

		RESPIRATORY	RESPIRATORY	RESPIRATORY	RESPIRATORY
<b>GOAL: Achieve consistent alveolar air pressure level to enable non-fatiguing production of speech with adequate loudness and breath groups</b>					
RESPIRATORY  RESPIRATORY  RESPIRATORY	<b>Establish respiratory support</b>	<b>Necessary when...</b>	<b>Try...</b>	<b>Strategies</b>	
		<ul style="list-style-type: none"> <li>Est. levels of alveolar pressure &lt;5cm on speech tasks</li> <li>Unable to sustain consistent air pressure for 5 seconds</li> <li>Unable to generate adequate alveolar air pressure to support phonation</li> <li>Have such limited respiratory support or control for speech that they are using a one-word-at-a-time strategy</li> </ul>	<i>Production of consistent alveolar air pressure</i>	<ul style="list-style-type: none"> <li>"Blow bottle" device (or other one-way valve), i.e. <b>cup+straw</b></li> <li>Sustained phonation with <b>volume unit (VU)</b> meter as biofeedback</li> <li>Practice consistent phonation while producing utterances all on one breath</li> </ul>	
			<i>Postural Adjustment</i>	<ul style="list-style-type: none"> <li><b>Flaccid</b>=seated. The 'stronger' inspiratory musculature is able to inhale against the added pressure generated by the forces of the abs.</li> <li><b>Spastic</b>=position that reduces excessive tone (must experiment). Reduces excessive resistance to airflow through larynx.</li> <li><b>Hypokinetic</b>=sit up straight (these pts. often hunch)</li> </ul>	
			<i>Respiratory Prostheses</i>	<ul style="list-style-type: none"> <li><b>Abdominal binder</b> (NOT for pt w/inspiratory weakness)</li> <li><b>Expiratory board/paddle</b>: behind them on chair, which they can lean on to provide increased expiratory pressure</li> </ul>	
		<ul style="list-style-type: none"> <li>Releases excessive air through larynx when speaking</li> </ul>	<i>Inspiratory Checking</i>	<ul style="list-style-type: none"> <li>Inspiratory muscles used to counter elastic recoil forces of exhalation to gradually release air to support speech</li> </ul>	
	<b>Stabilize respiratory pattern</b>	<ul style="list-style-type: none"> <li>Initiate phonation at inappropriate lung volume levels Initiate speech w/o prep inhalation</li> <li>Initiate breath groups at inconsistent lung volume levels</li> <li>Consistently produce utterances that are too loud or too quiet</li> <li>Don't terminate a breath group at an appropriate lung volume level; rather, continue to speak until reaching an excessively low level</li> </ul>	<i>Identify Functional Lung Volume Level</i>	<ul style="list-style-type: none"> <li>Typical speakers inhale to appx 60% of lung volume level B4 exhaling to speak</li> <li>Approach depends on what equipment you have available (water spirometer, Respitrace, magnometers)</li> </ul>	
			<i>Eliminate Abnormal or Maladaptive Respiratory Behaviors</i>	<ul style="list-style-type: none"> <li>Frequently associated with pt with cognitive disabilities</li> </ul>	
		<ul style="list-style-type: none"> <li>Produce utterances with stereotypic breath group lengths</li> <li>Never pause w/o inhaling</li> <li>Unable to manage quick inhalation needed to support short breath group utterance</li> </ul>	<i>Adjust Lung Volume Levels</i>	<ul style="list-style-type: none"> <li>Level 1: <b>Conceptual Training</b> <ul style="list-style-type: none"> <li>Pt reads short paragraphs with <b>respiratory</b></li> </ul> </li> <li>Level 2: <b>Conversational scripts</b> <ul style="list-style-type: none"> <li>Take turns reading from script with respiratory markings</li> </ul> </li> <li>Level 3: <b>Unaided Conversation</b></li> </ul>	
		<i>Maximizing Speech Naturalness</i>	<ul style="list-style-type: none"> <li>Practice natural stress patterns; adequate respiratory control and appropriate phrasing</li> <li>Teach pauses without inhalation</li> </ul>		

		LARYNGEAL	LARYNGEAL	LARYNGEAL	LARYNGEAL
LARYNGEAL	Establish Voluntary Phonation	Necessary when... Severe HYPOadduction	Try... <i>Identify Reflexive Phonation Acts</i>	Strategies	<ul style="list-style-type: none"> <li>Help pt discover when they are able to phonate and keep inventory:               <ul style="list-style-type: none"> <li>Cough, Sigh, Laugh; Keep phonation diary</li> </ul> </li> <li>Note positioning and stimuli that elicit it</li> </ul>
		FIRST, ensure that phonation is possible	<i>Develop Voluntary Phonation</i>	<ul style="list-style-type: none"> <li>Attempt reflexive behaviors repetitively</li> <li>Position pt for optimal generation of subglottal air pressure (supine, possibly with abs board)</li> <li>Pushing/pulling exercises with arms and legs</li> <li>THEN add oral cavity shaping to produce vowel sounds               <ul style="list-style-type: none"> <li>Initiate phonation THEN shape oral cavity</li> </ul> </li> <li>Vowel intelligibility drills</li> </ul>	
LARYNGEAL	Increase Loudness	HYPOadduction d/t <b>flaccid</b> dysarthria	<i>Behavioral Training</i>	<ul style="list-style-type: none"> <li>Generate greater levels of subglottal air pressure</li> <li>Initiate phonation at appropriate lung volumes or at appropriate times in respiratory cycle</li> </ul>	
			<i>Effortful Closure Techniques to Increase Medial Compression</i>	<ul style="list-style-type: none"> <li>Pushing, pulling, grunting, lifting, controlled coughing, pushing hands together, pushing elbows down on wheelchair</li> <li>Head rotation towards weak side to manipulate larynx</li> </ul>	
LARYNGEAL	Improve Quality	HYPOadduction d/t <b>hypokinetic</b> dysarthria	<i>Lee Silverman</i>		
			<i>Prosthetic Management</i>	<ul style="list-style-type: none"> <li><b>Portable amplifiers</b></li> <li><b>Microphone</b></li> </ul>	
			<i>Surgical Procedures (controversial)</i>	<ul style="list-style-type: none"> <li>Pallidotomy or thalamotomy</li> <li>Deep brain stimulation</li> </ul>	
LARYNGEAL	Reduce HYPER	<ul style="list-style-type: none"> <li>HYPER adduction</li> <li>Harsh quality</li> </ul>	<i>Vocal Function Exercises</i>	<ul style="list-style-type: none"> <li>Reduce effort used to talk</li> <li>Increase airflow thru glottis (may assist in reducing harshness)</li> </ul>	
			<ul style="list-style-type: none"> <li>Spasmodic dystonia</li> <li>Spasticity</li> <li>Essential tremor</li> </ul>	<i>Botox (along w/ Vocal Function Exercises)</i>	<ul style="list-style-type: none"> <li>Effects last 3-4 months</li> <li>Be careful... possible adverse effects</li> </ul>
LARYNGEAL	Improve Laryngeal Coordination		<i>Respiratory Laryngeal Timing</i>	<ul style="list-style-type: none"> <li>Prompt initiation of phonation at beginning of exhalation (reduces air wastage and fatigue)</li> <li><b>Biofeedback:</b> Show pt when the start to exhale vs. when they start phonating</li> <li><b>Effortful closure techniques</b></li> </ul>	
			<i>Articulatory Distinctions</i>	<ul style="list-style-type: none"> <li>Voice onset/cessation drills on voiceless consonants in vowel env'ts</li> <li>Teach to exaggerate other aspects of voiced/voiceless distinctions</li> <li>Focus on features OTHER than phonation (e.g. aspirating final unvoiced plosives)</li> </ul>	

VELOPHARYNGEAL		VELOPHARYNGEAL		VELOPHARYNGEAL	
Goal	Necessary when...	Try...	Strategies		
<b>Identify Patterns of VP Dysfunction</b>	<ul style="list-style-type: none"> <li>Nasal emission</li> </ul>	<i>Aerodynamic Measures</i>	<ul style="list-style-type: none"> <li>Trapping nasally emitted air</li> <li>Indirect measure</li> </ul>		
	<ul style="list-style-type: none"> <li>HYPERnasality</li> <li>HYPONasality</li> <li>Articulatory error patterns</li> </ul>	<i>Radiographic Techniques</i>	<ul style="list-style-type: none"> <li>Videofluoroscopy</li> </ul>		
		<i>Direct Visualization</i>	<ul style="list-style-type: none"> <li>Endoscopy</li> </ul>		
<b>Estimate Improved VP Function</b>		<i>Occlude Nares</i>	<ul style="list-style-type: none"> <li>May eliminate escape of air thru nasal cavity</li> <li>Provides gross estimation of potential of improved function</li> <li>Assess loudness, articulatory precision, and intelligibility w/ and w/o nares occluded</li> </ul>		
	<ul style="list-style-type: none"> <li><b>Flaccid</b> dysarthria</li> </ul>	<i>Supine Position</i>	<ul style="list-style-type: none"> <li>Gravity may assist soft palate closure</li> </ul>		
	<ul style="list-style-type: none"> <li><b>Flaccid</b> dysarthria</li> </ul>	<i>Dental Mirror to Elevate Soft Palate</i>	<ul style="list-style-type: none"> <li>Assess change in vowel quality and intelligibility</li> </ul>		
	<ul style="list-style-type: none"> <li>Coordination issues</li> </ul>	<i>Vary Speaking Rate</i>	<ul style="list-style-type: none"> <li>May help determine impact of speaking rate of VP function (slowing down may give time for VP to close fully)</li> </ul>		
<b>Strengthen Muscles of VP Closure</b>	<ul style="list-style-type: none"> <li>Mild VP dysfunction (must be able to achieve adequate closure)</li> </ul>	<i>CPAP Behavioral Training</i>	<ul style="list-style-type: none"> <li>Continuous Positive Airway Pressure</li> <li>Provides resistance training for the velum (resistance=air)</li> </ul>		
		<i>Articulatory or Speaking Rate Intervention</i>	<ul style="list-style-type: none"> <li>Improve the production of nasal and non-nasal consonants</li> <li>May need to address rate control <ul style="list-style-type: none"> <li>Decreased rate may help to increase articulatory competence</li> </ul> </li> </ul>		
<b>Achieve VP Closure Etc</b>	<ul style="list-style-type: none"> <li>Consistent inability to achieve VP closure</li> <li>NOT for palatal spasticity</li> </ul>	<i>Palatal Lift Device</i>			

	RATE	RATE	RATE	RATE	RATE	RATE	RATE
	<b>Goal</b>	<b>Necessary when...</b>	<b>Try...</b>	<b>Strategies</b>			
<b>RATE</b>	<b>Estimate Improved VP Function</b>	<ul style="list-style-type: none"> <li>As rate decreases, intelligibility improves               <ul style="list-style-type: none"> <li>Needed to achieve distinct articulatory targets</li> <li>Needed to coordinate various speech components simultaneously or consecutively</li> </ul> </li> </ul>	<i>Perceptual Judgments</i>	<ul style="list-style-type: none"> <li>Listen to speaker and judge whether rate is rapid/slow or whether it is appropriate for a given speaker</li> </ul> <b>LIMITATIONS</b> <ul style="list-style-type: none"> <li>Doesn't provide objective measures of rate, so hard to compare changes over time</li> <li>Judgment of rate is affected by articulatory precision</li> </ul>			
<b>RATE</b>		<ul style="list-style-type: none"> <li>ONLY if pt is not completely intelligible</li> <li>ONLY if excessive rate makes pt difficult to comprehend</li> </ul>	<i>Computerized Measures</i>	<ul style="list-style-type: none"> <li>Assess during sentence-reading task               <ul style="list-style-type: none"> <li><b>Stopwatch and calculator</b> (use to benchmark for goals)</li> <li>Speech Intelligibility test using computer</li> </ul> </li> <li>Assess during paragraph-reading task               <ul style="list-style-type: none"> <li>Use <b>acoustic analysis software</b></li> </ul> </li> </ul>			
<b>RATE</b>		ONLY for those with most severe impairments	<i>Rigid Rate Control Techniques</i>	<ul style="list-style-type: none"> <li><b>Alphabet Board:</b> speaker id's the 1<sup>st</sup> letter on board/AAC devise as each word is spoken</li> <li><b>Finger Tapping:</b> Touching thumb to finger or tapping rhythm on table as each word is produced</li> </ul> <b>ADVANTAGES:</b> <ul style="list-style-type: none"> <li>Often effective when other techniques are not</li> <li>Often improves speech intelligibility</li> <li>Helps provide listeners with extra cue (alpha board)</li> <li>Requires little training</li> </ul> <b>DISADVANTAGES:</b> <ul style="list-style-type: none"> <li>May cause more unnatural speech</li> <li>Rely on cosmetically unappealing devises</li> </ul>			
<b>RATE</b>	<b>Slow Rate While Preserving Prosody</b>	MUST be able to devote time to learning new skill	<i>Rhythmic Cueing</i>	<ul style="list-style-type: none"> <li>Use printed materials and point to words of a passage to model desired rate</li> <li>Give increased time to prominent words</li> <li>Intersperse pauses where appropriate</li> </ul>			
<b>RATE</b>			<i>"Backdoor" Approaches</i>	<ul style="list-style-type: none"> <li>Rate reduction is NOT primary focus, tho they are effective in reducing it</li> <li>Addressing intonation and pitch</li> <li>Addressing phrasing and breath patterning</li> </ul>			
<b>RATE</b>		<ul style="list-style-type: none"> <li>Select cases of <b>hypokinetic</b> dysarthria</li> <li>Excessively rapid speech, where voicing is consistently present</li> </ul>	<i>Delayed Auditory Feedback</i>				

ARTICULATION		ARTICULATION		ARTICULATION		ARTICULATION	
<b>Goal: Normalize function. But this is NOT the first priority, as it's probably affected by other subsystems.</b>							
ARTICULATION	<b>Goal</b>	<b>Necessary when...</b>	<b>Try...</b>	<b>Strategies</b>			
	<b>Reduce Physiologic Impairment</b>	Nerve damage	<i>Neural Anastomosis</i>	<ul style="list-style-type: none"> <li>Connecting the damaged nerve to a normally functioning nerve</li> </ul>			
	<b>Reduce Tone</b>	Certain <b>hyperkinetic</b> or <b>spastic</b> dysarthrias	<i>Biofeedback</i>	<ul style="list-style-type: none"> <li>Goal: Reduce abnormally high muscle tone</li> </ul>			
			<i>Botox</i>	<ul style="list-style-type: none"> <li>Reduce abnormal movements and tone</li> </ul>			
	<b>Optimize Speaking Rate</b>		<i>Antispasticity Medications</i>				
			<i>Delayed Auditory Feedback</i>				
			<i>Behavioral Instruction</i>				
			<i>Computerized Pacing</i>				
	<b>Strengthen</b>	<ul style="list-style-type: none"> <li><b>Flaccid</b> dysarthria d/t damage of CN V, VII, &amp; XII</li> <li>Weakness that is interfering with speech production</li> </ul>	<i>Speaking Rate Control</i>				
			<i>Biofeedback</i>	<ul style="list-style-type: none"> <li>Facial musculature, but NOT specifically speech-related activities</li> </ul>			
<b>Behavioral Compensate for Impairment</b>		<i>Strengthening Exercises</i>	<ul style="list-style-type: none"> <li>Use assistive force as needed to achieve desired movement</li> <li>Advance to movement against resistance</li> <li>Jaw: depression and elevation</li> <li>Lips: bilabial closure, rounding retraction, and labiodental approximation</li> <li>Tongue: Interdental protrusion, retraction, apical elevation, and dorsal elevation</li> </ul>				
		<i>Contrastive Production</i>	<ul style="list-style-type: none"> <li>Provide info on adequacy of speech RATHER than training pt to change movement patterns. Leverage what pt can already do.</li> <li>Produce 2 sounds in juxtaposition, but make each sound as different as possible (esp. voiced/voiceless cognates)</li> </ul>				
<b>Prosthetic Compensation for Impairment</b>	<ul style="list-style-type: none"> <li>Jaw control is disproportionately impaired relative to other structures</li> </ul>	<i>Intelligibility Drills</i>	<ul style="list-style-type: none"> <li>Produce set of words that differ by a single phoneme</li> <li>Pt produce, then clinician try to identify what was said</li> </ul>				
		<i>Palatal Lift Device</i>					
		<i>Bite Block</i>	<ul style="list-style-type: none"> <li>Maintains constant jaw position during speech</li> <li>Small, custom-fitted piece</li> <li>Hard, rubberlike material held between upper and lower teeth</li> </ul>				
		<i>Prosthetic Rate Control Devices</i>	<ul style="list-style-type: none"> <li>Pacing or alphabet boards</li> <li>Delayed Auditory Feedback devices</li> </ul>				

PROSODY

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**Goal: Maximize naturalness and accuracy of prosodic patterns. NOT 'normal' speech, but best possible speech given deficits.**

PROSODY PROSODY PROSODY PROSODY	Goal	Necessary when...	Try...	Strategies
	<b>Naturalness</b>	<ul style="list-style-type: none"> <li>▪ Monotony</li> <li>▪ Monopitch</li> <li>▪ Monoloudness</li> <li>▪ Syntactic mismatches</li> <li>▪ Inconsistency/conflict across prosodic features</li> </ul>	<i>Analysis of Modified Prosodic Patterning</i>	<ol style="list-style-type: none"> <li>1. Increase ability to signal stress appropriately               <ol style="list-style-type: none"> <li>a. Parameters: intensity, duration, and ff</li> </ol> </li> <li>2. Modify production in an effort to signal a targeted stressed syllable               <ol style="list-style-type: none"> <li>a. Do NOT provide specific instructions regarding which parameter to change</li> </ol> </li> <li>3. Identify features associated with most natural productions, and train pt to use these consistently               <ol style="list-style-type: none"> <li>a. "Emphasize the target word"</li> <li>b. "Use extra force on the target word"</li> <li>c. "Make the target word stronger"</li> </ol> </li> </ol>
			<i>Durational Adjustments</i>	<ul style="list-style-type: none"> <li>▪ Prolong stressed syllables</li> <li>▪ Insert pauses in appropriate locations</li> </ul> <p><i>Easier than simultaneously modifying the 3 suprasegmental features above!!</i></p>
			<i>Comparisons Across Breath Groups</i>	<ul style="list-style-type: none"> <li>▪ Identify abnormalities of prosody across breath groups</li> <li>▪ Learn to time breath groups appropriately to improve naturalness</li> </ul>