HEARING FOLLOW UP FOR CCMV

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AUDIOLOGISTS

- Clinical doctorate (AuD)
- What do we do?
  - Assess **hearing**
  - Evaluate and fit **hearing aids**
  - Evaluate and fit **cochlear implants**
  - Assess **vestibular** function
- Where do we work?
  - Hospital
  - Clinic
  - School
  - Private Practice

UNIVERSAL NEWBORN HEARING SCREENING

- Before universal newborn hearing screening, children were often not identified with hearing loss until 2-3 years of age
- Those with a milder degree of hearing loss were identified even later
- With universal screening, goal is to identify hearing loss by 3 months of age
- Before hospital discharge babies are screening using one of the following:
  - Automated Auditory Brainstem Response Testing
  - Otoacoustic Emissions (OAE) Screening
- Babies who do not pass initial screening or outpatient re-screening are referred for diagnostic testing
  - Confirm type, degree, and configuration of hearing loss

WHY DOES MY BABY WITH CCMV NEED TO SEE AN AUDIOLOGIST?

- Even if a baby passes the newborn hearing screening they could have some level of hearing loss and it does not guarantee typical hearing forever
- Children with cCMV are at risk for late-onset or progressive hearing loss
  - Approximately 50% with symptomatic cCMV will develop hearing loss (Fowler, 2013)
  - About 10% of babies who are asymptomatic (appear healthy at birth) may develop health problems, including hearing loss, over time. Vestibular disorders occur frequently in children with both symptomatic and asymptomatic cCMV (Bernard, Wiener-Vacher, Van Den Abbeele & Teissier, 2015; Pinninti, et al., 2021).

It can be hard to tell how much a baby is hearing at home!

SPEECH AND HEARING MILESTONES

Birth-3 months	4-6 months	7 months-1 year	1-2 years	2+ years
•Startles at loud sounds •Quiets or smiles when you talk •Cries change for different needs	•Moves eyes in direction of sounds •Pays attention to toys that make sounds & music •Coos and babbles, laughs	•Turns to look for sounds and name •Understands words for common items/people •Babbles long strings of sounds •Uses sounds and gestures to get & keep attention •Says 1-2 words	•Points to a few body parts •Follows 1 step directions •Uses a lot of new words •Asks questions •Puts 2 words together	•Increasing vocabulary •Increasing sentence length •Improved intelligibility

https://www.asha.org/public/speech/development/chart/

MOVEMENT AND BALANCE MILESTONES

Birth-4 months

- Holds head up when on tummy
- Moves both arms and legs
- Opens hands briefly

4-6 months

- Holds head steady without support when being held
- Holds a toy when put in hand
- Brings hands to mouth
- Pushes up onto elbows/forearms when on tummy

6-9 months

- Rolls from tummy to back
- Pushes up with straight arms when on tummy
- Leans on hands for support when sitting

9-15 months

- Gets into sitting position by themself
- Sits without support
- Pulls up to stand
- Walks, holding on to furniture

15-30 months

- Takes a few steps on their own
- Walks without support
- Climbs on and off furniture
- Kicks a ball
- Runs
- Walks up stairs

One leg standing screen

- 36 months
  - 2 seconds
- 42 months
  - 4 seconds
- 48 months
  - 6 seconds
- 54 months
  - 8 seconds
- 60 months
  - 10 seconds
- 72 months
  - 12 seconds

Important Milestones: Your Baby By Two Years | CDC
CDC's Milestone Tracker App | CDC

HOW OFTEN DOES MY BABY WITH CCMV NEED TO SEE AN AUDIOLOGIST?

- Minnesota Department of Health Audiology Guidelines:
  - Initial Diagnostic Audiology Assessment (ABR) by 1 month of age
  - Repeat ABR at 4-5 months of age
  - Monitor every 3 months until age 2 years
  - Monitor every 6 months from age 2-6 years
  - Monitor every 12 months from age 6-10 years

GOAL: To know if something has changed to allow for early intervention!

DEPARTMENT OF HEALTH

PEDIATRIC HEARING EVALUATION

- Auditory Brainstem Response Testing
- Otoacoustic Emissions
- Tympanometry
- Behavioral Audiometry

AUDITORY BRAINSTEM RESPONSE (ABR) TESTING

- Infants or children who cannot reliably condition to behavioral testing
- Sounds are presented through small earphones
- Electrodes pick up the response from the auditory nerve
- Screening (AABR) used for newborn hearing screening
- Diagnostic testing can determine **degree** and **type** of hearing loss through waveform analysis by audiologist

https://www.babyhearing.org/newborn-hearing-screening-tests

HOW IS A DIAGNOSTIC ABR EVALUATION DIFFERENT THAN THE NEWBORN HEARING SCREENING?

Newborn hearing screening

Completed via automated auditory brainstem response (AABR) or screening otoacoustic emissions (OAE)

- Both are screening tests and suggest normal hearing sensitivity, but cannot rule out minimal or mild hearing losses
- Takes between 3-30 minutes to complete

Diagnostic ABR evaluation

Includes finding of thresholds using ABR, tympanometry evaluation, and diagnostic otoacoustic emissions

- Information obtained includes hearing thresholds, if middle ear dysfunction is present, health of cochlear hair cells
- Takes approximately 2 hours to complete

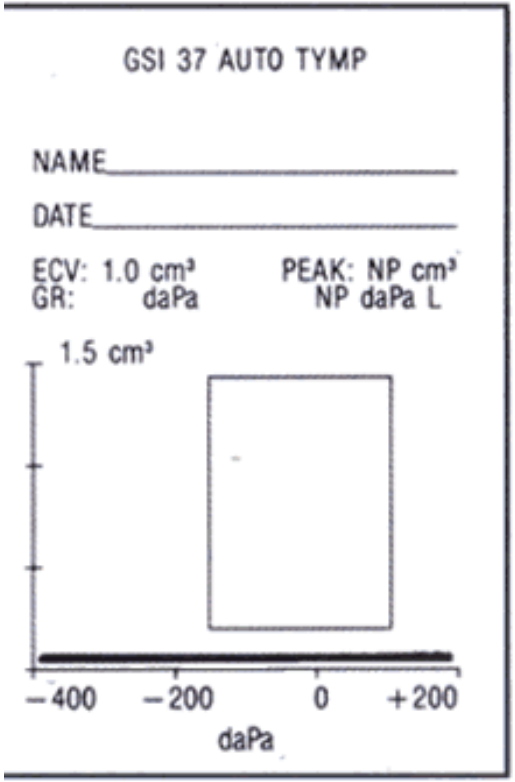
OTOACOUSTIC EMISSIONS (OAES)

- Measure of peripheral auditory function
- Outer hair cells send a small vibration out of the ear that is measured in the ear canal
- **Does not determine degree of hearing loss**
- For monitoring purposes, changes in OAEs can be helpful identifying concerns for a change in hearing
- Absent could mean hearing loss or middle ear dysfunction

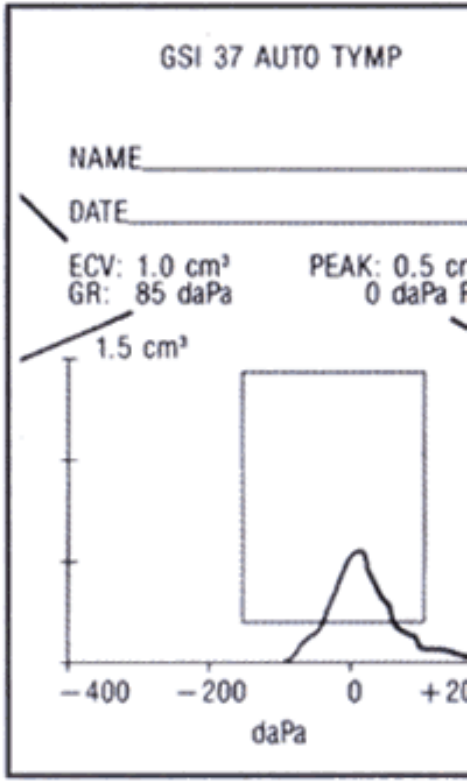
TYMPANOMETRY

- Provides objective information about the middle ear and eardrum
- Most common reason to visit pediatrician: middle ear fluid or ear infections
- With close monitoring of middle ear function, this can show up often
- Many babies and children have a temporary change in middle ear function with cold or ear-infection symptoms

Type 'B' tympanogram



Type 'A' tympanogram



VISUAL REINFORCEMENT AUDIOMETRY (VRA)

- 6 months - 2 years
- Sounds presented through earphones or a loudspeaker
- Child responds by looking at a screen or animated toy
- Jesi HearingTest 01

CONDITIONED PLAY AUDIOMETRY (CPA)

- 2 - 5 years
- Sounds are presented through earphones (or loudspeaker)
- Children perform a game-like action every time they hear a sound
- Jesi HearingTest 02

CONVENTIONAL AUDIOMETRY

- 5+ years, or as soon as they have the attention span to do the task without as much external reinforcement
- Sounds are presented through earphones (or loudspeaker)
- Push a button or raise a hand when you hear it
- Jesi HearingTest 03

WHAT IF SOMETHING ABNORMAL IS FOUND?

Permanent Hearing Loss

- Referral to ENT for hearing loss work-up
- Fit with appropriate amplification
- Return for close monitoring of hearing sensitivity (every 3 months until hearing loss is stable)

Conductive (transient) hearing loss

- Referral to ENT for medical management
- Closely monitoring of hearing sensitivity until hearing returns to baseline thresholds and then return to cCMV protocol

Vestibular delays/changes

- Referral to ENT for medical management
- Referral to physical therapy for (re)habilitation
- Vestibular diagnostic testing (depending on age)

REFERRALS AND RESOURCES

- Audiologist
- Ear Nose and Throat Physician
- Speech Language Pathologist
- Physical Therapy - balance concerns, delayed milestones
- School Services
- Parent Support

MINNESOTA SPECIFIC SUPPORT

www.helpmegrowmn.org

www.mnhandsandvoices.org

WHERE CAN I FIND MORE INFORMATION?

- State Statute: Sec. 144.064 MN Statutes
- Audiology monitoring guideline: Section 4: Audiology Guidelines For Infants With Congenital Cytomegalovirus (state.mn.us)
- Resources for professionals: Congenital Cytomegalovirus Resources for Providers - MN Dept. of Health (state.mn.us)
- Find an audiologist: EHDI Smart Tool Search (ehdi-pals.org)

Familiar Sounds Audiogram

This audiogram shows the speech region of any person speaking approximately 3 feet away from the listener (60 dB SPL). Example speech sounds, from an adult female, are also included.

Lower ← **Frequency** (similar to pitch) **[Hz]** → Higher

Lows for Prosody | Highs for Clarity

125 250 500 1000 2000 4000 8000

Softer

Whisper

Gas Lawn Mower

Intensity (similar to loudness) **[dB HL]**

Louder

-10 0 10 20 30 40 50 60 70 80 90 100 110 120

Speech Region

m ee oo ah oo ah ee sh s

Normal

Slight

Mild

Moderate

Moderately-Severe

Severe

Profound

Severity of Hearing Loss

What's Prosody?

Prosody is the melody-like aspect of speech that helps convey meaning and emotion. It refers to the pitch, loudness, and timing patterns of speech. The low-frequency portion of the speech region is very important for prosody.

What's Clarity?

The clarity of speech refers to how well a listener recognizes what is being said. The high-frequency portion of the speech region is very important for speech clarity.

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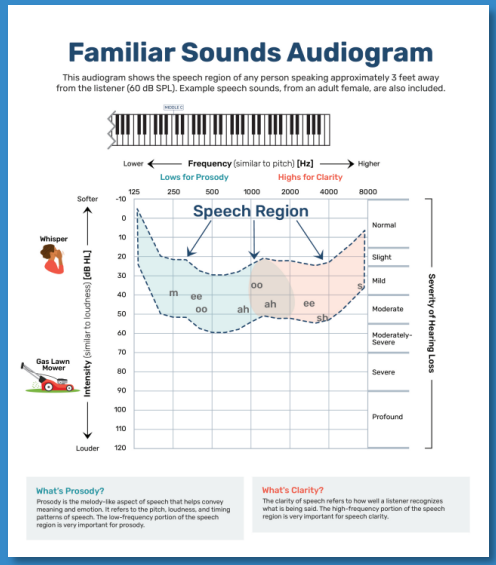

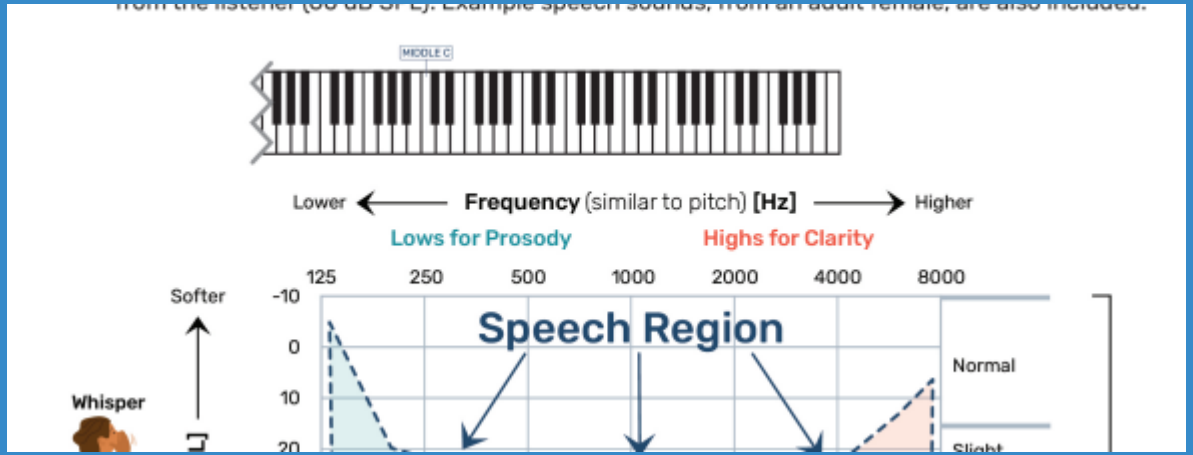

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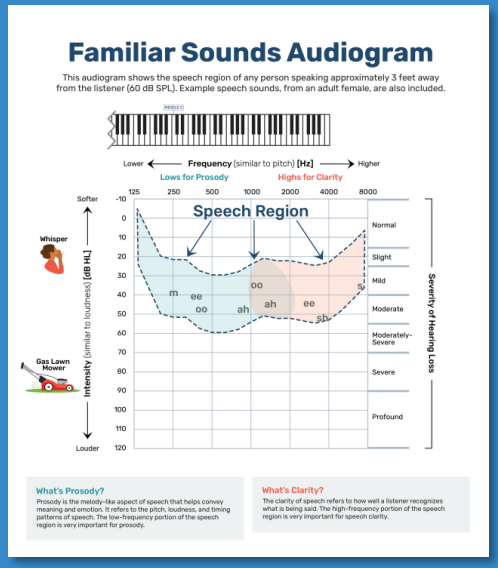

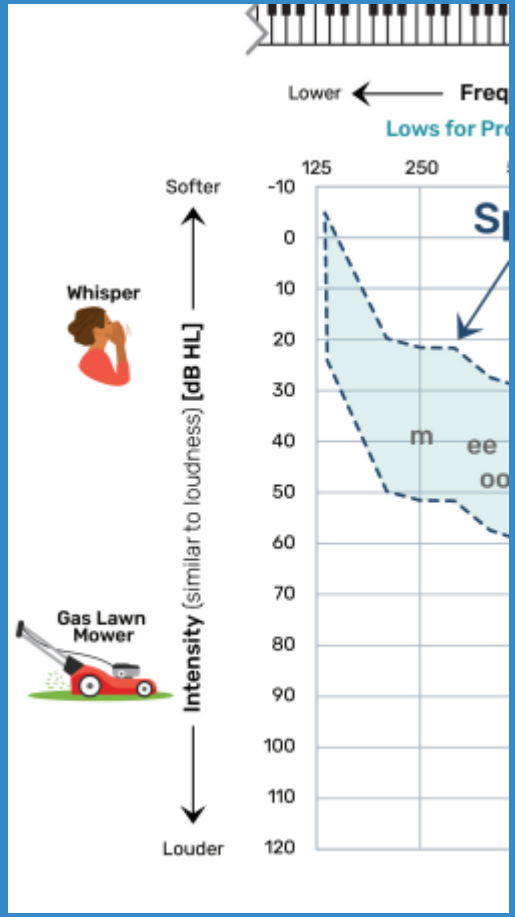

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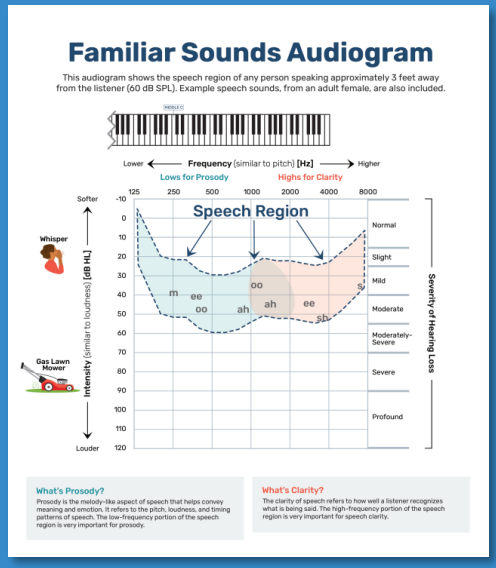

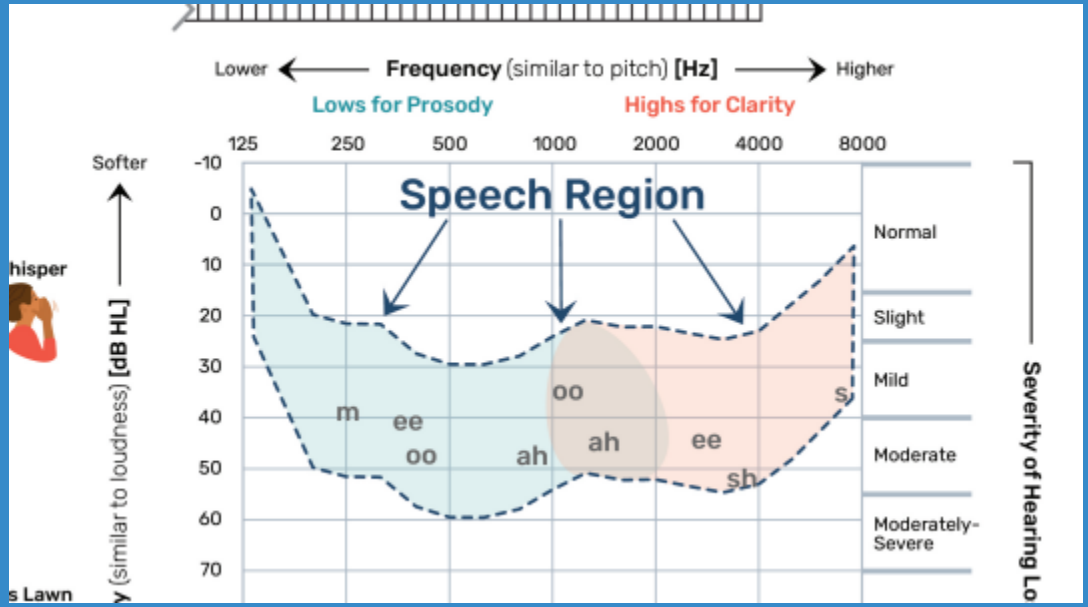

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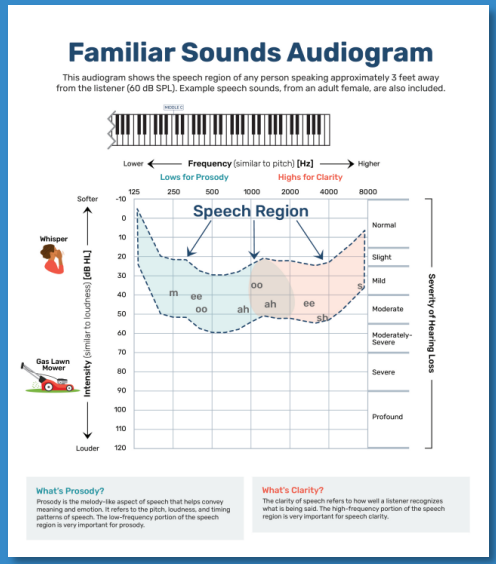

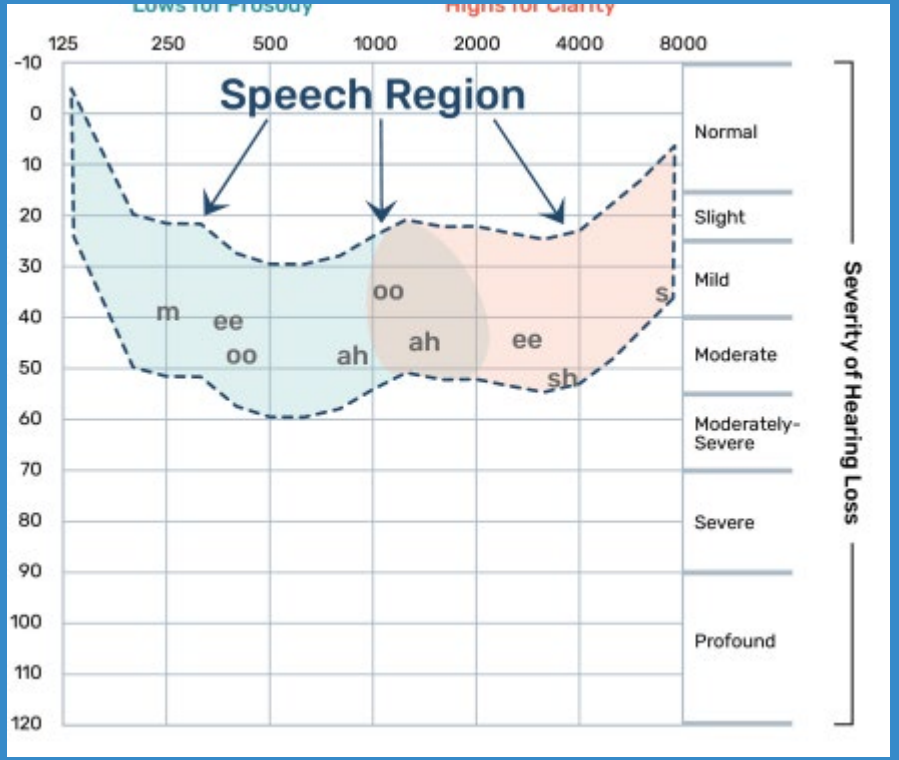

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HEARING AIDS

- All ages
- Amplify sounds
- Programmed for child's hearing loss
- Hearing can change, so can hearing aids
- Technology is always changing

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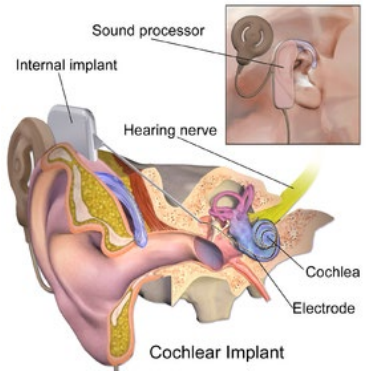
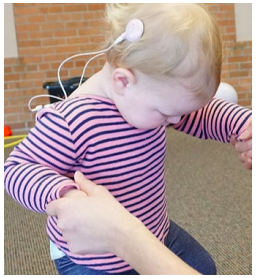
COCHLEAR IMPLANT

- FDA: 9 months and older, severe-to-profound hearing loss
- Single-Sided Deafness
- Did not benefit from traditional hearing aids
- Sends electrical stimulation to the inner ear and auditory nerve





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