ALLIED TEAM
TRAINING FOR
PARKINSON

SPEECH LANG PATH PART 2

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Disclosures for Celia Bassich, PhD., CCC-SLP

NONE
Disclosures for John M. Dean, MA CCC-SLP

John M. Dean MA CCC-SLP has worked with app developers, Belles Labs and Motion Nexus as an unpaid advisor. Neither of those entities nor any potential competitors are included within this presentation.

Objectives for this SLP breakout sessions:

- Identify appropriate technology to facilitate speech therapy assessment and intervention
- Detail potential limitations of certain technologies and be able to enumerate why some approaches may not have a readily available technological solution
- Demonstrate the ability to locate (and properly refer clients) to potential technological solutions for intervention and followup
Using technology for speech assessment and treatment in Parkinson’s disease

- Equipment
- Software
- Apps

Instrumental Measures for Outcomes

- Maximum Phonation Duration
  - Duration in secs.
  - Avg intensity level (Hz)
- Total Phonatory Range
  - Frequency range in Hz
- Reading & Conversational Speech
  - Avg intensity level (dB)
  - Avg Fo (Hz)
Equipment Options...

- The basics
  - Sound Level Meter
  - Digital Tuner
  - Stop watch
  - Digital recorder

- Software options (incl. Android and IOS apps)
  - LSVT ® Companion
  - Tuners, timers and recorders
  - ? More advanced analysis tools

Radio Shack Sound level Meter ($50)

- Place 30 cm (12” from pt mouth)
- Set WEIGHTING to C position
- Set RESPONSE to FAST position
- Set to 70 dB, change as needed

Tripod ($8) attaches to bottom
Alternatively, consider using a mic stand (preferably with a boom)*

*This setup requires a camera mount adapter

Decibel Scale is Logarithmic
Small changes = Large perceptual changes

- 10 dB is a doubling of loudness
  - Person is TWICE as loud with a 10 dB change

Guidelines provided by LSVT® LOUD
(Cynthia Fox, personal correspondence)

- Goals for LSVT are individual to each PT, using baseline data
- Realistic goals for increasing intensity
  - reading 5 – 10 dB from baseline value
  - conversation 4 – 8 dB from baseline value
IOS and android sound level meters

• Options ID’d as “acceptable” by Acoustical Society of America in a peer-reviewed article
  – Differences between -.52 and +2 dB from reference meter
  – iOS fared better than Android

• Android
  – SPL Meter by AudioControl, deciBel Pro by BSB Mobile Solutions, dB Sound Meter by Darren Gates, and Noise Meter by JINASYS

• iOS
  – Adv Decibel Meter 2.0 by Amanda Gates, Decibel Meter Pro 2.0.5 by Performance Audio, iSPL Pro 1.1.4 by Colours Lab, Noise Hunter 1.0.1 by Inter.net2day, NoiSee 1.0 by IMS Merilni Sistemi, Sound Level Meter 1.5 by Mint Muse, SoundMeter 3.3.1 by Faber Acoustical, (Real) SPL Meter 1.0 by BahnTech, SPL Pro 3.6 by Andrew Smith, SPLnFFT 4.0 by Fabien Lefebvre


How to perform a quick and dirty calibration

• True calibration can be nearly impossible
  – Requires a research quality environment and expensive equipment

• Set up your SLM a fixed distance from a sound generating device
  – Some tuners have this capability or you can generally find an app that has this feature

• Set up the mic for your computer or app-based SLM right next to the component SLM

• Play various pitches using the tuner and compare the results from both SLMs
  – Adjust the sensitivity of the program/app as needed
External Mics?

Probably not necessary (according to a statement from the developers)

- Dayton Audio iMM-6
  
  MicW and IMM6 Evaluation
  
  We have thoroughly tested MicW and IMM6, and our conclusion is that they do not improve on the performance of the built-in Apple device microphones, whether the iPhone mic or the supplied headset mic, either in appearance, and in the fact that it is a couple of inches away from the iPhone.
  
  Basically you are trading one small-diameter electret condenser capsule for another, with similar performance.

- MicW i436

Stopwatch

The old-fashioned kind... or use an app on your iPhone or android

Measure duration (in sec)
Frequency Analyzer (i.e. digital tuner) – Korg OT 120

- Amazon.com (~$69.99)
- May need to also buy a microphone
  - But not with the newer models

Measures fundamental frequency in musical notes*

*Need Chart to convert musical notes to Fo (Hz) – SEE TOOLBOX #6

Computer and app-based options also work quite well

- Do a search for “digital tuner” or “musical instrument tuner”
  - Be sure it is a chromatic tuner that includes all notes/frequencies, not just a guitar or bass or banjo “instrument” tuner

Android app called G Strings
iOS app called Tuna Pitch
Open source project for PC called LS Tune
**LSVT® Companion software**

- Automatically measures amplitude (in dB)
  - Sustained phonation
  - Glides
  - Connected speech

- **Benefits**
  - Improved data collection
  - More precise
  - Automated
    - Can focus clinical activities
    - Gather more data, more frequently
  - Telemedicine?
    - Home version

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**LSVT® Companion Software-Screenshots**

![Data Collection Menu](image)

![Trial Graph](image)
One-stop shopping **EXCEPT**

- Some measures are not included in the report
  - Incl pitch range
    - Have to manually identify these numbers during eval.
- **Microphone quality?**
  - Poor directional quality
    - Sensitive to ambient noise incl. vibration noise
  - Little data on frequency response
    - High-frequency sounds aren't well represented (/s/ and /f/, for example)
  - The newer model is somewhat better...

Sound recording

- Audacity (open source)
  - I also like to use this for visual feedback

- Wave Surfer and Praat (open source)
  - For more in-depth analysis
    - Not often needed for LSVT

- WebCam software (including iPad and other mobile versions*)
  - *It is important that you do not save any files in a cloud-based system unless it has been specifically secured for medical data and is HIPAA compliant
“Speak Up for Parkinson’s” app

- From the Northwest Parkinson’s Foundation
  - Records video + biofeedback via SLM
  - iOS only

Simple Phone/Tablet recording

- Either video or audio recording, preferably on the patient’s device
  - Record exercises for them to practice
  - Have them record samples
    - Practicing a specific exercise
    - Performing at different times of the day

- Could also be done with voice mail (pref. at a facility)
  - Google Voice?
    - I would be concerned about HIPAA compliance
Other technologies

- Background Monitoring Devices
- Biofeedback/Cuing
- Treatment tools
- AAC
- Volume Monitors

Monitoring?

- iEAR (iOS app)
  - Records snippets of sounds throughout the day
  - Allows for self evaluation of interactions and vocal performance

* Caveat-I get a lot of resistance to this app, to date, I have only demoed it in session
VocaLog Speech Monitor by Griffin Labs

- Provides biofeedback with cueing when voice is too quiet
- Monitors speech production for up to three weeks
  - Identify carryover
  - Correlate with medication timing?
    - Voice is not always affected by meds

Biofeedback- SpeechVive ®

- Uses an accelerometer to detect speech (via vocal fold movement)
- Plays “multispeaker babble” in earpiece to induce Lombard effect
• Based on research by Jessica Huber, PhD CCC SLP at Purdue University
• NIH funded research to support efficacy
  – Immediate improvement in volume and intelligibility
  – In some instances, carryover to improvement without the device
• Unlike devices that use white noise/pink noise masking, no indication of desensitization to “multispeaker babble” cue (for at least three years)

There are a number of app-based AAF/DAF options

AAF/DAF options

The Parkinson's app (uses multi-speaker babble)
Using Audacity for Biofeedback

open source - http://audacity.sourceforge.net/download/

Apps for Biofeedback

- **“Too Loud”**
  - Android

- **“Too Noisy”**
  - iOS
Personal amplification

• Although it’s preferable to improve vocal function, in some situations, amplification may be the most appropriate choice
  – Noisy public environments
  – Later stages of Parkinson’s disease
  – Persons with Parkinson’s plus diagnoses (particularly MSA)

Some amplification options

Voice Aerobics personal amplifier ($89) (www.VoiceAerobics.com)

BoomVox™ Wireless Amplifier ($349.00) (www.griffinlab.com)

* See Toolbox # 11 Choosing a Voice AMP & #12 Summary of Voice Amps

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Don’t let the price fool you...

- The RadioShack device doesn’t have proper shielding which leads to a lot of feedback...

- AmpliVox® Beltblaster Personal Waistband Amplifier Model: S206 Catalog #: 55025881 ($139)

Amplified Telephones: Crystal Tone Plus
http://www.marilynelectronics.com

- Most powerful amplification (up to 50dB) & speakerphone
- On/off outgoing & incoming amp. switch (also useful for people with hearing impairments)
- Price: $160
- Other telephone amplifiers: Communicative Medical Co. & Arizona Hearing OnlineCorp.
Simple Communication Board using Boardmaker®

Customize a series of laminated sheets
Over 3000 symbols
Multi-lingual!

Dedicated AAC devices...

Probably not that useful? Why?
AAC on the iPad

Same limitations as dedicated devices but may be a viable option for some (especially in private pay situations)

- Speak it!
- Communicaide
- Tap To Talk
- Speak up!
  http://www.parkinsonspeechhelp.com/home
- TouchChat
  http://www.silver-kite.com/touchChat
- Sono Flex
  http://www.tobisonoflex.com/
- LAMP Words For Life

Just for fun…

Parkinson’s Voice Initiative

- A research project started at MIT by Max Little
- This project collected data from 10,000 phone calls
- Subjects (PwPs and controls) performed sustained phonation (i.e. “loud aaah”) over the telephone to be analyzed for indications of Parkinson’s disease
- Here are excerpts from the summary…
  - "This project aims to collect 10,000 sustained phonations (‘aaah’ vocal sounds) through telephone-quality digital audio links, under realistic, non-lab conditions, to test the hypothesis that it is possible to detect Parkinson’s disease through these recordings. This follows up on several recent studies in which we have shown that this detection is possible with lab-quality digital audio recordings of sustained phonations [1,3-8], and that these results are not noticeably degraded when the audio is passed through simulated, low-bandwidth mobile telephone audio compression with channel distortion [2]. Furthermore, we are able to accurately predict the severity of Parkinson’s symptoms on a standard clinical scale (UPDRS) [3]."
  - "This could enable some radical breakthroughs, because voice-based tests are as accurate as clinical tests, but additionally, they can be administered remotely, and patients can do the tests themselves. Also, they are high speed (take less than 30 seconds), and are ultra low cost (they don’t involve expert staff time). So, they are massively scalable. "

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Version 2.0

- Partnering with My HealthPAL, Patients Like Me and Sage BioNetworks to track disease progression
  - PVI data in conjunction with Patients Like Me PDRS data
- Later version will provide de-identified data available for analysis

ALLIED TEAM TRAINING FOR PARKINSON

Telepractice
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JOHN M. DEAN, MA CCC-SLP
Disclosures for Celia Bassich, PhD., CCC-SLP

NONE

Disclosures for John M. Dean, MA CCC-SLP

John M. Dean MA CCC-SLP provides telepractice speech therapy services in California, Arizona and Colorado.

As part of his practice, he pays for use of some of the services mentioned in this presentation; he has no other business arrangements with any of these entities.
Telemedicine...

The American Speech Hearing Association (ASHA) defines telemedicine as “the provision of health services over a telecommunications network”

- In practice, telemedicine uses high-speed interactive video and remote computing applications to provide speech-language and hearing services to consumers

Efficacy

A number of articles highlighting the efficacy of telemedicine approaches to assessing and/or treating speech/language deficits and dysphagia associated with Parkinson disease.

- Speech Tx

- Swallowing Tx
  - Malandraki et al, 2011; Malandraki et al, 2013; Sharma et al., 2012; Sharma et al., 2013; Ward, et al., 2012
Mixed Approaches (Onsite + Online)

- Howell, Tripoliti and Pring implemented a mixed approach to LSVT LOUD (with a single "in person" session followed by three “telespeech” sessions each week).
  - Subjects demonstrated similar levels of improvement following each type of session
  - Overall improvements mirrored results of traditional LSVT treatment outcomes
  - Difficulty obtaining accurate sound pressure level readings in the telemedicine environment

Videophone-Delivered Voice TX

- Tindall and colleagues implemented a videophone technology as a standalone device
- Realized gains similar to those in traditional LSVT treatment in all areas
- **CAVEATS**
  - No improvement of volume during conversational speech.
  - Device had difficulty accurately recording not only sound pressure levels but also frequencies
Equipt refinements

- Other researchers incorporating customized equipment and applications to have identified improvements in performance following LSVT treatment consistent with face-to-face interventions
  

LSVT Companion®

- Ability to use the software for treatment (with the clinician in face-to-face session) as well as a self-study tool for practice in the home environment (Halpern et al., 2012).

- System is equipped with a calibrated microphone capable of providing accurate sound pressure levels,

- Could be implemented in an exclusively telemedicine approach to treatment
Telemedicine and Swallowing

- Researchers have demonstrated the efficacy of assessing various types of swallowing dysfunction using a telemedicine approach
- At the time of this writing, there is a dearth of research regarding outcomes of treatment interventions for dysphagia via telemedicine
  - Ward and Burns, 2014

Caregiver Burden and Cost Savings

- Tindall et al (2008), identified a savings of 35 hours of time and $1220 per care partner over the course of 16 sessions of therapy provided via telepractice.
  - Also identified a high level of patient and care partner satisfaction with telemedicine treatment
Health Information Security

- Most free providers of VoIP (Voice over IP) such as Skype® and FaceTime® are not considered compliant with health information privacy laws in the United States.
- Although they offer encryption of their streaming content and other security measures, they are still not considered appropriate for telemedicine
  - They provide few tools for auditing and tracking potential security problems.
  - Services also lack a Business Associate Agreement (BAA) between the service provider and the technology company.

Security (Cont.)

- Most free providers of VoIP (i.e. streaming video) are not considered HIPAA compliant.
- Although most VoIP signals are encrypted
  - Free providers don’t provide a mechanism for auditing in case of a security breach
  - Free providers don’t implement a business associate agreement (BAA)
- Most online storage options are not considered HIPAA compliant for many of the same reasons.
## Comparison of Options

<table>
<thead>
<tr>
<th>HIPAA Compliant</th>
<th>Not HIPAA Compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisco WebEx</td>
<td>Skype</td>
</tr>
<tr>
<td>Adobe Connect</td>
<td>FaceTime</td>
</tr>
<tr>
<td>Virtual CareWorks</td>
<td>Google Hangouts</td>
</tr>
<tr>
<td>FaceTalk (NOT FaceTime)</td>
<td>Storage</td>
</tr>
<tr>
<td>Other proprietary solutions ($)</td>
<td>Dropbox</td>
</tr>
<tr>
<td>Online Storage – BOX.com</td>
<td>Google Drive</td>
</tr>
<tr>
<td></td>
<td>Other</td>
</tr>
</tbody>
</table>

## Licensure Issues - US

- In the US, each state requires clinicians to have licensure in the state where the individual receiving services resides (in the addition to licensure requirements of the home state of the clinician).
- Results in the need to obtain licensure in multiple states in order to practice
  - A few states (including Delaware, Ohio, Oklahoma and Texas) specifically prohibit provision of services "solely by correspondence" (i.e. e-mail, fax, telephone, video conferencing etc.).
  - Telepractice services are constrained in these areas, regardless of licensure
International Licensure

- Mutual recognition agreements in Canada, the UK and Australia
  - still requires licensure in that country
- Elsewhere around the world, the process is cumbersome
  - Likely to necessitate having to undertake a credentialing exam.
  - Significant language and cultural barriers that may also hinder practice.
  - Providing intervention internationally also introduces the potential for fluctuating service quality and potential security risks due to variability in the technology infrastructure among countries.

Reimbursement

Continues to be significant fluctuations in reimbursement options from state to state in the US.

- Medicare does not provide reimbursement for speech language pathology telemedicine services
- Medicaid reimbursement for such services varies from state to state.
- Private insurance companies are beginning to pay for treatment services via telemedicine
- Some states have even mandated that telemedicine services must be reimbursed.

There is no current mechanism for reimbursement of services provided internationally.
References

Asha.org/academic/questions/Telehealth-and-Telepractice, accessed on 9/29/2014


ALLIED TEAM TRAINING FOR PARKINSON

DBS
Intro to Cognition

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Disclosures for Celia Bassich, PhD., CCC-SLP

NONE

Disclosures for John M. Dean, MA CCC-SLP

NONE
Surgeries for PD - OVERVIEW

Thalamotomy versus Pallidotomy

- Ablative surgeries are not common but if they do, they are generally performed unilaterally
  - Bilateral surgeries significantly increase the risk of complications including speech problems, vision issues and even cognitive deficits
- Both are PERMANENT and IRREVERSIBLE
  - In 20% of cases, tremor reoccurs
- Like DBS, surgery is not a cure

Primary targets of DBS

- Thalamus (ventral intermediate nucleus) or VIM
  - Primarily for essential tremor
- Subthalamic nucleus or STN
- Globus pallidus (pars interna) or GPI
- Pedunculo pontine nucleus or PPN?
  - Newer target, currently at the research stage
Summary Comparison

**STN (Most Common~98%)**

- Higher levels of speech difficulties as well (voicing deficits, slurring etc.)
- Increased mood disorders
  - Increased impulsivity
  - Other psychiatric symptoms?
- Greater risk of post sx (mild) cognitive decline
  - Particularly verbal fluency
  - Higher risk of developing dementia?
- However, STN results in significant improvements in motor function and appears to allow for greater reduction of medications

**GPI**

- Less risk of cognitive decline*
  - VF deficits in a handful of studies
  - However, Follett et al. 2010 found similar levels of cognitive performance decline in both STN and GPI (except for processing speed index)
  - *Mild deficits in either case...
- Reduced psychiatric symptoms
- Little or no reduction in medications following surgery

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Communication Deficits and DBS

“The impact of STN deep brain stimulation on speech in individuals with Parkinson’s disease: The patient’s perspective”

Wertheimer et al, 2014
Parkinsonism Relat Disord. 2014 Oct;20(10):1065-70

- N of 758 (287 with STN DBS) using VHI and a short interview
  - DBS cohort reported significantly more speech symptoms, esp slurred speech
    + Concomitant social and communication problems...

- CONCLUSION: DBS therapy's contribution to speech disturbance is gaining more attention, and the speech symptoms ensuing from and/or being exacerbated by DBS are in the incipient stages of being investigated.
What is meant by “cognitive decline”?

• Common areas of deficit for people with PD (as identified by testing in research studies)
  – Verbal fluency (letter and semantic)
  – Word finding
  – Set shifting and attention
  – Psychological effects on memory
  – Executive functioning

Typical presentation of cognitive difficulties for persons with PD

• Decreased concentration and attention
  – Particularly when distractions are present
• Difficulties with set shifting and changing tasks
  – Alternating attention
  – Difficulty with on-the-fly corrections when walking (to avoid obstacles)
• Generative naming/verbal fluency deficits
• Also difficulty with word finding (“tip of the tongue”)

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Particular Trouble with Dual Tasking...

Unfortunately, Life Is a Dual Tasking Activity

- Walking while avoiding obstacles
- Interpersonal interactions are dual task activities
  - E.g. Walking while having a conversation
  - E.g. Talking on the phone while putting groceries away, folding laundry etc.
- Driving itself is a dual tasking activity, even without all the new distractions we have today

What causes this difficulty with dual tasking?

- The basal ganglia is responsible for fine-tuning and automating movement
  - When it becomes damaged, many routine activities require additional attention in order to be performed properly.

- As a result, it becomes increasingly difficult to perform additional tasks at the same time
  - In later stages of the disease, some complex activities simply require too much additional “processing power” even when performed alone
Cognition and Parkinson’s disease
Bradyphrenia- “Slow Brain”

- Comparison between bradykinesia and bradyphrenia
- Very different than traditional mild cognitive impairment (MCI)
  - Mild Cognitive Impairment is a term to describe memory and problem solving difficulties that appear to be more advanced than general “age-related memory loss”
  - MCI may progress into a more serious level of deficit (and would be considered dementia)

Cognition Evaluation...

- Montréal Cognitive Assessment (MoCA) [http://www.mocatest.org/]
  - The preferred brief cognitive assessment for use in clinical trials where assessing cognition is not the primary focus
  - Parkinson Study Group (PSG) Cognitive/Psychiatric Working Group Task force
    - Authors noted the speed of administration and sensitivity to milder cognitive impairment as key benefits of this instrument (Chow, Amick and Brandt et al., 2010).
  - It does not have a significant ceiling effect that the Mini Mental Status Exam appears to present with when evaluating individuals with subtle cognitive deficits.
    - In one study comparing the two instruments, more than half of subjects with normal MMSE scores were identified as having a cognitive impairment when assessed with the MoCA (Nazem, Siderowf, Duda et al., 2009)
<table>
<thead>
<tr>
<th>Test Name</th>
<th>Montreal Cognitive Assessment (MoCA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The Montreal Cognitive Assessment (MoCA) is a brief cognitive assessment developed in 1996 in Montréal, Québec. It is freely available to clinicians and available in 35 different languages, including three versions in English (to facilitate subsequent retesting). It assesses numerous cognitive domains, including several that are of interest when assessing cognition in individuals with Parkinson's disease including visual spatial abilities, trail making and short-term memory assessment. Approximate time for administration (10 minutes to administer)</td>
</tr>
<tr>
<td>Sensitivity and Specificity</td>
<td>.82 and .75, respectively (Hoops, Nazem, Siderowf, et al., 2009)</td>
</tr>
<tr>
<td>Test/Retest Reliability</td>
<td>.79 (Gill, Freshman, Blender and Ravina, 2008)</td>
</tr>
<tr>
<td>Interrater Reliability</td>
<td>ICC = .81 (Gill, Freshman, Blender and Ravina, 2008)</td>
</tr>
<tr>
<td>Cutoff Scores</td>
<td>24/25 * (Hoops, Nazem, Siderowf, et al., 2009)</td>
</tr>
</tbody>
</table>

*Use of a slightly higher cutoff score of 26/27 resulted in a sensitivity of .83 but poor specificity (.53) (Hoops, Nazem, Siderowf, et al., 2009)
Disclosures for Celia Bassich, PhD., CCC-SLP

NONE

Disclosures for John M. Dean, MA CCC-SLP

NONE
Swallowing Dysfunction
Assessment and Treatment

- **3 potential areas of concern**
  - **Oral (in the mouth)**
    - Extended mastication (pumping)
    - Poor A-P transit
  - **Pharyngeal**
    - Slow transit
  - **Esophageal**
    - Significant reflux concerns
      - Incl. LPR

How does PD cause swallowing dysfunction?

Swallowing problems are generally considered to be a **non-motor deficit** (i.e. a non-movement deficit).

Some nonmotor elements of swallowing dysfunction can include:
- Sensory deficits
- Poor calibration
- Reflux and poor absorption/digestion

**However there are elements of swallowing deficits that could be considered to be motor deficits as well...**
- Slow movement or lack of movement
  - Tongue, lips and other parts of the mouth
  - Muscles of the esophagus that move food and liquid into the stomach
- Difficulty with coordination and timing of the swallow
- Lingual and Palatal Tremors?
Treatment approaches

- Direct interventions
  - Strengthening Exercises - oral and laryngeal musculature
  - Neuromuscular Electrical Stimulation (NMES) aka VitalStim®
    - Minimal evidence
    - Not appropriate for individuals with DBS!!!
- Behavioral improvements
  - Seated positioning
    - Including strengthening of the core musculature
  - Optimizing setup
    - Table set up and utensils
    - Addressing challenging or distracting environments

Compensatory approaches

- Changes in head and neck positioning
  - Chin tuck
  - Head turn?
- Changes in approach to eating
  - Changing rate of consumption including bite/swallow sizes
  - Alternating consistencies (i.e. between solid and liquids, also known as a liquid wash)
Parkinson’s Dysphagia Diet Characteristics

- Increase viscosity (thickness) of liquids?
- Moistened foods
- Slippery foods
  - Slick Diet-Swallow 1 tsp oil (olive) before eating
- Easier bolus formation
  - Foods with less crumbling
  - Foods requiring less chewing
- Warm liquids
- Avoid spicy & ice if symptoms of GERD/issues of esophageal mobility
- More frequent, smaller meals during the day
- Ensure or similar product to increase calories
- Crushed/liquid medication

Other compensatory techniques

- Improving environment
  - Reducing noise/modifying a distracting environment
- Adaptive equipment
  - Weighted utensils, Nosey cup, “Tubigrips” etc.
  - Raise the height of the plate for individuals with PSP to compensate for visual deficits
- Consider orally dissolving meds
  - Parcopa instead of Sinemet
  - Zelapar® instead of Selegiline
- Patch formulations
  - Neupro® (Rotigotine)
Does Respiratory Muscle Strength Training (RMST) help?

- Benefits not only breathing but also swallowing
  - Airway protection via coughing
  - Enhanced positioning due to core stability
  - Strengthening of submental swallowing muscles

- Expiratory Muscle Strength Training (EMST)
  - Using the SpeechVive® (Christine Sapienza @ U of FL)
    - Recent research documenting improvement for swallowing (but not voice) in IPD

Tutorial on maximum inspiratory and expiratory pressures in individuals with idiopathic Parkinson disease (IPD) and the preliminary results of an expiratory muscle strength training program.

Silverman et al, 2006
NeuroRehabilitation 21:71–79, 2006

- EMST has rehabilitative effect on swallow mechanism as it increases activity of submental muscles in neck, makes hyoid bone elevate
- Pt report that training is easy to complete, not very time consuming
- No significant effects on improving speech
Trainer Types

- **Resistance**
  - Level of effort is hard to calibrate so if patient uses less effort, they will have less resistance
    - PowerBreathe®
    - The Breather®
    - Expand-a-lung® - (inspiratory and expiratory)
    - Cocktail straws?

- **Pressure threshold**
  - Valve doesn’t open until pressure threshold is met
    - PowerLung®
    - Emst 150®
      - Device designed by Dr. Christine Sapienza @ U of FL

Esophageal Stage in PD – new frontier/challenge for SLPs

- **Reduced esophageal motility**

- **Feeling “full” too soon**

- **Heartburn/reflux**

What have we been trained to know about esophageal issues in dysphagia?
Digestive/esophageal issues in PD

- Entire GI tract is affected in PD
- GI issues (constipation, early satiety) often precede motor symptoms in PD
- Constipation often viewed as adverse effect of meds
  - However constipation usually precedes long before admin of antiparkinson meds

SLP needs to be aware of these GI issues when assessing for oropharyngeal dysfunction

- Symptoms of coughing, food getting stuck, aspiration may be result of issues below the oropharynx
- Need to give Reflux Severity Index
  - Toolbox #1 (QOL Pt Surveys)
- Ask about slow eating, early satiety, constipation to *obtain complete picture*
Take-home message about esophageal issues in PD

- Our exercises that target oral or pharyngeal will not be of benefit if major problem is esophageal
- We need to be able to recognize the GI problems and refer for medical management (meds: laxatives or promotility agents)
- Conundrum
  - Decreased esophageal motility benefits from warm thin liquids
  - What if pt aspirates thin liquids?

Thoughts

- Use of warm or room temperature thin liquids (not icy or cold)
- Counsel on reflux management
  - Dietary and behavioral recommendations include warm fluids with meals, smaller more frequent meals, avoid fibrous solids, tight fitting clothing around waist, avoid spicy foods, stay upright at least 1-2 hours after eating
Not one size fits all

• Biggest error is for us to dx dysphagia as primarily oropharyngeal when there is a great deal of GI dysmotility and we make poor recommendations
  – Vital stim
  – Thickened liquids
  – Icy cold

Really missing the boat

Dealing with Drooling (aka Sialorrhea)

• Causes
  – Primarily behavioral
    • Swallowing less frequently leads to an accumulation of secretions

• Signs and symptoms
  – Initially starts very mildly (e.g. wetness on the pillow in the morning)
  – Can progress into more debilitating manifestations
    • Including increased risk of swallowing problems
Treatment Options for Sialorrhea

- **Behavioral approaches**
  - Improve self-monitoring
  - Postural improvements
  - Increase frequency of swallowing
    - Ice chips
    - Hard candies (avoid mints except for cinnamon)
    - Chewing gum
- **Medications**
  - Anticholinergic medications
    - Most of these have significant side effects including negative impact on cognition, especially in older populations
      - Glycopyrrolate (glycopyrronium bromide) may be an alternative?
        - B/C it doesn’t cross blood brain barrier...
    - Atropine drops
      - Administered under the tongue

More aggressive approaches to treating sialorrhea

(In order of my preferences/biases...)

1. Botox injections of the parotids (or submandibular glands)
2. Surgical transposition of salivary gland ducts
   - Tendency for recruitment of other glands that may cause the problem to reoccur
3. Irradiation of the salivary glands
Family Resources

- **Hard Choices for Loving People**
  - Hank Dunn, 2001
  - Available from A & A Publishers, Inc
    - Phone: 703 707-0169
    - www.hardchoices.com

- **The Comfort of Home – guide for PD caregivers**
  - Meyer, Derr, Imke
  - www.comfortforhome.com

More resources from NPF

- If you need assistance regarding Parkinson's disease information or resources, please contact the NPF Helpline at 1-800-4PD-INFO (473-4636) during business hours.
- NPF website forums: Ask the Speech Clinician Forum and others
LSVT Global has an ONLINE educational course: Parkinson Disease and Swallowing.

The course is approximately 1 hour in duration and costs $30.00.
For more information (including CEU offerings) and to register for the course, go to:


ALLIED TEAM
TRAINING FOR
PARKINSON

Parkinson Plus Syndromes

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NONE
Atypical Parkinson’s or Parkinson Plus Syndromes

- PSP - Progressive Supranuclear Palsy
- MSA - Multiple System Atrophy
- CBD - Cortical Basal Generation (AKA Cortical Basal Ganglionic Degeneration)

Prognosis for all of these diseases is poor...

- Minimal or no benefit from medication
  - Sometimes some improvement with Sinemet initially but generally tapers off quickly
- Much faster disease progression
  - ~4-10 years
- Significant swallowing dysfunction
  - Often early appearing (which can be a clinical sign esp. in the presence of bilateral motor symptoms)
- Treatment goals are typically to minimize risk of aspiration and maintain func. communication as much as possible.
**Diagnosis**

- No definitive test or biomarker
- Depends highly on clinical judgment
  - Need detailed history of signs and symptoms to rule out other possible causes
- If suspected, REFER to a movement disorder specialist
- Gold Standard is:
  - *postmortem autopsy as a means for neuropathological diagnosis*

(Kent, 2013; Respondek et al., 2013; Williams & Lees, 2009)

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**Progressive Supranuclear Palsy**

- A rare neurodegenerative condition
- Average age of onset is **65 years old**
  - Can occur as young as 40 years old
- Affects areas of the brain stem and basal ganglia of the brain (located above the nuclei)

(Kent, 2013; Sjostrom, Holmberg, & Strang, 2002; Williams & Lees, 2009)
Etiology

- **CAUSE IS UNKNOWN!**
- Overproduction and accumulation of tau protein, causing neurofibrillary tangles and premature neuron death
- Damage from tangles blocks nerve impulses and affects the information being carried within the cell
- Tangles lead to atrophy in the affected areas of the brain
  - Results in: balance, mobility, communication, visual, and cognitive deficits

Statistics

- Occurs in **6.4 per 100,000** of the population
- Affects **men slightly more** than women
- Average time between symptom onset and diagnosis is **3 years**
- Incidence is estimated to be about **4%** of PD cases
- Disease duration is roughly **5-8 years**
- Most common cause of death is **aspiration pneumonia**, respiratory failure, or pulmonary embolus

(Kent, 2013; Sjostrom, Holmberg, & Strang, 2002; Williams & Lees, 2009)
Most Common Symptoms

- Reduced eye movement (gaze palsy)
- Recurrent falls (frequently backwards due to retroflex posture)- high risk of injury
- Reduced balance and mobility
- Speech and swallowing difficulties
- Cognitive decline
  - Memory tends to remain intact

Other Impairments

- **Other Gait/Balance Problems**
  - Bradykinesia
  - Stiffness
- **Eye Involvement**
  - Photophobia
  - Slowing of vertical eye movement
  - Vertical supranuclear gaze palsy: the patient can only look straight ahead; “blurred vision”
    - #1 distinguishing feature, but develops many years into the disease progression
- **Staring Gaze/Eyelid Retraction**
  - Surprised/worried facial appearance
  - Reduced blink rate

- **Behavioral and Cognitive Changes**
  - 50% show changes within the first 2 years
  - Slowness in response time, irritability, personality changes, apathy, and depression; memory remains

- **Frontal lobe** deficits associated with deficits in reasoning, problem solving, executive function, and mental flexibility

- **Bulbar Palsy**
  - Dysarthria
  - Dysphagia

Kent, 2013; Sjostrom, Holmberg, & Strang, 2002; Williams & Lees, 2009
PSP and Dysarthria

- Presents as a **mixed** dysarthria
  - *Spastic, hypokinetic, and ataxic*
  - 40% experience 2 of the 3 components, while the remainder exhibit all 3 components
- Usually occurs **early** in the disease due to brainstem and midbrain involvement
  - Second most common clinical manifestation
- **Severe** dysarthria can be noted in the early stages and can progress to **anarthria** in the later stages.
- No efficacious approach to speech therapy has been documented for this patient population

Kluin et al., 2001; Yorkston et al., 2010; Skodda, Gronheit, & Schlegel, 2012

Management

- No approved drugs- PSP does **not** respond to levodopa
- Focus on symptom management for balance, mobility, speech, swallowing, and eye movement
- Ultimately, speech therapy treatment will geared towards compensating for deficits and maintaining function
MSA

• 3-4 cases per 100,000
• Avg. age onset = after 50 years
• More common in men
• Life expectancy 7-10 yrs following symptom onset
• No cure or symptoms to slow disease progression
  – Not responsive to PD meds

Multiple Systems Atrophy: 1st described in 1960’s as Shy-Drager Syndrome

• MSA-P
  – Initial symptoms present as Parkinson’s followed by cerebellar dysfunction
• MSA- A
  – Initial symptoms present as autonomic dysfunction
    • Orthostatic hypotension
• MSA-C
  – Cerebellar atrophy with later signs of PD
Common Issues in MSA

- Mixed dysarthria
  - Hypokinetic + Spastic or ataxic
- Inhalation stridor is common (~33%)
- Swallowing issues are also common
- Communication can deteriorate quickly
- Cognition can be mildly affected

CBD

- <1 case per 100,000
  - Least common of the 3
  - Can co-occur with PD, PSP and other neurological diseases
- Slightly more common in women
- Life expectancy 7-10 yrs following symptom onset
- No cure or symptoms to slow disease progression
  - Not responsive to PD meds
Differential Dx via Dysarthria?

- **PSP**: spastic, hypokinetic
- **CBD**: spastic, hypokinetic, progressive apraxia of speech,
  - progressive non-fluent aphasia is common
  - Fronto temporal lobar dementia can occur
- **MSA**: spastic, hypokinetic, ataxic

References