Disclosures

Elise O’Brien has no financial or nonfinancial relationships to disclose.

Sarah Vetter has no financial or nonfinancial relationships to disclose.

Katie Walsh has no financial or nonfinancial relationships to disclose.
Course Objectives

1) Participants will define variations in the prelinguistic speech-language development of children with cleft palate.

2) Participants will recognize the implications these speech-language variations have on evaluation of children with cleft palate in the first year of life.

3) Participants will review treatment goals, strategies, and approaches appropriate for use with children with cleft palate in the prelinguistic stage of speech-language development.

4) Participants will appreciate the importance of parent education to facilitate transfer of skills beyond the therapy session.
Early Speech and Language Development
A free online course from the AFWI

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The basics of brain development and its connection to lifelong health.

SERVE & RETURN
Positive child-caregiver interactions build strong brains.

AIR TRAFFIC CONTROL
How children develop "executive function" abilities.

STRESS
How positive, tolerable and toxic stress impact the developing brain.

RESILIENCE
Why do some people bounce back better than others?

ADOLESCENCE
How human connections help strengthen brain connections.
BRAIN ARCHITECTURE
The basics of brain development and its connection to lifelong health.

SERVE & RETURN
Positive child-caregiver interactions build strong brains.
Early Speech and Language Development

• Development begins in utero. Distinct profiles of infant behavior can be evaluated at 1-3 days of age (Appleton et al., 2016).

• Early experiences matter and set the brain architecture for later development (National Scientific Council on the Developing Child, 2010).

• “Genes and experiences interact to shape brain architecture and functioning, which develops rapidly in the first few years of life when neuroplasticity is greatest.” (Daelmans et al., 2015, p 23).
Early Speech and Language Development

• Infant driven speech (e.g. rate, pitch) and vocabulary selection (e.g. diminutives) can impact linear vocabulary growth and enhance cognitive function (Cristia, 2013; Ota, Davies-Jenkins, & Skarabela, 2018).

• Through “serve and return” interactions positive epigenetic changes can be seen later in life (National Scientific Council on the Developing Child, 2010).
Pre-Linguistic Development &

*The Importance of Babbling*
# Pre-Linguistic Speech-Language Development

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHONATION</strong></td>
<td>0 – 6 Weeks</td>
</tr>
<tr>
<td></td>
<td>Reflexive crying including vegetative sounds (coughs, sneezes) that reflect a baby’s physical state.</td>
</tr>
<tr>
<td><strong>COOING</strong></td>
<td>6 Weeks – 4 Months</td>
</tr>
<tr>
<td></td>
<td>Baby produces vowel productions and consonant sounds from the back of the throat. Baby laughs and giggles with caregivers.</td>
</tr>
<tr>
<td><strong>EXPANSION</strong></td>
<td>4-5 Months</td>
</tr>
<tr>
<td></td>
<td>Baby engages in vocal play, including experimentation with volume and pitch. Baby develops other vocalizations, including trills, tongue clicks, hums, lip pops, or raspberries. Baby vocalizes with simple syllable combinations: “ama,” “ooo-ba”</td>
</tr>
<tr>
<td><strong>CANONICAL BABBLING</strong></td>
<td>6 – 10 Months</td>
</tr>
<tr>
<td></td>
<td>Baby develops vowels and consonants which resemble adult productions. Baby repeats/reduplicates the same consonant and vowel over and over again in one vocalization with adult-like timing. An example of these vocalizations may include: /ma-ma-ma/</td>
</tr>
<tr>
<td></td>
<td>Most consonants are stops, nasals, and glides. Alveolar stops (/t, d/) are the most common and bilabial stops (/p, b/) begin to increase. (Sosa, 2011)</td>
</tr>
<tr>
<td></td>
<td>“Marks a critical transition in the complexity of early vocalizations.” (Scherer, 2017 p. 175).</td>
</tr>
<tr>
<td><strong>VARIEGATED BABBLING (Jargon)</strong></td>
<td>10 – 18 Months</td>
</tr>
<tr>
<td></td>
<td>Baby continues to expand their variety of vowels and consonants. Baby uses an assortment of consonants and vowels in one vocalization. An example of these vocalizations may include: /mo-ma-ma-ba/</td>
</tr>
</tbody>
</table>

**FIRST WORDS**

(Oller et al., 1999; McLeod, 2003)
Babbling and its relationship to the development of words

The phonological system drives lexical acquisition

(Stoel-Gammon, 1998)

- Babies are exposed to their own speech sounds and speech sounds made by others
- Speech is a skill that requires practice
- Articulatory movements become more automatic with practice
- Automatic movements are easier to create
- It is more likely that these automatic sound combinations will be produced by the baby
- Others will ascribe meaning to their automatic sounds
Babbling is a reliable marker for early identification of speech-language disorders in children. (Stoel-Gammon, 1998)

- Babies with few practiced syllables take longer to produce meaningful speech.

- “Consonant babble facilitates expressive language [development].” (Stoel-Gammon, 1998, p.33)

- “Vowel babble competes with expressive language [development].” (Stoel-Gammon, 1998, p.33)

- Canonical utterances are “building blocks” of words. (Stoel-Gammon, 1998, p.29)
Babbling and its relationship to the development of words

- In 1975, Furguson and Farwell found that young children avoid words with sounds that are difficult to produce (As Cited in Stoel-Gammon, 1998, p.33)
  - Dependent on place and manner classes that child can produce.
  - Child will say words containing sounds they can produce accurately.
  - Phonologically difficult words will be avoided.
Babbling and its relationship to the development of words

- Longitudinal studies find links between babbling and words. (Stoel-Gammon, 1998)
  - Age of onset of babble with age of onset of words.
  - Number of CV syllables at 12 months with age of first words.
  - Use of consonants at 12 months and phonological skills at 3 years.
  - Diversity of syllable/phoneme types and speech-language performance at 5 years.
Pre-Linguistic Assessment
Entrance into the Canonical Babbling Stage

Canonical Babbling Ratio (CBR):
• Number of canonical syllables divided by total number of syllables
• Canonical syllables include a supraglotal consonant and fully resonant vowel.

True Canonical Babbling Ratio (TCBR):
• Number of TRUE canonical syllables divided by total number of syllables.
• A true Consonant is any consonant other than a Glide /j, w/ or Glottal /h/, Glottal Stop

A ratio of 0.15 or greater is the threshold for the canonical babbling stage.

(Stoel-Gammon, 1989 as cited in Chapman, Hardin-Jones, Schulte, Halter, 2001; Molemans et. al., 2011)
Parental Intuition

90% of parents of very low SES could identify whether their infants were in the canonical stage of babbling without any training.

(Ollers et al., 2001)
Independent Analyses

• Look at the child’s productive capabilities, without comparing productions to adult forms

• Example: Mean Babbling Level (MBL)
Pre-linguistic Analysis: Mean Babbling Level (MBL)
(Morris, 2010; Sosa, 2011)

- First described by Carol Stoel-Gammon in 1987
- Assesses phonological diversity in babbling
- Ideal sample is 50 unique utterances
- Vocalizations are transcribed then coded
- Normative data available for 9-24 months
Pre-linguistic Analysis: Mean Babbling Level (MBL)
(Morris, 2010; Sosa, 2011)

Included utterances must be:

- Judged by caregiver and examiner to be non-meaningful
- Characterized by at least a voiced vocalic element or a voiced syllabic consonant
- Produced on an exhalation
- 1 second of silence on either side of vocalization to score as utterance
- Judged to be speech-like
## Pre-linguistic Analysis: Mean Babbling Level (MBL)
(Morris, 2010; Sosa, 2011)

<table>
<thead>
<tr>
<th>LEVEL 1</th>
<th>LEVEL 2</th>
<th>LEVEL 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utterances containing vowels, glottals (h, ?) and/or glides (y, w)</td>
<td>Utterances containing syllables (e.g. CV, VC, CVC) with a single true consonant type, disregarding voicing</td>
<td>Utterances containing syllables with two or more consonant types, disregarding voicing</td>
</tr>
</tbody>
</table>

*Examples:* ha; awa; yaya; waya; ?a ?a

*Examples:* esi; mu; yasas; babai; kagi

*Examples:* nebo; gada; lam; dis

<table>
<thead>
<tr>
<th>1 Point</th>
<th>2 Points</th>
<th>3 Points</th>
</tr>
</thead>
</table>


Pre-linguistic Analysis: Mean Babbling Level (MBL)
(Morris, 2010; Sosa, 2011)

• Code each utterance, assigning the appropriate points

• Add the points and divide by the number of utterances in the sample to obtain the MBL
Pre-linguistic Analysis: Mean Babbling Level (MBL)  
(Morris, 2010)

<table>
<thead>
<tr>
<th>Age in Months</th>
<th>9</th>
<th>12</th>
<th>15</th>
<th>18</th>
<th>21</th>
<th>23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average MBL</td>
<td>1.33</td>
<td>1.50</td>
<td>1.58</td>
<td>1.65</td>
<td>1.80</td>
<td>1.90</td>
</tr>
<tr>
<td>Typical</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Developing</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td>0.24</td>
<td>0.27</td>
<td>0.28</td>
<td>0.20</td>
<td>Not Reported</td>
<td>Not Reported</td>
</tr>
<tr>
<td>Deviation</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Normative Data
Prelinguistic Vocal Characteristics in Infants with Cleft Palate with/without Cleft Lip

1) Variations in Frequency
2) Variations in Onset
3) Variations in Composition
4) Variations in Complexity
Why might children with cleft palate display variations in babbling or be at risk for speech-language deficits?

**Oral-Nasal Coupling**

Babies with cleft palate produce sounds with nasal distortion.

- Influences production of high pressure oral phonemes (i.e. stop, fricative, affricate consonants). (Chapman, Hardin-Jones, Schulte, Halter, 2001)

- Influences articulatory placement of specific phonemes (i.e. labial, alveolar, palatal, velar consonants). (Chapman, Hardin-Jones, Schulte, Halter, 2001)

- Babies learn to vary their babble productions through repeated practice and feedback from their caregivers. This nasal distortion may then negatively impact a baby’s vocalizations from becoming more and more like the vocalizations of their caregivers’. (Fry, 1966 as cited in Chapman, Hardin-Jones, Schulte, & Halter, 2001)
Why might children with cleft palate display variations in babbling or be at risk for speech-language deficits?

**Hearing Loss**
Babies with cleft palate are at risk for conductive hearing loss.

- Babies with cleft palate may experience frequent middle ear fluid and/or otitis media due to abnormal/absent contraction of the tensor veli palatine muscle which opens/closes the Eustachian Tube.
- Degrades the auditory signal that interferes with the input baby receives from caregivers as well as from his/her own speech attempts. Both are important for phonological development.
- Otitis media contributes to delays in pre-linguistic vocal development, as well as the size and variety of the consonant inventory size. (Rvachew, 1999; Luloff et. al, 1999 as cited in Chapman, Hardin-Jones, Schulte, Halter, 2001)

(Chapman, Hardin-Jones, Schulte, Halter, 2001; Scherer, Williams, Proctor-Williams, 2008)
Variations in Frequency?

Conflicting Reports

Vocalize as Frequently...

• At 6-months & 12 months of age, infants with cleft lip and palate produced non-specific utterances (e.g. non-vegetative sounds: cries, squeals, grunts) and babbling vocalizations as frequently as non-cleft peers. (Scherer, Williams, Proctor-Williams, 2008)

• Infants with cleft lip and palate vocalize with canonical babbling as frequently as non-cleft peers. (Baylis, 2018; Chapman, Hardin-Jones, Schulte, Halter, 2001)

Vocalize less Frequently...

• Infants 12-14 months of age, with cleft lip and palate produce fewer multisyllabic reduplicated & variegated babbling sequences as compared to non-cleft peers. (Chapman, 1991)
Variations in Onset of Babbling

- Infants with cleft lip and palate demonstrate a delay in the onset of canonical babbling as compared to non-cleft peers. (Chapman, Hardin-Jones, Schulte, Halter, 2001)

By 9 Months of age:
- 57% of babies with cleft lip and palate reached canonical babbling stage of pre-linguistic development.
- 93% of non-cleft peers reached canonical babbling stage.
Variations in Composition

Canonical & Variegated Babbling

• By 12 months of age, infants with cleft lip and palate vocalize with both canonical and variegated babbling forms.

(Chapman, 1991; Scherer, Williams, Proctor-Williams, 2008)
Variations in Composition
The Ingredients ...

Consonant Inventory

• At 9 months of age, the average consonant inventory for an infant with a cleft palate was half the size as compared to non-cleft peers. (Chapman, Hardin-Jones, Schulte, Halter, 2001)

• Scherer, Williams, & Proctor-Williams (2008) discovered at 12 months of age, the following sounds were represented in the consonant inventory of ≥ 50% of subjects’ repertoire:
  – Infants with cleft lip and palate: /w, m, n/, “ng.”
  – Noncleft peers: /p, b, w, b, t, d, k, g, n, j/.
Vowel Inventory

- At 9 months of age, infants with cleft lip and palate exhibited vowel inventories that were similar to their non-cleft peers. (Stout, Harding-Jones, Chapman, 2011)
Variations in Complexity
The Quality

Canonical Babbling Ratio (CBR)
& True Canonical Babbling Ratio (TCBR)

• Babies with cleft palate showed lower CBRs as compared to noncleft peers.
• Babies with cleft palate demonstrated even lower TCBRs than noncleft peers.

At 9 Months of age:
– Babies without a cleft palate produced 4-12 true consonants, with an average of 7 true consonants.
– Babies with cleft palate produced 0-5 true consonants, with an average of 2 true consonants.

(Chapman, Hardin-Jones, Schulte, Halter, 2001)
Mean Babbling Level (MBL)

• Babies with cleft palate showed lower MBLs as compared to noncleft peers. (Scherer, Williams, Proctor-Williams, 2008)

At 6 months of age:
– Infants with cleft lip and palate vocalized with similar levels of Level 1 babbling forms as compared to noncleft peers.
– Infants with cleft lip and palate used fewer Level 2 forms.
– Neither infants with cleft lip and palate nor noncleft peers used Level 3 forms.

At 12 months of age:
– Level 1 babbling forms still predominated in both groups.
– Infants with cleft lip and palate used fewer Level 2 forms.
– Only infants without a cleft palate used Level 3 forms.
Place of Articulation Variations

Infants with cleft palate vocalize:

- At the extremes of the vocal tract, producing more sounds with labial and glottal features.

- Infrequently with alveolar, velar, and palatal consonants.

(Chapman, 1991; Chapman, Hardin-Jones, Schulte, Halter, 2001; O’Gara & Logemann, 1988)
Manner of Articulation Variations

Infants with cleft palate vocalize:

- Predominately with vowels, nasals, glides, and glottals.
- Infrequently with stop consonants: /p, b, t, d, k, g/.
  - At 9 months of age, infants without a cleft palate often produce stops.
  - At 12-14 months of age, toddlers with unrepaired clefts of the palate produced few stop consonants (1%), yet oral stops accounted for over 70% of all consonants produced by noncleft peers.

(Chapman, 1991; Chapman, Harding-Jones, Schulte, Halter, 2001; Scherer, Williams, Proctor-Williams, 2008)
Hard Glottal Phonation on Vowels

- Infants with cleft palate employ frequent glottal features in their early vocalizations. This is sometimes heard as a hard glottal phonation of the vowel rather than a true grunt/growl or distinguishable glottal stop. (Chapman, 1991)
Production of Stops Consonants Pre-Repair

- Oral stops CAN occur in the pre-surgical inventory of infants with cleft palate. (Hardin-Jones & Chapman, 2018)

- No correlation found why some babies over others produced stop consonants pre-repair (e.g. Cleft type; Middle ear history). (Chapman, Hardin-Jones, & Halter, 2003)

“... remarkable ability that children show, in spite of varying deficits, to acquire early sounds and words that serve as the foundation for later speech and language development” (Chapman, Hardin-Jones, & Halter, 2003, p. 193-194).
Variations Occur Regardless of:

- **Cleft Type**
  - No significant differences in frequency of canonical babbling, size of consonant inventory, place and manner of consonant production when comparing infants with cleft lip and palate to infants with cleft palate only. (Hardin-Jones, Chapman, Schulte, 2003)

- **Early Palatal Obturation**
  - No significant differences in size of consonant inventory or place and manner of consonant production when comparing infants who wore palatal obturators pre-palate repair and unobturated infants. (Hardin-Jones, Chapman, Wright, Halter, Schulte, Dean, Havlik, & Goldstein, 2002).
## Influence of Surgical Intervention

After cleft palate repair, infants with cleft palate:

<table>
<thead>
<tr>
<th>Showed an increase in their canonical babbling ratio.</th>
<th>Did not exhibit an increase in their true canonical babbling ratio.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Increased their consonant inventory.</th>
<th>Continued to exhibit a decrease in overall size of consonant inventory.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Baylis, 2018; Jones, Chapman, Hardin-Jones, 2003; Scherer, Williams, Proctor-Williams, 2008)</td>
<td>- On average, children with cleft palate produced 3x fewer consonants than their noncleft peers.</td>
</tr>
<tr>
<td></td>
<td>(Jones, Chapman, Hardin-Jones, 2003)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Increased their production of alveolar, palatal, and velar phonemes.</th>
<th>Continued to produce less alveolar consonants.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased glottal features.</td>
<td>- Children without a cleft produced twice as many alveolar phonemes as children with cleft palate.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Produced more stop consonants, specifically /b/.</th>
<th>Continued to produced significantly fewer stops as compared to noncleft peers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Jones, Chapman, Hardin-Jones, 2003)</td>
<td>(Jones, Chapman, Hardin-Jones, 2003; Scherer, Williams, Proctor-Williams, 2008)</td>
</tr>
</tbody>
</table>
Relationship between early & later speech-language development:

- Children with cleft lip and palate show **lexical selectivity** based on their phonological characteristics. (Scherer, Williams, Proctor-Williams, 2008)
  - Produce more words beginning with vowels, nasals, and glides.
  - Produce few words beginning with oral stops.

- Children with cleft lip and palate **higher mean babbling levels** at 12 months of age have better speech-language skills at 3-years of age. (Scherer, Proctor-Willliams, 2008)
  - Larger consonant inventories and higher rates of stops consonant production.

- **True stop production**, both immediately before and after palatal surgery, is positively correlated with speech production measures at 21 months of age. (Chapman, 2004; Chapman, Hardin-Jones, & Halter, 2003)
Summary

Infants with Cleft Palate with/without Cleft Lip exhibit:

1) Delay in the onset of canonical babbling.
2) Decreased consonant inventory size.
3) Variations in the complexity of babbling:
   - Decreased true consonant babbling ratios.
   - Lower mean babbling levels.
4) Variations in the diversity of sounds:
   - More nasal, glides, and glottal sounds, with few stop consonants.
   - Preference for the extremes of the vocal tract; Tend to avoid the alveolar ridge as a place of articulation.

Differences / Deficits persist after surgical repair, and are unrelated to cleft type or use of a palatal obturator.

Important to limit the impact of otitis media with careful follow-up with the Otolaryngologist and/or Primary Care Physician.
Implications for Clinical Practice: What does this mean?

Key Diagnostic Implication

“A simple count of consonant inventory size without attention to the type of consonants produced may mask important areas of delay for children with cleft palate.”

(Chapman, Hardin-Jones, Schulte, Halter, 2001, p. 1277)

Key Therapeutic Implication

“Children with cleft lip and palate have a specific deficit in the complexity of early sound production that is characterized by lower mean babbling level and reduced use of stop consonants ... It has been suggested that practice with early sounds and sound sequences in the prelinguistic period is important to facilitate more control of sounds that will eventually be used in words.”

(Scherer, Williams, Proctor-Williams, 2008, p. 837)
Speech-Language Assessment for Children with Cleft Palate from Birth through Palatoplasty
Key Principles of Assessment for Children with Cleft Palate in the First Year of Life:

1) Capture communication in naturalistic setting

“Standardized tests provide a normative comparison for eligibility purposes; however, they fall short of providing sufficient information for intervention planning.”
(Scherer, 2016, p. 177)

2) Inclusion of both speech and language performance.

“Early intervention based on appropriate and thorough analysis of articulatory and phonological skills is essential; largely due to the role phonology plays in early linguistic development.”
(Scherer, Williams, Stoel-Gammon, & Kaiser, 2012, p. 1)
1) History
   • Medical
   • Developmental
   • Hearing
   • Psychosocial
   • Parental Concerns

2) Behavioral Observations & Play
   • Westby Play Scales
   • Rossetti Infant-Toddler Language Scale
     o Interaction-Attachment
     o Gestures
     o Play
   • MacArthur Communicative Developmental Inventories (CDI)
     o Gestures Used

3) Oral Mechanism Assessment

4) Speech Sample
   Obtained by:
   Clinician or Parent collected video &/or on-line transcription.

5) Receptive & Expressive Language
   • MacArthur Communicative Developmental Inventories (CDI)
     o Phrases Understood
     o Vocabulary Comprehension
     o Vocabulary Production
   • Receptive-Expressive Emergent Language Test – Third Edition (REEL-3)
   • Rossetti Infant-Toddler Language Scale
     o Language Comprehension
     o Language Expression

6) Parent & Caregiver Education

(Chapman, Hardin-Jones, & Scherer, 2013; Howard & Lohmander, 2011; Scherer, 2017; Scherer, Williams, & Proctor-Williams, 2008; Scherer, Williams, Stoel-Gammon, & Kaiser, 2012; Snyder & Scherer, 2004)
Prelinguistic Analysis

For children who are not saying words, assessment is best conducted from an analysis of the vocal sample and should include the following measures:

1. Vocal Composition.
   - Stage of pre-linguistic development
   - Inventory size: Total number of consonants & vowels

2. Vocal Complexity / Diversity:
   - Mean Babbling Level (MBL)
   - True consonants: Any consonant other than a Glide or Glottal
   - Sound Types:
     - Place: Bilabial, Alveolar, Velar, Glottal...
     - Manner: Nasal, Glide, Stop...

(Chapman, Hardin-Jones, & Scherer, 2013; Howard & Lohmander, 2011; Scherer, 2017; Scherer, Williams, & Proctor-Williams, 2008; Scherer, Williams, Stoel-Gammon, & Kaiser, 2012; Snyder & Scherer, 2004)
### Assessment Protocol s/p Cleft Palate Repair

#### Pre-linguistic or Linguistic

1) **History**
   - Medical
   - Developmental
   - Hearing
   - Psychosocial
   - Parental Concerns

2) **Behavioral Observations & Play**
   - Westby Play Scales
   - Rossetti Infant-Toddler Language Scale
     - Interaction-Attachment
     - Gestures
     - Play
   - MacArthur Communicative Developmental Inventories (CDI)
     - Gestures Used

3) **Oral Mechanism Assessment**

4) **Speech-Language Sample**
   *Obtained by:*
   Clinician or Parent collected video &/or on-line transcription.

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     - Language Comprehension
     - Language Expression

6) **Parent & Caregiver Education**

---

(Chapman, Hardin-Jones, & Scherer, 2013; Howard & Lohmander, 2011; Scherer, 2017; Scherer, Williams, & Proctor-Williams, 2008; Scherer, Williams, Stoel-Gammon, & Kaiser, 2012; Snyder & Scherer, 2004)
1. Vocal Composition.
   • Stage of pre-linguistic development and/or single word repertoire
   • Inventory size: Total number of consonants & vowels

2. Vocalization Complexity / Diversity:
   • Mean Babbling Level (MBL)
   • True Consonants
     – Presence of high-pressure oral phonemes, specifically stops /p, b, t, d, k, g/
   • Sound Types
     – Presence of nasalization.
     – Presence of compensatory substitutions.

3. Nasal Resonance / Audible nasal air emission
Significance of high-pressure oral phonemes s/p Cleft Palate repair

I can say Stops!
/p, b, t, d, k, g/
Significant of Nasalization

The presence of nasal substitutions following palatal surgery is not always an early sign of Velopharyngeal Insufficiency:

- In a recent study of 13 – 39 month old children, Hardin-Jones & Chapman (2018) discovered:
  - 75% of toddlers with cleft lip and palate produced nasal substitutions on one of more or their early words.
  - 35% of toddlers in non-cleft peer group produced nasal substitutions on one or more of their early words.
  - Only 38% of the toddlers with cleft palate who produced nasal substitutions were later diagnosed as having significant hypernasality and suspected Velopharyngeal Insufficiency.

- Zajac (2018) reported the gradual emergence of stop consonants in a sample of toddlers following cleft repair by 20 months of age.
  - Parent report of stop consonants is discrepant and may be overestimated.
Significance of compensatory articulations

Nasal Fricatives

Glottal Stops.

Backing
Key Points / Addressing the Myths:
(Chapman, Hardin-Jones, & Scherer, 2013; Hardin-Jones & Chapman, 2018)

• Complete an assessment and analysis of speech sound development!

• Remember oral stops may be produced before surgery.

• Compensatory articulation errors, such as Nasal Fricatives & Glottal Stops, are atypical speech sound development and require intervention.

• Neither post-surgery nasal substitutions nor post-surgery perception of hypernasality are always an early indicator of Velopharyngeal Insufficiency (VPI). The adequacy of the velopharyngeal (VP) of the mechanism cannot be assessed immediately after surgery. Assessment of VP function is an ongoing process in these early years and will occur over time as consonant inventory and utterance length expands.

• A final thought: A cleft palate is NOT always the culprit. Make sure the diagnosis of cleft palate is not distracting you from a central, or different, issue.
Pre-Linguistic Speech-Language Intervention for Infants with Cleft Palate
Treatment Philosophy

At the earliest stages of language development the phonological system drives the lexical system.

We know...

• Children are more likely to produce new words with sounds and syllables shapes represented within their babbling repertoire,
• Babbling with true consonants facilitates later speech-language proficiency.

Therefore...

Expanding the consonant inventory, specifically stop and alveolar consonants, should be targets for intervention in the pre-linguistic stage of language development.

Pre-Linguistic Intervention for Children with Cleft Palate

To advance expressive language as well as the frequency and diversity of a baby’s speech sound production, infants need to **PRACTICE**. Practice is facilitated by **increased communicative attempts** & **increased feedback from the conversational partner**.

### Caregiver Education & Training
- Impact of Cleft Palate on Speech-Language Development
- Environmental Arrangement
- Responsive Interaction
- Focused Stimulation Strategies

### Infant Goals
- Increase frequency of vocalizations
- Increase complexity and diversity of vocalizations
Parent-Implemented Intervention is Evidenced-Based

• Parent-implemented language interventions are an effective early language intervention, resulting in positive language outcomes, for children with language impairments. (Roberts & Kaiser, 2011)

• Increasing parent-child turn taking in interactions and improving parent responsiveness to communication are associated with positive child language outcomes. (Roberts & Kaiser, 2011).

• In a study of children with cleft lip and palate age 14-36 months of age, parents were reliable trained in the deliver of a focused stimulation intervention.
  – Children exhibited increased speech sound inventories, improved speech sounds accuracy, and reduced use of glottal stops.

  (Scherer, D’Antonio, McGahey, 2008)
Key Features of Parent Education & Training

1) Create a safe and supportive environment.
2) Engage in collaborative goal setting with the parents, while setting goals for both the parent and the child.
3) Teach both the behavioral/conceptual principle & the specific application of intervention. Help the caregiver understand the **Why**:
   - Provide examples, analogies, and stories, supplemented by supporting materials.
   - Relate new information to current parent knowledge, while offering time for caregiver reflection.
4) Include practice in implementing the procedures with the child in the session.
   - Coach and give feedback to support parent during practice.
   - Invite feedback from the parent.
   - Revisit application of feedback in subsequent sessions.
5) Teach for generalization and maintenance.
   - Assist family in creating a plan for implementation.
   - Train multiple caregivers.
   - Train in everyday settings, across various contexts/routines.

(Kaiser & Hancock, 2003; Roberts & Kaiser, 2011; Vetter & Corcoran, 2017)
Impact of Cleft Palate on Speech-Language Development

Caregiver Education Topics

1) Early speech-language development.
   • Stages of pre-linguistic development.
   • Importance of canonical babbling.
   • Manner and placement of early speech sounds.

2) Impact of oral-nasal coupling on speech sounds development.

3) What is velopharyngeal function.

4) Glottal productions.

5) Nasal air emission, and/or weak speech sound productions with attempts at high-pressure sounds.

6) Impact of otitis media and middle ear fluid on speech-language development.

Environmental Arrangement

Arranging the environment to promote engagement and communicative attempts from the child.

Examples:

1) Limit the number of toys in front of the baby at one time.
2) Place toys slightly out of reach.
3) Place toys in clear boxes.
4) Use toys that offer some challenge, such as cause-effect toys. (e.g. switches to operate, latches to open, buttons to push; wind-up toys)

Responsive Interaction

Responding to the child’s nonverbal and verbal communicative intent.

1) Follow the child’s lead in play; Enter into the child’s play.
2) Face-to-face interaction.
3) Joint attention.
4) Recognize infant’s nonverbal communication attempts.
5) Respond to baby’s vocalizations with imitation, without imitating grunts and growls.
6) Foster verbal turn taking.
7) Interpret baby’s vocalizations as communication.

Focused Stimulation Strategies

1) Interact responsively by **imitating** the baby’s vocalizations.

2) Use intensive **modeling** of gestures and vocalizations.
   • Do not model grunts and growls.
   • Talk/Narrate throughout the day.

3) **Expand** the baby’s vocalizations within simple babbling games.
   • Add a syllable.
   • Change a consonant.
   • Change a vowel.

“Parents should be the primary agents of intervention.”

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- Increase frequency of vocalizations
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(Peterson-Falzone, Trost-Cardamone, Karnell, Hardin-Jones, 2006).
A Note on Intervention Post-Palate Repair.

Enhanced Milieu Training with a Phonological Emphasis (EMT-PE)

Facilitates vocabulary acquisition and speech sound production though use of prompting strategies and coaching model for parent training.

- Improves speech sound accuracy.
- Facilitates production of stop consonants.
- Reduces substitution errors.

References


References


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