Disclosures & Gratitude

Owner of a tempo Voice Center, LLC & Voice Diagnostix, LLC

I am being compensated to speak for you all today

Thank you so much OSLHA for allowing me to speak to you all today about my passion.

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Anatomy Refresher

- The **larynx** or (voice box) houses the vocal folds
- The **hyoid bone** is the only bone in this system
- Cricothyroid muscles tilt thyroid cartilage down and forward to increase pitch
- Posterior cricoarytenoid muscles only abductors
- Vocal folds/cords include **muscles**
- They are brought together by muscles which tilt the arytenoid cartilages inward

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In Depth Anatomy

- Vocal ligaments run anterior to posterior
- Vestibular folds, or false vocal folds, close during
  - Coughs
  - Throat clears
  - Ventricular phonation
  - Growling
  - Swallowing
There are 5 layers of the vocal fold tissue:
- Epithelium
- Superficial layer
- Intermediate layer
- Deep layer
- Thyroarytenoid muscle
Bernoulli Effect: Positive air pressure from lungs forces vocal folds apart, lowered pressure created brings them together.

Myoelastic-Aerodynamic Theory: Vocal folds are stretchy and want to assume their original position when blown apart by air.
Myoelastic-Aerodynamic Bernoulli Effect

- Negative pressure causes vocal folds to be sucked together
- Closed airspace below folds
- Air pressure builds underneath, then via “single puffs of air,” pressure is released
- Vocal folds are naturally elastic and they want to assume their original position

- This cycle causes tens or hundreds of these puffs being released every second a person is vocalizing
- Vocal Cords = Vocal Folds
- They are tiny muscles with no pain receptors
- Normally they are white and shiny
- Men have longer and thicker vocal folds (Low)
  - The part that vibrates is 60% longer (Titze, 2010)
- Women have smaller and thinner vocal folds (higher pitch)

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Evaluation Overview

OTOLARYNGOLOGY EXAM MUST PRECEDE YOUR TREATMENT

- **Videostroboscopy**
  - 31579

- **Behavioral Analysis**
  - 92524

- **Acoustic & Aerodynamic Analysis**
  - 92520

- ASHA has finally released its Recommended Protocols for Instrumental Assessment of Voice:
Pre-Evaluation

- Voice Handicap Index or VHI-10
  - Can choose VRQ-L if you prefer it
- Reflux Symptom Index
- Obtain a good history
  - Onset, hypothesized cause, etiological factors, motivation of patient
  - Has it gotten worse? Does it ever get better?
  - Patient’s environment, occupation, voice use, stressors
- Laryngeal-Peripheral Exam
  - Palpate larynx for pain, tightness, thyro-htoid space
  - Observe any swallowing issues or laryngeal sensations
  - Determine respiratory pattern
    - Clavicular, thoracic, diaphragmatic, posture,
Behavioral Voice Evaluation

- Laryngeal-Peripheral Exam
  - Forced palpation (Aronson) using thumb and index finger to feel
    - Greater horns of hyoid, superior cornu of thyroid and in thyrohyoid space
      - (Narrow or absent space can suggest hyperfunction)
    - Lateral margins of thyroid lamina (between larynx and sternocleidomastoid)
      - Should not feel tight and larynx should move easily from side to side
    - Base of tongue region (submental)
      - Engagement of musculature or tightness suggests hyperfunction

- Physiological Voice Tasks
  - Maximum vowel prolongation
    - 15 second minimum adults ages 18-65
    - 10 second minimum adults 65+
  - S/Z ratio (1.4 suggests reduced glottal efficiency)

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Behavioral Voice Evaluation

- **Perceptual Listening**
  - Can use Consensus Auditory Perceptual Evaluation (CAPE-V)
    - Rating on 100 for Overall Severity
    - Roughness
    - Breathiness
    - Strain
    - Pitch
    - Loudness

- Can use the GRBAS rating scale (Grades of 0-3 with 0=normal, 1=slight, 2=medium, 3=high degree)
  - Grade
  - Roughness
  - Breathiness
  - Asthenia
  - Strain
Videostroboscopy

**WHAT IS IT?**

- Takes still shots at different points of vibratory cycle
- Simulates slow motion during sound production
- Most widely available, cost effective
- Two Options:
  - Rigid through mouth
  - Flexible through nose (distal chip option)
- Microphone on neck for pitch
- Considered instrumental exam
Videostroboscopy

**What does your patient do?**
- Three complete breath cycles
- Diadochokinetic task for larynx /ʔiʔiʔiʔiʔiʔiʔiʔiʔiʔiʔi/
- Sustained /i/ at typical intensity and pitch
- Sustained /i/ at varied pitches
- Sustained /i/ at varied loudness levels

**How to train?**
- Observe many exams
- Take a hands-on course
- Find a mentor for passes
- Find a mentor for analysis
- Practice, Practice, Practice!

*SIG 3 has a great list of courses to train for this, popular ones include:*

Vanderbilt
Emory
USC

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Acoustic Evaluations

**What is it?**

- Sound Pressure level (vocal loudness)
- Pitch ($f_o$)
- Still using Shimmer and Jitter?
- Cepstral Peak Prominence (CPP)
  - Measures overall noise level in vocal signal
- Can Use AVQI (Acoustic Voice Quality Index, Youri Maryn & colleagues)
- AVQI is a multidimensional measure over many parameters to determine dysphonia severity
- Combines connected speech and sustained vowels

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Acoustic Evaluations

What Does Your Patient Do?

- Sustained /a/ for 3-5 seconds
  - (use for CPP, AVQI)
- Standard Reading Passage (Rainbow or Trip to Zoo) and/or Standard Sentences
  - (use for vocal frequency mean, habitual dB, vocal frequency standard deviation, and CPP)
  - I use “We were away a year ago” for CPP & AVQI
- Loudness range
  - Glide on /a/ from loudest to quietest
  - (use for maximum and minimum vocal dB)
- Pitch range
  - (use for maximum and minimum pitch Hz)

Sentences:
1. The blue spot is on the key again
2. How hard did we hit him?
3. We were away a year ago.
4. We eat eggs every Easter
5. My mama makes lemon muffins
6. Peter will keep at the peak
Acoustic Evaluations

**Types of Software**

- Kay Pentax
- Computerized Speech Lab (CSL) Software
- Finding CSID (Awan)
  - Cepstral Spectral Index of Dysphonia
- Praat with Phonanium Plugins
- Sonetta by Mint Leaf Software
- Ling WAVES by Wevosys
- Speech Tool by James Hillenbrand

I’ve blogged on what I use:

Bit.ly/LowBudgetAcoustics

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Aerodynamic Evaluations

**What is it?**
- Measurements of airflow and air pressure
  - Determines if vocal folds are using air to vibrate efficiently

**How to obtain these measures?**
- Kay Pentax Phonatory Aerodynamic System (PAS)
- Digital Spirometer
  - Can use Contec SP10
- Timer or Stopwatch

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Aerodynamic Evaluations

**What Does Your Patient Do? Using PAS**

- Make sure your pneumotachograph is calibrated
- Catheter through mask hole for intraoral pressure
  - Attached to transducer
- Microphone attached to far end of pneumotachograph tube
- Short /piː piː piː piːː/ habitual pitch and intensity **AND** at raised loudness levels
  - Finds average glottal airflow rate, average interpolated air pressure and mean vocal SPL dB and Hz

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Aerodynamic Evaluations

WHAT DOES YOUR PATIENT DO? USING SPIROMETER AND TIMER

- Take Vital Capacity:
  - Take 2 easy breaths then on the third breath take in as much air as you can, then blow as much air as possible into the tube until there's no air left in your lungs.
  - Use Spirometer and nose clip (or have patient hold nose)
  - American thoracic society predicted values for norms.

- Take Maximum Phonation Time
  - Prolong /a/ as long as possible
    - Predicted MPT values (Yanagihra & von Leden, 1967) for norms
    - Use stopwatch to time
Aerodynamic Evaluations

**How do you calculate measures without PAs?**

- **Find Phonation Quotient**
  - PQ (mL/sec) = VC/MPT
  - Means from Rau & Beckett 1984 can be your comparison

- **Find Estimated Mean Flow Rate**
  - EMFR (cc/sec) = 77 + (0.236 * PQ)
  - Means from Rau & Beckett 1984 can be your comparison

- This is a measure of glottis efficiency and indicates balance or imbalance between phonation and respiration.

- This is a measure of airflow through glottis during phonation.

*Higher rates: Glottic Insufficiency  
Lower rates: Glottic hyperfunction*
Therapy Overview

Voice Rehabilitation Sessions
92507
What Is Voice Therapy?

- Education
- Vocal Hygiene
- Facilitate Physiological Balance
- Generalization
Efficient and effective voice production requires coordination of 3 physiological subsystems of voice. For voice production to remain efficient, effective, and healthy there must be an appropriate balance among these subsystems.

- Respiration
- Phonation
- Resonance

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Stimulability

- You want to find out the best voicing possible for your patient
- This impacts if you have a guarded or good prediction of improvement
- Manipulate the larynx (Nelson Roy), Hz high or low, inward phonation, Resonance, flow phonation, SOVTE’s

What Technique is best?
Here’s a handy flow chart

1. Does your patient have a breathy voice?
   - Yes
   - No

2. Does your patient have a rough, gravelly voice?
   - Yes
   - No

3. Does your patient have a strained, strangled voice?
   - Yes
   - No

4. Can your patient achieve a somewhat stronger voice with a forward focused hum?
   - Yes
   - No

5. Can your patient achieve a smoother voice with tongue trills, lip trills, or phonating through a straw?
   - Yes
   - No

6. Does a yawn/sigh improve your patient’s voice?
   - Yes
   - No

Flow chart outcomes:
- Try Vocal Resonance
- Try Semi-Occluded Vocal Tract Exercises
- Try Flow Phonation

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Types of Voice Therapy

SOVTE’s
Straw phonation
Cup phonation
Kazoo
Lip/tongue trills
Wave in a Cave
Humming

Flow Voice
Stretch and Flow
Confidential Flow

Resonant Voice
Stemple
Verdolino
Abbott

Reposturing & Circumlaryngeal Massage
Nelson Roy

LSVT
Speak Out
Lorraine Ramig
Samantha Elandry

Vocal Function Exercises
Joseph Stemple
Hierarchy of SOVTE’s from Titze 2006

Higher Resistance
- Smaller diameter straw
- Larger Diameter Straw
- Tubes
- Cups
- Standing Wave
- Bilabial/Labiodental fricatives
- Lip & tongue trills
- Nasal Consonants (RVT)
- Closed vowels (/u/ & /i/)
- Open vowels
- Speech

Lower Resistance

Greatest occlusive effect - most artificial

Smallest occlusive effect - most like speech

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Straw Phonation

It’s physics! Nothing is easier!

Can be done with or without water (bubbles in a cup)
Creates **inertive reactance** (back pressure) and allows you to phonate without excess glottic tension

https://www.youtube.com/watch?v=asDg7T-WT-0&t=24s

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Carryover in hierarchy from single sound, to word, phrase, sentence, conversation

For straw phonation, straw sound then straw out and say target
Flow Voice

- **Stretch and Flow**
  - Ed Stone & Robert Casteel
  - Uses unvoiced airflow to slowly merge with voiced airflow while keeping vocal muscles relaxed and keeping balance among vocal subsystems
  - Slightly different because it describes ways to shape voiceless speech into voiced speech
  - Creates new muscle memories for phonation and airflow
  - Shapes sound to optimize voice production
  - Utilizes tissue as biofeedback

**TIPS:**
- Tear tissue along the folded edge
- Keep patient at level providing more success vs failures
- Level practice varies from patient to patient, depending on skill
- When in doubt, probe!

Confidential Flow from Kittie Verdolini Abbott & Jackie Gartner Schmidt is very similar to this approach

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Flow Voice
Stretch and Flow

**Stretch & Flow Tissue Activity Phase I**
Begin with having your client tear a tissue an inch in width the same direction as the fold on a tissue. Place the tissue in front of the nose.

- Air only - open throat
  - Blow the tissue 5-7 times
  - Go slowly between breaths to avoid lightheadedness
  - Should sound like wind in the trees or Blowing over the top of a glass bottle

- 20% Sound / 80% Air
  - Open throat /u/
  - Blow the tissue 5-7 times

- Air only - open throat
  - One breath per word
  - Count 2-10 slowly

- Avoid pressed whisper
  - Vowels elongated
  - Lips can be rounded

**Stretch & Flow Tissue Activity Phase II**
Begin with having your client tear a tissue an inch in width the same direction as the fold on a tissue. Place the tissue in front of the nose.

- Air only - open throat
  - Two numbers per breath
  - Elongate vowels
  - Count 1-10 slowly

  - Go SLOWLY!
  - Take time between productions to catch breath

- Air only - open throat
  - Three numbers per breath
  - Elongate vowels
  - Count 1-9 slowly

  - Avoid pressed whisper
  - Vowels elongated
  - Lips can be rounded

- Air only - open throat
  - Five numbers per breath
  - Count 1-10 slowly

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Flow Voice

Stretch and Flow

**Stretch & Flow Tissue Activity Phase III**
Begin with having your client tear a tissue an inch in width the same direction as the fold on a tissue. Place the tissue in front of the nose.

20% Sound / 80% Air
One word per breath
Count 2-10 slowly

Tissue moves always
Elongate vowels
Open throat
Lips can be rounded

20% Sound / 80% Air
Two numbers per breath
Count 1-10 slowly

20% Sound / 80% Air
Three numbers per breath
Count 1-9 slowly

20% Sound / 80% Air
Five numbers per breath
Count 1-10 slowly

**Stretch & Flow Tissue Activity Phase IV**
Begin with having your client tear a tissue an inch in width the same direction as the fold on a tissue. Place the tissue in front of the nose.

50% Sound / 50% Air
One word per breath
Count 2-10 slowly

Tissue is optional
Air should be all gone at the end of the word

50% Sound / 50% Air
Two numbers per breath
Count 1-10 slowly

50% Sound / 50% Air
Three numbers per breath
Count 1-9 slowly

50% Sound / 50% Air
Five numbers per breath
Count 1-10 slowly
Resonant Voice Therapy

• **What is it?**
  • Targets perception of oral vibratory sensations paired with easy phonation
  • It should feel easy to produce sound (breath and sound production) and one should feel vibrotactile feedback from resonance in front of face
  • Make sure the patient can either hear or feel difference
  • Follows hierarchy from isolated sounds up to conversation
  • Lessac Madsen (Verdolini Abbott)
  • Joseph Stemple

**Patient TIPS:**
• Feels Easy
• Vibrations at front of face
Resonant Voice Therapy

- Basic Training Gesture
  - Stemple “Holmolmolm”
  - Verdolini Abbott “Mhm” as a “yes” question
  - Check in with patient to see if they **feel** resonance, ask where they feel it, what do they **hear**, does it feel easy*
- Single Words, short phrases – Verdolini Abbott
- Chant
  - Non linguistic (Stemple and Verdolini Abbott)
  - Shape the chant into speech
- Functional Phrases, Paragraphs,
  - Can have “Hum” as facilitator
  - Produce first with over-exaggerated resonance
  - Fade that in to typical
- Bridge Activities
  - Controlled conversation appropriate to patient
    - Phone call in session
    - Give lecture or present case
    - Teach music class

*Make sure you discuss the difference between mental and physical effort

Keep patient at level they are successful until 80% accurate
RVT training options

- Observing a clinician who is trained in how to perform this
- [www.visionsinvoice.com](http://www.visionsinvoice.com)
  - Kittie Verdolini Abbott does trainings online and in person periodically for LMRVT
- The Confident Clinician: Voice Rehabilitation Video Tutorial
  - Contains video demonstration of Vocal Resonance
- Joseph Stemple
  - Tutorial on Medbridge
  - [www.medbridgeeducation.com](http://www.medbridgeeducation.com)
Other Types

- Laryngeal Reposturing/Laryngeal Massage
  - Truly a hands on course
  - Supplemental info in Exercises for Voice Therapy book
- Lee Silverman Voice Treatment or Speak Out
  - Training in LSVT and Speak Out
    - Online or in person
    - Must be a certified provider
Vocal Function Exercises

1. Warmup
   1. Sustained /i/ on F4 or F3 (depending on gender)
   2. Nasal and engaged, not pushed

2. Stretch
   1. Glissando up on /o/ or semi-occluded ‘oooo’

3. Contract
   1. Glissando up on /o/ or semi-occluded ‘oooo’

4. Power
   1. Sustain C4, D4, E4, F4, G4 for females (C3, D3, E3, F3, G3 males)
   2. On /o/ or semi-occluded ‘ooo’

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Vocal Function Exercises

- Make sure you’re doing them twice through/twice per day
- No hard onsets
- I use piano, or piano app, or vocal pitch monitor app
- You may want to use an expiratory muscle training device to improve ability for these like EMST-150

- Vocal Function Exercises
  - Has another excellent tutorial on Medbridge
    - www.medbridgeeducation.com
Voice for Pediatrics

- Adventures in Voice for Peds from Kittie Verdolini Abbott [www.visionsinvoice.com]
- Moya Andrews Books
- Voice Adventures from Super Duper
- A tempo Voice Center digital download products
  - Bit.ly/atempoSTORE and Bit.ly/atempoTPT
  - Teachers Pay Teachers store with all products to print off and work with voice goals
- Voice Monsters from Queen’s Speech
Voice Resources

- The Source for Voice Disorders
- CEU’s
  - Medbridge, Speechpathology.com
  - U of Wisconsin
    https://cme.surgery.wisc.edu/courses/voice
- Voice in a Jiff & Confident Clinician Video from a tempo Voice Center
- If you want to specialize in voice
  - Sig 3
  - Listserv Iowa
    https://medicine.uiowa.edu/iowaprotoocols/voiceserve-discussion-forum
- Find a voice therapy mentor
  - Expand Your Scope.com
  - Research around your area

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Don't sing into a colander

You will strain your voice
Myth #1

Q: Throat clearing is an effective way to remove mucus from your vocal folds, and is not damaging.
Q: Throat clearing is an effective way to remove mucus from your vocal folds, and is not damaging.

A: True and False. Throat clearing is considered “Phonotrauma” and can be damaging to the vocal folds.
Myth #2

Q: Milk makes you produce more mucus, and is therefore bad for your voice.
Q: Milk makes you produce more mucus, and is there for bad for your voice.

A: False. Dairy products temporarily thicken saliva, but do not increase mucus production.
Myth #3

Q: Inhalers can’t cause hoarseness
Myth #3

Q: Inhalers can’t cause hoarseness

A: Investigations continue with research to see if myopathy occurs, but they can cause fungal infections

Practical Considerations for dysphonia caused by inhaled corticosteroids. Galvan CA, Guarderas JC. Mayo Clin Proc 2012 Sep;87(9):901-4

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Myth #4

Q: Testosterone therapy from subcutaneous implants causes lowered voice
Q: Testosterone therapy from subcutaneous implants causes lowered voice

A: False. A study by Glaser, York & Dimitrakakis showed no adverse effect on the female voice including lowering or deepening
Myth #5

Q: I only have mucus on my vocal folds when I’m sick.
Q: I only have mucus on my vocal folds when I’m sick.

A: False. You always have mucus on your vocal folds to keep them cool. Keep it thin by drinking water so it can keep swelling away.
Q: After excessive voice use, like a night out with loud music or a speaking engagement, voice rest is best.
Myth #6

Q: After excessive voice use, like a night out with loud music or a speaking engagement, voice rest is best.

A: False. Humming in resonant voice shows that it may reduce swelling even more than voice rest alone. Nothing is wrong with voice rest, but humming helps more.
Resonant Voice Exercise is Better Than Vocal Rest?

Talking
Silence
Humming

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Q: When you breathe diaphragmatically, you breathe air into your diaphragm.
Q: When you breathe diaphragmatically, you breathe air into your diaphragm.

A: False. Your diaphragm is a muscle that contracts when you inhale. Air goes in your lungs, not your diaphragm.
Questions?

- Email me: info@atempovoicecenter.com
- www.atempovoicecenter.com
- Thank you!

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NOW I AM A
VOCAL GENIUS!


Baken RJ, Orlikoff RF. Clinical Measurement of Speech and Voice. 2000, San Diego: Singular


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