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Grand Rounds: Interdisciplinary CI Teams for Optimized Care Plans, in partnership with UChicago Medicine

Josh Sevier, AuD, LLM; Shannon Barry, AuD; Ted Imbery, MD; Michelle Havlik, MHS, CCC-SLP, LSLS Cert AVT; Yini Sun, AuD; Katie Swail, AuD

UChicago Ear and Hearing
UChicago Medicine, Chicago, Illinois, USA

Josh Sevier, AuD, LLM

Dr. Sevier is a cochlear implant audiologist and the clinical program manager of the UChicago Medicine hearing loss program. His clinical interests include cochlear implants and providing services via telepractice. He was formerly an assistant professor at a doctor of audiology program where he taught classes and supervised students in the department's cochlear implant program. Dr. Sevier has published numerous articles in peer-review journals and continues research of cochlear implants.

Shannon Barry, AuD

Dr. Shannon Barry is an audiologist who specializes in hearing care and tinnitus with adult patients. She received her Bachelor of Science in Audiology from the University of Texas, and received her Doctorate of Audiology from Rush University Medical Center. She completed her final year of clinical training at the Edward Hines Jr VA Medical Center. Dr. Barry is a Fellow at the American Academy of Audiology and an American Board of Audiology certificate holder in Tinnitus Management.

Ted Imbery, MD

Dr. Imbery is an otolaryngologist who specializes in otology and neurotology, the specialty of ear and hearing disorders. Dr. Imbery is passionate about treating adults and children with a wide array of ear problems. His clinical expertise includes cochlear implantation, skull base surgery (vestibular schwannoma), aural atresia and management of chronic ear disease (cholesteatoma). He also expanded his experience in advanced cochlear implantation techniques and radiosurgery for treatment of skull base tumors.

Michelle Havlik, MHS CCC-SLP, LSLS Cert AVT

Michelle Havlik, MHS, CCC-SLP, LSLS Cert AVT is a licensed American Speech Language Hearing Association (ASHA) certified speech-language pathologist who specializes in listening and spoken language development in children with hearing loss. She has worked at UChicago Medicine and has been a member of the Pediatric Cochlear Implant and Hearing Loss Program since 2009. She became a Listening and Spoken Language Specialist Certified Auditory Verbal Therapist (LSLS Cert. AVT) in 2014.

Yini Sun, AuD

Dr. Sun is an audiologist who specializes in hearing care for adult patients. Her clinical interests include audiological and vestibular diagnostics, hearing aids, and cochlear implants. She graduated with her Doctor of Audiology degree from Vanderbilt University and completed her clinical fellowship training at Vanderbilt University Medical Center. Dr. Sun is certified by the American Speech-Language-Hearing Association.

Katie Swail, AuD

Dr. Swail is a pediatric audiologist specializing in cochlear implantation and vestibular evaluation. She received her bachelor's degree from University of Illinois Urbana-Champaign, and she received her Doctorate of Audiology from Rush University. Dr. Swail completed her audiology externship at University of Chicago Medicine, and is a member of the Pediatric Hearing Loss Team..

Disclosures

- **Presenter Disclosure**: Financial: Josh Sevier is an employee of UChicago Medicine. Non-financial: Josh Sevier has no relevant non-financial relationships to disclose. Financial: Shannon Barry is an employee of UChicago Medicine. Non-financial: Shannon Barry has no relevant non-financial relationships to disclose. Financial: Ted Imbery is an employee of UChicago Medicine. Non-financial: Ted Imbery has no relevant non-financial relationships to disclose. Financial: Michelle Havlik is an employee of UChicago Medicine. Non-financial: Michelle Havlik has no relevant non-financial relationships to disclose. Financial: Yini Sun is an employee of UChicago Medicine. Non-financial: Yini Sun has no relevant non-financial relationships to disclose. Financial: Katie Swail is an employee of UChicago Medicine. Non-financial: Katie Swail has no relevant non-financial relationships to disclose. AudiologyOnline has made a donation to UChicago Medicine for this presentation.
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Learning Outcomes

After this course, participants will be able to:

- Describe approaches an interdisciplinary team can incorporate into their workflow and communication for patients with hearing loss and complex social, emotional, and/or medical histories.
- Identify which disciplines can contribute to a cochlear implant team and their role in patient care.
- Identify factors or variables for adult and pediatric cochlear implant patients that necessitate additional surgical planning and nuance.

Outline

- What is inter/multi disciplinary?
- Components of a CI Team and Function/ Other important possibilities
- Our Program/ Responsibilities
- Case Studies of the team in action

What makes an interdisciplinary team?

- *Multidisciplinary* refers to the addition of the competencies of multiple professionals who stay within the boundaries of their fields, whereas ***interdisciplinary*** denotes that the various disciplines are coordinated toward a common and coherent approach

(Merriam Webster, 2023)

Aspects of a successful interdisciplinary team

- Good communication
- Clear vision
- Flexibility
- Reflection
- Interprofessional values and e
- Respecting and understandinç
- Shared decision making
- Appropriate skill mix

(Nancarrow et al, 2013)

(McLaney et al, 2023)

Aspects of a successful interdisciplinary team

- Team culture: camaraderie and team support/relationships
- Quality and outcomes of care
- Interprofessional conflict resolution
- Appropriate team processes and resources
- Leadership and management
- Training and development opportunities
- Personal attributes

(Nancarrow et al, 2013)

(McLaney et al, 2023)

Aspects of a successful interdisciplinary team

- Facilitating interdisciplinary communication:
  - Maintain interprofessional ethos
  - Build positive working relationships
- Barriers to interdisciplinary communication:
  - Hierarchy
  - Challenging working conditions
- Key Finding: healthcare providers significantly associate with personal aspects of IDC, such as mutual respect and understanding among other professionals.

(Gleeson et al, 2021)

Members of interdisciplinary CI teams

- Audiology
- Otolaryngology
- Speech Language Pathology
- Social Work
- Psychology
- Neurology
- Primary Care
  - Anyone who works with the patient is welcome to be included!

Our Process

- Common goal
- Monthly Zoom meetings- Adult and Peds teams
- Open communication- EPIC secure chat, emails, in person

Our Process

- Proximity of clinics- AUD, SLP, and ENT
- Collaboration, camaraderie, and flexibility
- Mutual respect and understanding of roles

What makes our program unique?

- Interprofessional Medical School Rotations
- Intern (1st Year Resident) Observations
- Inpatient Team and Patient Identification
- New Student Trainings from the Speech Team

CI Appointment Flow

Evaluation

Meet with audiology for formal evaluation. Evaluation may include:

- Questionnaires
- Speech-in-noise testing
- Discussion of realistic expectations of a cochlear implant
- Device selection process

Pre-Op
(Initial visit)

Meet with surgeon to discuss implant and candidacy

Schedule imaging and surgery date, if applicable

Activation appointment with audiology (2 weeks post-surgery) may also be scheduled at this time

Surgery

Surgery takes approx. 1.5-2 hours to complete

Gauze dressing should remain in place for 24-48 hours after surgery to reduce swelling

After surgery, there will be no sound in the implant ear for approx. 2 weeks prior to activation

Post-op
(2 weeks after surgery)

Meet with surgeon to assess the healing of the site

Activation
(2-4 weeks after surgery)

Meet with your audiologist to activate the cochlear implant

You will receive sound in the implant ear on this date, along with your equipment

Do not expect to hear clearly on this date! This is just the beginning of a process that will continue to evolve throughout the next 6-12 months (approx.)

Initial follow-up
(6-8 weeks post-op)

ENT follow-up

Audiology follow-up:

- 2-weeks post-activation
- 6-weeks post-activation

Aural rehab therapy:

Initial aural rehab assessment

Ongoing follow-up

ENT follow-up:

6 months or as needed

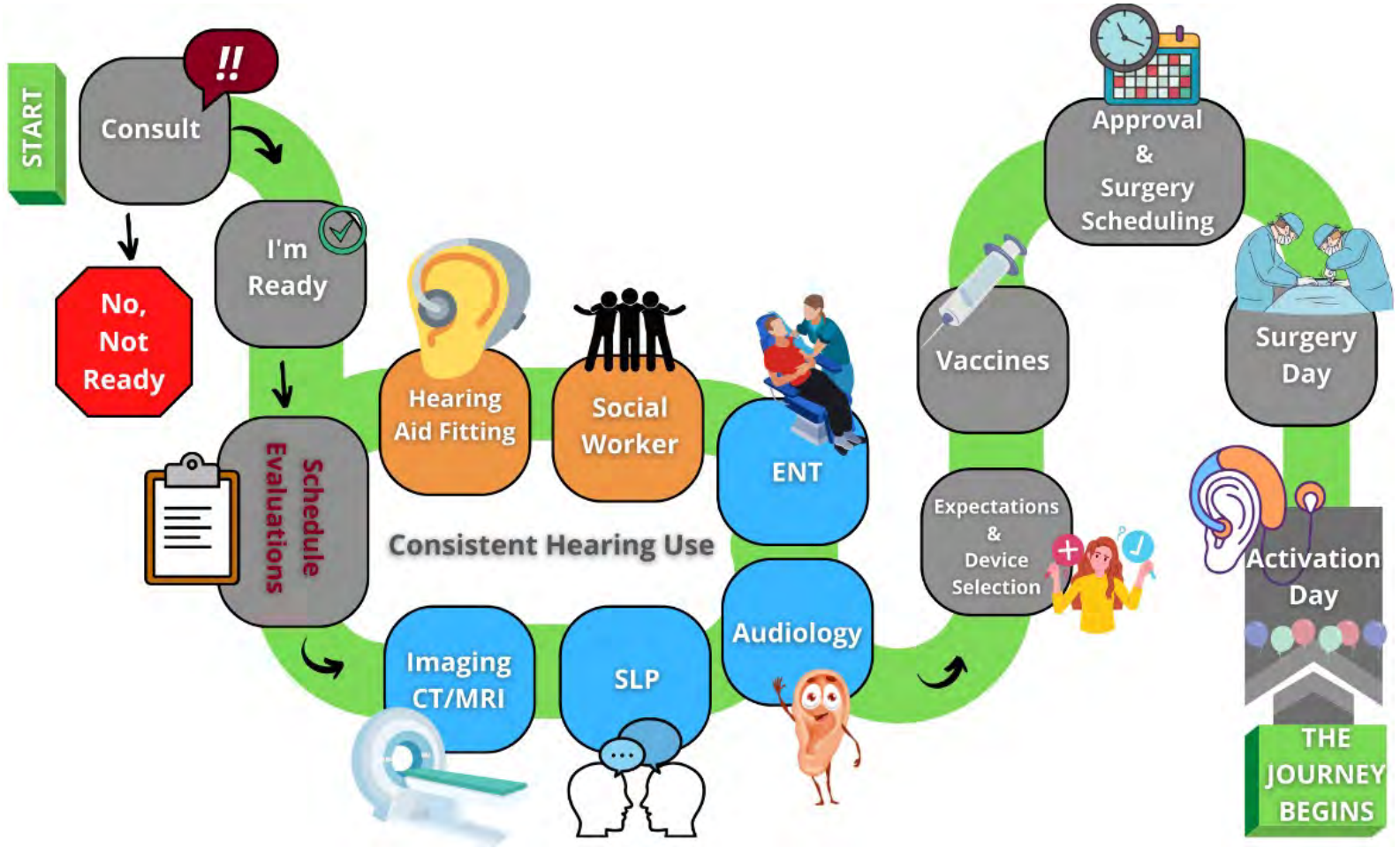
Audiology follow-up:

- 3 months for speech-in-noise testing
- 6 months or as needed

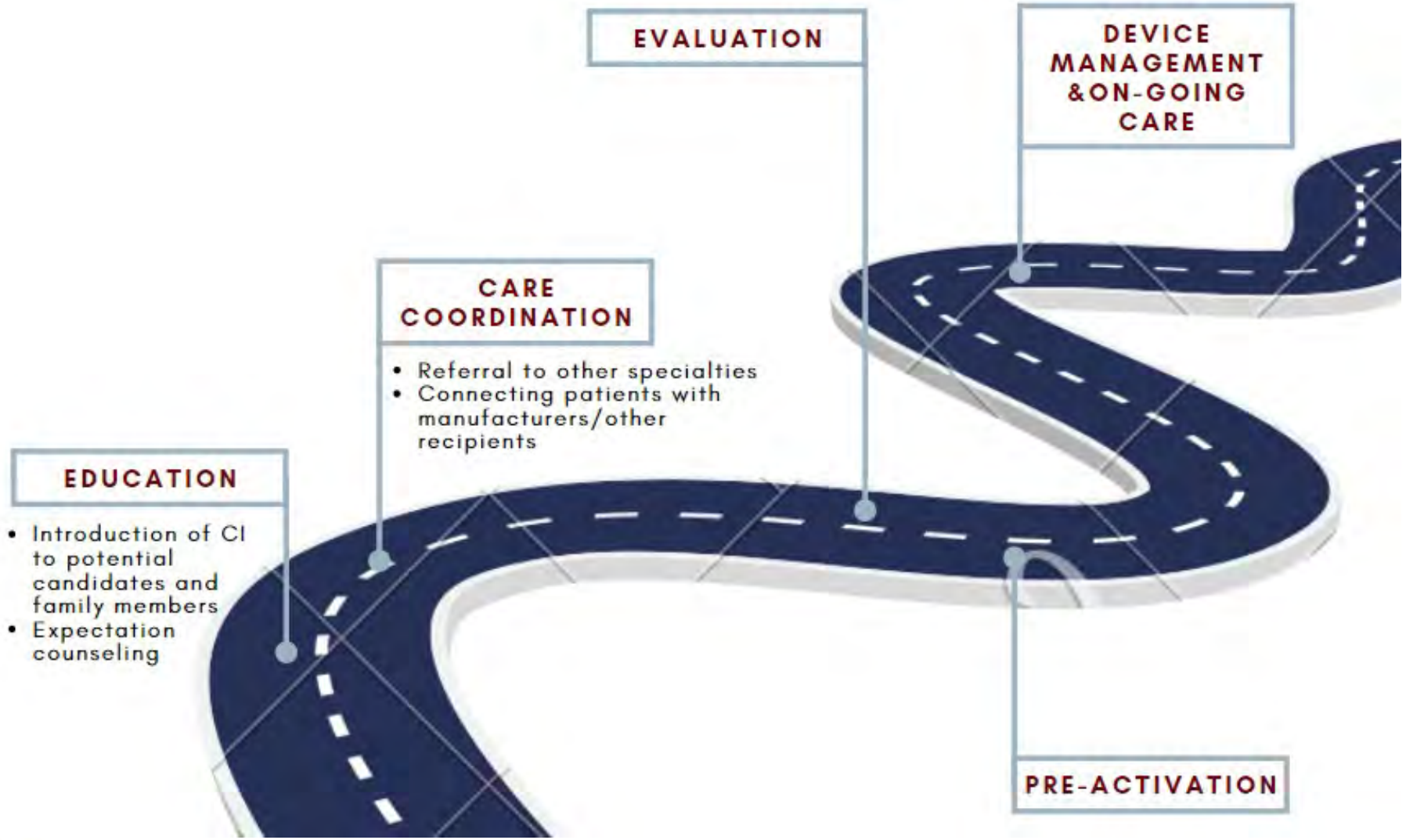
Aural rehab therapy:

Follow-up appointments every 2-3 months, or as needed the first year

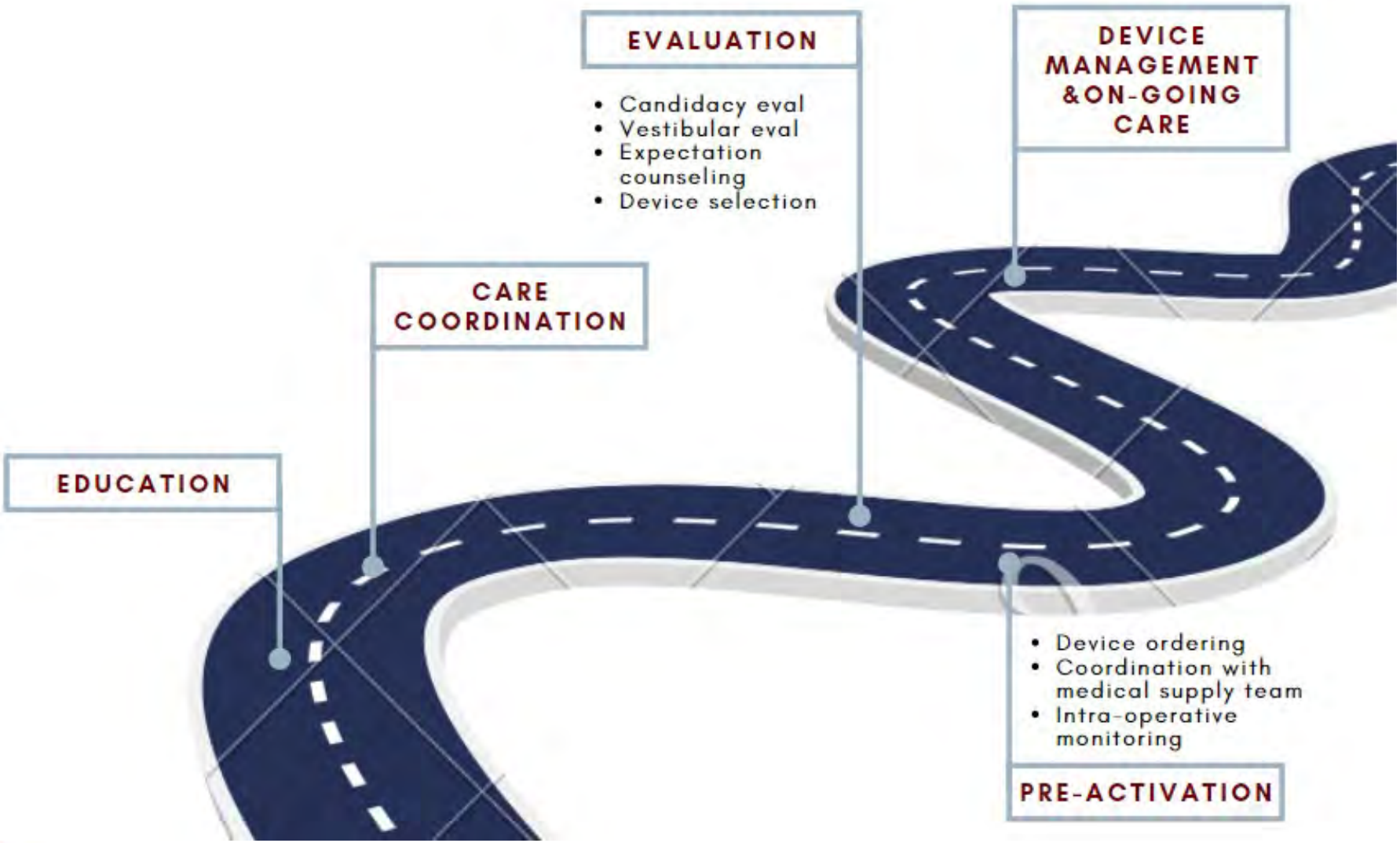
Appointment Flow--Pediatrics



What Audiology Contributes to the Team



What Audiology Contributes to the Team



Device Management & On-going Care

- Implant activation
- Counseling on use of processors & accessories
- Providing education resources
  - Manufacturer customer portals
- Counseling on life-style adjustments for patients and family members
  - Daily use and maintenance of the devices, advocacy for accessibility, social engagement, etc.
- Routine follow-up visits for mapping and outcome monitoring
  - Detection thresholds
  - Speech testing
  - Questionnaires (i.e. self-reported hearing quality, quality of life, etc.)
- Troubleshooting & RMA requests
- Processor upgrades
- Detection of device failure
- Close communication with other specialties

What Surgeon Contributes to the Team

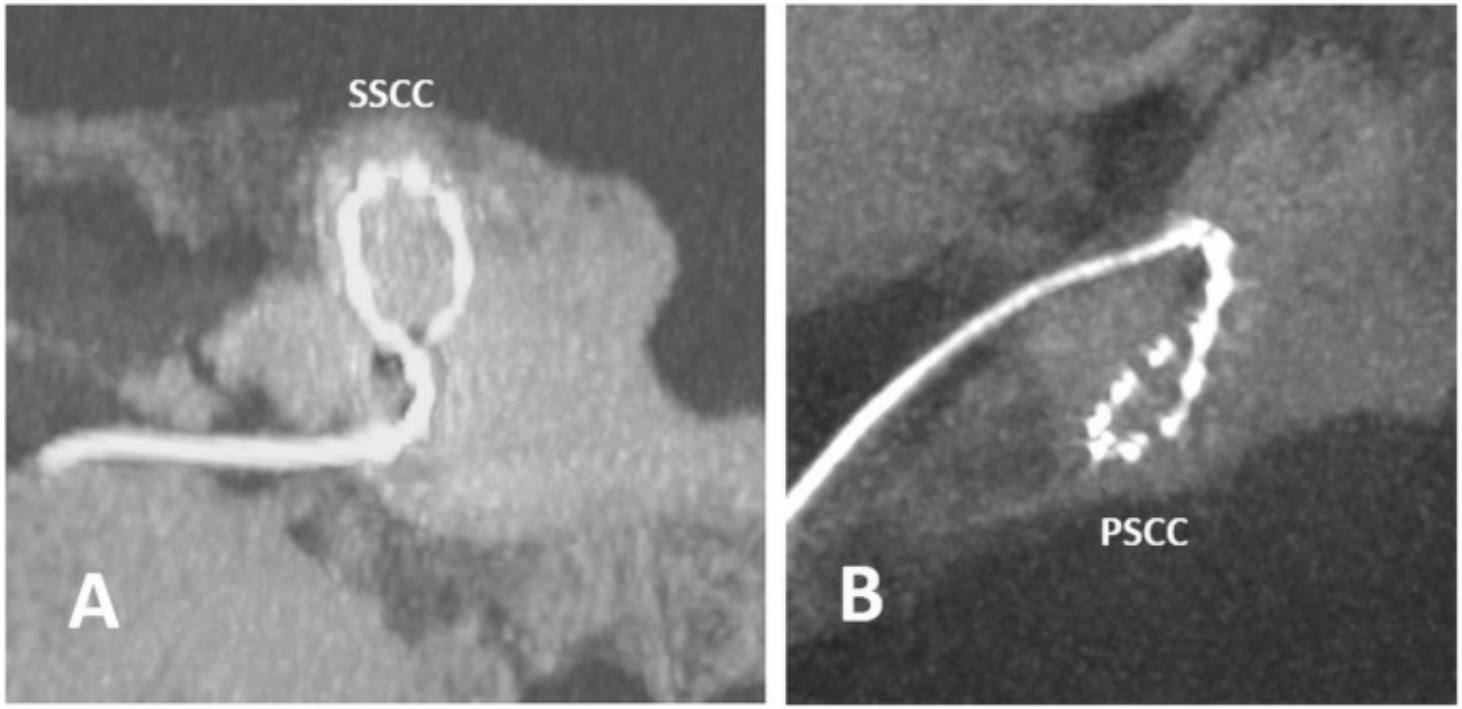
- Many candidates are often referred from audiology or other ENTs
- Perform detailed otologic history, exam, and review other relevant medical and surgical history
  - Obtain imaging (CT or MRI) to assess cochlea and temporal bone anatomy
- Candidates are presented at our team meetings for discussion and review other needed interventions (neuropsychiatry eval, etc)
- Counsel patient about surgical risks, benefits, and expected rehabilitation afterwards
- Help with device (electrode) selection
  - Anatomical factors, hearing preservation, etc

What Surgeon Contributes to the Team

- Put the implant in!
- CI surgery routinely done as outpatient for adults in children
  - Approximately 1.5 hours per ear
- Initial follow-up done about 2 weeks after surgery, with activation on same day
- After this, majority of follow-up transitions to audiology and SLP
- See on annual basis or as needed for issues

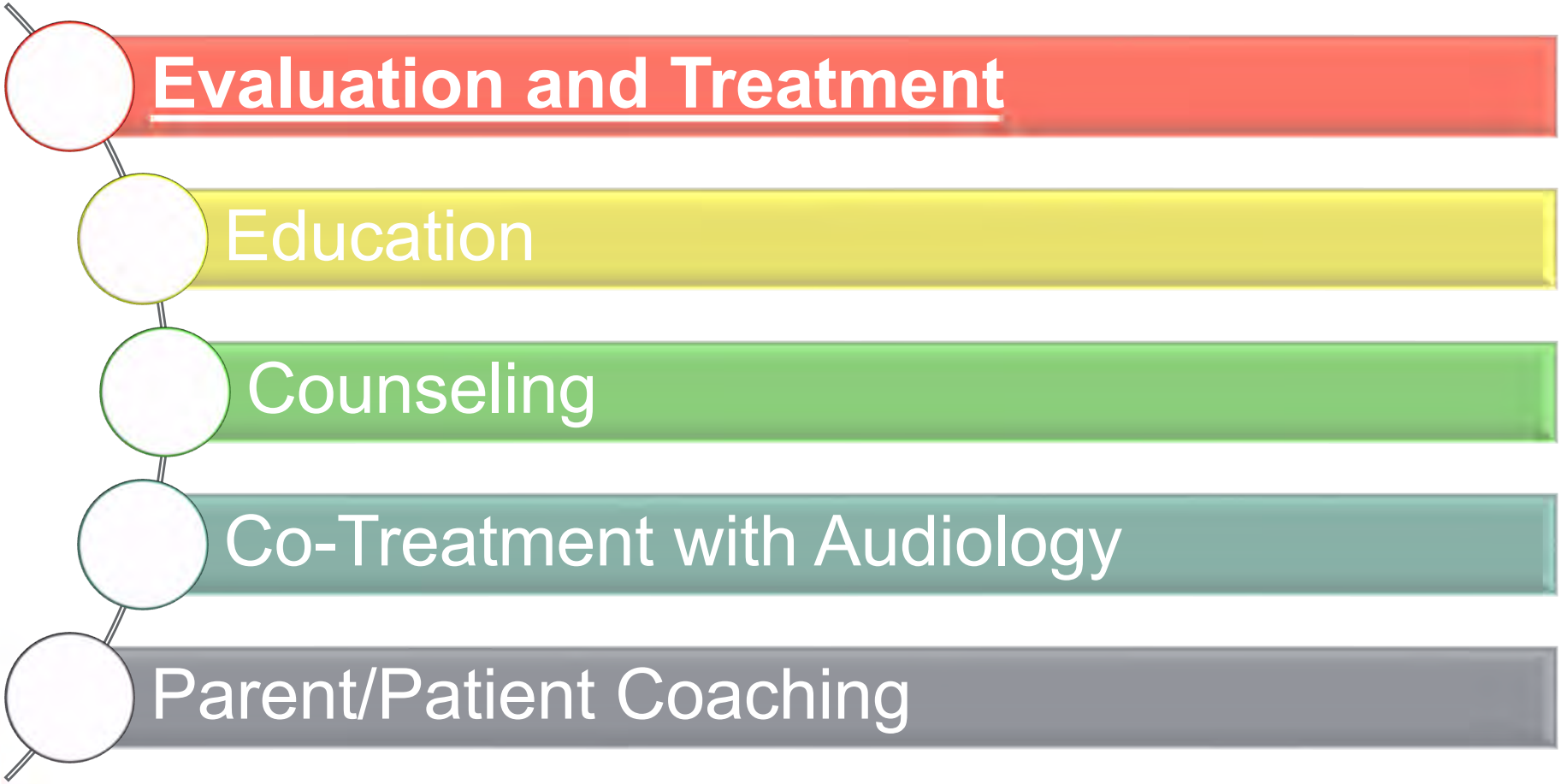
What Surgeon Contributes to the Team

- Also see patients with existing implants who may have performance issues or other possible complications
  - Evaluation for device failures (soft or hard) involves otologic examination and often imaging to determine if there are device issues

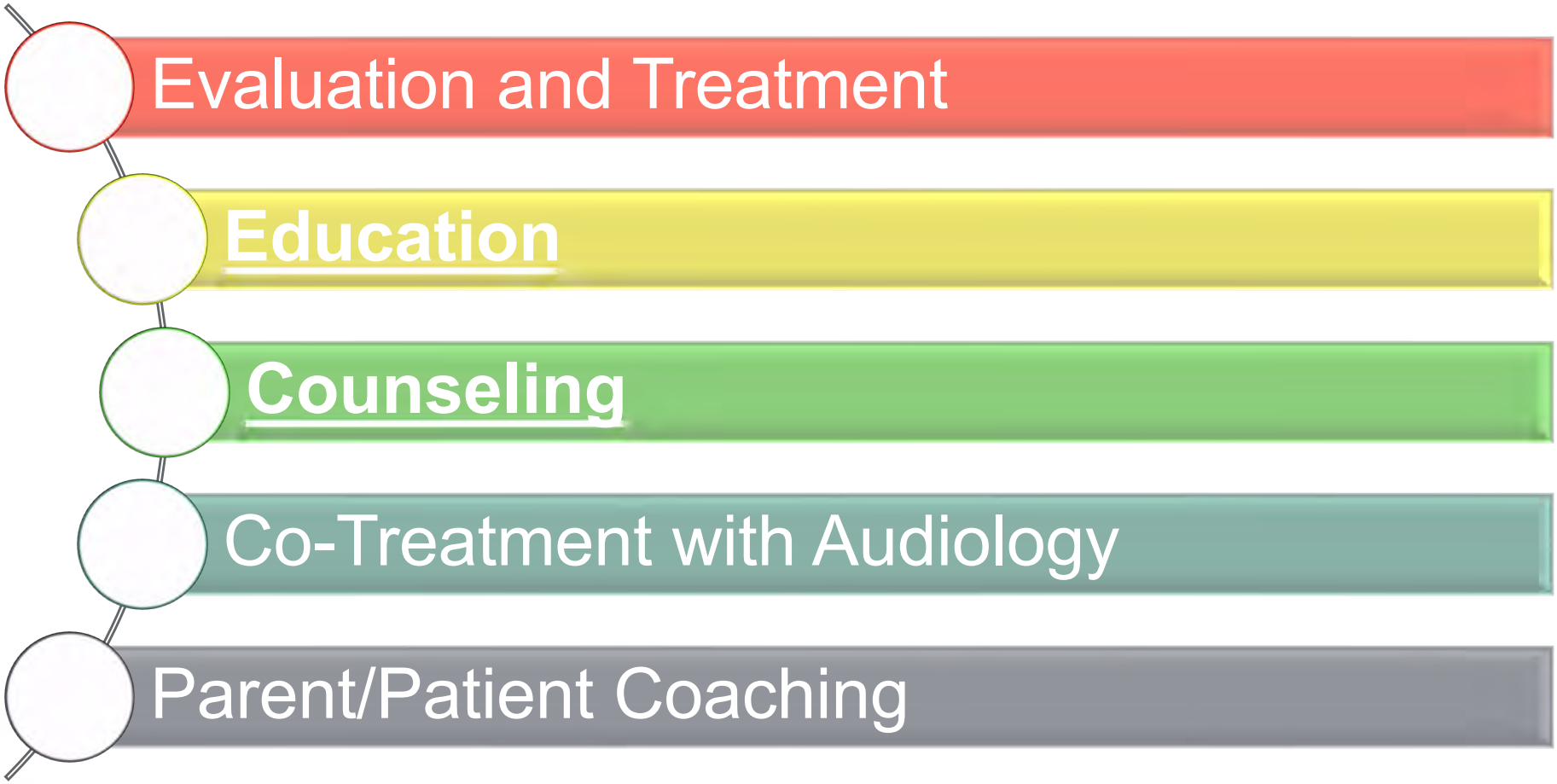


(Widmann, et al, 2020)

What SLP/AVT Contributes to the Team

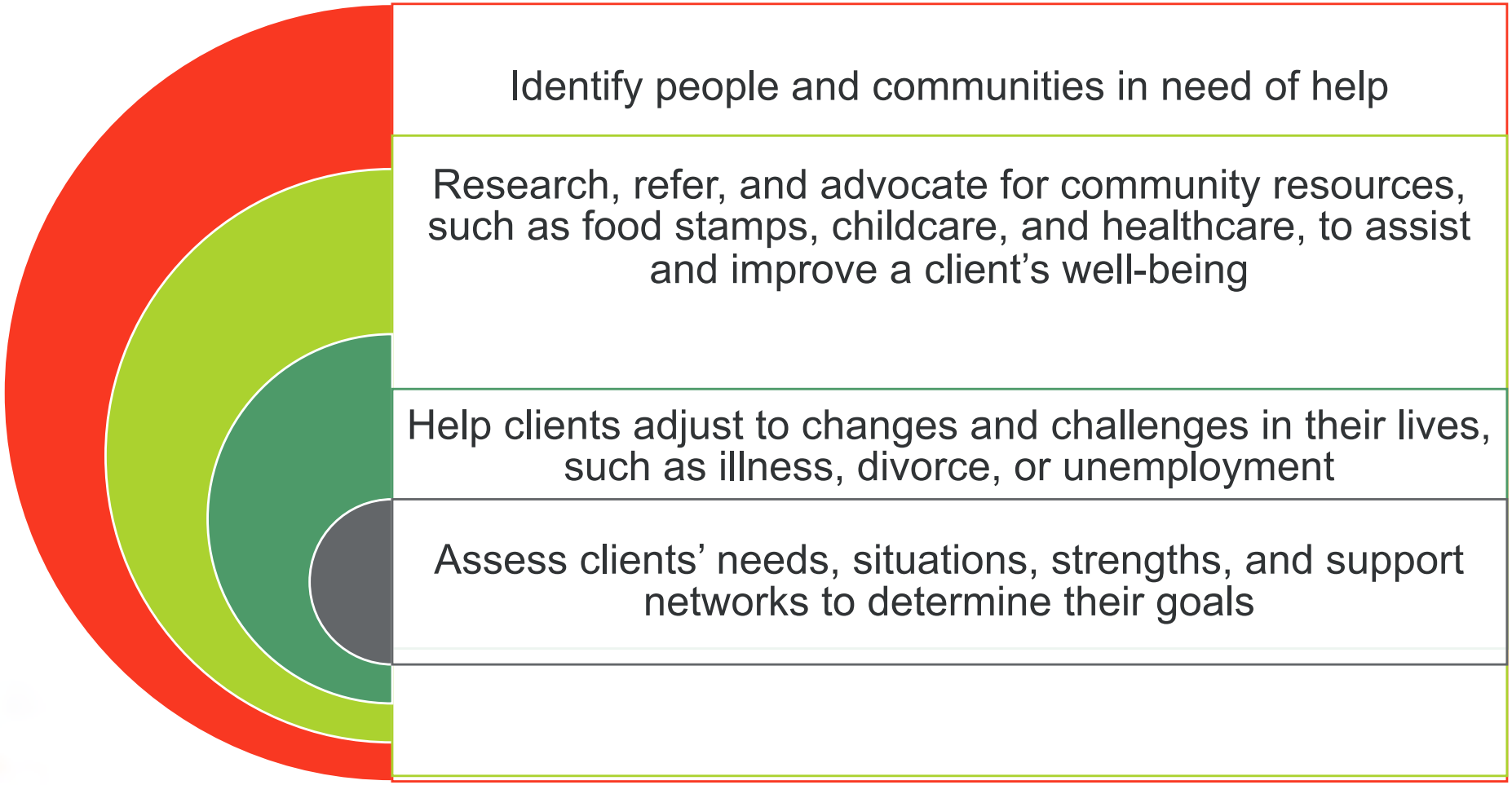


What SLP/AVT Contributes to the Team



What SLP/AVT Contributes to the Team

What SW Contributes to the Team



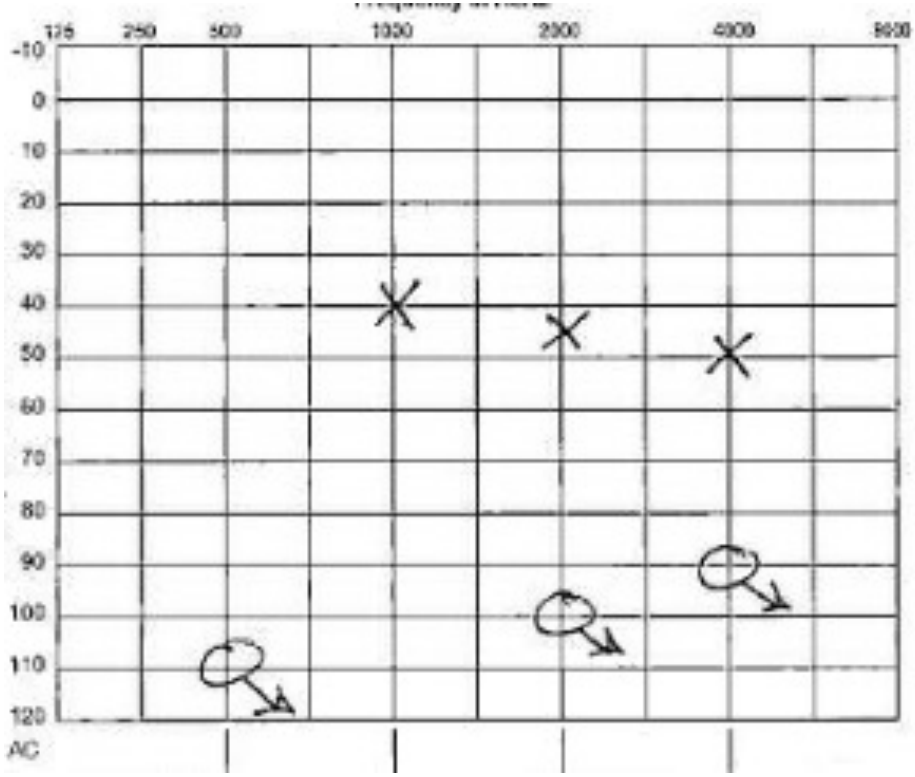
https://www.bls.gov/ooh/community-and-social-service/social-workers.htm#tab-2

Interdisciplinary Case 1

Pt. "Ear Pods"

Patient "Ear Pods"

- 7 year old male with complicated history of tuberculosis meningitis (4 years old when diagnosed) with hydrocephalus and shunt placement
- Initial audio at time of infection indicated normal hearing sensitivity bilaterally
  - Lost to follow-up for 1.5 years
  - Audio indicated no response for the right ear and moderate hearing loss for the left ear
  - Subsequent sedated ABR confirmed profound SNHL
  - Imaging demonstrated left cerebellopontine tuberculoma
- Interdisciplinary discussion regarding CI in setting of ongoing TB
  - AuD, SLP, ENT, SW, Neurology, Infectious disease



SLP Findings Pre OP

- **Language**:
  - Receptive One-Word Picture Vocabulary Test,4th edition (ROWPVT-4)
  - Raw Score 5
  - Standard Score <55
  - Percentile <1
  - Severe delay

  - Oral Written Language Scale, 2nd Edition (OWLS-2)
  - attempted but discontinued – no basal obtained

- **Functional Audition:**
  - When aided - Ling 6 detection for all sounds except /s/, none identified
  - Inconsistent responses to environmental and speech sounds
  - No auditory comprehension or identification elicited
- **Speech:**
  - informally assessed due to reduced vocab skills and judged to be mild-moderate delay

Patient "Ear Pods" TB Meningitis

- CI surgery in setting of programmable VP shunts
  - Soft tissue adjustments for magnet placement, tubing behind the ear

Patient "Ear Pods" TB Meningitis

- Left CPA tuberculoma
- Need to monitor lesion and impact of potential left CI on MRI surveillance

Patient "Ear Pods" TB Meningitis

- Right CI surgery was uncomplicated
  - Minor soft tissue adjustments
- Grandmother reports that listening skills have greatly improved since activation
  - He is able to answer basic questions in quiet
  - Has become more social as well

SLP Findings Post -OP

- **Language:**
  - Oral Written Language Scale, 2nd Edition (OWLS-2)
  - Listening comprehension RS: 21 SS: 48 %ile:<,1 Age 3:3
  - Oral Expression RS: 23 SS: 57 %ile: .2 Age Equiv: 3:10
    - Receptive One-Word Picture Vocabulary Test-4 ed (ROWPVT-4)
  - RS: 57 SS: 75 %ile: 5th Age Equiv: 4:5
  - Expressive One-Word Picture Vocabulary Test- 4 ed (EOWPVT-4)
  - RS: 32 SS: 57 %ile: <1 Age Equiv: 2:10
- **Functional audition:**
  - Ling 6 detected and identified 100%
  - Early Speech Perception Test:
    - Category 4 - consistent word identification
    - Follows 2 critical element directions
    - Closed set vowel and consonant identification in mono syllables
- **Speech:**
  - Goldman Fristoe Test of Articulation – 3rd edition (GFTA-3)
  - RS:10 SS: 79 %ile: 8 Age Equiv: 5:1

Patient "Ear Pods" TB Meningitis

- Post-op was readmitted for difficulty walking
  - Workup indicated TB involvement of spinal cord with edema/compression
  - Required extensive rehabilitation
  - Issues with anemia, remains underweight, requires wheelchair for most ambulation
- Continued importance of SW to address needs, care team coordination with providers

SLP & SW role

- SLP contacted school case manager, teacher, school SLP
- Educated and empowered mother on IEP process and what to advocate for
- Educated on communication modalities and therapeutic approaches family could choose from
- Completed formal and informal assessments of language, audition, speech
- Offered to attend school meeting to address school and team concerns with school attendance and f/u care at UCM
- Coordinated appts with SW and SLP
- SW monitored case and provided updates to family, team, school, and DCFS

Summary of Case and Interdisciplinary Involvement

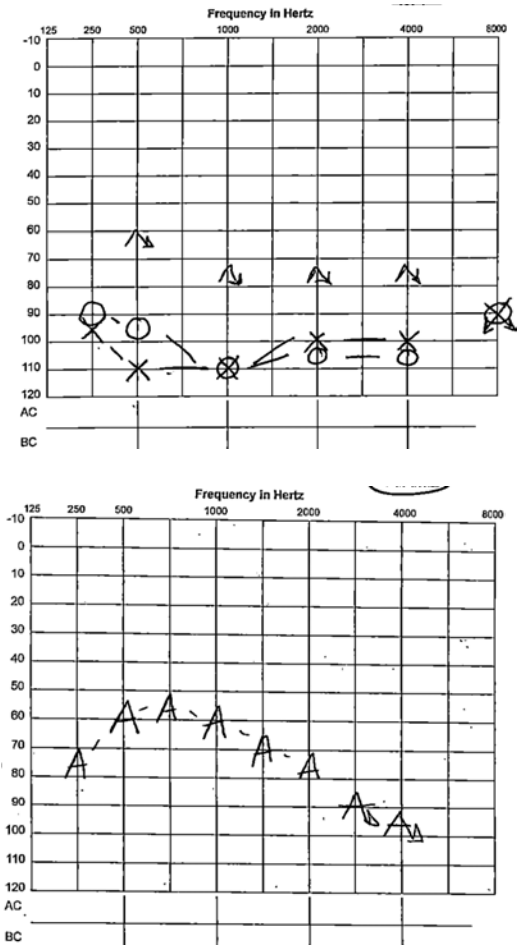
- Rare case of Tuberculosis Meningitis left otherwise normally developing child, profoundly deaf bilaterally.
- After consulting imaging, ENT, SW, AuD, and SLP, a meeting was scheduled to discuss whether or not to implant the right ear.
- SW worked diligently behind the scenes to ensure all barriers were removed as much as possible to provide potential for success.
- Following surgery, appointments were coordinated with all of the disciplines on the same day to provide a consistent care plan.
- Strides were made in auditory and speech access.
- Due to homes issues, the patient experiences significant setbacks in overall health. This led to multiple admissions for failure to thrive.
- While each discipline on the team worked with each other to provide optimal outcomes, this case truly highlights the SIGNIFICANT work performed by social workers. This helped with not only team visits but in the patients everyday life as well.

Interdisciplinary Case 2

Pt. "911"

Patient 911 – psychiatric history

- 20 years old female
  - ASL as primary mode of communication
- 2006: Diagnosed with bilateral profound SNHL, congenital in nature; started hearing aid use
- Imaging largely normal except
  - "bilateral enlargement of the lateral semicicular canals and the vestibules...there is no vestibular aqueductal enlargement"
- Completed CI evaluation in 2006, 2021, and 2023
  - March 2023: AzBio 0% in quiet (bilaterally aided)
- Patient and mother expressed strong interest in cochlear implantation with expectations for sound awareness and music perception.



SLP Findings and Role

- Speech Language Evaluation in 2021 was mainly informal assessment due to pt's age and language being ASL. Administered only a Self Assessment of Communication Questionnaire - results next slide. Input from mother included as well.
- Referred to Social Work
- Collaborated with team with counseling
- SLP used a therapy session to review roadmap and discuss therapy needs and expectations if pursues CI
- SLP was fluent in ASL which helped establish rapport and aided in sensitivity to cultural nuances of case
- SLP attended ethics discussion with team

Patient 911 – psychiatric history

- Significant mental health history
  - History of family trauma
  - Victim of assault
  - Multiple ED visits for behavior concerns
    - 10 visits in the last 2 years
  - Present symptoms of bipolar disorder, depression, suicide gesture, delusions/visual hallucinations, and aggressive behavior towards others

Patient 911 – psychiatric history

- Ethics committee meeting
  - Interprofessional panel across multiple faculties/faculties/specialties
  - Concern for Schizophrenia
  - Pro implantation – Increased access to sound will provide safety cues, sound awareness, and improve quality of life
  - Con implantation – Access to sound will not improve quality of life and potentially trigger mental health event
  - Additional discussion regarding mental health resources from Deaf provider
  - Resolution: Psych evaluation prior and treatment throughout implantation process
- Care team includes audiology, otology, social work, behavioral health
- Ongoing coordination for surgery rescheduling...

Summary of Case and Interdisciplinary Involvement

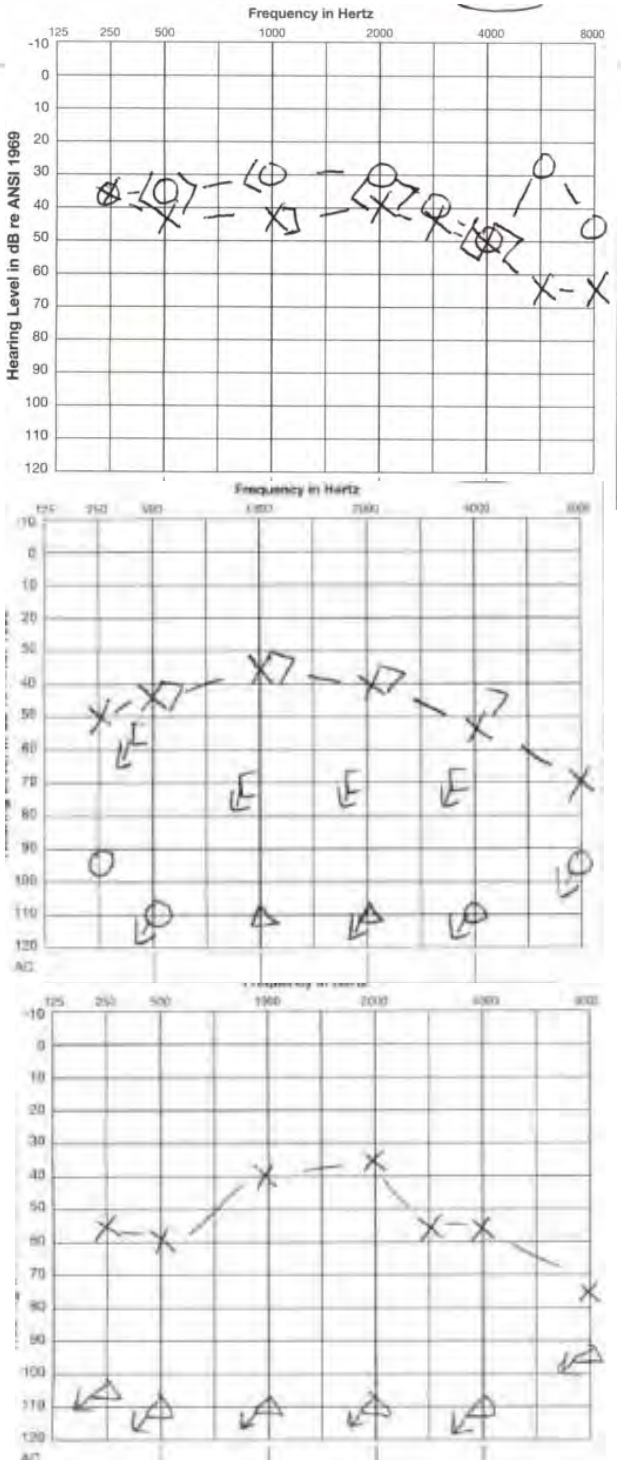
- Patient with profound sensorineural hearing loss interested in cochlear implantation.
- Evaluation complicated by social history and mental health concerns without established care in place
- CI team utilized interdisciplinary care for full evaluation
- When team could not come to a consensus, Hospital Ethics committee was employed for additional perspective
- The team's network expanded to include local mental health resources for care on case-by-case basis

Interdisciplinary Case 3

Pt. "COVID?"

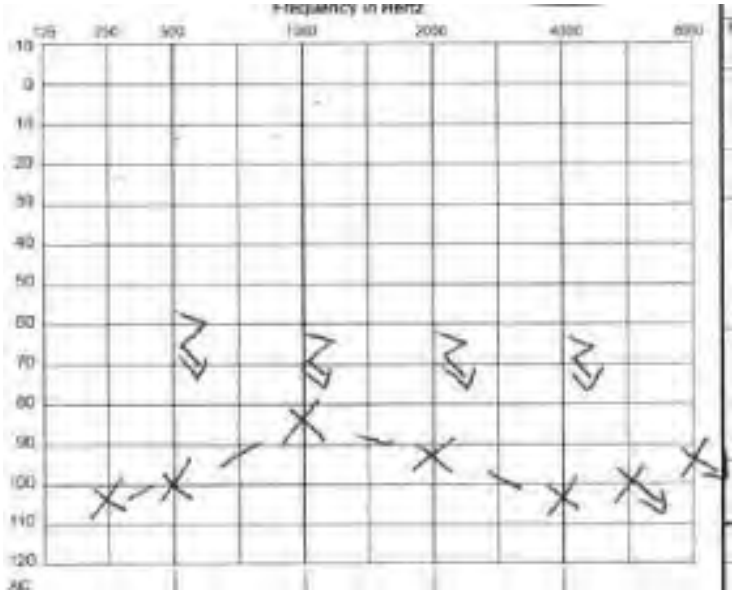
Patient COVID – Sudden HL

- 49 year old female
- 10/2021 - Seen for tinnitus, fit with hearing aids shortly after
- 1/2022 - Sudden R HL, intratympanic steroids without improvement
- 3/2022 - CI evaluation, 0% AZ Bio
- 6/2022 - Right ear implanted



Patient COVID – Sudden SNHL

- 8/2022 - Left sudden loss
  - 16% WRS
- 3/2023 - Left surgery
- 4/2023 - Right CI change in performance
  - Integrity test
- 6/2023 - Right revision



Patient COVID – Internal Device Failure

- Integrity testing by manufacturer completed:

- Results revealed short circuit electrodes during testing of the device and further analysis revealed these shorts were caused by physical contact
- of the electrode wire bundle to the electrode ring, causing insulation damage.

SLP Findings and Role

- Aural Rehab Evaluation completed s/p first R CI
- Functional audition skills
  - Ling 6 detected and identified
  - Suprasegmental identification in closed sets
  - Auditory identification for monosyllables in closed sets
  - Nature of vowel and consonant substitutions suggested issue with access from 2K-4K Hz
- Patient interview and questionnaire revealed pt's main concerns related to ADLs and QOL:
  - Communication when speakers wear masks
  - Communication when battery dies or at end of day
  - Safety when home alone
  - Phone communication
  - Communication in noise and group situations

SLP Findings and Role

- Revaluated following 2nd CI activation and R CI reactivation
- Functional Audition Skills:
  - Patient understood spoken language via closed captioning and lip reading only.

    L CI only: perceives as chipmunk sound quality
    - Identified volume changes
    - Did not identify pitches or pattern perception accurately
    - Ling sounds detected, but identified s, oo, sh only. Substituted Ur/ah, oo/ee, ur/m.
    - Consonant perception: Voicing, placement, manner errors

    R CI ONLY: described as robotic
    - Identified volume changes accurately
    - Could not identify patterns or pitches
    - Ling 6 detected. Identified oo, sh. Substituted M/ah, oo/ee, sh/s, oo/m.
    - Consonant perception: Voicing, place, manner errors; perceived most sounds as b or d

SLP Findings and Role

- Patient interview and questionnaire revealed:
  - ADLs severely impaired due to poor word discrimination now in both ears
  - Now on short term disability from work
  - Mental health reported to be declining – sought counselor support following recommendation from SLP
  - Slow progress
  - Dealing with menopause symptoms and treatments

COVID-19 and Hearing Loss – Journal Articles

- Saniasiaya (2019) – HL & COVID-19
- Kilic, et al (2020) – Sudden SNHL & COVID-19
- Saki, et al (2021) – CI Failure following COVID -19

Hormones and CI

Apisa, et al (2019) – Menstrual Cycle & CI

Lafer, et al (2015) – Growth Hormone & CI performance

Summary of Case and Interdisciplinary Involvement

- Multiple Covid-19 infections
- Internal Device Failure
- Menopause - fluctuations in impedances
- Sudden onset for an oral communicator
- Short Term Disability, now maybe Long Term
- Co-Treat planned with audiology and speech next month so … to be continued!!

Summary/ Wrap Up

- Big Takeaways From This!
  - ID teams allow a patient to a comprehensive plan of care, which may lead to optimal outcomes!
  - Team meetings, where everyone is respected, allow for the sharing of ideas to aid in a patient's care.
  - ID teams do not all look the same! Resources may be limited, but you still can think outside the box to provide comprehensive care.
  - Don't be afraid to ask for help! That's what being on a team is all about! If you're stumped there are people all over willing to help!

CI Audiologists

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Neurotologists

Michael Gluth, M.D.
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Q & A