

Adult Cochlear Implant Candidacy

G Paul Moore Symposium 2021

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Disclosures

- American Cochlear Implant Alliance Board Member – Melissa Hall
- University of Florida Health

This presentation is not sponsored by any manufacturer or entity.

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Learner Objectives for the day

- Recall members of the cochlear implant team and their roles
- Demonstrate knowledge of expanding cochlear implant candidacy criteria
- Compare differences in adult candidacy and pediatric candidacy criteria
- Apply information learned to help modify diagnostic and therapeutic approaches to complex clinical cases

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CI2021 Virtual Conference

<https://www.acialliance.org/page/CI2021>

CI2021 COCHLEAR IMPLANTS in CHILDREN and ADULTS
COCHLEAR IMPLANTATION: IT TAKES A VILLAGE

April 28 – May 1, 2021 | Virtually



CI2021 COCHLEAR IMPLANTS IN CHILDREN AND ADULTS

April 28-May 1, 2021 | Virtually

Scientific Program Committee: American Cochlear Implant Alliance

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Cochlear Implant Professional Team



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CI Team

- The PATIENT and the FAMILY
- Surgeon: Otolaryngologist (ENT) Neurologist
- Audiologist
- Speech-Language Pathologist
- Early Interventionist
- Hearing Therapist
- Psychologist
- Teacher of the deaf
- Administrative Support
- Coordinator/Scheduler
- Social Worker
- Group Home Managers
- Mainstream Teacher
- Geneticist
- Pediatrician
- Nurse
- Others

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UF Health Team

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CI Physicians

- Patrick Antonelli, MD
- Si Chen, MD
- Thomas Schrepfer, MD - pediatrics

CI Audiologists

- Katherine Gray, AuD
- Kristin Letlow, AuD
- Melissa Hall, AuD
- Jonathan Hirst, AuD

SLPs

- Laura Mundorf, SLP - pediatrics
- Melissa Hall, AuD/SLP
- Community and School SLPs – pediatrics

Radiologist

- Anthony Mancuso, MD

Teachers/Educators

- APRNs and PAs
- Schedulers
- Primary Care Physicians
- OTs/PTs
- Residents
- Psychiatry/Psychology
- Neurology
- Developmental Pediatrician - Pediatrics

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Why are we talking to you about **CI Candidacy**?

Everyone knows about it, right?



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Cochlear Implant Candidacy... *clear as mud*



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Key Factors in Decision Making

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- Patients
- Food and Drug Administration
- CI Manufacturers
- Health Care Providers
- Insurance
 - Private
 - Medicare and Medicaid
 - Tricare and Veterans Administration

***Reimbursement Rates**



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Variability in Evaluation and Management of Adult CI Candidates

- # of people with disabling hearing loss continues to increase globally
 - Access to hearing health care remains disproportionately low
- Cochlear implantation remains primary treatment solution for significant hearing loss
- Respondents in recent survey asked to report how often psychological testing and cognitive screening were included as part of the standard pre-implant workup
 - Most, 82%, reported rarely or never including a psychological evaluation
- Bilateral CI Candidacy evaluations are variable among centers and providers
 - 61% of respondents selected second side candidates while using scores obtained for the HA alone in the ear to be implanted
 - 39% of respondents based the candidacy decision on the bimodal (CI + HA) scores

Prentiss et al 2020

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Variability in Evaluation and Management of Adult CI Candidates

This lack of standardization in the delivery of care may increase the risk for health care inequities

What does this mean?

The same patient could go to two different centers, get two different CI evaluations, and get two different recommendations.

Prentiss et al 2020

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Variability in Evaluation and Management of Adult CI Candidates

It is well documented that cochlear implants improve quality of life.

It is also well documented that CI market penetration is very poor for people who could benefit.

National push toward clinical guidance documents that may be referenced by clinicians.

Prentiss et al 2020

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Adults Earning potential

- Early retirement due to difficulties hearing with hearing aids
- Early retirement in the middle of global pandemic due to mask mandates and the need to lipread to communicate
- Increased requests for letters of medical necessity related to disability for places of employment to provide appropriate accommodations
- What this should be telling us as hearing health care professionals?
 - We are not referring soon enough for CI evaluations
 - We are not referring at all

Increased accesses to cochlear implantation may provide opportunities for competitive employment and associated economic benefits for the individual, their families, and society.

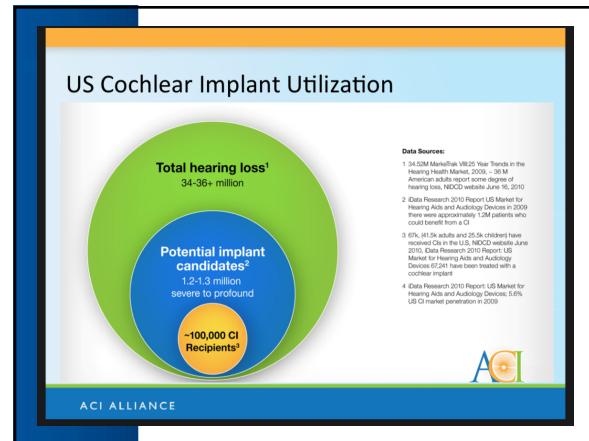
Clinkard et al 2015

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Development of New Cochlear Implant Quality of Life Instruments for Adults

- Patient-reported outcome measures (PROMs) are instruments devised to capture a patient's perspective about their overall health or treatment.
- HHIE/HHIA, COSI
 - Not sensitive to CI
- No universally accepted QOL instrument for CI patients
- **Development of New Cochlear Implant Quality of Life Instruments for Adults**
 - McMackan et al 2019

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Why is CI Utilization so low?

- Low general awareness
- Hearing loss referral networks are unaware of candidacy and outcomes
- Political issues associated with deafness
- Clinic and hospital financial issues
- Need for widely accepted 'best clinical practices'
- Timely and comprehensive cost-effectiveness data
- ACIA = dedicated organization focused on CIs

Sorkin 2013

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Why is CI Utilization so low?

- Low general awareness
- Hearing loss referral networks are unaware

In some states, the reimbursement to the hospital for the CI device and related surgical costs from the Medicaid program covers less than 10% of the actual cost of the device practices

- Timely and comprehensive cost-effectiveness data
- ACIA = dedicated organization focused on CIs

Sorkin 2013

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Utilization and awareness of CIs in the US - Minorities

- Time to CI may also be related to availability of hearing and healthcare services in minority communities
 - Lower rates of routine care and procedures than white populations (2002 Institute of Medicine Report)
- People with severe hearing loss pursuing treatment of any kind (HAs or CIs)
 - 5% African-Americans
 - 40% white patients
- HAs before CI may slow degradation of central auditory pathways
 - What does that mean for people not seeking intervention and treatment for severe hearing loss?
 - May partially explain poorer audiological outcomes
- What about social medical systems? Other countries?
 - A study in the UK showed that affluent children were more likely to obtain CIs than less affluent children despite social medical system with high public funding



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Utilization and awareness of CIs in the US - Minorities

- Time to CI may also be related to availability of hearing and healthcare services in minority communities

Professionals need to become more accountable in this dilemma.

We cannot rely on any healthcare system alone to solve the problem of poor utilization and awareness of the benefits of CIs

What about our own attitudes toward the technology?

Does our attitude translate into bias that may deter a patient from benefiting from the technology that could improve their quality of life and/or employment possibilities?



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Guidance documents

- AAA CI Position Statement – more specific information, not well agreed upon
- ASHA and AAA general guidance documents lack specifics
- ACIA Guidance Documents for Adults and Peds forthcoming, but not published yet
- MSTB – old guidelines, but most recent test battery

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Adult best practice clinical guidelines - Areas to address

- effect of duration of deafness and amount of residual hearing as key factors in outcomes
- rehabilitation practices, both the need for rehabilitation and the nature of such follow-up for adults of all ages
- best practices for treatment of older adults

Sorkin 2013

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60/60 referral guideline

Providers should consider patients for CI eval if...

- Unaided Pure Tone Average ≥ 60
 - AND
- Best ear unaided monosyllabic word score $\leq 60\%$
- Market penetration for CIs is very poor
 - What does that mean?
 - People who could benefit from this technology are not notified of CIs, not evaluated for CI candidacy, are not directed to appropriate providers

Zwolan et al 2020

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Minimum Speech Test Battery (MSTB)

- Most centers follow the recommendations of the MSTB to determine adult candidacy.
- Although the revised MSTB provides audiologists with recommended testing materials, thereby encouraging greater consistency in testing protocols and methods, the revised recommendations are not supported by evidence and do not represent a consensus of commissioned experts.
- Should we be doing words or sentence testing
 - What about MEDICARE?

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FDA Candidacy and Insurance Considerations

FDA U.S. FOOD & DRUG ADMINISTRATION

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Clinical Trials

- Research study that explores whether a medical device is safe and effective for use in humans
- Result in FDA-approved indications (statements about candidacy) for cochlear implants
- 1984: first clinical trials to evaluate multi-channel cochlear implants in adults in the U.S.
- 1985: FDA approved first multi-channel device for use in adults
- 1990: multichannel devices were first approved in children

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Clinical Trials

FDA U.S. FOOD & DRUG ADMINISTRATION

- Statements about degree and severity of hearing loss
- Statements about speech recognition/benefit from hearing aids
- Indications guide decisions regarding who is a candidate for a cochlear implant, and impact insurers decisions regarding payment for CIs

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Do cochlear implant centers/programs need to adhere to the FDA indications?

Typically, yes

- Insurer requirements vary
- Insurers may state:
 - The patient must meet FDA-approved indications
 - Some insurers refuse to preauthorize, and state their printed criteria MUST be met while others will consider preauthorization even if the patient DOES NOT meet their stated candidacy requirements
 - Some insurers review audiometric test results to ensure the patient meets criteria before they will preauthorize
 - Some insurers will consider a peer-to-peer review for the surgery if denied

FDA U.S. FOOD & DRUG ADMINISTRATION

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- Not typically audiologists doing pre-authorization
- Audiologist needs to work closely with the pre-authorization support person to ensure patient meets criteria
- I highly recommend reading through various policies as they frequently include a review of the literature on which they have based their recommendations/indications
- Do they state specific test for determination of candidacy?
- Some are outdated – you may have the opportunity to provide them with updated information if you get a denial

COCHLEAR IMPLANT MONTHLY RATE

COVERAGE:

A single or multi-channel cochlear implant MAY BE ELIGIBLE FOR COVERAGE in patients with severe or profound sensorineural deafness who are unable to benefit from a hearing aid, including those with a hearing aid, including those with hearing loss due to meningitis and who do NOT have:

- Acoustic (8th) nerve damage;
- Central auditory pathway damage; or
- Other media or other active, unresolved ear problems such as infection.

DESCRIPTION:

A COCHLEAR IMPLANT is intended to restore a level of auditory sensation to individuals with severe to profound sensorineural hearing loss by means of electrical stimulation of the auditory nerve. The device uses implantation to improve communication ability in most adults and apparently results in significant psychological and social benefits as well.

Severe hearing loss is defined as a hearing threshold of 70-90 dB HL or greater in the better ear. Profound hearing loss is defined as a hearing threshold of 90 dB and above.

Currently, the multi-channel model has replaced the single channel model. The basic components of a cochlear implant include:

- a microphone;
- an external signal processor;
- a transmitter;
- an internal receiver; and
- an electrode array implanted in the cochlea.

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CENTERS FOR MEDICARE & MEDICAID SERVICES

CMS
CENTERS FOR MEDICARE & MEDICAID SERVICES

- CIs are covered for:
 - Treatment of bilateral, pre- or post-linguistic, moderate-to-profound sensorineural hearing loss in individuals who demonstrate limited benefit from amplification
- Limited benefit from amplification is defined as:
 - Test scores of less than or equal to 40% correct in the best-aided condition and less than or equal to 50% in the ear to be implanted **if the patient is in an approved clinical trial.**
 - ***Can score less than or equal to 60% in best aided condition and less than or equal to 50% in the ear to be implanted **if the patient is in an approved clinical trial.**
 - <https://www.cms.gov/medicare-coverage-database/details/ncd-details.aspx?NCDId=245&ncdver=2&bc+BAABAAAAAA&>

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FDA recognizes that some patients should receive a product even though they do not meet the approved labeling/indications

- FDA states:
 - “Good medical practice and the best interests of the patient require that physicians use legally available drugs, biologics, and devices according to their best knowledge and judgment. If physicians use a product for an indication not in the approved labeling, they have the responsibility to be well informed about the product, to base its use on firm scientific rationale and on sound medical device, and to maintain records of the product’s use and effects.”
 - <http://www.fda.gov/RegulatoryInformation/Guidances/ucm126486.htm>

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- CI program may be at risk for an audit if indications are not met
- Implanting a patient outside the specified indications may mean the insurer will refuse payment
 - Hospital will then need to determine who will cover the cost
- With Medicare, the centers place themselves at risk for denial of payment or at risk for an audit and a potentially large fine if a patient receives an implant who does not meet their approved indications

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FDA Approved Indication Example

- **P960058 (Advanced Bionics) – HiResolution Bionic Ear System**
Indications For Use:
 - The HiResolution Bionic Ear System is intended to restore a level of auditory sensation to individuals with severe-to-profound sensorineural hearing loss via electrical stimulation of the auditory nerve.
 - Adults 18 years of age or older
 - Severe-to-profound, bilateral sensorineural hearing loss (>70 dB)
 - Postlingual onset of severe or profound hearing loss
 - Limited benefit from appropriately fitted hearing aids, defined as scoring 50% or less on a test of open set sentence recognition (HINT Sentences)

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A presentation slide from UF Health featuring the UF Health logo and the text "Cochlear Americas - Adults". The main title is "FDA Approved Indication Example" followed by a bulleted list under "P970051 (Cochlear Americas) – Cochlear Nucleus Cochlear Implant System Indications For Use". The list includes: - Adults - Individuals 18 years of age or older who have bilateral, pre, peri or postlinguistic sensorineural hearing impairment - Limited benefit from appropriate binaural hearing aids, as defined by test scores of 50% correct or less in the ear to be implanted (60% or less in the best-aided listening condition) on tape-recorded tests of open set sentence recognition - Moderate to profound hearing loss in the low frequencies and profound (≥ 90 dB HL) hearing loss in the mid to high speech frequencies.

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Candidacy Guidelines

Cochlear® Nucleus® Implant Systems

NORMAL (0-15 dB HL)

MILD (16-25 dB HL)

Moderately Severe (26-40 dB HL)

Severe (41-70 dB HL)

PROFOUND (71-100 dB HL)

Frequency (Hz)

Dominant Ear (blue) Non-Dominant Ear (yellow)

COCHLEAR IMPLANT
Adults (18+ yrs)

- Hearing loss is profound
- DNN in both ears
- Failed to benefit from amplification and/or previous audiological test score of a 50% open-set word recognition score or better than 60% in the dominant ear to be implanted and 50% or better in the non-dominant ear.

Children (6-17 yrs)

- Severe to profound DNN in both ears
- Failed to benefit from bilateral hearing aids or failed to benefit from HMDT (DNN scores > 20%)

Children (0-24 mos)

- Profound DNN
- Profound hearing loss from birth
- Amniotic fluid at least one MAC/

HYBRID™ IMPLANT
Adults (18+ yrs)

- Adults who produced high-frequency SNR in both ears
- Adults who produced approximately inter-totter differences in speech perception
- Adults' word recognition scores between 15% and 60%, and the dominant ear to be implanted

Children (6-17 yrs)

- Adults who produced word recognition scores equal to or better than that of the ear to be implanted and not more than 15% difference in SNR (2.3-4.9 dB vs 4.0-6.0 dB)
- Children use only

For more information:
800 483 3123 or Cochlear.com/US
info@cochlear.com | CochlearUSA.com

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MED-EL - Adults

FDA Approved Indication Example

- P000025 (Med-El) – Med-El Cochlear Implant System Indications**

For Use: The Med-El Cochlear Implant System is intended to restore a level of auditory sensation via the electrical stimulation of the auditory nerve.

- Adults
- 18 years of age or older who have bilateral, sensorineural hearing impairment
- Limited benefit from appropriately fitted binaural hearing aids, defined by test scores of 40% correct or less in best aided listening condition on CD recorded tests of open-set sentence recognition (Hearing In Noise Test [HINT] sentences)
- Bilateral severe to profound sensorineural hearing loss determined by a pure tone average of 70 dB or greater at 500 Hz, 1000 Hz, and 2000 Hz

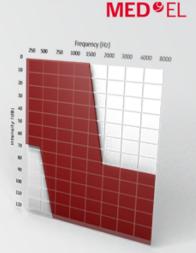


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Electro-acoustic Candidacy: CI + HA same ear

EAS Candidacy

- FDA approved for candidates age 18+
- EAS candidates have normal hearing up to a moderate sensorineural hearing loss in the low frequencies, sloping to a severe-to-profound hearing loss in the high frequencies
- Single-word speech understanding scores are 60% or less in each ear (i.e., CNC words in quiet)



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Electro-acoustic Candidacy: CI + HA same ear

Contraindications



- No rapid progressive hearing loss
- No autoimmune disease
- No hearing loss as a result of meningitis, otosclerosis or ossification
- No malformations or obstruction of the cochlea
- No air-bone gap > 15dB
- No external ear contra indications to using amplification devices



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- Establish a documented test protocol
 - Test materials
 - Presentation level
 - Presentation mode (quiet & noise)
- Document all tests performed
- Team discussion if borderline candidacy or if candidacy is unclear
 - document the meeting and the decision in chart
- Test procedures used with a patient should NOT be dependent on their type of insurance – the same test protocol should be used regardless of insurance
 - Treating patient's differently because of their insurance can lead to legal issues.

What do I do about all of the variability in indications?

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- Establish a documented test protocol
 - Test materials
 - Presentation level
 - Presentation mode (quiet & noise)
- Document everything appropriately and thoroughly in the patient's chart, including all tests performed
- If **if you tested the condition, you HAVE to document!** patient's chart
- Test procedures used with a patient should NOT be dependent on their type of insurance – the same test protocol should be used regardless of insurance

What do I do about all of the variability in indications?

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Welfare of Patients

Remember that you are part of the collective purpose for the welfare of your patients.

Compassion Caring Feeling

Patients seek help and solutions to very difficult problems. The process of being evaluated for cochlear implant candidacy can be challenging and stressful for patients.

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Evaluation Protocol Adult

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What does UF Health do?

Research current best practices and evidence-based practices regularly
Develop a protocol and agree upon protocol as a team (surgeon, audiologists, and SLPs)
Revise regularly due to advancements in the field

- **Chart Review**
 - Other pertinent specialties and results
 - Otolaryngology/Neuro-otology
 - Speech-Language Pathology
 - Audiologic history and results
 - Neurology
 - Imaging Reports
 - Others
- **Case History:**
 - Specific questions
 - HA use and trial
 - What is our stance on adults and HA trial – literature
 - Considerations regarding etiology, aidable hearing
 - CI Expectation questionnaire for not typical candidates – complete with patient at the end to allow for discussion and clarification
 - Self-reported HHIE/HHIA questionnaire

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Comprehensive Audiologic Evaluation

- Otoscopy
- Tympanometry
- DPOAEs – 1.5kHz to 8kHz
- AC 125 Hz to 8000 Hz
- SRT individual ears
- WRS recorded with NU6 each ear individually
 - Recorded unless patient is unable, **MLV as last resort for any open set recognition tasks**
- BC – 250 to 4000 Hz

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What does UF Health Do?

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Verification and Validation

Critical step in cochlear implant candidacy evaluations!

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What does UF Health do? Verification

- Verify patient's hearing aids via real ear
- Do they meet targets?
- If they do not meet targets with personal HAs appropriately (i.e., underfit or overfit):
 - 1) program clinic stock
 - 2) test with patient's HAs for additional information
 - Can be useful in counseling
 - ***Do not determine candidacy from these aids – they are not optimized for the patient or the hearing loss

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What does UF Health do? Verification

- Verify patient's hearing aids via real ear
- Do they meet targets?
- If they do not meet targets with personal HAs appropriately (i.e., underfit or overfit):
 - **Less than half of the patients referred for a CI evaluation are wearing appropriately fit HAs (Prentiss et al 2020).**
 - ***Do not determine candidacy from these aids – they are not optimized for the patient or the hearing loss

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What does “best-aided” mean?

- Controversial definitions of “best-aided”
- Best aided assumes
 - HAs have been verified and optimized
- Several studies suggest that <50% of dispensers are performing these measurements on a routine basis (Mueller and Picou, 2010)

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What does “best-aided” mean?

- Controversial definitions of “best-aided”

This makes it **ESSENTIAL** for CI programs to perform verification since a decision regarding a surgical procedure will be based upon our results.

- Several studies suggest that <50% of dispensers are performing these measurements on a routine basis (Mueller and Picou, 2010)

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Verification

- Features are functioning adequately according to manufacturer's specifications
- Ensure the device(s) are providing appropriate access to acoustic information
- Perfect verification does not ensure complete patient satisfaction
- Verification alone is NOT enough to justify a given technology

Validation

- Ensuring the device(s) are meeting the communication needs of the patient
- We need to know if our patient's listening needs have been met
- Demonstrating how the patient performs

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Verification is:

- The same as validation
- Ensuring the patient is satisfied
- Ensuring the device(s) are functional
- Ensuring the device(s) are providing appropriate access to acoustic information

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Verification is:

- The same as validation
- Ensuring the patient is satisfied
- Ensuring the device(s) are functional
- Ensuring the device(s) are providing appropriate access to acoustic information

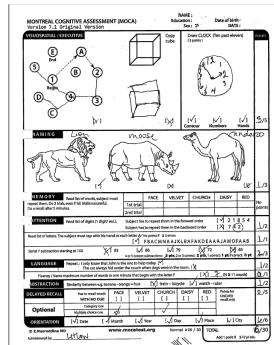
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Aided Testing Protocol

- Aided audiogram
- Speech perception
 - Aided SRT AU
 - AzBio Quiet and Noise
 - CNC Quiet and Noise
- CID live voice with clear communicator mask
- MOCA for >65 years, and younger if concerns arise

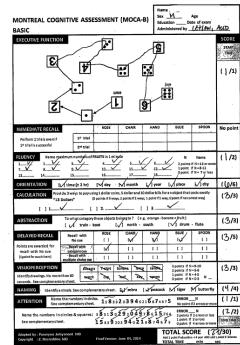
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MOCA – Abnormal Score



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MOCA – Normal Score



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Hearing aid trials - Adults

FDA – no specific requirement for any manufacturer

UF Health Considerations

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Candidacy by Insurance

- Private Insurance:
 - 50% or less on open set recorded sentence recognition – AzBIO in best aided condition.
 - If patient doesn't qualify in quiet, we test at +10 SNR. If 50% or less -> qualify for implant
 - Indicate if it is for each ear, or one ear, and which one.
- Medicare
 - <40% on open set recorded sentence recognition
 - AzBIO in best aided condition.
 - If patient doesn't qualify in quiet, we test in noise
 - UF Health patient base largely adult and MEDICARE age

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Test Materials

- Most of the patients scored 85% or higher on hint sentences.
- AzBIO see more of a spread of scores. More difficult test than HINT.
- We want something that is sensitive enough to tell us who is doing well and who is having more difficulty. The HINT was not good at telling us that.
- AzBIO is more sensitive

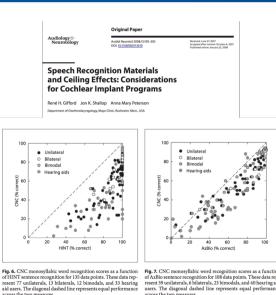


Fig. 6. CNC monosyllabic word recognition scores as a function of different language backgrounds. Data points represent 17 patients, 13 bilinguals, 12 monolinguals, and 17 hearing aids. Data points are plotted as a function of the mean score across the two measures.

AzBio Sentences

- 2 male and 2 female speakers
- 15 lists of 20 sentences
 - 8 lists utilized in clinic and additional sentence lists used in research
- Increased linguistic complexity and faster rate of production than previous sentence measures
- Can be presented in quiet or noise
 - Noise is multi-talker babble
- Less likely to demonstrate a ceiling effect than HINT sentences – but still not as real life as CNC words

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AzBio Sentence Test
List 1
MSTB CD – Track 01
(Left Channel = Speech, Right Channel = Noise)

Sentence	Text	Pos.	Score
1	I could hear another conversation through the cordless phone.	9	
2	She relied on him for transportation.	6	
3	He was an ordinary person who did extraordinary things.	9	
4	How long has this been going on?	7	
5	His class was on Saturday.	5	
6	She was entitled to a bit of luxury occasionally.	9	
7	The vacation was cancelled on account of weather.	8	
8	The salon is not open on Mondays.	7	
9	She had a way to justify any of her wrongdoing.	10	
10	I feel sorry for my brother.	6	
11	On numerous occasions they left early.	6	
12	In private she let her hair down.	7	
13	A mother always has something better to do.	8	
14	You should be used to taking money from ladies.	9	
15	Who would think about cancer for attention?	7	
16	Hang the air freshener from your rearview mirror.	8	
17	You can use your computer to make greeting cards.	9	
18	I guess you know what you're doing.	7	
19	You must live in a gingerbread house!	7	
20	The cat was born with six toes.	7	

Words Correct
Words Possible 151

Percent Correct _____

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- ## CNC
- Male speaker only
 - “Ready” prompt
 - CNC structure – consonant nucleus consonant
 - Monosyllabic words
 - Fewer contextual cues than sentences
 - Typically presented in quiet
 - More comparable to NU-6 words, which are used to assess unaided recognition or recognition with HAs
 - Scores are typically similar/slightly lower than scores obtained on AzBio sentences
 - CNC words have been used in clinics for several years
 - Longitudinal data

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Patient ID: _____ Date: _____ Test Condition: _____

Monosyllabic Word Test Key (CNC, List 2)
MSTB CD – Track 10 (Left Channel)

Score all words for a beginning consonant sound, a nucleus (vowel) sound and an ending consonant sound.
(Total phoneme count per word = 3. Phonemes must be in the appropriate order.)

Practice Item	1. DUCK	2. BOMB	3. JUNE	Test Items	Whole Word (Optional)	# Correct Phonemes	Test Items	Whole Word (Optional)	# Correct Phonemes
Test Items	0	1	2	0	1	2	0	1	2
1. GAIN	□	□	□	26. SAD	□	□	26. SAD	□	□
2. FLIP	□	□	□	27. MUSH	□	□	27. MUSH	□	□
3. FERN	□	□	□	28. BACH	□	□	28. BACH	□	□
4. BEG	□	□	□	29. GOAL	□	□	29. GOAL	□	□
5. LATE	□	□	□	30. LA	□	□	30. LA	□	□
6. DIRE	□	□	□	31. HASH	□	□	31. HASH	□	□
7. DICE	□	□	□	32. SOURCE	□	□	32. SOURCE	□	□
8. LOVE	□	□	□	33. COOL	□	□	33. COOL	□	□
9. COKE	□	□	□	34. THIS	□	□	34. THIS	□	□
10. CHOOSE	□	□	□	35. TAIL	□	□	35. TAIL	□	□
11. GERM	□	□	□	36. WEEP	□	□	36. WEEP	□	□
12. NOSE	□	□	□	37. LA	□	□	37. LA	□	□
13. JET	□	□	□	38. BOUGHT	□	□	38. BOUGHT	□	□
14. LIL	□	□	□	39. DAWK	□	□	39. DAWK	□	□
15. RING	□	□	□	40. MEET	□	□	40. MEET	□	□
16. ROOT	□	□	□	41. MET	□	□	41. MET	□	□
17. YELL	□	□	□	42. BUTH	□	□	42. BUTH	□	□
18. NOSE	□	□	□	43. SHIP	□	□	43. SHIP	□	□
19. TAIL	□	□	□	44. TWIN	□	□	44. TWIN	□	□
20. PAYE	□	□	□	45. TIRE	□	□	45. TIRE	□	□
21. VINE	□	□	□	46. TAPE	□	□	46. TAPE	□	□
22. HIDE	□	□	□	47. SOULD	□	□	47. SOULD	□	□
23. HIDE	□	□	□	48. FAKE	□	□	48. FAKE	□	□
24. KNOB	□	□	□	49. KNON	□	□	49. KNON	□	□
25. PUFF	□	□	□	50. SUCK	□	□	50. SUCK	□	□

Sum of boxes checked for: 3 3 3 3

Grand Total: 1 Phoneme Correct X 1 = _____
2 Phonemes Correct X 2 = _____
3 Phonemes Correct X 3 = _____

Words with 3 Phonemes Correct = _____ / 50 Words Grand Total: _____ / 150 Phonemes

Rev. 5/25/2011 Minimum Speech Test Battery Score Sheets Page: 10

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Testing in noise – Is it appropriate?

UFHealth
UNIVERSITY OF FLORIDA HEALTH

- Need to **adequately evaluate communication**
 - We will miss patients if we don't test in noise who can really benefit from a cochlear implant.
- *If you are going to administer noise preoperatively to determine candidacy, you should administer the same SNR post-operatively so you have an idea of the efficacy of your recommendation to provide a CI.

If you're using a +5 SNR to determine candidacy, you should have an idea of how well patients **at your center and nationally do post-implant when tested at +5 SNR.

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General Possible Contraindications for CI

UFHealth
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Relative	Absolute
<ul style="list-style-type: none"> • Pulmonary conditions • Cardiac conditions • Hematologic conditions • Uncontrolled epilepsy • Not being available for rehabilitation • Undiagnosed conditions due to patient age and lack of prevalent symptoms • Age of implantation • Cognitive concerns • Social concerns 	<ul style="list-style-type: none"> • Absence of cochlear development demonstrated on CT and MRI <ul style="list-style-type: none"> – Micheal deformity – Cochlear atresia – Lack of auditory nerve • Severe mental disease • Severe intellectual disability • Acute or chronic otitis media and mastoiditis without eradication for the disease

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Possible Medical Contraindications to CI or special considerations

- Anatomical & physiological anomalies that preclude surgical intervention via a CI
- Absence of 8th cranial nerve
- Cochlear nerve deficiency
 - Associated with poorer outcomes
- Cochlear dysplasia
 - Mondini
- Internal auditory canal narrowing
- Temporal bone fracture with injury to 8th nerve or cochlea structure
- Chronic otitis media
- Medical comorbidities
 - Concurrent Cerebrospinal Fluid (CSF) shunts/drains
- Anesthetic risks without approval/medical clearance
 - Cardiac clearance
 - Neurology clearance
- Ossification of cochlea following pathology
 - Recurrent episodes of bacterial meningitis prior to implantation
 - Ossificans
 - Otosclerosis
- Perilymph gusher/X-linked gusher

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Adult Hearing Loss

~40 million people with hearing loss in US

- 17% adults 20-69 years (~26 million)
 - Most common disability in military
- 40-50% of adults age >75 years have HL
- 600,000 cases Meniere's disease in US
 - 45,000 new cases each year
- 4000 new cases of Sudden deafness each year
- 1/100,000 every year diagnosed with acoustic neuroma

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Adult Hearing Loss

- Impact
 - Sound awareness
 - Communication abilities
 - Quality of Life
 - Social isolation
 - Depression
 - Accelerated Cognitive Decline

6-8% of adult candidates receive CI in US

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Otologist Issues

- Is the ear implantable?
 - What are the risks?
 - Bleeding
 - Infection
 - Facial nerve injury
 - CSF leak
 - Meningitis
 - Vestibular problems
 - Device failure
 - If implanted, will it work?
 - Is there an 8th nerve present?
 - Accurate diagnosis with about 70% of the cases in question. That leaves us with about 30% of patients that we "try and see" if the CI will work
 - Is the brain OK?
 - Will the patient wear the device?
 - Family support?

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Cochlear Implantation

Normal Cochlear Implantation

- Anatomic/surgical considerations
- Hearing preservation

Special Situations

- Inner ear malformations
- Post-meningitis ossification
- Cerebrospinal Fluid Gusher
- Chronic ear disease
- Acoustic Neuroma
- Single Sided Deafness

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Adult evaluation example 1

Adult evaluation example 2



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Anyone need a break??
Up next...

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