Using Speech Science to Improve Clinical Decision Making in Motor Speech Disorders
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Outcomes
After attending this short course, participants will be able to:
  1. Explain and appreciate how knowledge of acoustic, physiologic, kinematic, and perceptual
     processes can directly influence clinical decision making, treatment preparation and delivery in
     patients with Motor Speech Disorders.
  2. Understand and describe the contribution of select instrumental measures to treatment
     planning.
  3. Describe how speech science can be integrated into their clinical practice and inform and guide
     therapeutic tasks and their delivery to clients.

• Specific motor speech disorder to be used as an example: speech production of patients with
  hypokinetic dysarthria
• Hypokinetic dysarthria impacts multiple speech production systems, including:
  o Respiratory system
  o Phonatory system
  o Resonatory system
  o Articulatory system
  o Prosody

1. Perceptual speech characteristics of hyperkinetic dysarthria:
   • Deviant speech dimensions (Duffy, 2013; Darley, Aronson & Brown, 1969):
     o Monopitch
     o Reduced stress
     o Monoloudness
     o Imprecise consonants
     o Inappropriate silences
     o Short rushes of speech
     o Harsh voice quality
     o Breathy voice
     o Low pitch
     o Variable rate
     o Other (increased rate in segments, increase of rate overall, repeated phonemes)
• Above deviant dimensions result in perceptual characteristics of (focus of this presentation):
  o Imprecise consonants
  o Rate rapid/accelerating or slow rate
  o Reduced loudness, short breath groups
• Relate to reduced range of movement

2. Relate perceptual characteristics to **acoustics and physiology of the articulatory, resonatory and phonatory systems:**
• Use intelligibility testing to understand acoustic characteristics (e.g., Kent et al. 1989). **Why is intelligibility decreased?**
  o What does “imprecise consonants” mean?
  o How do “short rushes of speech” and “variable rate” impact articulation?
• Types of acoustic and physiologic measurements: how to make, what they tell us. Consider:
  o Place
  o Manner
  o Voicing

**Example 1: Incomplete articulatory and/or velopharyngeal constriction for /p/ and /t/ production**
• Stop gap effects
• Burst release effects
• Voicing errors
• Examine:
  o Air pressure and air flow
  o Nasalance
  o Acoustic analysis
  o Perception and intelligibility

**Example 2: Incomplete articulatory and/or velopharyngeal constriction and reduced movement for /s/ production**
• Place or articulation effects
• Incomplete constriction effects
• Examine:
  o Air pressure and air flow
  o Nasalance
  o Acoustic analysis
  o Perception and intelligibility

**Example 3: Reduced movement for cardinal vowels**
• Place of articulation effects
• Nasalance
• Examine:
  o Formant frequencies
  o Formant transitions
3. Relate perceptual characteristics to **acoustics and physiology of the respiratory-phonatory system**:
   - Why is there reduced loudness and short breath groups?
   - How might deviations in speaking rate relate to respiratory-phonatory system function?
   - Types of acoustic and physiologic measurements: how to make, what they tell us. Consider:
     - Reduced aerodynamic function (e.g., vital capacity, intraoral pressure)
     - Reduced amplitude of chest wall movement, related to rigidity
     - Reduced loudness

   **Example 4: Reduced movement for respiratory function**
   - Duration effects
   - Loudness control
   - Loudness variability
   - Examine:
     - Vital capacity
     - Intraoral pressure
     - Airflow
     - Chest wall movement
     - Control of relaxation pressure

4. How do the above measurements **inform treatment**? What is the evidence?

5. Consider role of **possible cognitive deficits**.

References