

Assessment and Treatment of Resonance Disorders

Instruments to be used in assessment and eligibility determination are IEP Team decisions. Eligibility for every area should be based on documentation of:

- A disability that negatively impacts academic achievement or functional performance, and
- The need for specially designed individualized instruction

** Resonance disorders are related to velopharyngeal and upper airway structure and function.*

** Voice disorders are related to laryngeal structure and function.*

- 1) Roles of the school-based SLP in the management of resonance disorders
 - a) Provide information to students, teachers, other professionals and families about resonance disorders
 - b) Assess resonance and velopharyngeal function
 - c) Provide appropriate referrals for structural management
 - d) Provide treatment to improve the perception of oral-nasal resonance balance and to correct associated articulation, language and voice problems
- 2) Impact of resonance disorders on education
 - a) Difficulty in being heard in and out of the classroom
 - b) Limited classroom participation (oral reading, discussions, oral presentations) in an effort to conceal resonance differences
 - c) Impaired social interactions
 - d) Reluctance to participate in extracurricular activities
 - e) Negative attention from teachers, as well as peers
- 3) Definitions of disorders related to Velo-Pharyngeal Dysfunction (VPD), (Dworkin, et al., 2004)
 - a) Hypernasality – excessive nasal resonance on vowels and semivowels [l,r,w,y]
 - b) Nasal emission – excessive nasal airflow on pressure consonants (plosives, fricatives and affricates)
 - c) Hyponasality – reduced nasal resonance on nasal consonants [m,n,ŋ]
 - d) Denasality – absence of nasal resonance on nasal semivowels
- 4) Etiology of disorders related to the palate and upper airway
 - a) Hypernasality – not always the result of an overt cleft or other structural deficit that can be visualized
 - Cleft palate
 - Submucous cleft palate
 - Occult submucous cleft palate
 - Disproportionate velopharyngeal size
 - Short soft palate
 - Short hard palate
 - Deep pharynx
 - Muscle weakness or paralysis (dysarthria)
 - Muscle incoordination (apraxia)

- b) Hyponasality – blockage of the upper airway/nasopharynx
 - Large adenoids
 - Large tonsils
 - Allergies
 - Nasal obstruction from deviated septum, nasal polyps, etc.
- 5) Assessment of resonance disorders
- a) Hypernasality and hyponasality: These perceptual disorders cannot be diagnosed by instrumentation.
 - b) Velopharyngeal function and upper airway obstructions: These are physical characteristics that should be diagnosed by instrumental assessment. Clinicians working in the schools do not have access to instruments such as nasoendoscopy or acoustic analysis equipment. Therefore, children with suspected VPD should be referred to a cleft palate/craniofacial team for these evaluations (NC list attached)
 - c) Structural assessment of suspected nasal or upper airway obstruction is completed by an ENT or other physician.
 - a) Assessment of oral and pharyngeal function – See Appendix I
 - b) Perceptual assessment of resonance and nasal emission – See Appendix II
 - c) Tongue anchor test (screening for VPD) - can be used with children approximately 4 years of age or older. Failing the tongue-anchor test does not diagnose VPD but is an indicator that instrumental assessment may be needed.
 Procedure for Tongue Anchor Test:
 - Instruct the child to stick out his/her tongue with the lips around it and puff up his/her cheeks. If the child can maintain the impounded air, the VP mechanism is functioning normally or functions reasonably well. If air pressure cannot be maintained and the child exhibits hypernasality and/or nasal emission, he/she should be referred to a cleft palate-craniofacial team for further assessment of VP function.
 - Modifications – If a young child is unable to perform the tongue anchor test, it can be modified by having the clinician hold the tongue with a gauze pad and pinch the nostrils while the child “fills” his/her mouth with air. The clinician should instruct the child to keep the air in his/her mouth when the nostrils are released.
- 6) Articulation problems commonly associated with VPD
- a) Weak pressure consonants – due to the inability to impound air pressure in the oral cavity during production of fricatives, stop-plosives and affricates. May be accompanied by nasal air emission.
 - b) Compensatory misarticulations - glottal stops, pharyngeal affricate, pharyngeal fricative, pharyngeal stop, posterior nasal fricative, nasal fricative, mid-dorsum palatal stop. A complete description of these misarticulations can be found at: <http://clefttherapy.com/treatment.htm>
 - c) Phoneme-Specific Nasal Air Emission (PSNAE) – This is not related to velopharyngeal dysfunction but is a learned behavior that is often mis-

identified as VPD. PSNAE does not require surgical or prosthetic management, but can be treated with articulation therapy focusing on:

- Production with a posterior nasal fricative or pharyngeal fricative,
- Production of sibilants (s, z, sh, ch, j), and
- Stimulation for correct production

7) Treatment of resonance disorder

- a) Surgical or prosthetic management is required to correct velopharyngeal inadequacy.
- b) Speech therapy can improve the perception of hypernasality to a limited degree under the following conditions:
 - Hypernasality is very mild and child is stimuable
 - Hypernasality is inconsistent or occurs when the child is tired
 - Hypernasality is due to misarticulation and child is stimuable
 - Hypernasality is associated with apraxia or dysarthria
 - Surgical correction has been recently completed and child needs to learn to use new structure
- c) Treatment procedures that may reduce the perception of hypernasality and/or nasal emission – these should be tried for approximately 6 weeks. If no/limited improvement is noted, the child should be referred to a cleft palate/craniofacial team. Specific treatment procedures and activities can be found at:
 - <http://clefttherapy.com/therapy.htm>
 - <http://www.cincinnatichildrens.org/assets/0/78/759/781/65e90133-9243-4926-a065-8a97951944fb.pdf>

North Carolina Cleft/Craniofacial Teams

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References and Resources

American Cleft Palate-Craniofacial Association. Core Curriculum for Speech Language Pathologists (2007).

http://www.acpa-cpf.org/EducMeetings/CoreCur/speech_language_pathology.html

American Speech Language Hearing Association Special Division 5:

<http://www.med.umich.edu/speechpath/MSHAHandout2006-Adobe.pdf>. This website contains specific information about assessing and treating children with clefts.

Cleft Palate Foundation *The School Aged Child*:

http://www.cleftline.org/publications/booklet_summaries#schoolaged

Cleft Palate Foundation *Speech Samples from Normal and Hypernasal Speakers*. <http://www.acpa-cpf.org/EducMeetings/speechSamples/index.htm>

Dworkin, J.P, Marunick, MT & Krouse, J.H. (2004). Velopharyngeal dysfunction: Speech characteristics, variable etiologies, evaluation techniques, and differential treatments. *Language, Speech and Hearing Services in the Schools*, 35, 333-352.

Hardin-Jones, M, Chapman, K. & Scherer, N. J. (2006, June 13). Early intervention in children with cleft palate. *The ASHA Leader*.

Kuehn, D.P. & Henne, L.J. (2003). Speech evaluation and treatment for patients with cleft palate. *American Journal of Speech-Language Pathology*, 12, 103-109.

Kummer, AW (2001). *Cleft Palate and Craniofacial Anomalies*. San Diego: Singular Press.

Kuster, J.M. (December 21, 2010). Resources for clients with craniofacial abnormalities. *The ASHA Leader*.

<http://www.youtube.com/user/luiscuadros2>. (This link contains videos of the assessments and treatments of many children with clefts.)

Peterson-Falzone, SJ, Hardin-Jones, M.A, & Karnell, MP (2001). *Cleft Palate Speech*. 3rd edition. St. Louis, MO: Mosby. ISBN# 0-323-02526-9

Peterson-Falzone, S.J., Trost-Cardamone, J.E., Karnell, MP Hardin-Jones, MA. (2004). *The Clinician's Guide to Treating Cleft Palate Speech*. St. Louis, MO: Mosby.. (This book explicitly describes evidence-based procedures for improving communication function in children with palatal clefts.)

Ruscello, DM. (2008). An examination of non-speech oral motor exercises for children with velopharyngeal inadequacy. *Seminars in Speech and Language*, 29, 294-303. This paper discusses speech therapy approaches, including non-speech oral-motor exercises, that do not work in the treatment of VPI and its related disorders.)

APPENDIX I

Sample Form

LIPS

- Symmetry: WNL _____ Asymmetric (describe) _____
- Comments _____

NOSE

- Left nostril patency: Normal _____ Blocked _____
- Right nostril patency: Normal _____ Blocked _____
- Is blockage temporary (allergies) _____ Permanent (Deviated Septum) _____
- Nasal grimacing during speech No _____ YES If so, what sounds _____

OCCLUSION

- Overbite/protrusive maxilla _____
- Underbite _____
- Open bite (location) _____
- Crossbite/reduced maxillary width _____

TEETH

- Missing teeth (not developmental) _____
- Ectopic/extra teeth (note location) _____

TONGUE

- Symmetry during protrusion and elevation _____
- Ankyloglossia (anteriorly displaced or shortened lingual frenulum) _____
- Relative tongue size _____
- Other anomalies _____

HARD PALATE AND ALVEOLUS

- Fistulas (Note size and location) _____
- Submucous cleft palate (defect under the mucosa) _____

TONSILS

- Size and position (may be obstructive) _____

VELUM (velopharyngeal closure cannot be determined solely by intra-oral inspection)

- Bifid uvula _____
- Absent uvula _____
- Symmetry at rest and during elevation _____
- Extent of velar movement _____
- Gag response _____
- Tongue anchor test PASSED _____ FAILED _____

APPENDIX II

Protocol for Assessment of Speech Errors Related to Velo-Pharyngeal Dysfunction (VPD)

Adapted from Peterson-Falzone, Trost-Cardomone, Karnell, & Hardin-Jones (2006). *The Clinician's Guide to Treating Cleft Palate Speech*. Page 70

1. Obtain an adequate speech sample
 - A. Sample varied contexts
 - 1) Connected speech – conversation, reading, picture description, counting, etc.
 - 2) Articulation tests
 - 3) Stimulability
 - B. Complete phonetic transcription of errors in all contexts
2. Analyze the speech sample
 - A. Rate overall speech understandability/intelligibility based on conversational speech
 - B. Document phonetic inventory
 - 1) Inventory size, sound types/phones, phonological processes
 - 2) Compare to developmental norms if appropriate
 - 3) Describe compensatory articulations (e.g. glottal stops, pharyngeal productions)
 - C. Document type and degree of speech resonance (WNL, hyponasal, hypernasal, mixed)
 - D. Document nasal air emission (none, turbulent, non-turbulent)
 - E. Classify errors
 - 1) Place, manner, voicing
 - 2) Substitution, distortion, omission,
 - 3) Compensatory articulation substitutions or co-productions
 - F. Describe cleft palate error patterns
 - 1) Hypernasality: pattern and severity
 - 2) Nasal emission pattern: obligatory or learned
 - 3) Maladaptive compensatory misarticulations
 - 4) Backed oral productions
 - 5) Pattern consistency (affects same sound/sounds all of the time or inconsistently affects one or several sounds)
3. Correlate perceptual speech data to orofacial exam findings - determine relationships between speech sound production and oral structure
4. Interpret the clinical data
 - A. Make a definite diagnosis or
 - B. Make a tentative diagnosis pending:
 - 1) Instrumental assessment
 - 2) Outcome of diagnostic speech therapy