

# Borderline Cochlear Implant (CI) candidacy: Comparing speech perception outcomes of implanted vs. non-implanted adult patients

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## Aim

To compare the speech perception outcomes of patients falling just inside of new NICE CI audiometric criteria with those just outside; asking is it likely for patients currently just outside of criteria to also benefit from a CI?

## Rationale

There is some evidence that individuals with greater residual auditory function have potential for improved functional speech benefit following CI. Therefore, comparing results between patients either side of criteria could predict likely outcomes in borderline cases.

## Method

A retrospective longitudinal comparison of pre-operative and post-operative speech outcomes for adult patients assessed for a CI at St. Thomas' Hearing Implant Centre was carried out between April 2018 and March 2020.

Inclusion Criteria	Exclusion Criteria
PTA responses at 0.5, 1, 2, 3 and 4 kHz: • Non-implanted group: 2 points $\geq$ 70dB HL, outside NICE criteria • Implanted group: worst 2 points $\leq$ 90dB HL, within NICE criteria	• Pre-lingual hearing loss (HL) aka speech intelligibility rating < 5 • Insufficient English language fluency • Potential neuropathy (NF2/ Meningitis/ ANSD) • Asymmetric HL (if worse ear implanted) • Significant (> 20 dB) conductive element

## Results

Demographics		
	Implanted	Non-Implanted
Group Number	N = 21	N = 16
Mean Age	61 Years	65 Years
Sex	12 Male 9 Female	10 Male 6 Female
Mean 4 Fq HL (Best Ear)	81.6 dB HL	66.0 dB HL

Statistics	Group / Time / AB Phonemes Score	Group / Time / AB Ph Score	Significance
Ear Specific	Implanted / Pre / 20% S.D 21%	Implanted / 1W / 36% S.D 20%	p = 0.09
	Implanted / Pre / 20% S.D 21%	Implanted / 3M / 70% S.D 13%	p < 0.001
	Implanted / Pre / 20% S.D 21%	Implanted / 9M / 75% S.D 16%	p < 0.001
Time Point	Implanted / 1W / 36% S.D 20%	Implanted / 3M / 70% S.D 13%	p < 0.001
	Implanted / 3M / 70% S.D 13%	Implanted / 9M / 75% S.D 16%	p = 0.38
Non-Implanted	Implanted / 9-12M / 75% S.D 14%	Non-implanted // 63% S.D 14%	p = 0.016

## Key Points

By 12 months post-op, all implanted patients had AB score (CI only) better than their pre-op AB score (best aided)

At one week post-op, patients' AB scores (CI only) were on average as good as their pre-operative AB scores (best aided)

By 12 months post-op, implanted patients' mean AB scores (CI only) were significantly higher than the out of criteria groups AB scores (best aided)

Candidates currently outside criteria with asymmetric HL/mixed HL (with worst ear suitable for CI) likely to benefit from extended criteria

Anticipated this data will help inform future prospective RCT to look at suitability of further CI criteria relaxation

### References

- Fontenot, T. E., Giardina, C. K., Dillon, M. T., Rooth, M. A., Teagle, H. F., Park, L. R., & Fitzpatrick, D. C. (2019). Residual cochlear function in adults and children receiving cochlear implants: Correlations with speech perception outcomes. *Ear and hearing*, 40(3), 577-591.
- National Institute for Health and Care Excellence (2009). Cochlear Implants for Children and Adults with Severe to Profound Deafness. Retrieved from <https://www.nice.org.uk/guidance/ta168>
- National Institute for Health and Care Excellence (2019). Cochlear Implants for Children and Adults with Severe to Profound Deafness. Retrieved from <https://www.nice.org.uk/guidance/ta566>
- Vickers, D., Eyles, J., Brinton, J., Glasberg, B. & Graham, J. (2009). Conversion of scores between Bamford, Kowal and Bench (BKB) sentences and Arthur Boothroyd (AB) words in quiet for cochlear implant patients. *Cochlear Implants International*. 10(3), 142-149.