

Cochlear Implant Decision Making Study

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Outline

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Introduction

CI

A cochlear implant is an electronic device that can help a person who is profoundly deaf or hard of hearing to improve their hearing (NIH, 2011)



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Introduction Continued...

- Spatial hearing
- Monaural/Binaural hearing
- HINT test
- PTA test
- Groups(I, II, III, IV)



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Objectives

First

Detect whether one cochlear implant (CI) or two CIs are needed in a patient in order to validate theoretical guidelines for CI selection strategies from Perreau et al (2007)

Second

Optimize the candidacy process for binaural and monaural cochlear implantation



Methodology

• The study tested 311 patients with cochlear implants at the University of Iowa Hospital and Clinics

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- One implant
- Two implants
- Data Reformation
- SAS version 9.3
- Correlations (Zero Order)
- Logistic Regression:
 - $\bullet \ 0 = 1 \ \text{Cls}$
 - 1 = 2 Cls

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Logistic Regression Model

Status = -1.91 + 0.03 * maxPTA + 0.01 * maxHINT-0.15 * eduYears + 0.02 * implantAge

- maxPTA = worse ear PTA score
- maxHINT = maximum ear HINT score
- eduYears = number of years of education
- implantAge = subjects age in which the implantation cochlear implant was received

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- Based on the data used, this study found that our model can be significantly determined by the explanatory variables:
 - the worse ear score in the pure tone audiometry (PTA) test (p-value = 0.0390)
 - years of education (p-value = 0.0094)

• Resulting in 67% precision

Results Continued...

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Goodness of Fit

- Percent concordant: 67.4
- Percent discordant: 32.6
- C: 0.674



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- The membership of the CIs can possibly be predicted by the variables:
 - worse PTA

Conclusions

- years of education
- More analysis is needed
- Include more variables in the analysis, to project a better response of the cochlear implant selection



- Perform a discriminant analysis to confirm results for logistic analysis.
- Add the variables,
 - duration of deafness
 - years of hearing aid use

• Compare their pre-implant unilateral data to bilateral data



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