Clinical and socioeconomic predictors of hearing aid usage in infants aged 0-2: a single-site retrospective cohort pilot study

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Introduction

Early intervention and access to aiding is crucial for infants with hearing loss to enable speech and language acquisition within the critical period [1]. Further impacts on quality of life, socio-emotional development and early learning have also been highlighted [2].

Despite advances in the early intervention pathway, the benefits of aiding may only be realised with consistent daily usage [3]. Using datalogging values as an outcome, two studies have highlighted daily usage of the hearing aid at 4.36 hours per day (SD=3.17) for infants aged 6-24 months [4] and infants aged 0-4 as 5 hours per day [5].

Lower socioeconomic status and maternal education levels are linked to low infant device usage [6]. Much of the literature which explores parent-reported challenges to optimal hearing aid use focuses on situational and practical aspects of daily use [7,8] but often fails to capture cultural, linguistic and social barriers.

Aims

1. To quantify average hearing aid use in infants aged 0-2 within our patient cohort through collection of datalogging values.

2. To investigate whether hearing aid use time increases within the first two years in infants fitted aged 0-2.

3. To assess the feasibility of collecting datalogging, and clinical and sociodemographic information to explore associations with hearing aid use.

4. To collect data which can inform a sample size calculation for a larger multicentre study with the aim of highlighting patients and families which are at higher risk of low hearing aid usage.

Methods and Materials

A retrospective review of records was performed on 96 patients aged 0-2 who met the inclusion criteria. They were fitted with datalogging-enabled hearing aids at a single-site hospital between 2005-2022.

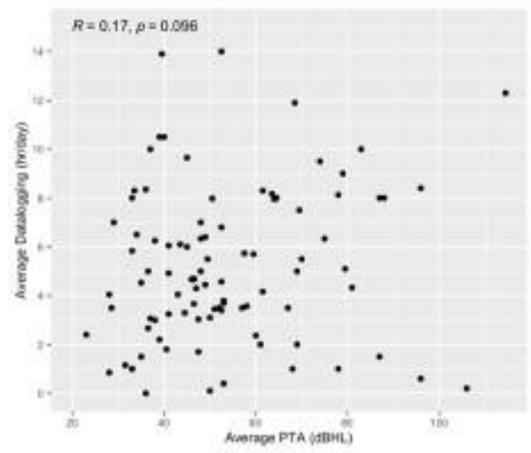
Datalogging values were collected for six different time points post fitting that coincided with their routine clinical follow-up appointments: 2 & 6 weeks, 6, 12, 18 & 24 months. Clinical and sociodemographic information including sex, average pure tone threshold, unilateral vs bilateral use, additional disabilities, Index of Multiple Deprivation, Income Decile, Education and Skills Decile, Income Deprivation Affecting Children Index (IDACI), ethnicity and home language was collected.

The Shapiro-Wilk test found results to be non-normally distributed. Median, interquartile ranges and extreme values are therefore presented. Categorical clinical and socioeconomic variables were dichotomised due to the small sample size and analysed against average datalogging values using Wilcoxon Rank-Sum testing. Spearman's correlation was performed to assess an association between continuous variables.

Results

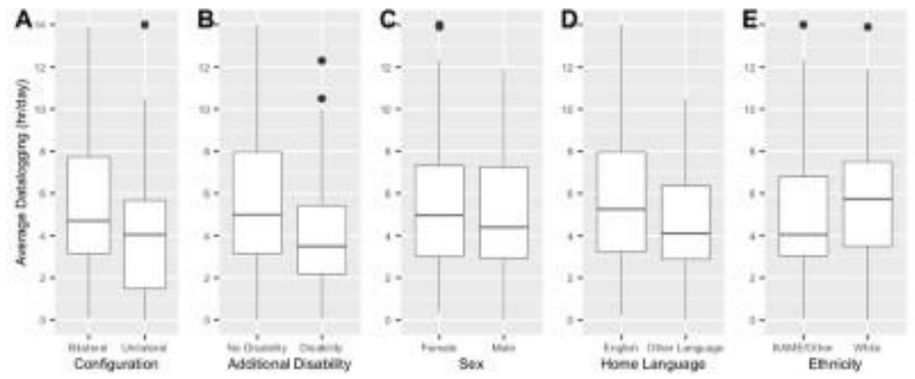
The datalogging results indicated a median average of 4.67 hours (3.0-7.3) hours per day use across patients and across the first two years post-fitting. Differences in datalogging according to IDACI Decile was significant (p=0.01), suggesting that infants from the more deprived groups (1-5) used their devices less. All other predictors did not reach statistical significance. There was insufficient data to investigate change in hearing aid use over the first two years post-fitting.

Figure 1



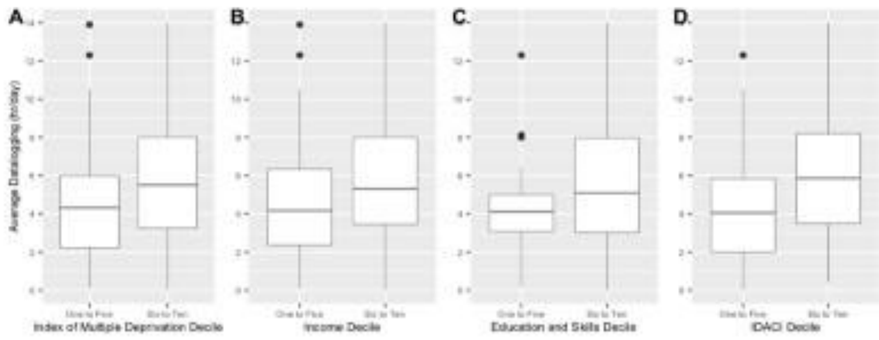
Correlation between average datalogging values and average pure tone threshold

Figure 2



Datalogging values by categorical clinical and sociodemographic variable: (A) lateral configuration, (B) additional disability, (C) sex, (D) home language, (E) ethnicity.

Figure 3



Datalogging values by Deprivation Decile: (A) Index of Multiple Deprivation (IMD) (B) Income Decile (C) Education and Skills Decile (D) Income Decile Affecting Children Decile (IDACI)

Discussion and Conclusion

There were significant amounts of missing datalogging information. Some missing data was attributed by the clinical teams to lost hearing aids or unattended appointments. It is also believed that time restraints in clinic are the primary barrier.

Hearing aid use is lower than considered optimal for 0-2 year olds with permanent childhood deafness. IDACI Decile was a related factor, indicating that infants from more deprived backgrounds may achieve lower hearing aid usage than those from the lesser deprived regions. This finding needs to be verified on a larger scale and better understood to explore potential approaches to overcome the problems.