Interventions for Treatment of Respiratory Issues in Rehab

Michaela A. Medved, MA, TSSLD, CCC-SLP
Speech-Language Pathologist
Director of Patient Care Services, Aspire Center for Health and Wellness

Who am I?

- **Name:** Michaela A. Medved
- **Credentials:** MA, TSSLD, CCC-SLP
- **Certifications:** LSVT
- **Undergraduate Studies:** SUNY Binghamton, CUNY Lehman
- **Graduate Studies:** CUNY Lehman
- **Where I Work:** Speech-Language Pathologist at Aspire Center for Health and Wellness

What is Aspire?

- At the Aspire Center for Health and Wellness we provide individualized rehabilitation services to improve overall quality of life
- Our services include speech and swallowing therapy, physical therapy, occupational therapy, float (REST) tank, Alter G treadmill

What is my role?

- For individuals living with MS, the role of the SLP is to address the treatment of **dysarthria, respiration and respiratory deconditioning (disuse atrophy)**
- Additional concerns targeted during therapy: cognition, short and long term memory, comprehension, and dysphagia

Dysarthria

Perceptually speech sounds:

- Sloppy
- Imprecise
- Uncoordinated
- Effortful

Overall vocal quality may sound:

- Harsh
- Hoarse
- Breathy
- Nasal

What is Dysarthria?

- A neurological, motor speech disorder which is characterized by slow, weak, or uncoordinated movements of the speech musculature (lungs, vocal folds, velum, tongue, lips, nose, jaw)
- Respiratory and articulatory muscles may become weak resulting in poorly articulated or perceptually "slurry" sounding speech
- Often results in reduced speech intelligibility and decreased communicative function

Causes of Dysarthria

- Overall changes in respiration occur due to deconditioning
  - Deconditioning is a result of:
    - Sedentary lifestyle
    - Underused respiratory system
    - Disuse atrophy of respiratory musculature
- Interference along the upper motor neurons and/or lesions within the cerebellum

Overall Characteristics of Dysarthria

- Combination of vocal weakness and reduced respiratory support leads to significantly reduced vocal volume in individuals with MS
- Endurance for conversation or the sensation of “running out of air” is frequently reported
- On average individuals with MS have a vocal volume which is 8 dB SPL less than the average adult

Dysarthria and MS

- Individuals with MS present with:
  - Spastic dysarthria
  - Ataxic dysarthria
  - Mixed dysarthria
  - Flaccid dysarthria

Assessing Dysarthria

- Assessment of oral-motor function the peripheral speech mechanism. Includes:
  - Examining structure and function of articulators
  - Evaluating respiratory support and control
  - Analysis of laryngeal loudness, pitch and vocal quality

Assessing Dysarthria Cont.

- Perceptual analysis of respiration, phonation, resonance, articulation, and prosody in order to classify the type of dysarthria and determine severity
- Rating of speech intelligibility
- Both formal and informal assessments are used

Neuropathology of Spastic Dysarthria

- Bilateral lesion involving the direct and indirect upper motor neuron pathways
- Areas of phonation, articulation, resonance and prosody are impaired

Speech Characteristics of Spastic Dysarthria

- Harsh or strained vocal quality with pitch breaks
- Imprecise articulation
- Hypernasality
- Reduced breath support and/or inability to control
- Monoloudness paired with slow speech rate
- Short phrases with reduced stress
- Speech deterioration with increased fatigue

Neuropathology of Ataxic Dysarthria

- Results from cerebellar lesions
- Given its connections to the vestibular system, equilibrium is significantly effected
- Following cerebellar damage, individuals are slow to initiate movements; movements often undershoot or overshoot targets
- Individuals present with incoordination and overall reduced muscle done resulting in slowness and inaccuracy in the force, range, timing, and direction of speech movements

Speech Characteristics of Ataxic Dysarthria

- Vocal tremor
- Irregular articulation breakdown
- Dysrhythmic rapid alternating movements of the tongue, lips and mandible
- Prosody difficulties include scanning speech, slow rates, excess and/or equal stress, monopitch/monoloudness
- Excessive loudness or irregular bursts
- Prolonged phonemes and intervals

Flaccid Dysarthria

- Result of overuse of Baclofen
- The most common speech signs observed in individuals with flaccid dysarthria include:
  - Imprecise articulation
  - Hypernasal voice
  - Hoarse and breathy vocal quality
  - Slow-labored speech

Functions of the Human Respiratory System

- Primary function is to supply oxygen to all the parts of your body by inhaling oxygen-rich air and exhaling air filled with carbon dioxide (waste gas)
- Regulates blood pH
- Regulates blood oxygen and carbon dioxide levels

Components of the Respiratory System

- Human respiratory components include:
  - Nasal cavity, pharynx (throat), larynx (voice box), trachea (windpipe), bronchi, and alveoli (site of gas exchange)
- Inhaled air follows the following pathway:
  - Nasal cavity → pharynx → larynx → trachea → bronchi → bronchioles → alveoli

Typical Speech Production

- The normal processes of speech and voice production overlap and require the following processes to work together:
  - Respiration
  - Phonation
  - Resonance
  - Articulation
  - Prosody

Deconditioning

- Deconditioning = respiratory muscle disuse atrophy
- Caused by:
  - **Sedentary lifestyle** which is common in individuals with MS due do muscle weakness/spasticity, and/or fatigue and depression
  - **Underused respiratory system** due to walking less or not at all. In order to prevent deconditioning the respiratory system must remain engaged; either you use it or you lose it

Respiration and ADLs

- Therapy is less focused on the correction of specific impairments and rather focuses to acquire specific skills which are necessary to participate in everyday activities
- Improvement of vocal volume
- Increased intelligibility

Activities of Daily Living

- Personal information for safety purposes (name, address, phone number)
- Ability to communicate wants and needs
- Participation in activities; changes in communication should not impair an individual to cease participation in conversations or social interactions
- Safe nutritional intake

Dysphagia

- Dysphagia = difficulty swallowing
- Typically an individual swallows ~1000 each day
- Over 40% of individuals living with Multiple Sclerosis experience swallowing difficulties within 15 years of their initial diagnosis (ASHA 2008)

Signs and Symptoms of Dysphagia

- Coughing or throat clearing
- Decreased vocal quality (wet, hoarse, weak)
- Recurring chest infections
- Multiple swallows necessary
- Longer mealtimes (30+)
- Globus sensation
- Modified diet (thickened or pureed food)
- Difficulty initiating swallow
- Anterior spillage of food or liquids

Causes of Dysphagia

- Decreased neural drive (energy) to the swallowing musculature
- Insufficient sensory feedback
- Jaw restrictions
- Disruption of air flow
- Anatomical changes to the swallowing musculature
- Muscle atrophy due to disuse

Dysphagia and Respiration

- Respiration shares many muscles that are reciprocally active in swallowing
- Breathing and swallowing processes are closely interrelated in their central control and are highly coordinated
- Strong respiratory musculature is necessary to avoid pulmonary contamination via aspiration and to ensure adequate ingestion and swallowing of secretions, liquids, and foods
- Respiration as a life sustaining function

Respiration and Rehab Potential

- Tasks which are addressed in both physical and occupational therapy require respiratory strength
- In order to adequately and autonomously communicate therapeutic concerns proper respiratory support is necessary
- E.g. Patient performing 6-minute walk time test who can physically walk for 6 minutes but becomes extremely winded and therefore cannot complete the task

Respiratory Difficulties for Individuals with MS

- Lesions in the brain may effect aspects of mobility and function including lung functioning
- Lesions in the cervical spine may create the sensation of “MS hug” or the feeling of shortness of breath
- Overall weakness may affect breathing

Respiratory Difficulties for Individuals with MS

- Spinal lesions which may or may not affect an individual's posture may restrict the ability to both inhale and exhale
- Sleep apnea is one of the most common breathing difficulties in individuals with MS
- One of the side effects of the many drugs approved for MS treatment is reduced lung capacity

Assessing Respiratory Function

- Simple yet successful motor speech evaluation can be conducted by any rehab professional
- Collect the data from 3 sustained /a/
  - What you will need – timer and sound level meter (ipad or smart phone applications available)
  - Have the client sit in the most upright position possible
  - Prompt patient with "do what I do" – Take the deepest breath possible and sustain /a/ until out of breath

Assessing Respiratory Function Cont.

- Information obtained from sustained /a/
  - Mean phonation time
  - Average vocal volume (yelling for help during emergency)
- Forced vital lung capacity
  - Maximum amount of air that can be forcefully exhaled after maximum inhalation
  - Provides information about the air available for speech and vegetative purposes

Treatment – Buhl Spirometer

- Buhl spirometer used for measurement of diaphragmatic movement and vital lung capacity
- Baseline measures may be taken at initial evaluation and measured throughout the course of therapy

Treatment – Incentive Spirometer

- Used for the strengthening of the intercostal muscles and increased lung function
- Improves respiratory support for speech, articulation, and swallowing
- Amount of resistive pressure and duration can be adjusted according to specific client goal

Treatment - Breather

- The Breather ® is a resistive breathing training (RBT) device for client with neuromuscular diseases
- Use of the Breather ® has been show to:
  - Improve respiratory support for phonation, articulation and swallowing
  - Aid in both inspiratory and expiratory resistive breathing training

Treatment – Breather Cont.

- Strengthens the skeletal muscles of the neck, as well as the pharyngeal and laryngeal muscles
- An effective took in teaching diaphragmatic breathing for breath support
- Especially helpful in the prevention of aspiration

Treatment – LSVT

- LSVT® LOUD (Lee Silverman Voice Treatment) is a high effort, intensive voice treatment used to improve vocal volume and articulation skills
- The treatment is centered on a very specific therapeutic exercise called the **sustained "ah"**
- Sustained "ah" acts as a "trigger" to coordinate the speech production subsystems (respiratory, phonatory, and articulatory)

The Sustained "ah"

- #1 exercise to improve vital lung capacity (Hixon & Hoit, 2005)
- Increases breath support for both speech and vegetative purposes
- Aids in control of expiratory flow-focus on intercostal muscles
- Improve vocal volume and intelligibility
- Improves swallowing by imitating laryngeal excursion

Your Turn!

- 1. Take a deep breath
- 2. Open your mouth as wide
- 3. Say "ah" for as long and as loud as you can until you have no air left in your lungs
- GO!

Normative Values

- Males: 20-40 seconds
- Females: 15-25 seconds
- Children: 10-18 seconds

(Duffy, 2005; Hixon & Hoit, 2005)

Treatment Techniques & Strategies

- 1. Pacing
- 2. Phrasing
- 3. Tap-it-out

Who is a Candidate?

EVERY MS PATIENT NEEDS A BASELINE MOTOR SPEECH EVALUATION!

Case Study 1 - 2007

- 40-year-old male
- Diagnosed 1995
- Initial concern during in 2007– significant voice loss and lacking air to sustain appropriate vocal volume and intensity

Physiologic range

Reading sample

Speech sample

Sustained “ah”

Case Study 1 - 2014

- Current medications: Tecfidera 240 mg 2x/day, Baclofen 10mg 3x/day
- Presents with Flaccid dysarthria secondary to medications
- Most recently hospitalized due to reoccurring pneumonia
- Current therapy plan


Physiologic range


Reading sample


Speech sample


Sustained "ah"

Case Study 2

- 64-year-old male
- Diagnosed 1980s
- Sought to be evaluated due to change in voice and cognition
- Primary area of concern is significant voice loss
- States that he does not have enough air to sustain appropriate vocal volume
- Presents with Spastic dysarthria

Case Study 2 – Speech Samples

Speech 2007

Sustain “ah” 2007

Speech 2008

Sustain “ah” 2008

Questions?

CONTACT INFO:

Michaela A. Medved

Email: michaela@nyaspire.com

Web: www.nyaspire.com

Phone: 212-453-0036