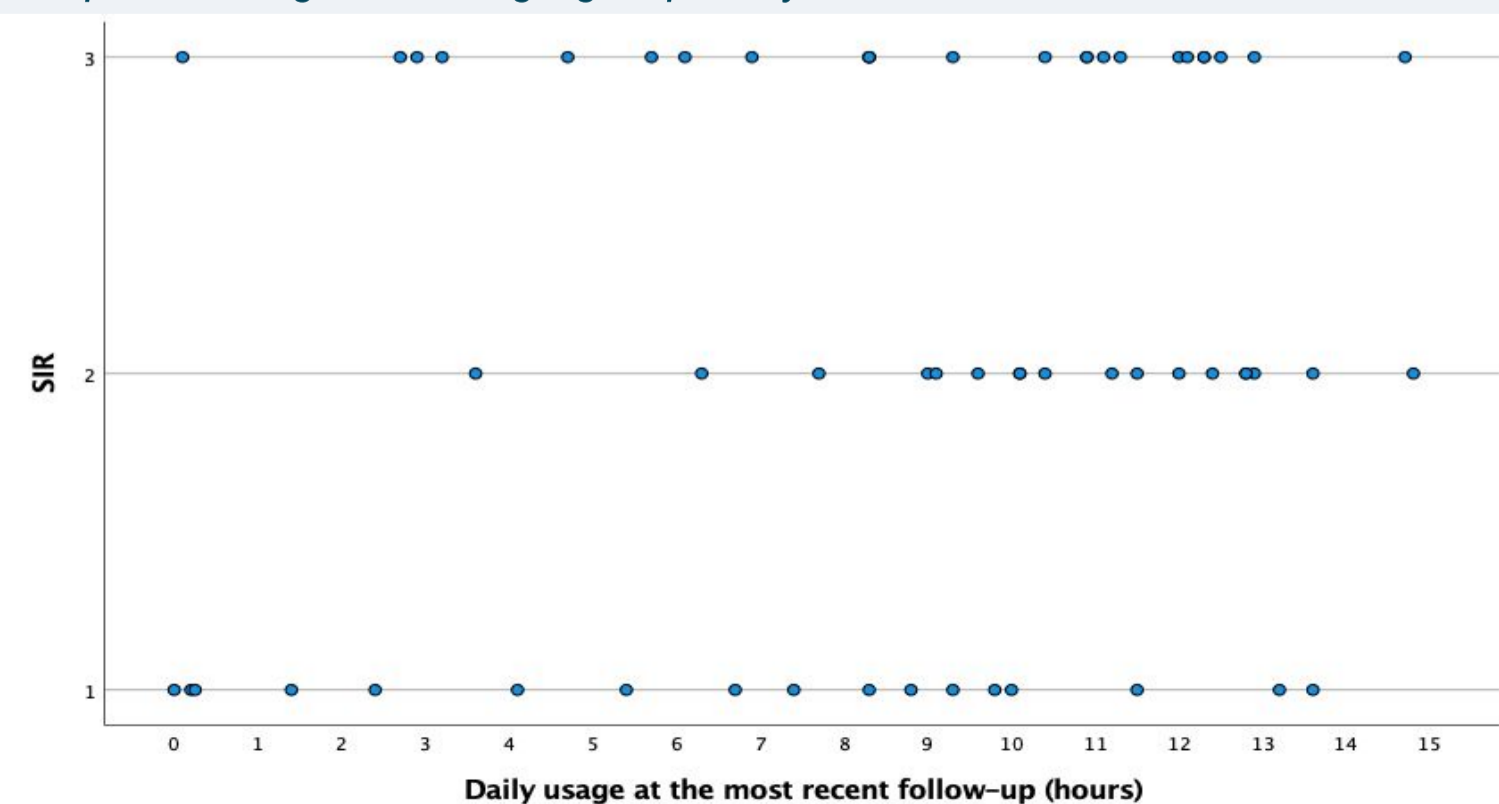
Results & Discussion (cont.)

8.5% of the cohort (n = 5) were non-users (less than 2 hours of average daily usage).
The correlation between SIR and long-term usage was weak and non-significant (r = 0.188, p > 0.05), as was the correlation between speech perception and long-term usage (r = -0.113, p > 0.05). As seen in graph 1, patients with a higher SIR score are not more likely to be better long-term users.
No preimplant factors were predictors of long-term usage. Postoperative BKB scores did not improve significantly. None of the environments in scene analysis were statistically significant predictors of long-term usage (p > 0.05), unlike daily usage at 3-month follow-up, which was found to be a significant predictor (r = 0.741; F (1, 30) = 36.436, p < 0.05; graph 2). Patients who wear their CI at 3-month follow-up are 1.947 times more likely to remain users (X^2 (1) = 6.062, p < 0.05), explaining 46% of the variance and correctly identifying 93.8% of cases.
These findings indicate that intense rehabilitation and encouragement to use their sound processors in the first 3 months after implantation makes long-term benefit more likely, demonstrating the importance of establishing use early on and supporting patients to achieve this.

Graph 2 – Daily usage evolution over time
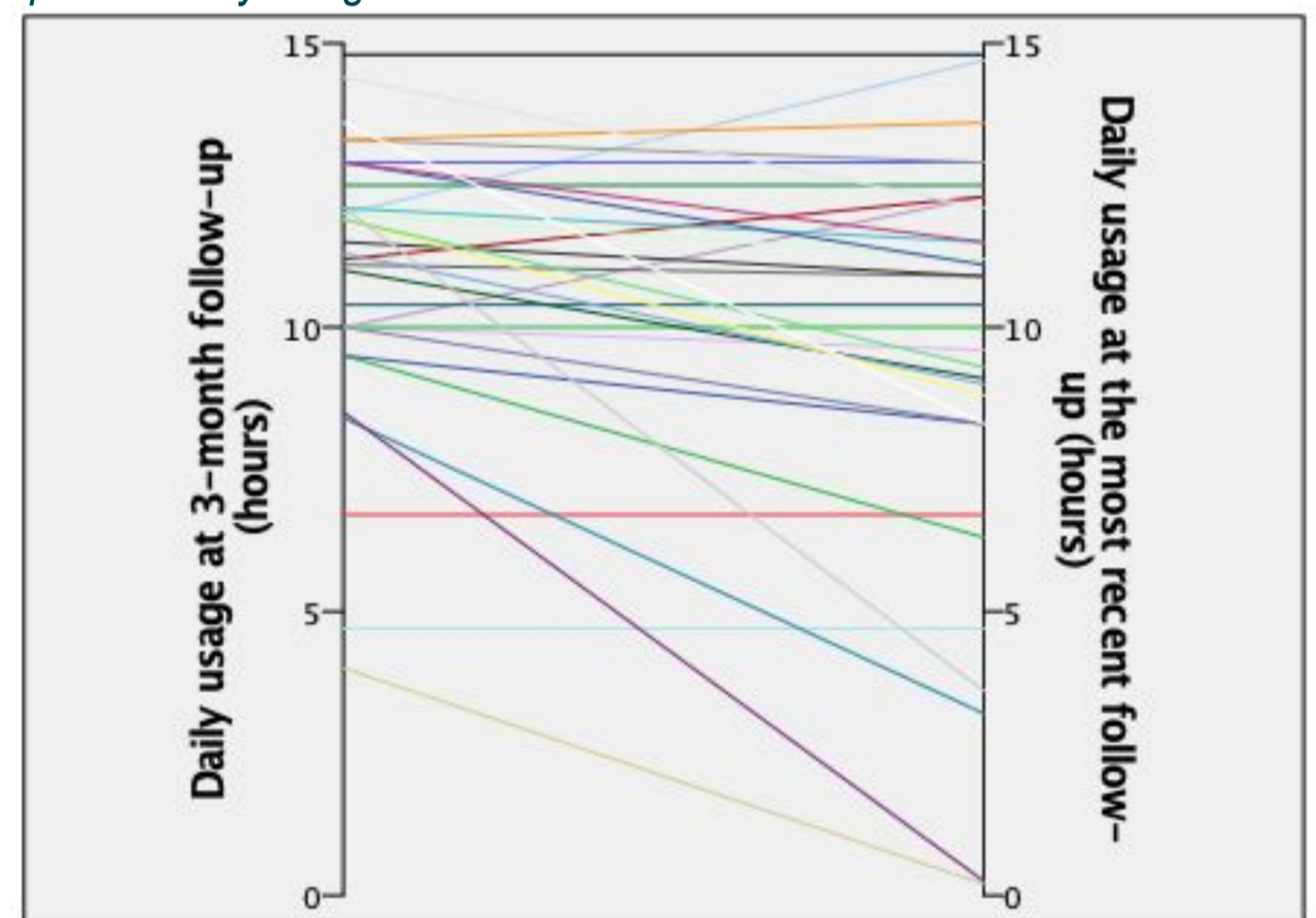
Conclusion

This study implies substantial benefit to the cohort of NT CI recipients that is not directly witnessed through speech intelligibility or speech recognition, neither of which should be used to influence decisions about implantation criteria. It also offers valuable insights of user statistics for both the assessment and rehabilitation of non-traditional recipients. NT CI candidates who are users at 3-month follow-up can expect to be and remain good long-term users, favouring listening with their CI in SiQ and quiet environments. Future studies in larger NT CI groups should focus on in-depth user statistics and the development of CI-specific subjective benefit PROMs.

List of Abbreviations: SIR – Speech Intelligibility Rating; HA – hearing aid; BKB – Bamford-Kowal-Bench sentence test; NT CI – non-traditional cochlear implant recipient; SiQ – Speech in Quiet