Can we talk?
Speech, language, and hearing issues in the young child

Kathleen Borowitz, MS, CCC-SLP
Speech-Language Pathologist, Clin 4
University of Virginia Children’s Hospital
Our Topics

• Language milestones
• Common language problems and causes
• Hearing loss
• Bilingualism
• Speech sound development
• Common speech problems and causes
• Treatment
Speech

• The production of individual sounds, vocal quality and resonance, and fluency
  – Articulation
  – Hoarseness, pitch, nasality
  – Stuttering, abnormal rhythm
Language

• The understanding and use of words to communicate and gain meaning from the world.
  – Listening
  – Talking
  – Looking
Language Components

Expressive

• the words or sentences used to make requests, demands, seek information, greet, respond or express ideas and feelings

Receptive

• hearing and distinguishing sounds and words and processing the information
# Receptive Language Milestones

<table>
<thead>
<tr>
<th>Age</th>
<th>Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td>Startles in response to sounds; movement to voices</td>
</tr>
<tr>
<td>1-2 months</td>
<td>Stops movements to sounds/voices</td>
</tr>
<tr>
<td></td>
<td>Begins differentiating angry v. pleasant tones</td>
</tr>
<tr>
<td>3-6 months</td>
<td>Interested in voices: recognizes mother’s voice</td>
</tr>
<tr>
<td></td>
<td>Recognizes new sounds</td>
</tr>
</tbody>
</table>
# Receptive Language Milestones

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-12 months</td>
<td>Localizes sounds&lt;br&gt;Understands salient words</td>
</tr>
<tr>
<td>12-18 months</td>
<td>Follows one-step directions&lt;br&gt;Understands verbal/gestural requests</td>
</tr>
<tr>
<td>18-24 months</td>
<td>Fetches objects from another room&lt;br&gt;Points to body parts&lt;br&gt;Points to pictures in book when named</td>
</tr>
<tr>
<td>2-3 years</td>
<td>Follows two-step directions&lt;br&gt;Understands in/on/under&lt;br&gt;Understands big/little</td>
</tr>
</tbody>
</table>
## Receptive Language Milestones

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Milestones</th>
</tr>
</thead>
</table>
| 3-4 years | Follows three-step directions  
Recognizes some colors  
Processes long questions  
Follows conversation |
| 4-5 years | Counts at least 3 objects  
Recognizes printed letters and numerals  
Knows all basic colors  
Identifies shapes |
# Expressive Language Milestones

<table>
<thead>
<tr>
<th>Birth</th>
<th>Cry and other physiologic sounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2 months</td>
<td>Cooing as well as cry</td>
</tr>
<tr>
<td></td>
<td>Open vowel sounds</td>
</tr>
<tr>
<td></td>
<td>Early vocal play</td>
</tr>
<tr>
<td>3-6 months</td>
<td>Babbling as well as cooing</td>
</tr>
<tr>
<td></td>
<td>Some imitation of sounds</td>
</tr>
<tr>
<td></td>
<td>Consonant-vowel syllables</td>
</tr>
</tbody>
</table>
# Expressive Language Milestones

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-12 months</td>
<td>Increase in babbling&lt;br&gt;Syllable combinations&lt;br&gt;Begins pointing and “talking”&lt;br&gt;Squeals and screams</td>
</tr>
<tr>
<td>12-18 months</td>
<td>Uses words referentially&lt;br&gt;Jargon with variety of consonant sounds</td>
</tr>
<tr>
<td>18-24 months</td>
<td>Uses variety of words (verbs and nouns)&lt;br&gt;Uses 2 word combinations&lt;br&gt;Gives first name</td>
</tr>
</tbody>
</table>
# Expressive Language Milestones

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Milestones</th>
</tr>
</thead>
</table>
| 2-3 years | Uses 4-6 word sentences  
Uses plurals, negatives, pronouns  
Answers questions, repeats simple sentence |
| 3-4 years | Uses 6-10 word sentences  
Relates an experience or story  
Using *is* and *ing*  
Gives whole name, rote counts to 10 |
| 4-5 years | Uses complex sentences  
Uses irregular plural and past tense forms  
Provides detailed information  
Meaningful conversations |
Common Language Problems

• Receptive delay
  – Poor comprehension, may be indicative of a more global delay

• Expressive delay
  – Limited vocabulary, grammar, length of sentences

• Language disorder/Poor communication skills
  – Poor eye contact/attention to speaker
  – Inappropriate use/understanding of gesture
  – Inappropriate use/understanding of facial expressions
Causes of Language Delay

• Global developmental delay
• Hearing loss
• Autism spectrum disorders
• Environmental factors
  – Parent-child attachment
  – Deprived environment
  – Poor language modeling
Hearing Loss: Facts and Figures

In US:
• 1/1000 born with profound deafness
• 2-3/1000 born with partial HL
• Nearly 50% of children with HL of racial/ethnic minority
• Newborn HL 20x more prevalent than PKU
• Risked-based only newborn hearing screening IDs only 10-20% of infants with HL
Hearing Testing in Newborns

Evoked Otoacoustic Emissions (EOAE)

- Tiny, flexible plug inserted in ear
- Microphone in plug records the otoacoustic emissions (responses) of the normal ear
- There are no emission in a baby with hearing loss
Hearing Testing in Newborns

Auditory Brainstem Response (ABR)

- Electrodes attached to scalp
- Clicking sounds through earphones in ears
- Brain activity in response to sounds measured
Hearing Testing in Infants

- EOAE
- ABR
- Behavioral Audiometry
  - Observe behavior in response to certain sounds
Hearing Testing in Toddlers

• **Play Audiometry**
  – Audiometer used to transmit sounds at different volumes and pitches
  – Usually with earphones

• **Visual Reinforcement Audiometry**
  – Training to look toward a sound source using reward
  – Useful 6 months – 2 years
Hearing Testing in Older Children

- **Pure Tone Audiometry**
  - Audiometer testing with earphones

- **Tympanometry**
  - Assesses middle ear function by detecting changes in pressure in the middle ear
  - Not a test of hearing
  - Available in most pediatric offices
Hearing Loss: School Performance

• Even mild HL affects school performance
  – Children with unilateral loss 10x more likely to fail at least one grade
  – Children with mild HL miss 25-50% of speech in classroom

• Half of children with HL graduate high school with 4th grade reading level or less (Gallaudet Univ, 1996)
Hearing Loss: Intervention

- Infants as young as 4 weeks can wear amplification
- Early intervention (<6 months of age) results in better speech and reading comprehension
- Cochlear implant as young as 12 months
What is a Cochlear Implant?

Small complex electronic device to provide “sense of sound” to deaf person

• External portion (behind the ear)
  – Microphone
  – Speech processor
  – Transmitter

• Internal portion (surgically placed)
  – Receiver/stimulator (under skin)
  – Electrode array (on cochlea)
    • 4-22 channels; less than 1% of normal
Hearing Loss:
Cochlear Implants

• Approved for children in 1990
  – 12-18 months for profound, bilateral SNHL (>90dB)
  – >18 months for severe-profound SNHL (>70 dB)
• Cost $40,000 +
• Requires years of extensive aural rehab/speech therapy in congenital deafness
  – CI does not restore normal hearing
  – can give useful representation of sounds in the environment and help in understanding speech
• Sign language used to be strongly discouraged
Bilingualism
Simultaneous Acquisition

• Bilingual from birth or when 2nd language introduced < 3y
• Same developmental stages as monolinguals
• May have slightly delayed onset of talking but still within normal range
• From beginning, seem to acquire 2 separate languages that they can differentiate
• Readily switch between languages according to conversational partner
Bilingualism
Sequential Acquisition

• Second language introduced after 1st language well-established (>3 y)
  – Immigrate to new country
  – Exclusively speak heritage language at home until begins school

• Silent period may occur with initial exposure
  – May last a few weeks to months (longer in younger children)
  – May rely on gestures

• Single words or memorized phrases first, then “formula” constructions

• Continue grammatical errors or abbreviated sentences as they learn grammatical rules of new language
Bilingualism Fact or Myth?

• **Bilingualism causes language delay**
  
  – Vocabulary in each language may be smaller than average, *but* total vocabulary (from both languages) will be at least the same size as a monolingual child
  
  – May say their first words slightly later than monolingual children, but still within the normal age range (between 8-15 months)
  
  – Bilingual child demonstrating significant delays in language milestones could have a language delay or disorder
Bilingualism Fact or Myth?

• When children mix their languages it means that they are confused and having trouble becoming bilingual
  – Code switching
  – Natural part of bilingualism

• A person is not truly bilingual unless he is equally proficient in both languages
  – Rare to be equally proficient in both languages
  – Almost always a “dominant language” with greater proficiency
Common Speech Problems

- Articulation delay
- Stuttering
- Dysarthria
- Apraxia
- Hypernasality
Speech Sound Acquisition

• Front to back
• Visible to less visible
• Initial position
• Final position
• Medial position
• Clusters
Speech Sound Acquisition

At 3 years of age
- 65-100% of children produce “acceptable” response for nearly all sounds
  - Exceptions: v, th (v/u), z, l, r

At 4 years of age
- all sounds but th(u), l, r
- boys later on r and th(v)
Speech Sound Acquisition

At 3 ½ years of age
• 75-80% perfected /s/

At 5 ½ years of age
• 75% mastered /r/
Speech Intelligibility Expectations

2 years 25%
2 ½ years 65%
3 years 75%
4 years 90%
Causes of Speech Delay

• Specific learning disability
• Motor control/weakness
• Hearing loss/chronic OTM
• Familial pattern
• Anatomical problem
  – Bite alignment
  – Cleft palate/VPI
Stuttering: Definition

- Disorder involving breakdown in the speech motor system  (JSHR 2010)

- Speech disorder in which a person repeats or prolongs sounds, syllables or words disrupting the flow of speech  
  (J Neurodevelop Disord 2011)
Stuttering: Dysfluency Types

Between Word
- Interjections
- Phrase repetitions
- Revisions

Within Word
- Sound or syllable repetition
- Prolongations
- Blocks
Stuttering: Facts and Figures

• Begins in childhood (2 ½ - 5 years)
• 95% identified by age 7
• >50% of children who stutter “outgrow” the problem
• Girls more likely to show unassisted recovery
• At least 2 different stuttering genes identified (2004, 2011)
Stuttering: Diagnosis

Differentiate between normal non-fluency and true stuttering

– Duration
– Types of dysfluency
– Percent of stuttered words
– Secondary characteristics
Stuttering: Referral Guidelines

• “Stuttering” lasting > 6 months
• Family history
• Signs of struggle or fear
• Prolongations or blocks
• Parental anxiety
Stuttering
Treatment Approaches

• Fluency shaping
  – Gradually increasing length and complexity of utterance (GILCU)
  – Slow rate
  – Parent awareness/guidance

• Intensive 2-3 week programs

• Traditional therapy

• Masking devices
Dysarthria

Muscular weakness or paralysis resulting in poor motor control for speech production
Dysarthria

Causes

- Cerebral palsy
- Acquired brain injury
- Neuromuscular disease
- Cranial nerve damage
Dysarthria

Treatment Approaches

• Improving muscle strength and range of motion
• Slowing the rate of speech
• Improving breath support
• Precision of consonants
• AAC
Childhood Apraxia of Speech

Motor planning problem not associated with muscle weakness or paralysis

– Inability to coordinate the timing of voice, respiration, and oral movements for speech production
Apraxia

Characteristics

• Inconsistent productions
• Groping or effortful productions
• Inability to imitate sounds
• Poor sequencing of sounds
• Increasing difficulty with increasing length of utterance
Apraxia

Treatment Approaches

- Motor programming (repetitive practice)
- Sensory cueing (visual/tactile)
- Rhythmic (melodic intonation tx)

Emphasis on movement patterns versus sound patterns
Hypernasal Vocal Resonance

Results from too much nasal air flow for non-nasal sounds

- Non-nasal sounds:
  - s/z, sh/zh, f/v, h
  - p/b, t/d, k/g, ch/j
- Nasal Sounds:
  - m, n, ng
Hypernasal Vocal Resonance

Causes:

• Cleft palate
• Velopharyngeal insufficiency or dysfunction
• Incorrect production/learned behavior
• Hearing loss
Hypernasal Vocal Resonance

Velopharyngeal Insufficiency (VPI)
• Soft palate is short or has poor closure

Evaluation of VPI
• Speech assessment
• Nasoendoscopy
• Video fluoroscopy
Hypernasal Vocal Resonance

• Compensatory versus Obligatory errors
• Sound specific errors
• Speech therapy trial
• Surgery
  – Only for obligatory errors that cannot be corrected through speech therapy
  – Not appropriate for sound specific or HL
Summary

• Speech delay may be separate from language delay
• Even mild, transient hearing loss can affect speech and language development
• Early and consistent amplification is crucial for speech and language development
• CI does not restore hearing
Summary

• Bilingualism does not cause language delay
• Bilingual children should be tested in both languages
• There are differences between articulation delay, dysarthria, apraxia, and vocal resonance disorders
• Early intervention for stuttering is effective