Clinical Evaluation and Treatment Outcomes for Individuals with MS:

The Role of a Speech-Language Pathologist in Comprehensive Care

Speech & Hearing Associates
Westfield, NJ

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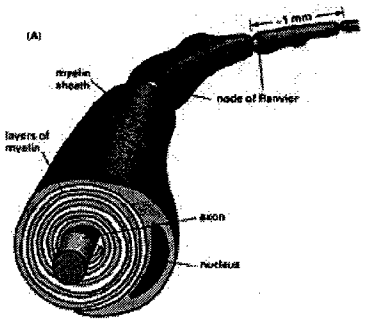
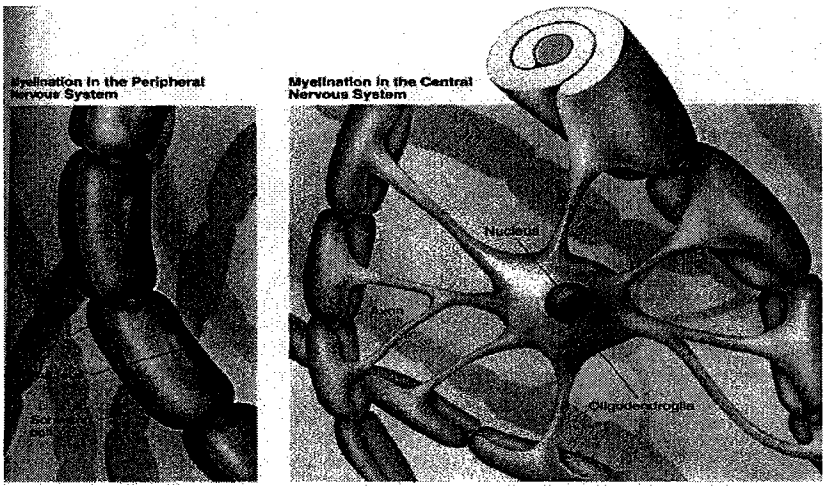
Marissa A. Barrera, TSHH, MS, CCC-SLP
Doctoral Student, Graduate Center: City University of New York

MS: The Facts

- Multiple Sclerosis (MS) is one of the most common neurological diseases, yet its cause is unknown and its course is unpredictable.
- MS is a disorder of the brain and spinal cord which results from loss of myelin.
- Myelin is important because it surrounds and insulates nerve fibers and facilitates the conduction of nerve impulse transmission.



Myelination in CNS



MS: The Facts

- Demyelination causes scarring and hardening (sclerosis) of nerve fibers in the spinal cord, brain stem, and optic nerves, which slows nerve impulses and results in weakness, numbness, pain, and vision loss.
- Because different nerves are affected at different times, MS symptoms often worsen (exacerbate), improve, and develop in different areas of the body. Early symptoms of the disorder may include vision changes (e.g., blurred vision, blind spots) and muscle weakness.
- MS can progress steadily or cause acute attacks (exacerbations) followed by partial or complete reduction in symptoms (remission).
- Most patients with the disease have a slightly shortened lifespan.

MS: The Facts

Types

- Multiple sclerosis is classified according to frequency and severity of neurological symptoms, the ability of the CNS to recover, and the accumulation of damage.
  - **Primary progressive MS** causes steady progression of symptoms with few periods of remission.
  - **Relapsing-Remitting MS** causes worsening of symptoms (exacerbations) that occur with increasing frequency, along with periods of reduced symptoms (remission).
  - **Secondary progressive MS** is initially similar to relapsing-remitting MS and eventually progresses to MS with no remission.
  - **Relapsing-Progressive MS** causes accumulative damage during exacerbations and remissions.

Incidence & Prevalence

- **MS** is the most common neurological cause of debilitation in young people and affects about 500,000 people in the United States.
- Worldwide, the incidence is approximately 0.1%. Northern Europe and the northern United States have the highest prevalence, with more than 30 cases per 100,000 people.
- MS is more common in women and in Caucasians. The average age of onset is between 18 and 35, but the disorder may develop at any age. Children of parents with MS have a higher rate of incidence (30-50%).

Speech & Language Impairments

- 44% of the MS patients experience impairments of speech and voice in the early onset of their disease.
- It is estimated that between 45% and 65% of all people with MS experience problems with memory, attention, word-finding, problem-solving, or other cognitive functions as a symptom of the disease.
- 33% of MS patients report impairments of voice, chewing and swallowing capabilities.
- There is very little relationship between the severity of physical symptoms and the severity of cognitive problems. One person may have severe physical symptoms but no problems with cognition.

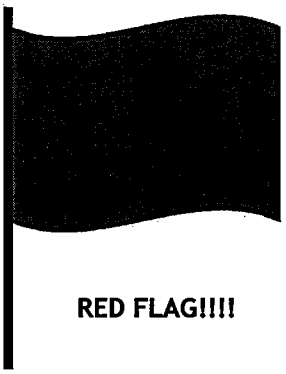
Source:
Hartelius, L., Svensson, P. (1994). Speech and swallowing symptoms associated with Parkinson's Disease and Multiple Sclerosis: A Survey. *Folia Phoniatr Logop.* 46(1):9-17.

Speech & Language Impairments

- Cognitive difficulties can be particularly distressing for people because they are changes that nobody sees.
- Many times the person with MS may not recognize that their problems with memory, attention, word-finding, and problem solving are MS-related, and he or she may worry that he or she is going crazy.
- It is generally believed, cognitive problems associated with MS are different than cognitive difficulties associated with diseases like Alzheimer's disease, Creutzfeldt-Jakob disease (CJD), Parkinson's disease, Huntington's Corea or brain injury.

Why today's in-service?

- Only 2% of MS patients are appropriately referred for treatment of speech, voice and swallowing disorders.
- Less than 1% receive appropriate cognitive intervention.



RED FLAG!!!!

ASSOCIATED DISORDERS

Speech Disorders

- The most common speech and language disorders associated with MS are:
  - *dysarthria*
  - *dysphagia*
  - *dysfluency*
  - *anomia*

Speech Disorders

- **Dysarthria** is a speech disorder that occurs from a weakness or incoordination of the speech muscles (i.e., extrinsic and intrinsic muscles of the tongue, levator labii superioris, levator anguli oris, zygomaticus major, risorius, despressor labii inferioris, depressor anguli oris, mentalis, orbicularis oris, buccinator).
- Perceptually, dysarthric speech can best be described as imprecise and uncoordinated.
- Often respiratory and articulatory subsystems are weak, resulting in poorly articulated or "sloppy" sounding speech.

Speech Disorders

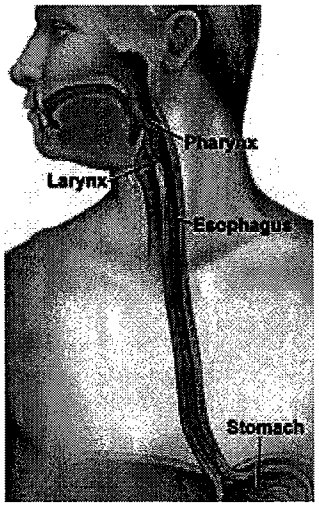
- Dysarthria is a feature of many neurological diseases including cerebral palsy, stroke, traumatic brain injury, Parkinson's disease, Amyotrophic Lateral Sclerosis (ALS) and multiple sclerosis.
- Dysarthria is a relatively common symptom of multiple sclerosis. It comes in two different forms:
  - Episodic paroxysmal dysarthria, dysarthria lasts for up to a few minute and recurs several times a day (very common with MS)
  - Consistent dysarthria, symptoms of dysarthria persist throughout the day and night.

Speech Disorders

- Dyskinetic dysarthria:
  - hyperkinetic leading to problems with speech rate and rhythm
  - hypokinetic which results in poor articulation and slurred speech.
- Spastic dysarthria: spasticity of the muscles involved in speech. Different characteristics of speech are affected depending on the muscles compromised.
- Peripheral dysarthria: Affects the airflow of speech and results in distorted consonants and speaking in short phrases and or residual air supply.
- Mixed dysarthria: Results from dysfunction in more than one speech motor system.

Dysphagia

- Dysphagia is difficulty swallowing.
- Normal swallowing occurs 1000 times per day.
- A swallowing disruption can occur at four levels:
  - 1. Oral Preparatory Phase
  - 2. Oral Phase
  - 3. Pharyngeal Phase
  - 4. Esophageal Phase



Dysphagia

- Individual with MS experience:
  - Dehydration
  - Globus sensation
  - Penetration of the vocal folds resulting in gurgly/wet voice quality when speaking after swallowing
  - Increased or thickened secretions that are difficult to clear
  - Recurrent respiratory infections and pneumonia
  - Reduced appetite
  - Weight loss
- During an exacerbation, MS patients are frequently placed become NPO and/or receive non-oral feedings (i.e., PEG, TPN).

Voice Disorders

- **Dysphonia** is a voice disorder causing a change in vocal quality.
- Speaking is effortful, laborious and fatiguing.
- Vocal quality can sound harsh, hoarse, breathy or nasal.
- Vocal weakness paired with reduced respiratory support causes significantly reduced vocal volume in MS.
- Both dysarthria & dysphonia are conditions that occur because of muscle weakness, spasticity, tremor or ataxia (lack of muscle coordination).

Dysfluency

- Dysfluency can best be described as the inefficient coordination of the speech subsystems:
  - Respiration
  - Phonation
  - Articulation
  - Resonance
- For individuals with MS, dysfluencies are neurological in origin, unlike "stutters".
- Dysfluency effects MS patient's rate, rhythm, intonation, pitch and overall speech intelligibility.

Language Disorders

- **Anomia** is cognitive disorder described as difficulty finding words, labeling and/or naming objects and retrieving information from your long term and working memory.
- People with anomia often says things such as:
  - "You know that place where we went on vacation." *(Example of memory retrieval)*
  - "Honey where are those things you put in the door, they're small, you turn them?" *(Example of circumlocution)*
  - "It's a... Ugh! I have the word in my head I just can't get it out" *(Example of lexical/word retrieval)*

Cognition

- MS patients experience difficulties with executive functions including attention, organization, distractibility, memory and synthesis of information.
- Problem solving and simple and complex reasoning skills commonly decrease with the progression of MS.

Cognition

- Types of cognitive problems many people with MS experience:
  - **Attention and Concentration-** Usually attention for simple tasks are good. Yet, as difficulty and complexity of tasks increase, problems with attention and concentration are more likely to occur.
  - Problems often occur when people with MS are asked to concentrate on more than one things at a time (i.e., in the case in office environments or households with children)
  - Often, people with MS who have problems with attention find that they can only work on one thing at a time in quiet, distraction-free environments, whereas before they could talk on the phone, work on their computer, and listen to the radio, all at the same time.

Cognition

- **Processing Speed-** Many people with MS experience an overall slowing down in how fast they can process information. Some people describe a lag in time between when they recognize they need to say or do something and when their body actually reacts.
- A very commonly observed feature across the range cognitive dysfunctions seen in MS is that performance accuracy is less affected than the speed of performance. This may be because MS affects white matter and rarely affects grey matters, which is believed to be responsible for the processing.

Cognition

- Memory- There are at least two separate systems for memory.
  - *Procedural memory* is the memory for how to do things. This almost always remains intact in people with MS, although as the disease progresses sequencing can be affected.
  - *Semantic memory* is the memory for events, words, or things. This type of memory is typically affected in MS patients. People with MS have trouble remembering recent everyday events. It's less common is difficulty with remembering earlier life events or important historical information.

Cognition

- Parts of semantic memory:
  - 1. Ability to perceive and attend to information: If someone is unable to successfully attend to information, because of concentration deficits, there is reduced opportunity to encode or learn information.
  - 2. Memory retrieval/recall: People with MS related-memory problems can have problems with both retrieval/recall, or in only area. Some individuals have difficult with learning and/or remembering what they see, but have no difficulty learning and/or remembering things they hear or visa versa.
- Some individuals with MS have difficulty learning and/or remembering information regardless of how it is presented.

DIAGNOSTICS

Diagnostics

- Speech Assessment: Formal tools such as:
  - Apraxia Battery for Adults
  - Frenchay Dysarthria Assessment
  - Fisher Logemann Sentence Articulation Test
  - Oral Motor Examination of Speech-Revised
- Speech Assessment: Informal assessment tools:
  - Rainbow passage
  - Zoo passage
  - Speech samples
  - Reading samples

Diagnostics

- Language Assessment: Formal tools such as subtests from:
  - The Ross Information Processing Assessment - Geriatrics (RIPA-G)
  - Scales of Cognitive Ability for Traumatic Brain Injury (SCATBI)
  - Minnesota Test for Differential Diagnosis of Aphasia
  - Word Memory Test
  - Wechsler Test of Adult Reading
  - Aphasia Diagnostic Profile (ADP)
  - Boston Naming Test (BNT)

  * Scales of Cognitive & Communicative Ability for Neurorehabilitation (SCCAN)*
- Language Assessment: Informal assessment tools evaluating following cognitive domains:
  - Immediate, short-term and long-term memory
  - Pragmatics
  - Orientation
  - Reasoning and problem solving
  - Attention to task

Diagnostics

- Voice:
  - Buffalo Three-Point Scoring System for Voice Disorders
  - Voice Handicap Index (VHI)
  - Voice Assessment Protocol for Children and Adults
- Informal
  - Fundamental frequency
  - Vital Capacity
  - Mean phonation time
  - Physiologic range
  - Conversational amplitude
  - Maximum vocal intensity
  - Reading intensity
  - S/Z ratio
  - Respiratory and phonatory efficiency

Diagnostics

- Formal assessment tools evaluating dysfluency:
  - Stuttering Severity Instruement-3
  - Stoker Probe for Fluency and Language
- Informal assessment tools evaluating dysfluency:
  - Fluency ratios
  - Spontaneous speech samples
  - Conversational speech samples
  - Reading samples
  - Singing samples

TREATMENT APPROACHES

Treatment- Speech and Voice

- Speech techniques to improve dysarthria & dysphonia.
  - Practice with various speech sounds
  - Oral motor exercises to improve the movement, strength and coordination of the articulators (tongue, lips, palate)
  - effective voice use (e.g. exercises-yawn sigh, easy onset)
  - Use of appropriate vocal intensity
  - Improvement of vocal quality (i.e., resonance)
  - Augmentative communication devices (AAC) & voice processors when necessary.

LSVT- Overview

- The Lee Silverman Voice Treatment (LSVT) is a proven effective speech treatment program that restores oral communication in individuals with neurological diseases beyond what current pharmacological and surgical interventions can offer (Schultz et al., 2000).
- LSVT® developed by Dr. Lorraine Ramig, has been scientifically studied over 15 years with 5 million dollars in NIH funding and is the ONLY speech treatment with Level I efficiency evidence (Goetz, 2003; Ramig et al., 2001).

LSVT- Overview

- LSVT has been successfully applied to individuals with Parkinson's Disease, multiple sclerosis, stroke, ataxic dysarthria, aging voice, vocal fold paralysis and children with cerebral palsy and Down syndrome (Sapir et al., 2003; Sapir et al., 2004; Ramig et al., Fox, 2003; Robinson et al., 2004).

LSVT-Application to MS

- Case 1: 49 year old female, wheelchair bound, mild cognitive involvement 20 years post-diagnosis.
- Medications: Baclofen
- Outcome: Improvement in articulation, reduced vocal fold bowing, and improved facial affect. Increase in vocal volume was achieved, however was not statistically significant.
- Impression: Limited outcomes secondary to late therapeutic interventions.

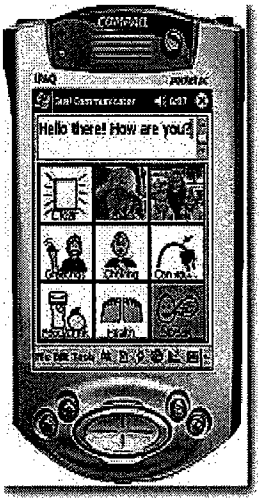
LSVT-Application to MS

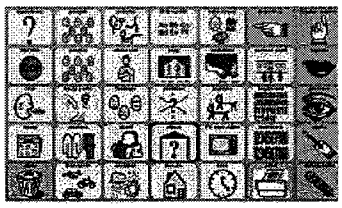
- Case 2: 46 year old female with progressive MS with superimposed exacerbations, 10 years post diagnosis.
- Medications: Baclofen, prozac, ditropan
- Outcome: Statistically significant improvement in articulation, vocal fold bowing, facial affect, vocal volume and laryngeal excursion. Reported less fatigue.

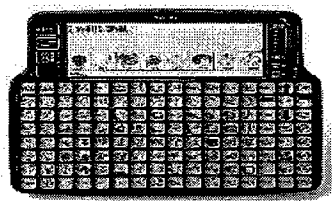
Treatment- AAC

- In a sample of 656 individuals with MS, 28.8% reported the use of communication augmentation equipment.
- Augmentative and Alternative Communication devices are used to assist individuals with communication.
- Devices include pictures, symbols, talking/speaking devices, personal computers, and voice amplifiers.
- AAC devices can be used when:
  - a person's speech muscles become very weak,
  - a person is too tired/fatigued to talk, or
  - you are unable to speak because of medically necessary treatments (i.e., intubation, ventilator dependent).

Treatment- AAC Devices







Treatment- Swallowing

- LSVT (preliminary data available)
- VitalStim
- Shakir Isometrics
- Mendelssohn Maneuvers
- Change of diet and special liquids
- Oral Motor Intervention
  - Exercises can help increase the movements necessary for effective swallowing.

Treatment- Cognition

- Strategies to help improve anomia, memory, organization & attention to task
  - Workbook of Activities for Language and Cognition (WALC) #4, #5, #10
  - Cognitive Reorganization-Third Edition
  - Functional Memory Manual
  - Critical thinking for activities of daily living $83
  - Everyday Activities to Sequence
  - Problem solving picture cards
  - Daily living situations for adults with disabilities
  - Advanced Descripto-cards for functional language and cognition -
  - The Word Finding program

Treatment- Cognition

- Generic cognitive rehabilitation concepts:
  - Repeating
  - Visualizing
  - Writing Down Important Information
  - Associations
  - Alphabet Search
  - Word finding drills
  - Word lists
  - Calendar drills
  - Role playing

Importance of Comprehensive Evaluation

- Each individual with MS is unique and requires a specialized/individualized evaluations:
  - Speech
  - Language
  - Cognition
  - Swallowing
  - Voice

CASE STUDIES

Case Study #1: Total Care

- Patient: SP
- Medical Status: 57 year old female, quadriplegic, home bound, 24 hr care, home aide, treated by Dr. Sylvester.
- Reason for referral: slurred speech
- Initial Dx of MS: 15+ years
- SLE Results: reduced vocal volume, reduced respiratory support, vocal fatigue, short term memory deficits, word finding difficulties, orientation/organization, and NPO (nutrition via PEG).

Case Study #1:Total Care

- Treatment Approach:
  - AAC evaluation for Voice Amplifier (Spectrum VP)
  - Intensive cognitive intervention
    - Visual and auditory recall tasks
    - Orientation
    - Word retrieval
  - Modified diet
  - Swallowing compensatory strategies
  - Group and individual therapy twice weekly

Case Study #1: Total Care

- Current Status after 10 months of intervention:
  - No longer home bound
  - Use of Spectrum VP
  - Removal of feeding tube and implementation of soft diet with thin liquids
  - Improved cognition
  - Improved vital capacity
  - Integration back into the community.

Case Study # 2: Early Intervention

- Patient: MW
- Medical Status: 43 year old male, ambulatory, married, unable to work due to cognitive difficulties/word finding, treated by Dr. Williams.
- Reason for referral: concentration and memory
- Initial Dx of MS: 3 years
- SLE Results: short term memory deficits, word finding difficulties, orientation/organization, imprecise articulation, and disordered pharyngeal phase swallowing skills.

Case Study # 2: Early Intervention

- Treatment Approach:
  - Clinical swallowing evaluation
  - Modified Barium Swallow Study: swallowing compensatory strategies
  - Cognitive intervention
    - Word retrieval
    - Calendaring skills
    - Short-term and immediate memory
  - Oral motor intervention
  - Articulation drills
  - Individual therapy once weekly

Case Study # 2: Early Intervention

- After 6 months of intervention:
  - Utilization of cognitive compensatory strategies
  - Improved clarity of speech
  - Improve pharyngeal transit time
  - Improved semantic word retrieval
- Current Status after 14 months of intervention:
  - Generalization of cognitive strategies
  - Enrollment into college program and earning excellent grades
  - Discontinued articulation drills

Case #3: Long-Term Care

- Patient: KL
- Medical Status: 58 year old female, wheelchair bound, semi-home bound, home aide.
- Reason for referral: augmentative equipment
- Initial Dx of MS: 28+ years
- SLE Results: significantly reduced cognitive status, unable to respond to questions reliability, unable to express needs/wants, dysfluent, disorientated, word finding, sensory deficits, oral phase swallowing disorder.

Case #3: Long-Term Care

- Intervention:
  - LightWriter evaluation, determined to be inappropriate
  - Implementation of low tech AAC board (picture symbol communication)
  - Implementation of pacing board to reduce neurogenic dysfluencies
  - Functional phrases/communication
  - Activities of daily living

Case #3: Long-Term Care

- Current Status after 4 years:
  - Significantly reduced cognition (child-like)
  - Utilization of picture communication board
  - Chopped diet
- Bottom line:
  - Minimal medical/therapeutic intervention

Importance of Early Intervention & Baseline Testing

- In order to best serve patients diagnosed with Multiple Sclerosis, research indicates baseline testing and early intervention supports optimal treatment outcomes.
- Baseline testing:
  - Speech/Articulation
  - Voice/Respiratory
  - Swallowing
  - Cognition/Executive Function
- Early intervention and assessment allows for monitoring and maintenance of communication, cognition and swallowing functions.

QUESTIONS