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A solid red square is located in the bottom left corner of the page.

Hear now. And always



When the time is right to consider different hearing technology for your patients

Terry Zwolan, Ph.D.

Cochlear Americas

Tracy Murphy, AuD

North Shore Audio-Vestibular Lab

Learning Outcomes



- After this course, participants will be able to describe the 60/60 guideline for referring patients for a cochlear implant candidacy evaluation.
- After this course, participants will be able to list outcomes typically obtained by patients after receiving a cochlear implant.
- After this course, participants will be able to describe ways to successfully counsel patients regarding the benefits of participation in a cochlear implant candidacy evaluation.

Our Mission

We help people hear and be heard.

We **empower** people to connect with others and live a full life.

We **transform** the way people understand and treat hearing loss.

We **innovate** and bring to market a range of implantable hearing solutions that deliver a lifetime of hearing outcomes.



Hear now. And always

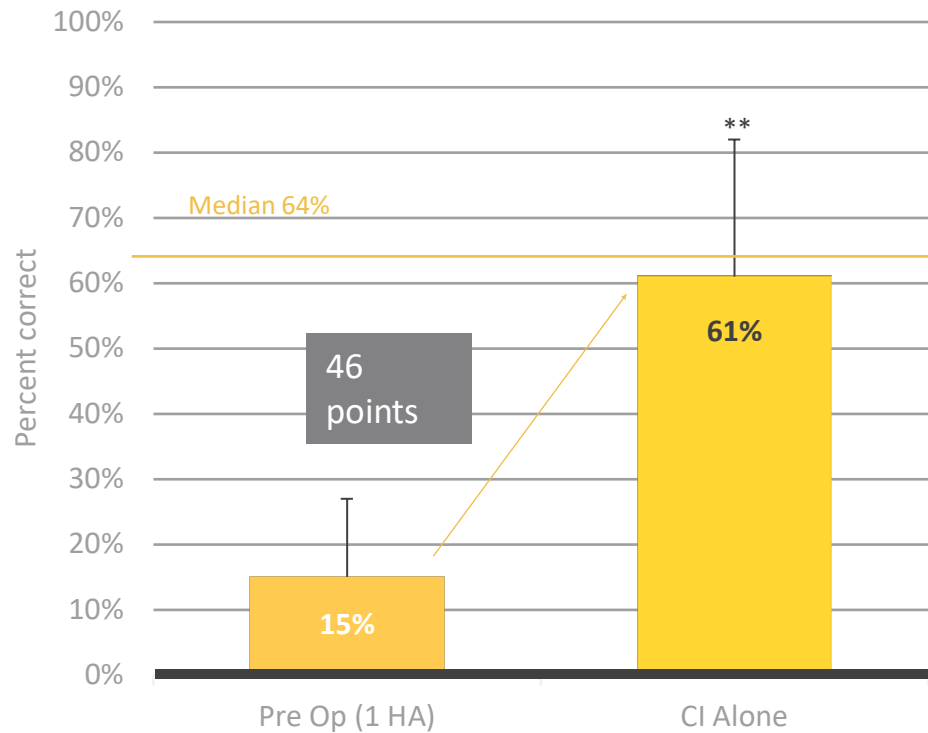


Introduction

CI Outcomes: Speech Understanding in Quiet and Noise



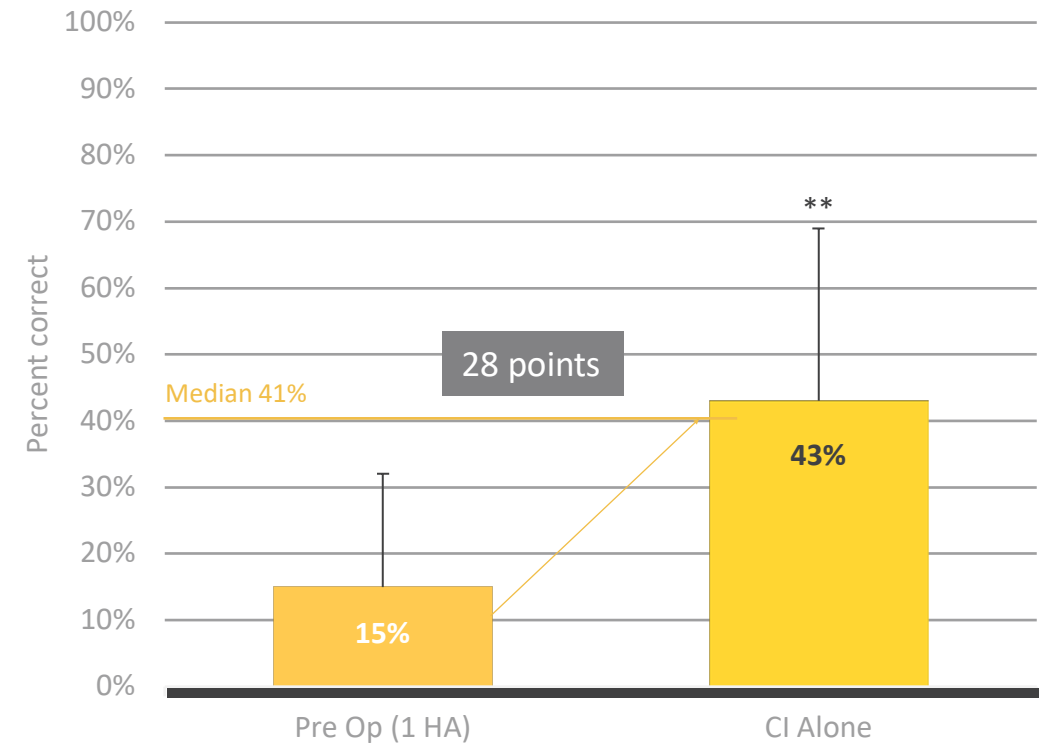
CNC Words



**p < 0.001

N=96

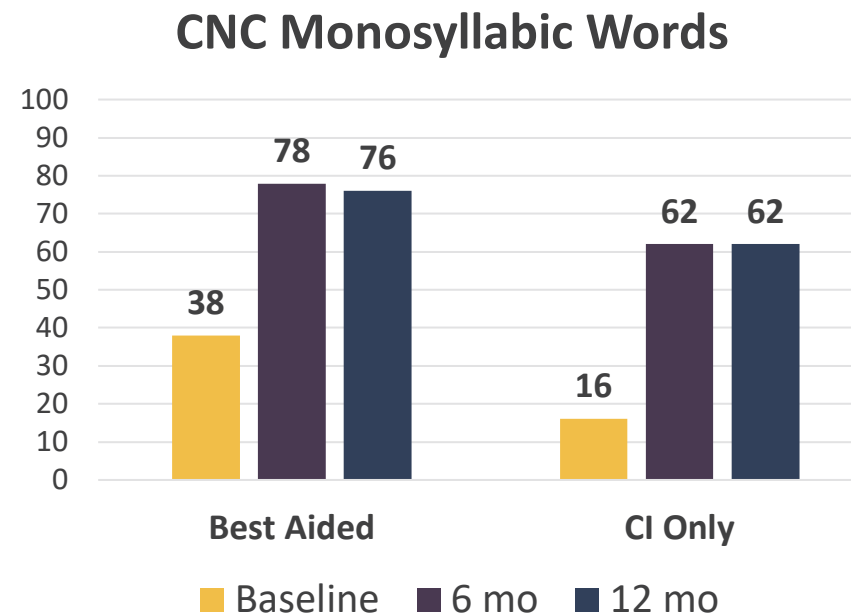
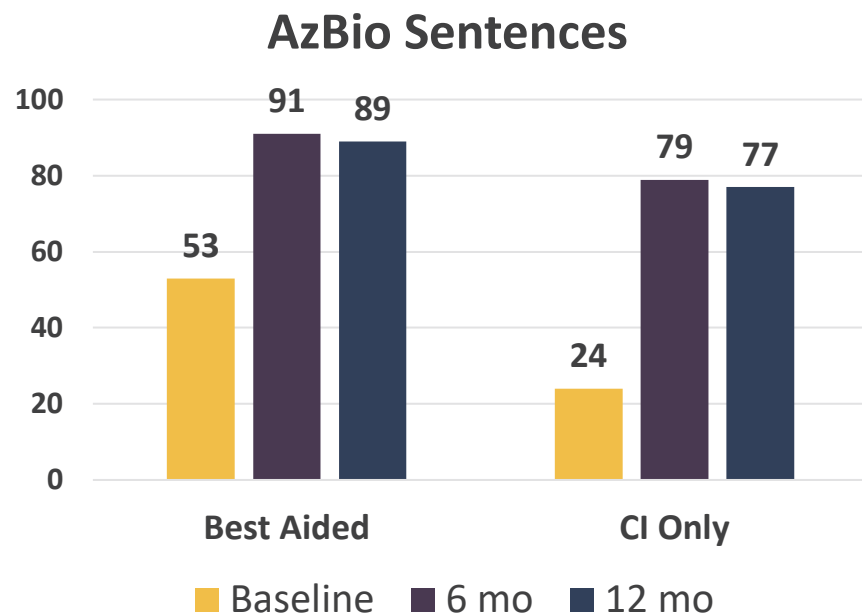
AzBio Sentences +10 dB SNR S_0N_0



**p < 0.001

CI Outcomes: Speech Understanding in Older Adults

Assessment of Cochlear Implants for Adult Medicare Beneficiaries Aged 65 Years or Older Who Meet Expanded Indications of Open-Set Sentence Recognition: A Multicenter Nonrandomized Clinical Trial (Zwolan et al, 2020)

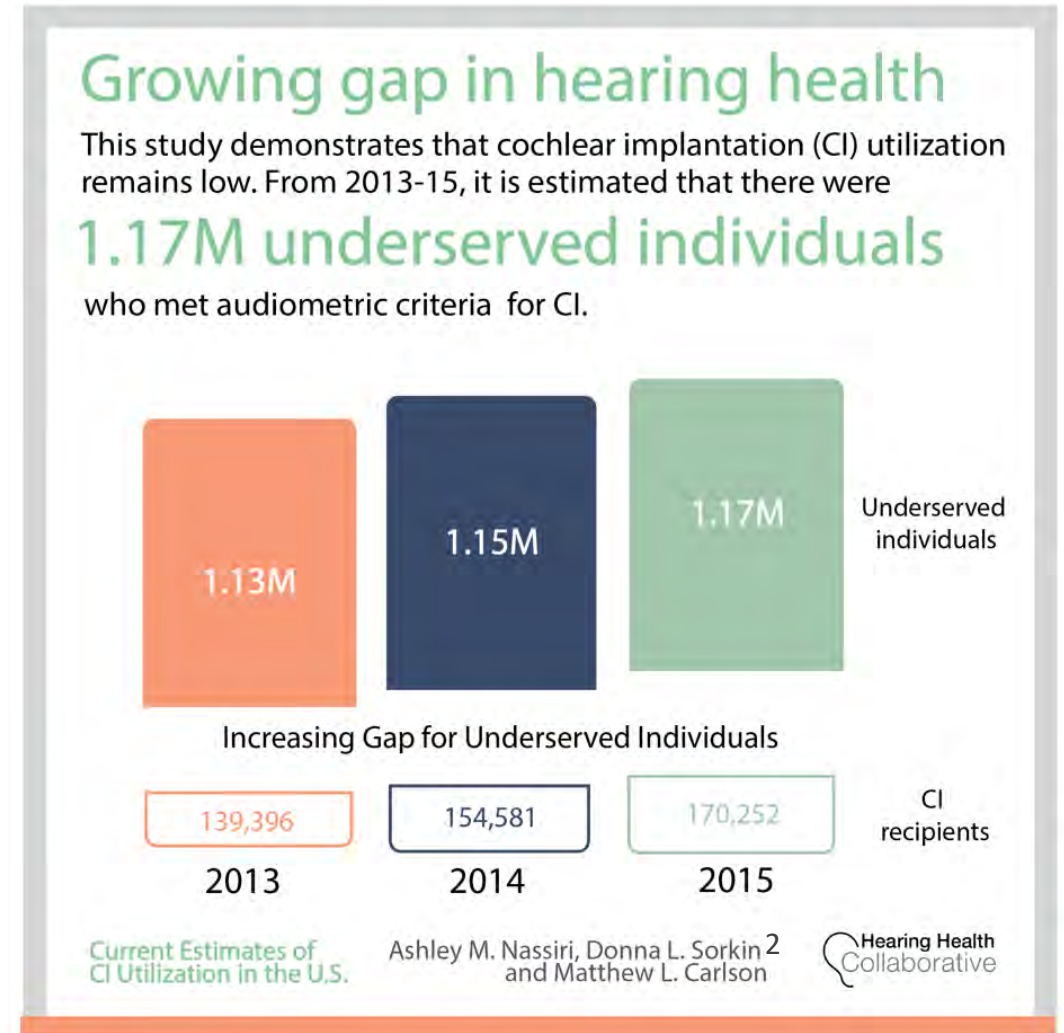


The results of this study helped expand Medicare indications to include adults who score $\leq 60\%$ on sentences

Establishing the Need

Current CI utilization rate is 2.1% ²

- ❑ < 10% of adults who qualify for a cochlear implant receive one¹
- ❑ About 50% of children who qualify for a CI in the U.S. receive one¹



1. Sorkin DL, Buchman CA. Cochlear Implant Access in Six Developed Countries. Otol Neurotol. 2016 Feb;37(2):e161-4. doi: 10.1097/MAO.0000000000000946. PMID: 26719962.

2. Nassiri AM, Sorkin DL, Carlson ML. Current Estimates of Cochlear Implant Utilization in the United States. Otol Neurotol. 2022 Jun 1;43(5):e558-e562. doi: 10.1097/MAO.0000000000003513. Epub 2022 Mar 8. PMID: 35261379.

Why are so few people being referred for CIs?

- Lack of familiarity with CI candidacy¹
- Poor communication between CI clinics and HA dispensers/diagnostic audiologists²
- Varied criteria across clinics regarding when to refer and when to recommend a CI³
- Most primary care physicians do NOT^{4,5}
 - Routinely screen patients for hearing loss,
 - Refer patients for hearing health issues, or
 - Know where to send patients if they do have issues

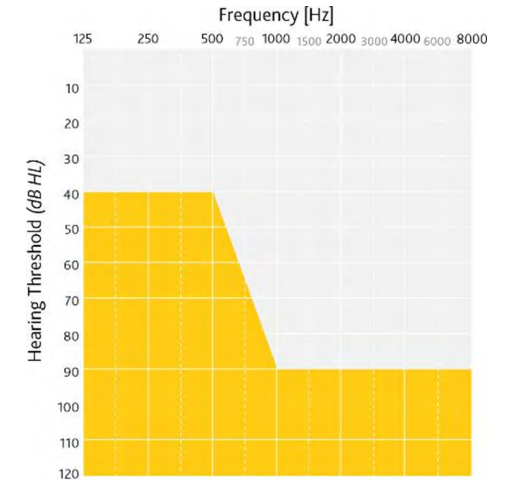
1. Sorkin DL. Cochlear implantation in the world's largest medical device market: utilization and awareness of cochlear implants in the United States. *Cochlear Implants Int.* 2013 Mar;14 Suppl 1(Suppl 1):S4-12. doi: 10.1179/1467010013z.00000000076. PMID: 23453146; PMCID: PMC3663290. Appelbaum EN, Yoo SS, Perera RA, Coelho DH. *Duration of eligibility prior to cochlear implantation: have we made any progress?* *Otol Neurotol* 2017; 38: 1273-77.
2. WHO (2021). World Report on Hearing. Available at <https://www.who.int/publications/i/item/world-report-on-hearing>, accessed February 2022.
3. Nassiri AM, Marinelli JP, Sorkin DL, Carlson ML. Barriers to Adult Cochlear Implant Care in the United States: An Analysis of Health Care Delivery. *Semin Hear.* 2021 Dec 9;42(4):311-320. doi: 10.1055/s-0041-1739281. PMID: 34912159; PMCID: PMC8660164.
4. Sorkin DL, Buchman CA. Cochlear Implant Access in Six Developed Countries. *Otol Neurotol.* 2016 Feb;37(2):e161-4. doi: 10.1097/MAO.0000000000000946. PMID: 26719962.
5. Cohen SM, Labadie RF, Haynes DS. Primary care approach to hearing loss: the hidden disability. *Ear Nose Throat J* 2005; 84: 26-31, 44.



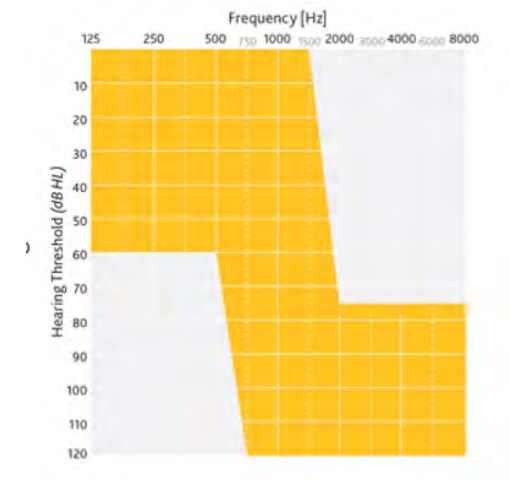
Adult Indications for Nucleus® Cochlear Implants



Nucleus Cochlear Implants are intended for use in adults who have bilateral moderate to profound sensorineural hearing impairment and obtain limited benefit from appropriately fit bilateral hearing aids.



The Nucleus Hybrid L24 cochlear implant system is indicated for unilateral use in patients aged 18 years and older who have residual low-frequency hearing sensitivity and severe to profound high-frequency sensorineural hearing loss and who obtain limited benefit from appropriately fit bilateral hearing aids.^



^The Acoustic Component should only be used when behavioral audiometric thresholds can be obtained and the recipient can provide feedback regarding sound quality. The Hybrid L24 Implant is approved in the US for adults 18 and older for unilateral use only.

Single Sided Deafness (SSD)

Nucleus Indications* for Single Sided Deafness: (5 years +)

Ear to be implanted:

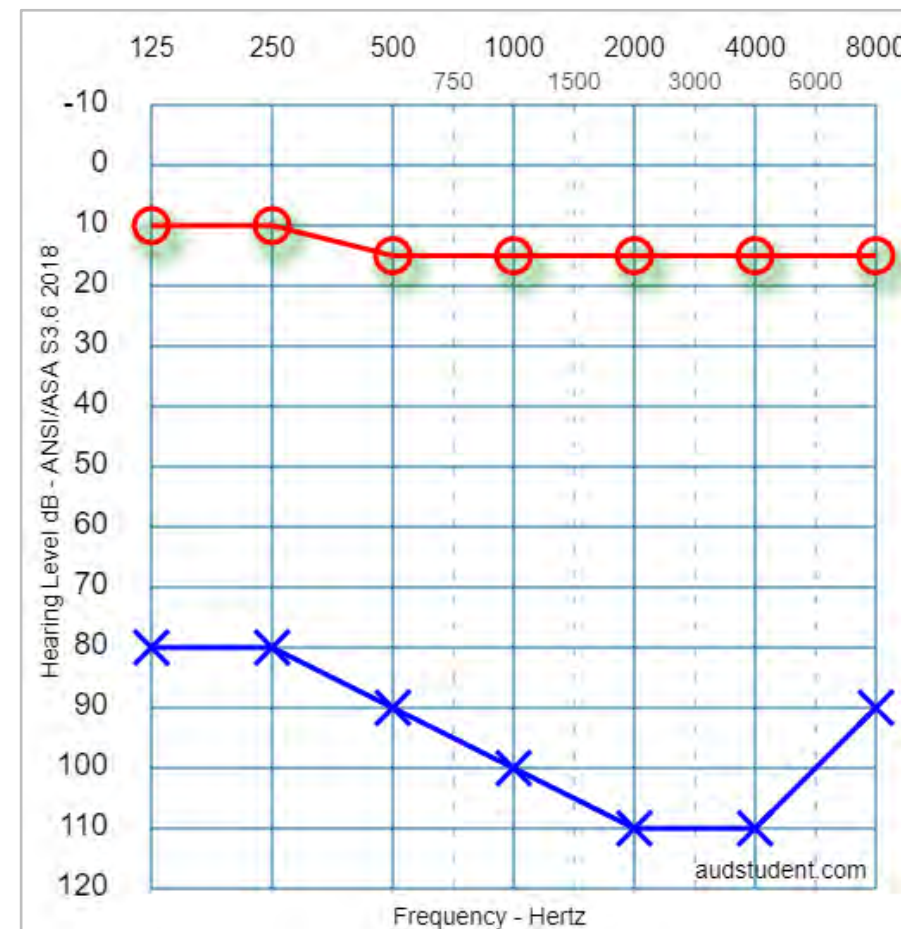
Severe to profound sensorineural hearing loss defined as:

Pure-tone average at .5, 1, 2, 4 kHz >80 dB HL

Aided CNC word score or developmentally appropriate
word test $\leq 5\%$

Contralateral Ear:

Normal or near normal hearing defined as: Pure-tone
average at .5, 1, 2, 4 kHz ≤ 30 dB HL



Health Benefits of Earlier Implantation



Shorter duration of severe to profound hearing loss in the implanted ear was shown to be a predictor of better hearing outcomes¹

Reduced social isolation²

Improved overall health³

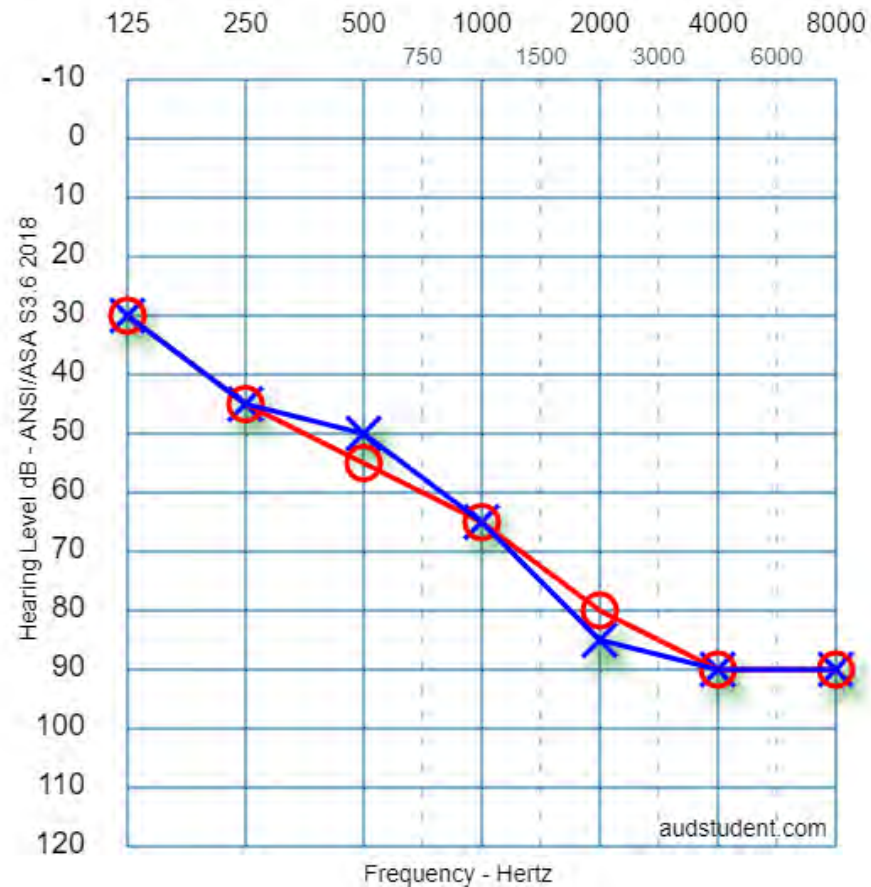
Improved verbal and memory functions⁴

Better hearing outcomes correlated with duration of hearing loss, speech understanding before cochlear implantation and the amount of residual hearing⁵

1. Plant K, McDermott H, van Hoesel R, Dawson P, Cowan R. Factors Predicting Postoperative Unilateral and Bilateral Speech Recognition in Adult Cochlear Implant Recipients with Acoustic Hearing. *Ear Hear.* 2016 Mar-Apr;37(2):153-63. doi: 10.1097/AUD.0000000000000233. PMID: 26462170.
2. Castiglione A, Benatti A, Velardita C, Favaro D, Padoan E, Severi D, Pagliaro M, Bovo R, Vallesi A, Gabelli C, Martini A. Aging, Cognitive Decline and Hearing Loss: Effects of Auditory Rehabilitation and Training with Hearing Aids and Cochlear Implants on Cognitive Function and Depression among Older Adults. *Audiol Neurotol.* 2016;21 Suppl 1:21-28. doi: 10.1159/000448350. Epub 2016 Nov 3. PMID: 27806352.
3. Manrique-Huarte R, Calavia D, Huarte Irujo A, Girón L, Manrique-Rodríguez M. Treatment for Hearing Loss among the Elderly: Auditory Outcomes and Impact on Quality of Life. *Audiol Neurotol.* 2016;21 Suppl 1:29-35. doi: 10.1159/000448352. Epub 2016 Nov 3. PMID: 27806353.
4. Cosetti MK, Pinkston JB, Flores JM, Friedmann DR, Jones CB, Roland JT Jr, Waltzman SB. Neurocognitive testing and cochlear implantation: insights into performance in older adults. *Clin Interv Aging.* 2016 May 12;11:603-13. doi: 10.2147/CIA.S100255. PMID: 27274210; PMCID: PMC4869653.
5. Derinsu U, Yüksel M, Ge?ici CR, ?iprut A, Akdeniz E. Effects of residual speech and auditory deprivation on speech perception of adult cochlear implant recipients. *Auris Nasus Larynx.* 2019 Feb;46(1):58-63. doi: 10.1016/j.anl.2018.06.006. Epub 2018 Jun 23. PMID: 29945747.

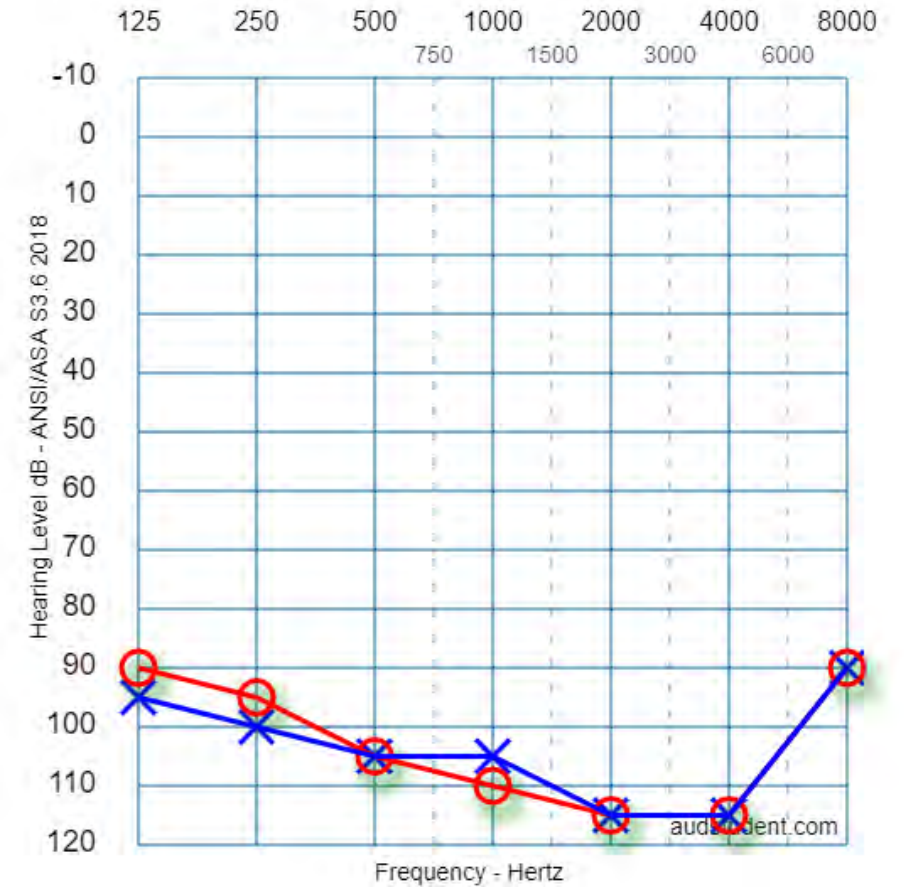
Said Another Way¹

Patient A



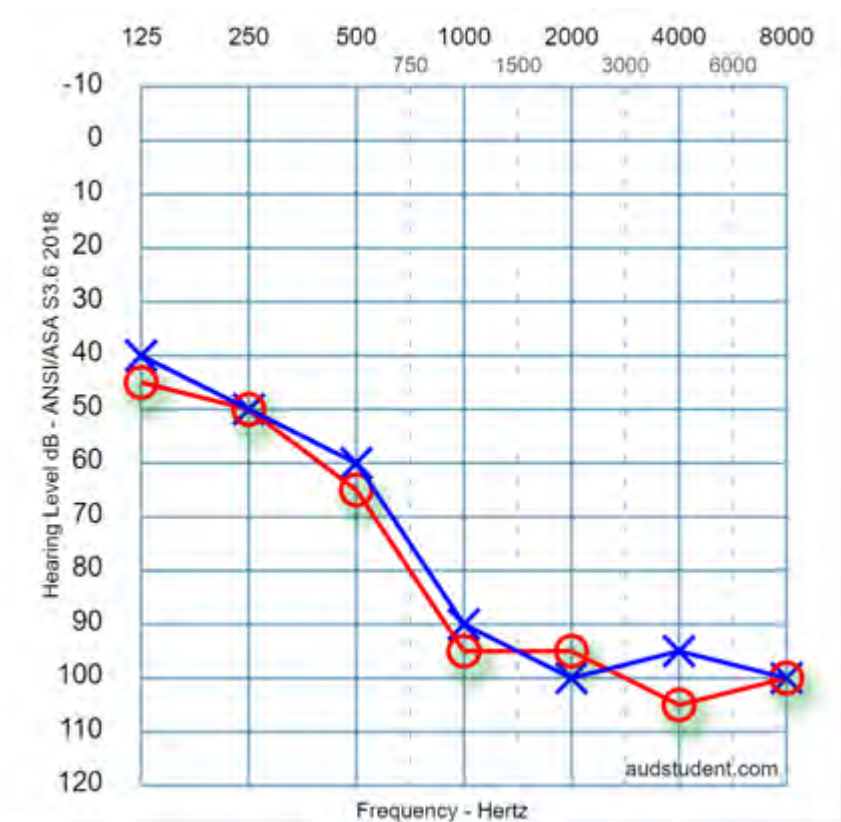
**Patient A
may do
better with
a CI than
Patient B**

Patient B



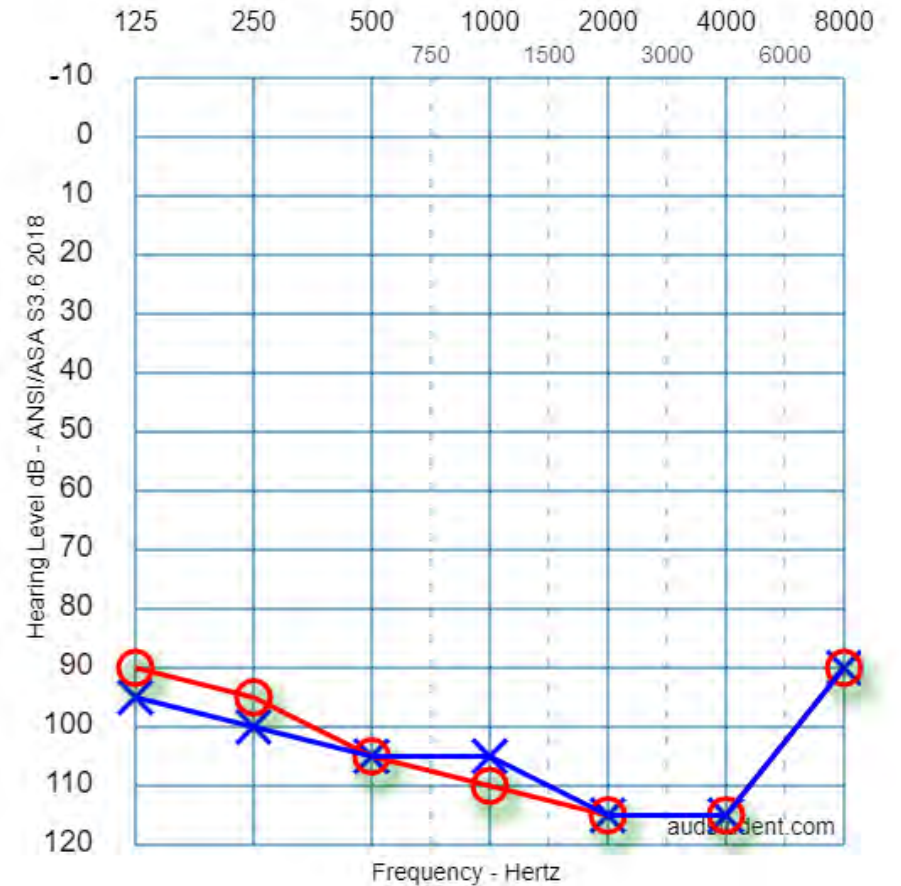
Said Another Way¹

Patient A



**Patient A
may do
better with
a CI than
Patient B**

Patient B



Audiologic Evaluation vs Cochlear Implant Evaluation

- In the United States, the standard of care for audiometric testing includes thresholds and **unaided word** recognition
- CI candidacy is based on the audiogram and **aided sentence recognition**
- Diagnostic audiologists rarely perform aided sentence recognition testing



So how **would** clinicians know when to refer?



When clinicians would ask us this, we weren't sure what to say



Development of a 60/60 Guideline for Referring Adults for a Traditional Cochlear Implant Candidacy Evaluation^{*1}

Teresa A. Zwolan, Kara C. Schwartz-Leyzac, and Terrence Pleasant

Department of Otolaryngology—Head and Neck Surgery, Michigan Medicine, Ann Arbor, Michigan

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QUESTION:

Could routine audiometric measures be used to differentiate candidates from non-candidates to determine who should be referred for a CI evaluation?

Preoperative data for 529 patients seen for a CI candidacy evaluation between 1/1/2016 and 9/30/2019

- 250 met traditional candidacy and 279 were non-candidates

Retrospectively examined

- **Unaided** thresholds for each ear (PTA)
- **Unaided** monosyllabic word recognition for each ear

*This provides a recommendation of when an adult may be referred for a cochlear implant evaluation but does not guarantee candidacy based on indications. (Only for adults). For more information on candidacy, please visit www.cochlear.us/cicandidacy

Study Definitions

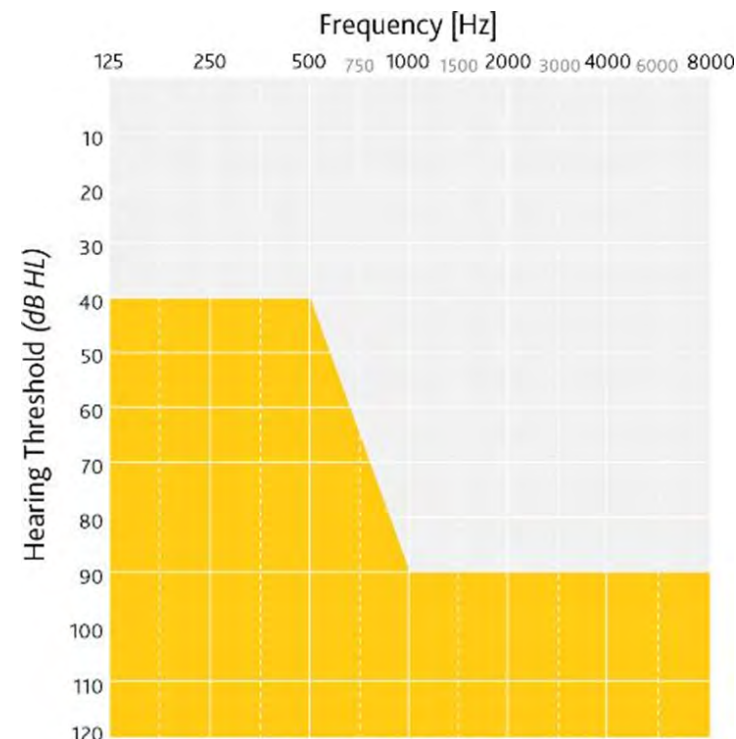
Best Aided

- Best sentence score (RE/LE/AU) obtained at a +10 dB SNR

- ✓ Bilateral moderate to profound SNHL
- ✓ Best aided sentence score $\leq 60\%$

Audiogram

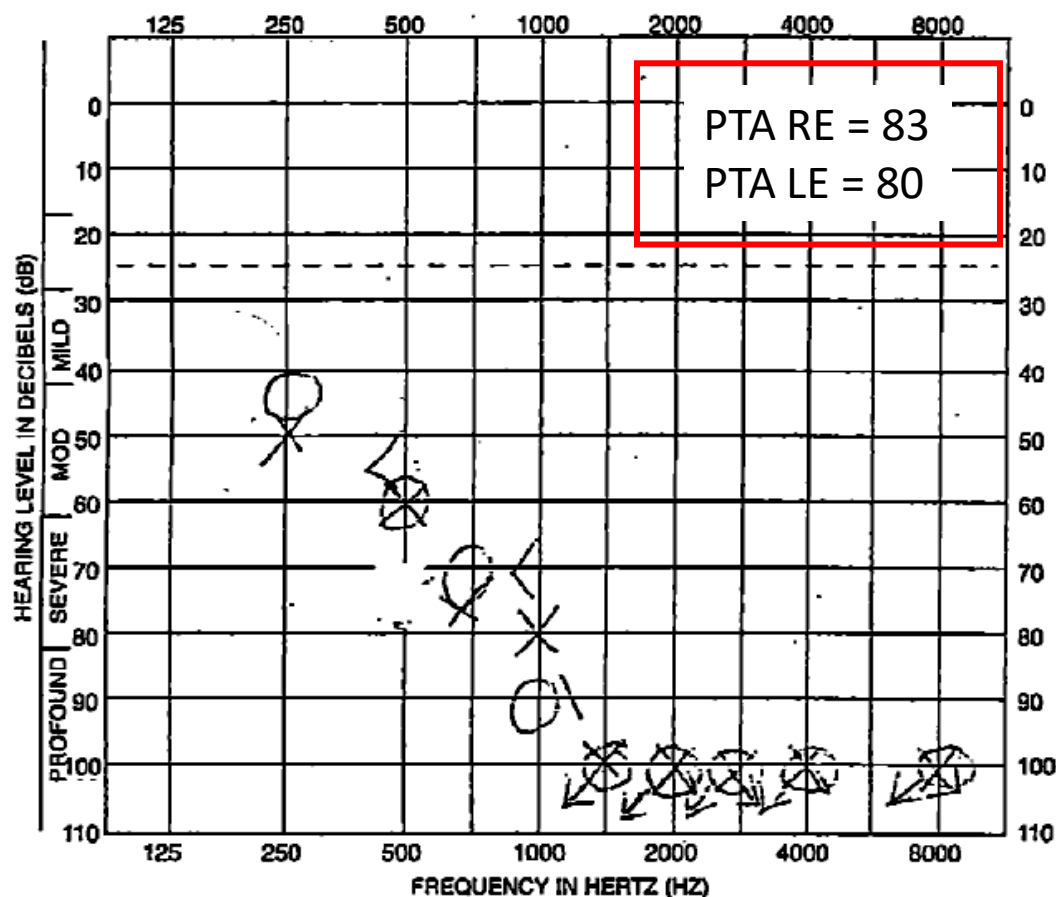
- PTA (500, 1K, 2K)
- Unaided monosyllabic word recognition score (ALL accepted including taped, MLV, NU6, CNC, CID-W22, various presentation levels)



NOTE: Not a single referral audiogram included aided sentence recognition testing

Example Study Audiogram

Test material?
Presentation live voice or recorded?



SPEECH AUDIOMETRY

Masking

	L	Ear Level	R
SRT	100		65
PB in Quiet	60%		20%
PB Level	MCL 25		MCL 25
PTA			

IMPEDANCE

	L	R
TYPE	A	A
VOL	1.5	1.2
COMP.	0.5	0.5
daPa	-10	10

TDH _____

INSERTS ☒

Symbols

	unmasked	masked
Air		
right	o	Δ
left	x	□
Bone		
right	<	5
left	>	
unspecified bone:	v	
masking dilemma:	*	

ACOUSTIC REFLEXES

IPSI	500	1000	2000	4000
LE STIM.	DNT			
RE STIM.				

OTOACOUSTIC EMISSIONS

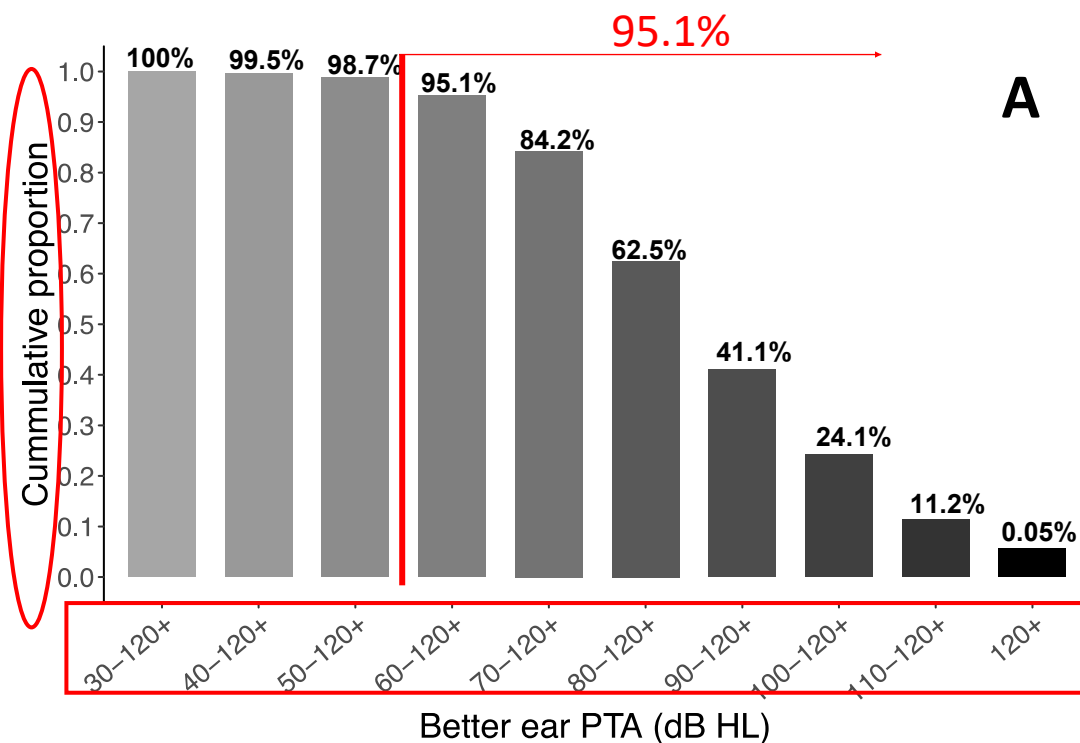
	1.5K	2K	3K	4K	5K	6K
LE	DNT					
RE						
	P=pass					R=refer

History: ☐ Subjective HL R/L

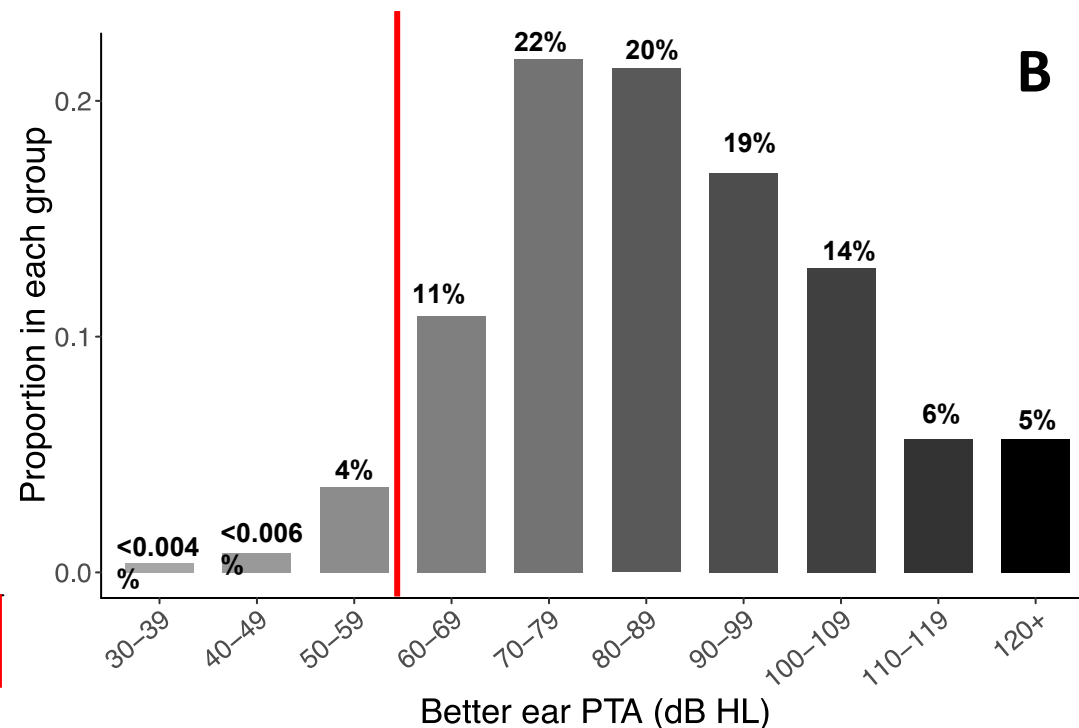
☐ Tinnitus R/L

update audis for
new hearing aids

RESULTS: Pre-operative Unaided Better Ear PTA



Cumulative percentage data

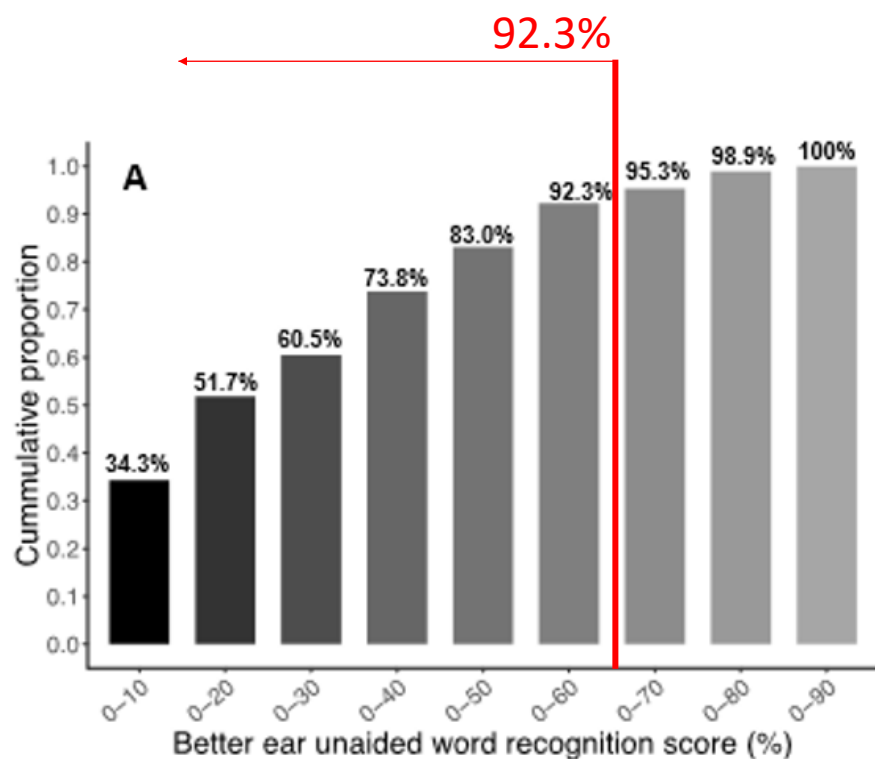


Proportion of patients with various PTAs

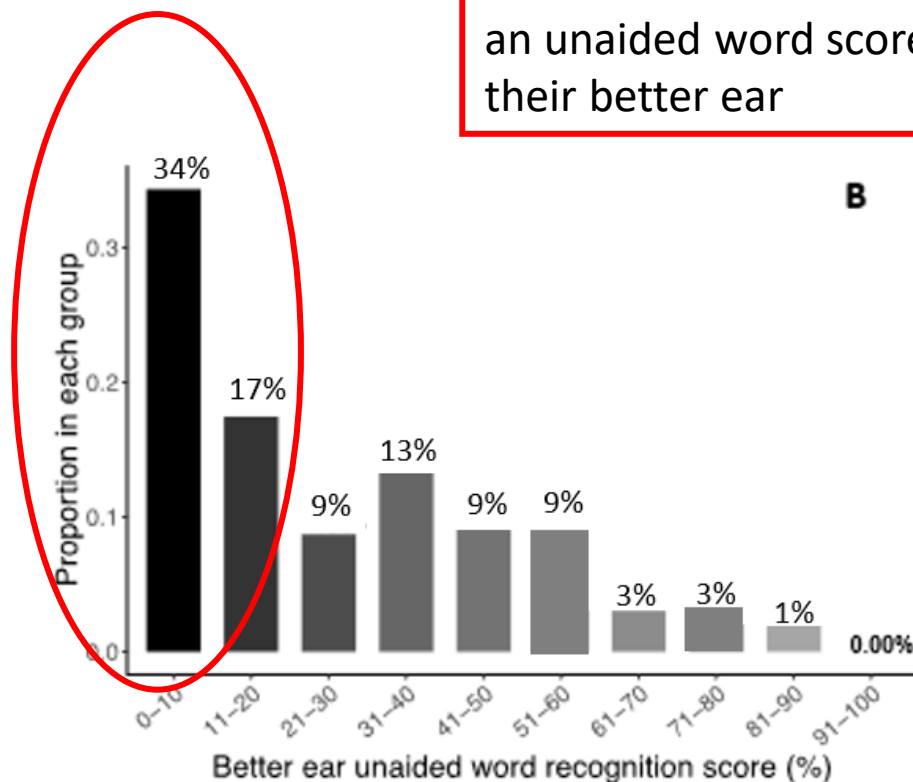
95% of patients who qualified for a CI had a better ear PTA $\geq$ 60 dB HL

N=250

RESULTS: Pre-operative Unaided Word Score - Better Ear Word



Cumulative percentage data



Proportion of patients with various word recognition scores

51% of candidates demonstrated an unaided word score $\leq 20\%$ in their better ear

92.3% of patients who qualified for a CI had a better ear word recognition score $\leq 60\%$

Hear now. And always



When to Consider a Cochlear Implant Evaluation in Adults

Audibility: Pure Tone Average (500, 1000, 2000 Hz)

Speech understanding: Unaided Word Recognition Score

6 greater than
or equal to
60dB¹
in the better
ear



6 less than
or equal to
60%¹
in the better
ear

**Patient experiences
ANY of the following:**

- ☐ Struggles to hear on the phone
- ☐ Has difficulty understanding others
- ☐ Withdraws from social events
- ☐ Often needs others to repeat themselves

How did it work to differentiate candidates versus non-candidates?



Of 415 patients with both data points:



Hit Rate

- The 60/60 referral guideline was accurate for 340/415 (82%) of the patients



Miss Rate

- 75/415 (18%) of patients were not accurately identified:
 - 8 candidates were missed
 - 67 *non-candidates* did meet the 60/60

Of the 67 non-candidates:

- Some received a CI despite not meeting traditional indications
- Many returned the following year(s) and eventually became candidates, enabling us to catch them early
- Many non-candidates returned to their referring audiologist and were motivated to purchase new hearing aids

Efficacy as a Screening Tool

	Candidate	Non-Candidate	Total	
Meets 60/60	212	67	279	PPV = 76%
Does not meet 60/60	8	128	136	NPV=94%
Total	220	195		
	Sensitivity = 212/220 (96%)	Specificity = 128/195 (66%)		

Sensitivity = the ability of the guideline to correctly classify someone as a “candidate”

Specificity = the ability of the guideline to correctly indicate someone is “not a candidate”

Efficacy as a Screening Tool

	Candidate	Non-Candidate	Total	
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Total	220	195		
	Sensitivity = 212/220 (96%)	Specificity = 128/195 (66%)		

Sensitivity = the ability of the guideline to correctly classify someone as a “candidate”

Specificity = the ability of the guideline to correctly indicate someone is “not a candidate”

Positive Predictive Value of the 60/60 Guideline



	Candidate	Non-Candidate	Total	
Meets 60/60	212	67	279	PPV = 76%
Does not meet 60/60	8	128	136	NPV=94%
Total	220	195		
	Sensitivity = 212/220 (96%)	Specificity = 67/195 (66%)		

PPV OF 76% means a patient has a 76% probability of MEETING traditional indications if they meet the 60/60 Guideline

NPV of 94% means there is a 94% probability that a patient WILL NOT meet traditional indications if they do NOT meet the 60/60 Guideline

Negative Predictive Values of the 60/60 Guideline

	Candidate	Non-Candidate	Total	
Meets 60/60	212	67	279	PPV = 76%
Does not meet 60/60	8	128	136	NPV=94%
Total	220	195		
	Sensitivity = 212/220 (96%)	Specificity = 67/195 (66%)		

PPV OF 76% means a patient has a 76% probability of MEETING traditional indications if they meet the 60/60 Guideline

NPV of 94% means there is a 94% probability that a patient WILL NOT meet traditional indications if they do NOT meet the 60/60 Guideline

As Seen in the Literature: Lee et al (2022)¹

- Assessed the clinical application of five recently published cochlear implant candidacy evaluation (CICE) referral screening tools based on CICE data obtained for 248 patients
 - Zwolan et al 60/60 (2020)²
 - Hoppe et al (2015)³
 - Gubbels et al (2017)⁴
 - Hoppe et al (2021)⁵
 - Lupo et al (2020)⁶
- 60/60 demonstrated the best overall performance on external validation (provided the best balance of sensitivity and specificity) for screening patients using both traditional and Medicare criteria
- The authors indicated support for use of the 60/60 Guideline

1. Lee DS, Herzog JA, Walia A, Firszt JB, Zhan KY, Durakovic N, Wick CC, Buchman CA, Shew MA. External Validation of Cochlear Implant Screening Tools Demonstrates Modest Generalizability. *Otol Neurotol*. 2022 Oct 1;43(9):e1000-e1007. doi: 10.1097/MAO.0000000000003678. Epub 2022 Sep 1. PMID: 36047695; PMCID: PMC9481700.
2. Zwolan TA, Schwartz-Leyzac KC, Pleasant T. Development of a 60/60 Guideline for Referring Adults for a Traditional Cochlear Implant Candidacy Evaluation . *Otol Neurotol*. 2020 Aug;41(7):895-900. doi: 10.1097/MAO.0000000000002664. PMID: 32658396.
3. Hoppe U, Hast A, Hocke T. Audiometry-Based Screening Procedure for Cochlear Implant Candidacy. *Otol Neurotol*. 2015 Jul;36(6):1001-5. doi: 10.1097/MAO.0000000000000730. PMID: 25700016.
4. Gubbels SP, Gartrell BC, Ploch JL, Hanson KD. Can routine office-based audiometry predict cochlear implant evaluation results? *Laryngoscope*. 2017 Jan;127(1):216-222. doi: 10.1002/lary.26066. Epub 2016 Oct 31. PMID: 27797418.
5. Hoppe U, Hocke T, Hast A, Iro H. Cochlear Implantation in Candidates With Moderate-to-Severe Hearing Loss and Poor Speech Perception. *Laryngoscope*. 2021 Mar;131(3):E940-E945. doi: 10.1002/lary.28771. Epub 2020 Jun 2. PMID: 32484949.
6. Lupo JE, Biever A, Kelsall DC. Comprehensive hearing aid assessment in adults with bilateral severe-profound sensorineural hearing loss who present for Cochlear implant evaluation. *Am J Otolaryngol*. 2020 Mar-Apr;41(2):102300. doi: 10.1016/j.amjoto.2019.102300. Epub 2019 Sep 11. PMID: 31761407.

As Seen in the Literature: Reddy et al (2022)¹

“Variables with the greatest capacity to accurately differentiate CI candidates from noncandidates using aided AzBio in quiet scores were

- earphone CNC WRS (AUC-ROC value = 0.73)
- earphone pure-tone threshold at 1000 Hz
- earphone PTA (AUC-ROC values = 0.86-0.88)

Based on the ROCs, a 1000 Hz PTA >50 dB HL, **(3-freq) PTA >57 dB HL**, and a **monosyllabic WRS <60%** can each serve as individual indicators for referral for CI evaluations.”

NOTE: Receiver operating characteristic (ROC) is used to assess the diagnostic performance of a test²

1. Reddy P, Dornhoffer JR, Camposeo EL, Dubno JR, McRackan TR. Using Clinical Audiologic Measures to Determine Cochlear Implant Candidacy. *Audiol Neurotol*. 2022;27(3):235-242. doi: 10.1159/000520077. Epub 2022 Jan 17. PMID: 35038700; PMCID: PMC9133005.

2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8831439/#:~:text=The%20ROC%20curve%20is%20used,or%20absence%20of%20a%20disease>. Accessed 6/12/2023

Some say the 60/60 is too stringent¹

- The recently released MSTB-3 recommends basing candidacy on the best aided scores of the ***ear to be implanted*** (and not the bilateral best aided score). Thus, the 60/60 may miss potential candidates.
- Some researchers recommend referral when WRS <60% **OR** PTA > 60 dB HL in either ear.¹
- Clinics who utilize a +5 SNR for sentences will have a higher hit rate and a lower miss rate with the 60/60 because the 60/60 is based on a +10 SNR

Importance of Speech Testing Parameters

	Preoperative Best Unaided Word Score (%)	Preoperative Best Aided Word Score (%)
Candidates		
Mean (SD)	25.47 (23.0)	16.88 (17.1)
N	196	219
Min-max	0-88	0-76
Non-candidates		
Mean(SD)	56.25 (23.9)	48.31 (24)
N	195	203
Min-max	0-100	0-100

In the 60/60 study, mean *unaided* scores were higher than mean *aided* word scores

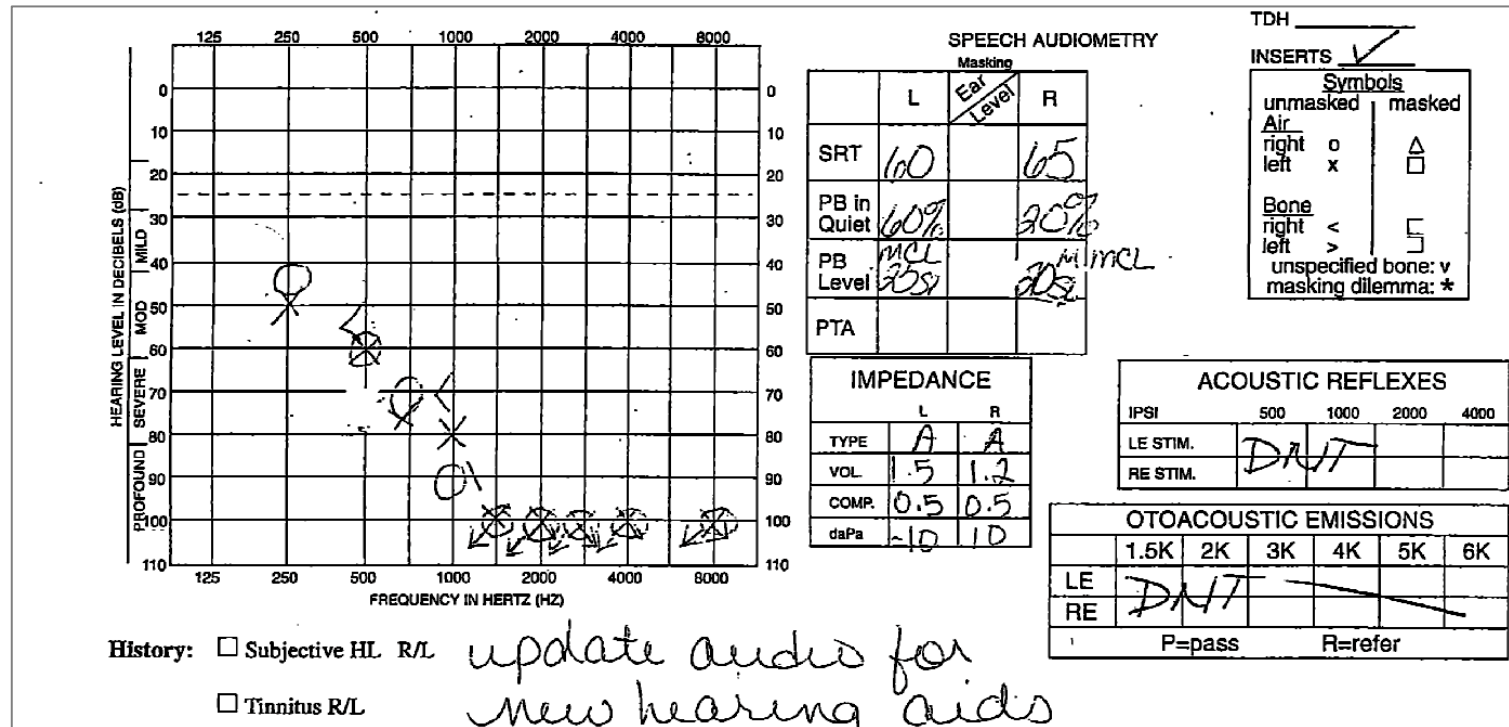
Patients tend to score higher with unaided testing due to use of a loud presentation level, often live voice testing, etc,)

Hear now. And always



Examples of Candidate Referrals

Patient #1



PTA

RE 83

LE 80

WRS

RE
60%

LE
20%

Patient #1

SPEECH AUDIOMETRY			
Masking			
	L	Ear Level	R
SRT	60		65
PB In Quiet	60%		20%
PB Level	MCL 25		MCL 25
PTA			

Unaided words scores are often higher than CNC scores due to presentation level and use of live voice

	CNC	AzBio	AzBio +10 dB SNR
Preop RE Aided	8%	24%	
Preop LE Aided	24%	24%	
Preop Bilateral Aided	DNT	28%	
1 yr post right CI	82%	98%	44%
1 year post bimodal (right CI + left HA)	DNT	DNT	79%

Patient #2



Health System

Physician

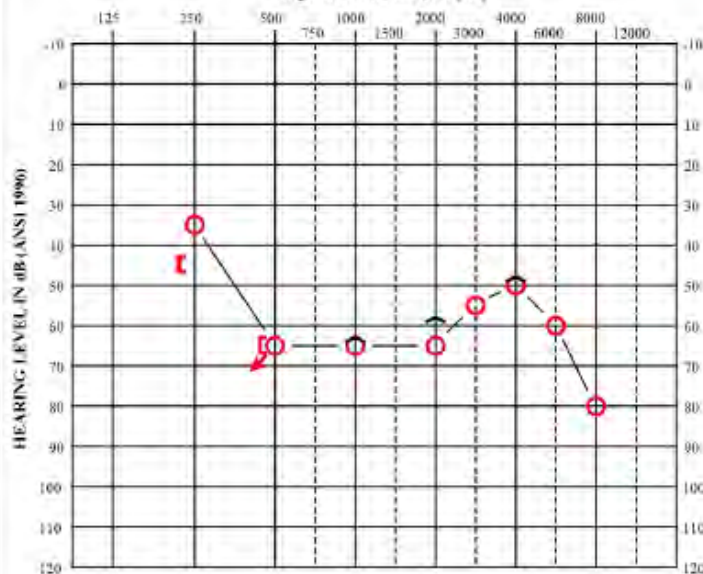
Date of Service

11/17/2020

☐ ONIHL

RIGHT EAR

FREQUENCY IN HERTZ (Hz)



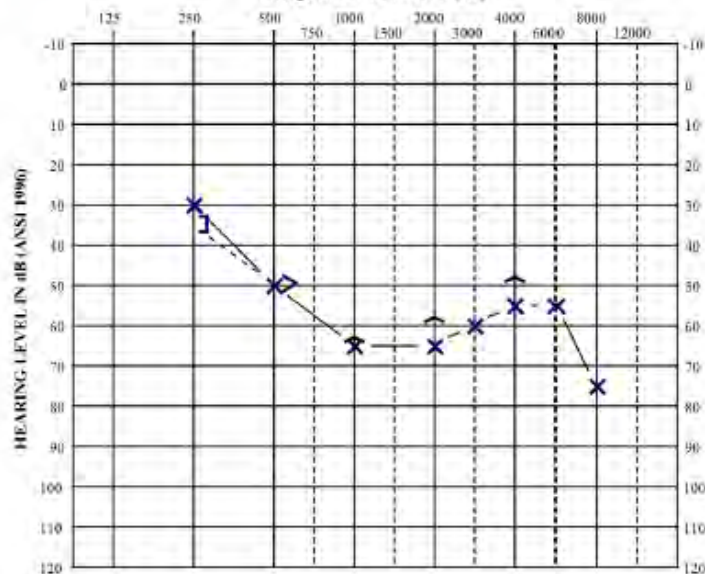
SPEECH AUDIOMETRY

* = Masked

R	SRT	SDT	%	NL	MASK	LIST
	60		48	85	55	NU 6 by difficulty List 2 /

LEFT EAR

FREQUENCY IN HERTZ (Hz)



SPEECH AUDIOMETRY

* = Masked

L	SRT	SDT	%	NL	MASK	LIST
	55		48	85	55	NU 6 by difficulty List 3 /

PTA

RE 65

LE 60

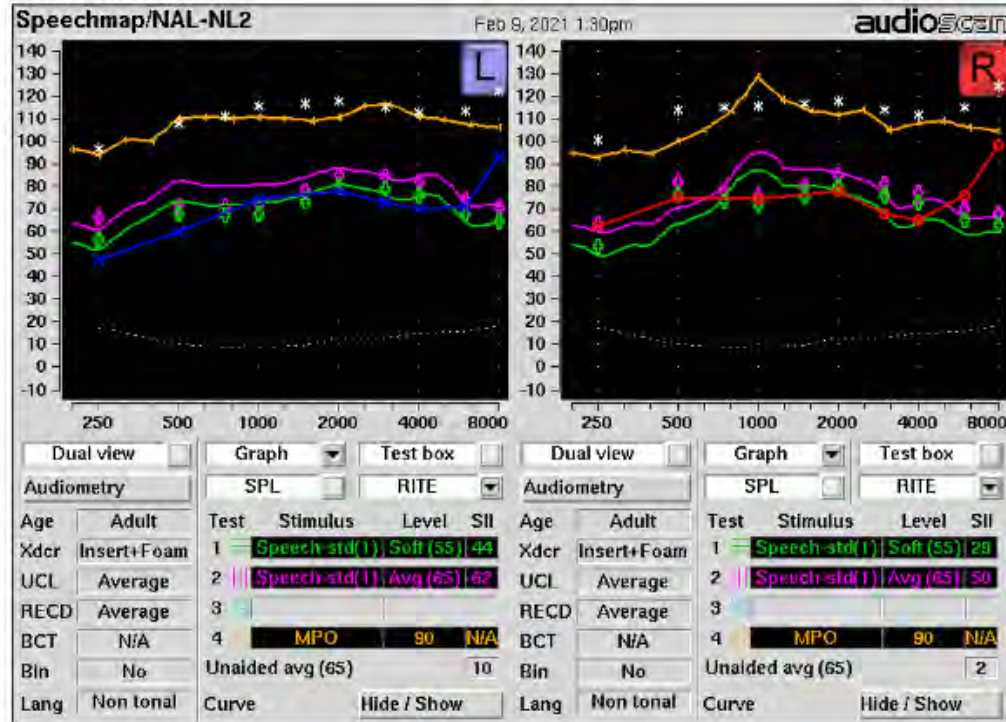
WRS

RE
48%

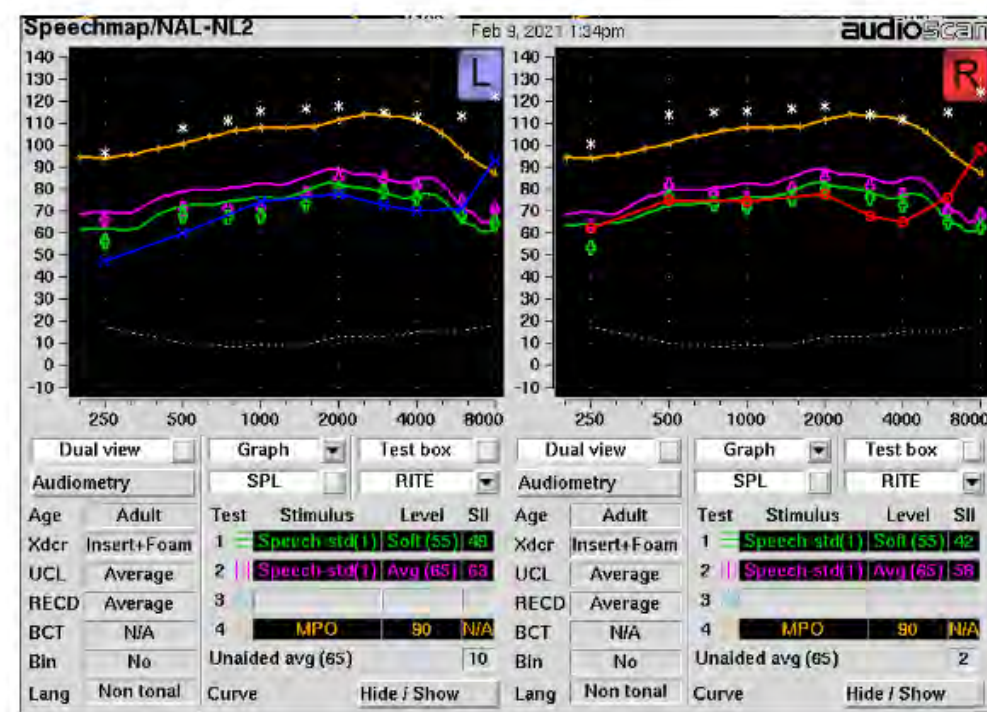
LE
48%

Patient #2

Personal Aids:



Clinic Aids:

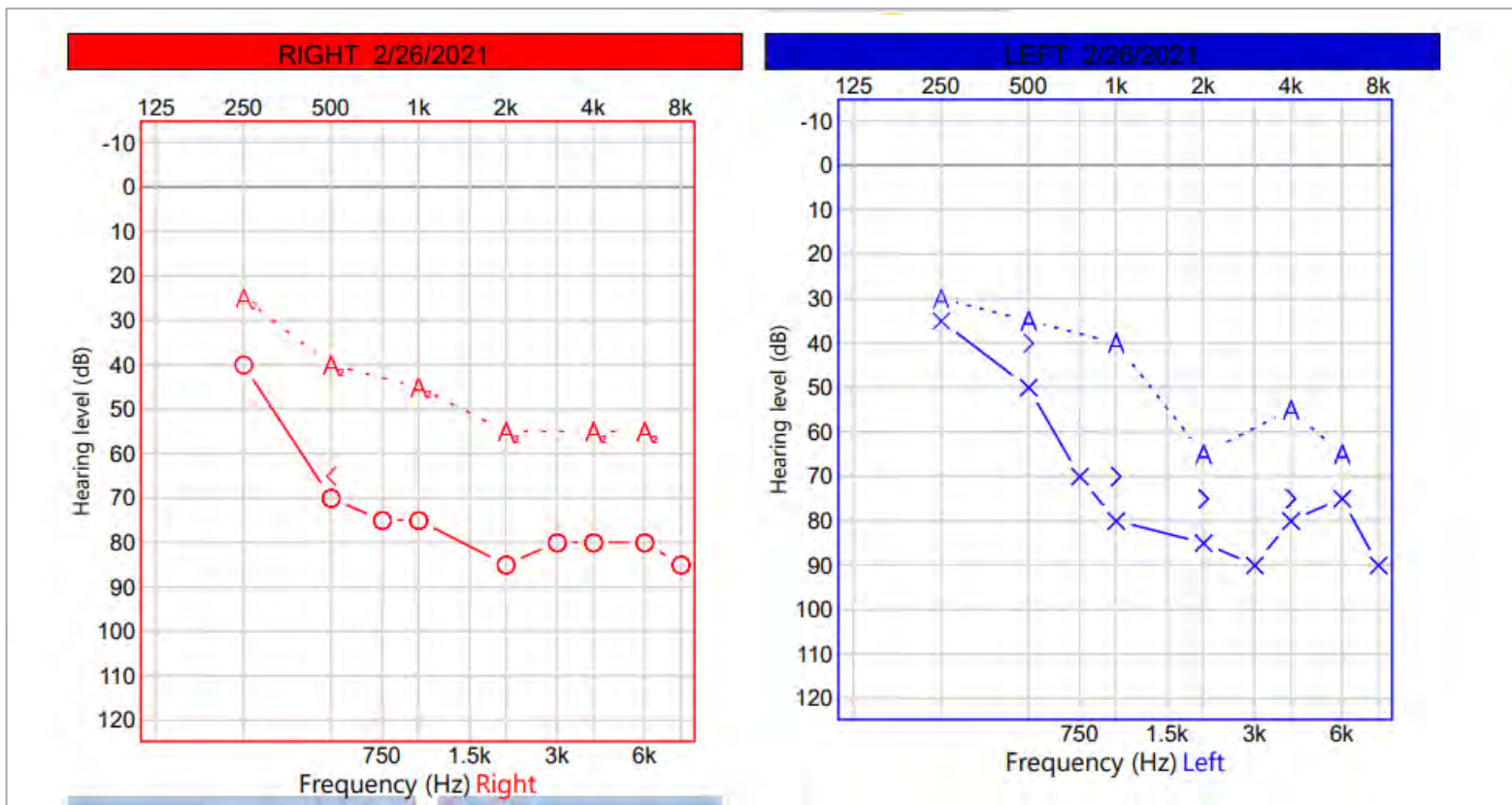


AIDED EVALUATION: Aided hearing thresholds were assessed using the patient's personal amplification and clinic Phonak B90 BTE hearing aids set to today's audiometric results using NAL-NL first fit.. Please see scanned audiograms for complete functional gain results. Speech perception was evaluated in the soundfield using the AzBio -sentences and the CNC monosyllabic words in quiet and at a +10 signal-to-noise ratio, presented via CD recording. Results are as follows:

	CNC	AzBio	AzBio +10SNR
Right Aided	11/25 = 44%	121/139 = 87%	DNT
Left Aided	15/25 = 60%	110/136 = 81%	DNT
Bilateral Aided (clinic aids)	DNT	116/146 = 80%	100/137 = 73%
Bilateral Aided (personal aids)	DNT	DNT	69/145 = 48%

- Patient was referred back to dispensing audiologist with a recommendation to consider reprogramming or replacement of hearing aids.

Patient #3



PTA

RE 77

LE 72

WRS

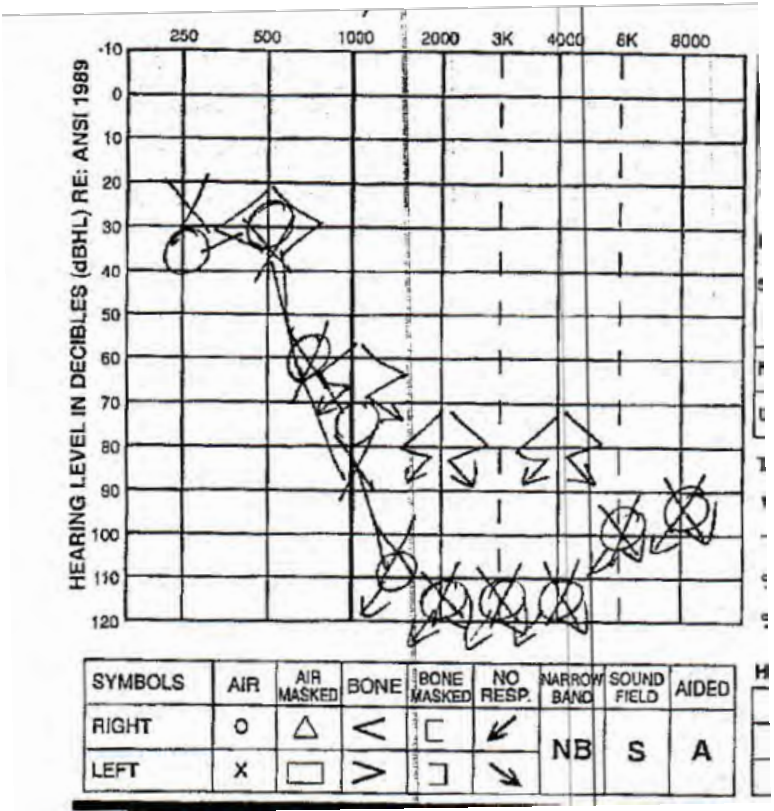
RE
52%

LE
56%

Patient #3: CICE and Follow Up

CI Candidacy Evaluation	Left Ear	Right Ear	Two Ears
Preop CNC Words	26%	36%	
Preop AZ Bio (Quiet)	19%	20%	
Preop AZ Bio +10 dB SNR			48%
Post CNC Words	42%	92%	
Post AzBio (Quiet)			97%
Post AzBio (+10 dB SNR)			76%

Patient #4



PTA

RE 53

LE 60

WRS

RE 24%

LE 36%

Patient #3: CICE and Follow Up



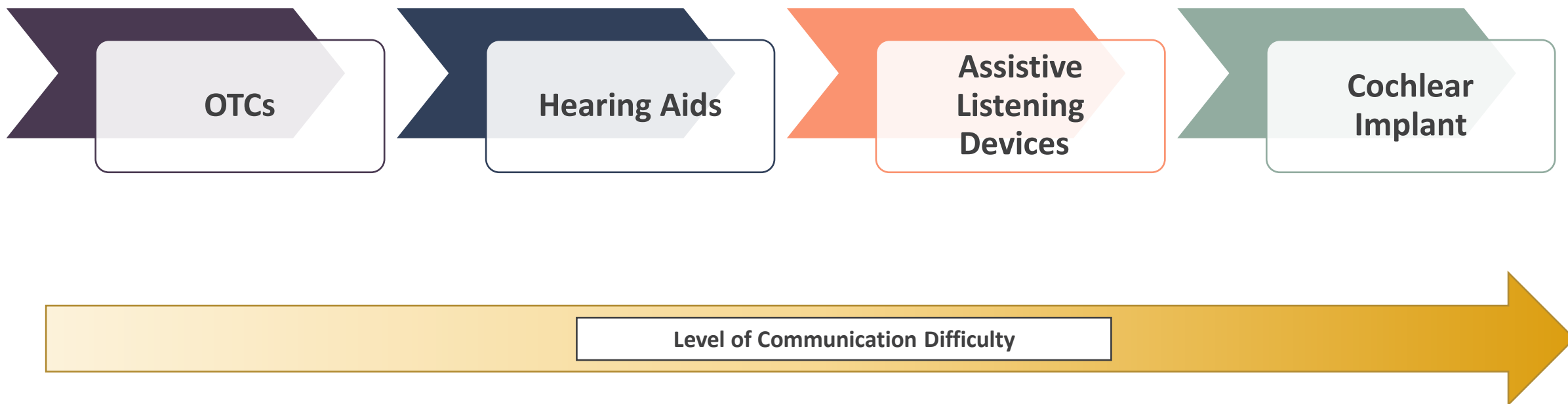
	Left Ear	Right Ear	Bilateral HA
Preop CNC Words	26%	36%	
Preop AzBio (Quiet)	19%	20%	
Preop AzBio (+10 dB SNR)			48%
	Left Ear	Right Ear	Bilateral CI
Post CNC Words	42%	92%	
Post AzBio (Quiet)			97%
Post AzBio (+10 dB SNR)			76%

Hear now. And always



Counseling

The Patient Journey Can Be Long and Complex



Patients need assistance along their journey to know when it's right to transform to the next step. Clinicians are vital in that process.

Counseling Patients¹

Change is hard

You are the
trusted advisor for
your patients

Patients need you
to be confident

What you say (and
how you say it)
matters

You're
recommending an
evaluation, not
surgery

Patients get to
decide their own
path

You don't have to
have all the
answers, more will
come at the CICE

How to **Counsel** Hearing Aid Users
About Their Prospective Candidacy
for a **Cochlear Implant**



By Terry Zwolan, Ph.D.

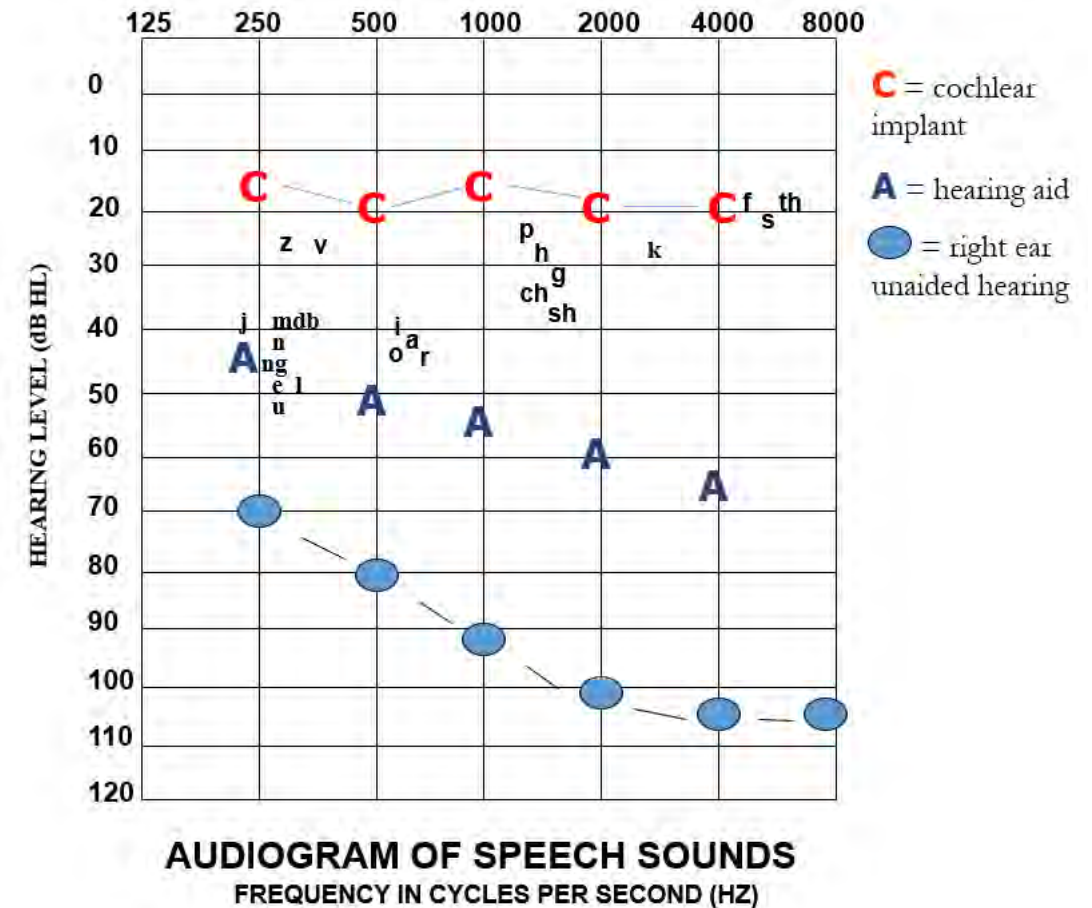
Helpful things to say...



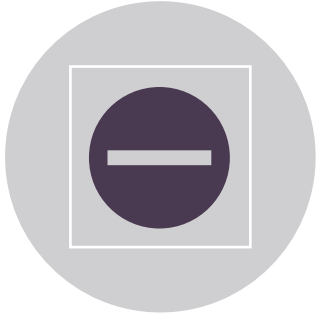
- “Everything has been done to maximize your hearing with hearing aids - a cochlear implant may be the next best step to improved hearing.”
- If someone is hesitant to proceed, ask them “Why?” - discuss their concerns.
- Let them know it’s not brain surgery. CI surgeries are not experimental. They are safe and effective.
- Let them know the CI center can check to see if their insurer covers cochlear implants, even before they go for an evaluation.
- Ask the center or Cochlear to connect them with a CI user who can address their questions.
- In your discussion, focus on what they can GAIN, rather than on what they will lose.

Steps to Show the Benefits of Cochlear Implants

1. Overlay a patient's aided audiogram with a typical CI audiogram.
2. Show average speech perception scores and obtained with CIs, and compare the average scores to what they're getting from hearing aids



What to Avoid



Suggesting the CI is a last resort.



Waiting to refer for an evaluation until you are sure they are a candidate – early referral is best.

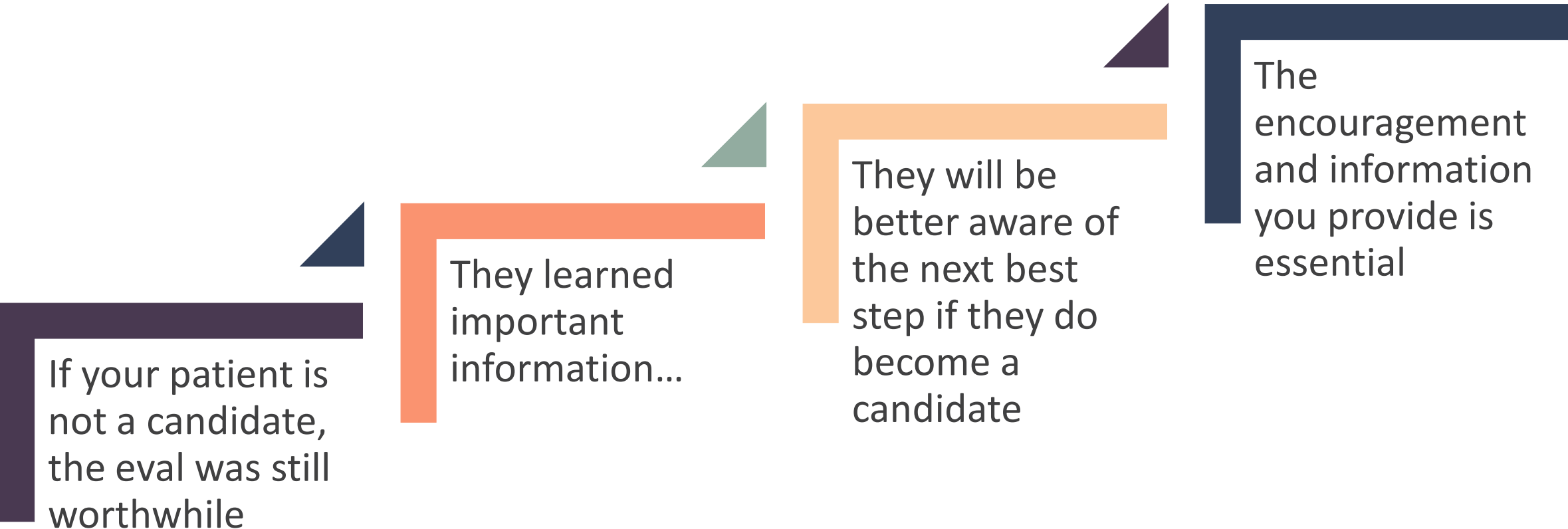


Assuming patients are too old or that they have too many health issues to receive a CI.



Expecting they're not interested if they declined an evaluation previously.

A Worthwhile Step



If your patient is not a candidate, the eval was still worthwhile

They learned important information...

They will be better aware of the next best step if they do become a candidate

The encouragement and information you provide is essential

Benefits of Making a Referral for a CI Evaluation

- ✓ When patient has an evaluation but is NOT a candidate, they often ask for a recommendation of where to obtain new hearing aids. Referrals can be **bi-directional**.
- ✓ A recommendation for **new hearing aids** from someone not involved in the sale of a hearing aid can support a decision to purchase new technology.
- ✓ The vast majority of patients receiving CIs today continue to use a hearing aid in their **opposite ear**.

Benefits of Bimodal Hearing



Sound localization¹⁻³

Speech perception in quiet^{1,2,4,5}

Speech perception in noise^{2,3,5}

Sound quality^{1,2}

Functioning in real-life environments³

Quality of life⁴

Perception of music⁶



1. Potts LG, Skinner MW, Litovsky RA., et al. Recognition and localization of speech by adult cochlear implant recipients wearing a digital hearing aid in the nonimplanted ear (bimodal hearing). J Am Acad Audiol (2009 Jun); 20, 353–373.
2. Morera C, Cavalle L, Manrique M, et al. Contralateral hearing aid use in cochlear implanted patients: Multicenter study of bimodal benefit. Acta Otolaryngol (2012 Jun); 132, 1084–1094.
3. Ching TY, Incerti P, Hill M. Binaural benefits for adults who use hearing aids and cochlear implants in opposite ears. Ear Hear (2004 Feb); 25, 9–21.
4. Farinetti A, Roman S, Mancini J, et al. Quality of life in bimodal hearing users (unilateral cochlear implants and contralateral hearing aids). Eur Arch Otorhinolaryngol (2015 Nov); 272, 3209–3215.
5. Gifford RH, Dorman MF, McKarns SA, Spahr AJ. Combined electric and contralateral acoustic hearing: Word and sentence recognition with bimodal hearing. Journal of Speech, Language, and Hearing Research. (2007 Aug(1;50(4):835-43.
6. Sucher CM, McDermott HJ. Bimodal stimulation: benefits for music perception and sound quality. Cochlear Implants International. (2009 Jan); 1;10(S1):96-9.

What Can CI Audiologists Do Better?



Improve	Improve communication with referral sources
Provide	Provide better information on candidacy and referral guidelines to referrers ¹
Counsel	Counsel with confidence

1. Looi V, Bluett C, Boisvert I. Referral rates of postlingually deafened adult hearing aid users for a cochlear implant candidacy assessment. Int J Audiol. 2017 Dec;56(12):919-925. doi: 10.1080/14992027.2017.1344361. Epub 2017 Jul 5. PMID: 28678547.

What Can We All Do Better?



- Many CI programs are partnering with audiologists outside their practice to participate in CI candidacy evaluations and post-op care. This is an example of how we can **work together**
- We need to **think of ways to work together sooner, and better**
- We need to **embrace telehealth options** to make f/u easier for patients
- We need to **develop a standard of care, based on patient-need**

Resources are available



over **77%** recipients that say if they could do it over again, they would have gotten their cochlear implant sooner*

When to consider a cochlear implant evaluation for adults*

96% patients meeting the 60/60 criteria below are cochlear implant candidates

≥ 60 dB Audibility
Pure tone average greater than or equal to 60 dB in the better ear (500, 1000, 2000 Hz)

Speech Understanding ≤ 60
Unaided Word Recognition Score less than or equal to 60% in the better ear

Or if your patient experiences ANY of the following:

- Struggles to hear on the phone
- Has difficulty understanding others
- Withdraws from social events
- Often needs others to repeat themselves

Scan to learn more about when to refer
www.cochlear.us/when-to-refer

Cochlear

* This provides a recommendation only of when an adult may be referred for a cochlear implant evaluation, but does not guarantee candidacy based on indications (only for adults). For more information on candidacy criteria, please visit www.cochlear.us/candidacy.

How a cochlear implant system works

- 1 Microphones on the sound processor pick up sounds and the processor converts them into a digital signal.
- 2 This signal is transferred to the implant just under the skin.
- 3 The implant sends the digital sound signal to the electrode array in the cochlea.
- 4 The hearing nerve picks up the signal and sends it to the brain, which is understood as sound.

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Frequently asked questions

How are hearing implants different from hearing aids?

Hearing aids help many people by making the sounds they hear louder. Unfortunately, as hearing loss progresses, sounds need to not only be made louder, they need to be made clearer. Hearing implants can help give you that clarity, even in noisy environments.¹

How can cochlear implants improve my hearing?

Hearing your friends and family in noisy situations is especially difficult for those with hearing loss. Now you do not have to miss out on those important conversations. In fact, adult cochlear implant users demonstrated a significant improvement in hearing in noise when compared to their hearing aid performance.¹

Studies have shown that people with cochlear implants:

- See improvements in speech understanding, sound clarity and language skills⁴
- May see an improvement in quality of life⁵

How is this covered by insurance?

Fortunately, if you are a candidate, cochlear implants are covered by most insurers, including Medicare and Medicaid. The evaluating physician will confirm if your insurance covers cochlear implants prior to your evaluation.

What can I expect next?

A cochlear implant evaluation is completed to determine if you are a candidate.

Next steps for a cochlear implant evaluation:

- 01 Audiological evaluation, performed by a cochlear implant specialist
 - Hearing test (with and without hearing aids)
 - Speech understanding test (with and without hearing aids)
- 02 Medical check, performed by a cochlear implant specialist
 - Review health history
 - Scan or x-ray of head/neck
 - Discuss options with surgeon
- 03 Insurance approval

How do I find a hearing implant specialist?

If your hearing health specialist provided you with a cochlear implant referral, explore options to find an audiologist for an evaluation.

Scan to learn more about when to refer
www.cochlear.us/when-to-refer

Published online: 2021-12-09

Questions?
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www.cochlear.us/when-to-refer

Mythbusters! The Truth about Common Misconceptions in Cochlear Implantation¹

Erika A. Woodson, M.D.,¹ Ksenia Aaron, M.D.,¹ Ahn Nguyen-Huynh, M.D., Ph.D.,¹ Jonathan Vargo, M.D.,² and Sarah E. Mowry, M.D.^{2,3}

ABSTRACT

Cochlear implantation (CI) is the preferred method of hearing rehabilitation when patients cannot perform well with traditional amplification. Unfortunately, there are still significant misconceptions around this life-changing intervention. The goal of this article is to address some of the most common myths around CI surgery. After reading this article, the learner will be able to explain the utility of CI in patients with residual hearing and recognize that insurance coverage is widespread. The reader will be able to list common risks associated with this well-tolerated procedure including anesthetic risk and the risk of vestibular dysfunction. Additionally, the reader will be able to identify the significant positive impact of CI on patients' quality of life. Finally, the reader will identify that many patients can safely have an MRI scan after implantation, including nearly all contemporary recipients.

KEYWORDS: cochlear implants, outcomes, hearing loss, vestibular dysfunction, insurance, hearing preservation, MRI compatibility, anesthesia

Summary and Discussion

- ❖ The 60/60 guideline recommends a patient be considered for a CI evaluation when the audiogram shows a PTA ≥ 60 dB HL and when WRS $\leq 60\%$.
- ❖ What YOU say and do matters.
- ❖ Your patients will be grateful when you refer them for a CI Evaluation, even if they are not a candidate. The CI evaluation educates them about their next possible step in their hearing journey – it's comforting for them to know there is an option if they lose more hearing.



Thank you!

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