

Spotlight on Voice Evaluation and Voice Therapy

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Learning Outcomes

Attendees will demonstrate knowledge of 3-essential components of a voice evaluation for organic voice disorders.

Attendees will demonstrate ability to set relevant treatment goals for voice therapy.

Attendees will describe 3 evidence-based techniques for treatment of voice disorders.



What does a voice specialist do?

- Treats/gives therapy for all varieties of voice disorders
- Most often will also provide therapy for swallowing and airway disorders
- Examples of voice disorders:
 - Phonotraumatic lesions
 - Nodules
 - Polyps
 - Cysts
 - Neurologic voice disorders
 - Vocal Fold Paresis/Paralysis
 - Organic Essential Tremor of the Larynx
 - Parkinson's Disease
 - Functional Voice disorders
 - Primary Muscle Tension Dysphonia/Functional Aphonia
 - Aging Voice Disorders
 - Presbylarynges/Vocal Fold Bowing



What does a voice specialist do?

- Other disorders many voice pathologists treat include those related to the airway such as:
 - Chronic cough/throat clearing
 - Paradoxical Vocal Fold Motion/Vocal Cord Dysfunction/Laryngospasms
- If you are a voice therapist who works at an ENT office with a heavy laryngeal cancer population, you will most likely find yourself doing dysphagia therapy as well
 - Post radiation
 - Post reconstruction
 - Not typically post stroke, neurologic, etc.
- Gender affirming voice therapy
 - Train voice that match's patient's gender identity, including, but not limited to:
 - Pitch, intonation, language, articulation, nonverbals and gestures



Where do voice specialists work?

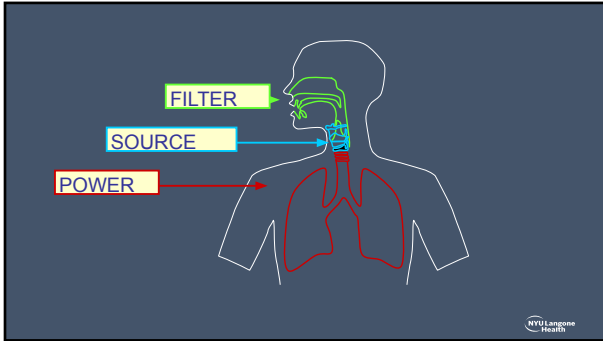
- Most Voice Pathologists work at an ENT/Otolaryngology office/within a department
 - This could be private practice, hospital based, university based
- Some work in private practice on their own without a doctor in-house
 - Need to at least have doctor for referral base
- Best to have laryngologist (fellowship trained in voice), but could have otolaryngologists (ENT) who have interest in voice
- To perform therapy, it is highly recommended to have a videostroboscopy performed to view the vocal folds
 - Voice Therapists can perform these, but must have a doctor to diagnosis (so private practice therapists cannot do them alone)



Function of the larynx

- Biological function
 - Airway protection
 - Performance of physical tasks
- Physiological function
 - Sound producing mechanism





The most basic elements of the respiratory system are the:

- Ribcage
- Lungs
- Diaphragm/ abdominal unit

JERSEY SPEECH LAB logo and NYU Voice CENTER logo are present in the bottom left and right corners respectively.



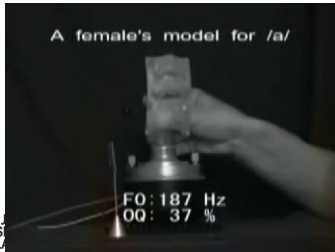
Phonatory System (Source)

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Vocal Fold Vibration

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Resonating System (Filter)

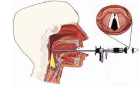


A 3D model of the vocal tract developed by Professor Howard and his team to aid our understanding of the intricacies of the human voice



Laryngeal Visualization Methods: Review

- Flexible nasal endoscopy vs. Rigid transoral endoscopy

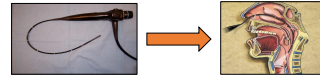


- Halogen light vs. Stroboscopy



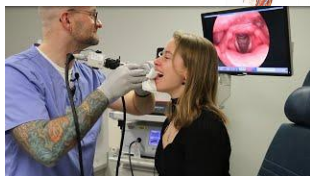
Flexible Nasal Endoscopy:

Assessment of Laryngeal Physiology or Function



Rigid Transoral Endoscopy:

Assessment of Vocal Fold Tissue



Videostroboscopic Evaluation

- What parameters/characteristics do we evaluate?
- Begin at "normal" pitch/loudness

1. Fundamental Frequency
2. Glottic closure
3. Supraglottic activity
4. Vertical levels of the VFs
5. Vocal fold edge
6. Periodicity
7. Amplitude of vibration
8. Mucosal wave
9. Phase closure
10. Phase symmetry
11. VF mobility



Common Vocal Pathologies

Normal Vocal Folds



Benign Lesions

- NON-cancerous
- Structural defect (irregular/abnormal tissue), most often occurring at the sight of greatest impact and shearing stress on the tissue (anterior 1/3 of VF)
- Size dictates level of disruption of VF closure and vibration
- Can be discrete (clearly defined borders) or diffuse (generalized area of irritation)
- Can be bilateral or unilateral (then gradually form into bilateral lesions due to reactive swelling)

Surgical Treatment

- Depends on the type of lesion, level of disruption in person's life, and whether they respond to behavioral treatment
- PRIMARY if lesion blocks airway or obstructs VF closure needed for vibration
- SECONDARY if lesions causes considerable voice problems

Five M's of Voice Breakdown

1. Muscle
2. Mucosal
3. Mucus
4. Medical
5. Mental



Layered Structure

This image is pulled from Springer online: Operative Techniques in Laryngology

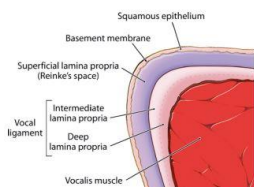


Fig. 1.4 Coronal section through the free edge of the vocal fold, demonstrating the layered microanatomical structures that allow vibration

Voice Evaluation

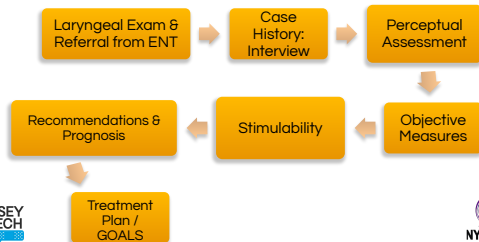


Referral:

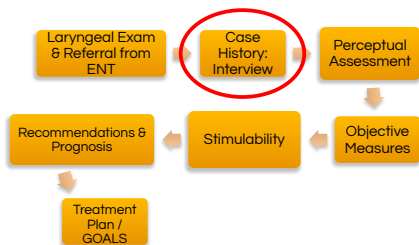


- ✓ ENT (Laryngology Specialist)
- ✓ Diagnosis
 - Vocal fold lesions / tissue
 - Vocal fold motion
 - Vocal fold closure patterns (determined with stroboscopy)
- ✓ Recommendations / Plan
 - Behavioral therapy (speech therapy? Singing lessons?)
 - Medications given?
 - Surgery planned?

Voice Evaluation



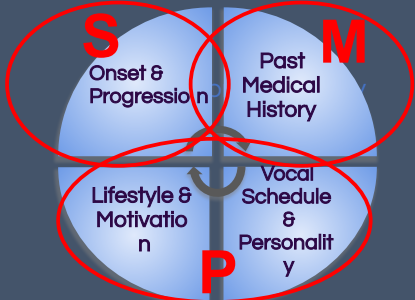
Voice Evaluation



Case History: What's the story?



Case History: What's the story?



Case History: What's the story?



S - Symptoms Onset & Progression

- Gradual or sudden onset? Trigger?
- Current symptoms?
- When is it worse – morning or evening?
- Does anything make it better?
- Does anything make it worse?

Patient Report: Voice Symptoms

THE SOUND OF THE VOICE

- * TOO HARSH / HOARSE / RASPY
- * VOICE LOSS
- * TOO HIGH / LOW
- * TOO LOUD / SOFT
- * REDUCED VOCAL RANGE

THE FEEL OF THE VOICE

- * TOO EFFORTFUL
- * PAINFUL / IRRITATED / SORE
- * DRY THROAT
- * INCREASED MUCOUS

Case History: What's the story?

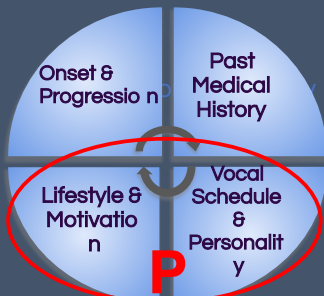


M - Medical

Past Medical History

- Asthma? Allergies?
- Respiratory issues?
- Covid?
- Autoimmune / inflammatory conditions?
- Gastrointestinal issues? Reflux?
- Medications → xerostomia?
- Injuries? Stroke?
- Surgeries
 - Chest surgeries?
 - Intubations

Case History: What's the story?



P - Personality & Personal Details Vocal Schedule & Lifestyle

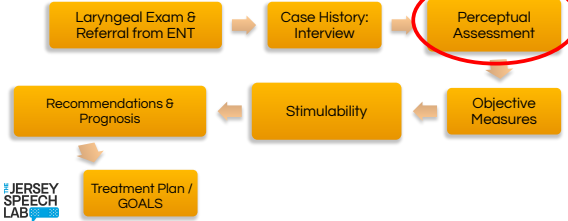
- **Vocal demands:** how they use their voice for work or activities outside work
 - “Do you use your voice a lot for work?”
 - “How do you use your voice at home?”
- Lifestyle
 - Social interactions: related to vocal demands
 - Health habits: Diet, alcohol intake, exercise, sleep
- How could these factors affect carryover? Prognosis?

P - Personality & Personal Traits

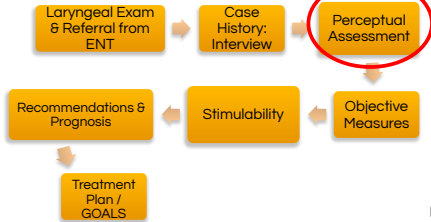
Personality & Motivation

- Talkativeness/Extroversion
- Signs of anxiety
- Kinesthetic awareness
- Motivation/Self-efficacy

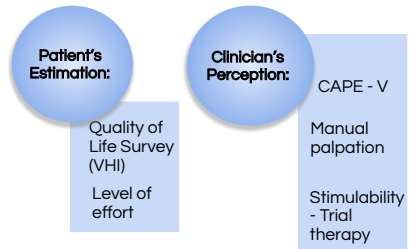
Voice Evaluation



Voice Evaluation



Perceptual Assessment



Voice Handicap Index -10 (VHI-10)

Jacobson et al, 1997; Rosen et al, 2004

Validated and Standardized Questionnaire = Self-analysis of Quality of Life Issues as it relates to:

Functional. Impact on Daily Activities

Physical. Perception of Laryngeal Discomfort

Patient's **Emotional.** Response to the Disorder

VHI - 10

These are statements that many people have used to describe their voices and the effects of their voices on their lives. Circle the response that indicates how frequently you have the same experience.


	Never	Almost never	Some- times	Almost always	Always
My voice makes it difficult for people to hear me.	0	1	2	3	4
People have difficulty understanding me in a noisy room.	0	1	2	3	4
My voice difficulties restrict personal and social life.	0	1	2	3	4
I feel left out of conversations because of my voice.	0	1	2	3	4
My voice problem causes me to lose income.	0	1	2	3	4
I feel as though I have to strain to produce voice.	0	1	2	3	4
The clarity of my voice is unpredictable.	0	1	2	3	4
My voice problem upsets me.	0	1	2	3	4
My voice makes me feel handicapped.	0	1	2	3	4
People ask "What's wrong with your voice?"	0	1	2	3	4

What are we measuring?

INDIRECT measures

- Visual Images
- **Acoustic Signal**
- Aerodynamic changes in pressure and flow

We make inferences about laryngeal pathology from the results




What Equipment do you need?

Microphone (*ideal: Head Mounted*) → PRE-AMP! → Digital recording equipment

- Keeps consistent distance from mouth
- Angled from the center of the mouth
- Cardioid or unidirectional
- Avoid clipping

- Internal or external sound card
- Sample at least 20KHz
- 16 Bits of amplitude quantization

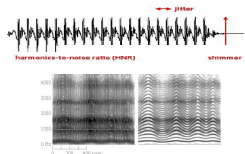

Quiet recording space



Adapted from Awan et al., 2015

Spectral Methods: Sound Perturbations (Voice Quality Measurements)

- Waveform
 - Jitter: cycle-to-cycle differences in frequency
 - Shimmer: cycle-to-cycle differences in intensity (amplitude)
 - Noise-to-harmonic ratio (NHR)
- Spectrogram
 - Type (visualized)
 - Noise-to-harmonic ratio (NHR)


Voice & Speech Tasks

Running Speech

- Cape-V sentences
- Spontaneous speech: *How did you get here today?*
- Standardized passage: *The rainbow passage*

Sustained vowel

- Comfortable pitch (3-5 seconds) X 3
- High pitch (3-5 seconds) X 3
- Low pitch (3-5 seconds) X 3
- Soft as possible X 3
- Loud as possible X 3




Awan et al., 2015

What are we measuring?

INDIRECT measures

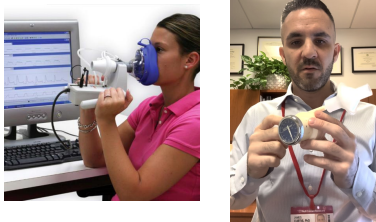


- Visual Images
- Acoustic Signal
- **Aerodynamic changes in pressure and flow**

We make inferences about laryngeal pathology from the results



Aerodynamic Measurements

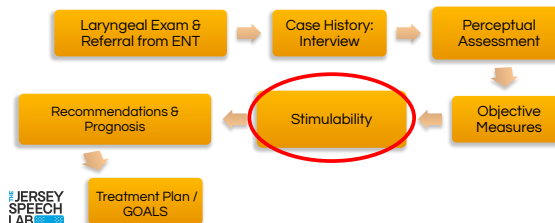
Airflow, Subglottal pressure, Glottal Resistance

Resources for setting up your own voice lab

- [Kristie Knickerbocker, A Tempo Voice Center blog](#)
- [National Center for Voice and Speech Science Recommendations](#)
- [James Curtis, PhD tutorial](#)

Voice Evaluation



Stimulability Testing:

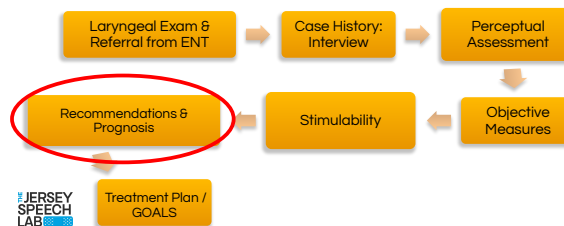


Kinesthetic Awareness

Builds self-efficacy

Assess readiness

Voice Evaluation



IMPRESSIONS & CONCLUDING DISCUSSION:

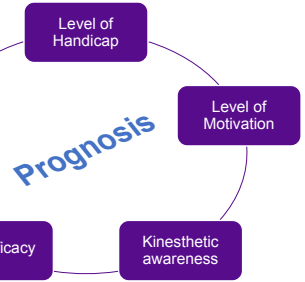
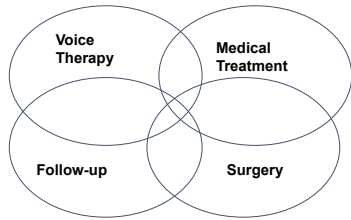
Educate and Counsel:

- ✓ Diagnosis
- ✓ Prognosis
- ✓ Vocal Hygiene (less is more).

Impressions

1. Summary of the patient diagnosis and symptoms
2. Summary of subjective & objective findings
3. What might have caused and/or perpetuated the problem?

Recommendations



GOAL setting



Therapy

Direct Tx: Physiologic Goal



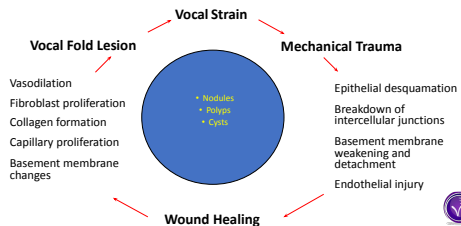
The Basic Problem

Closing too much

Closing too little

Poor coordination

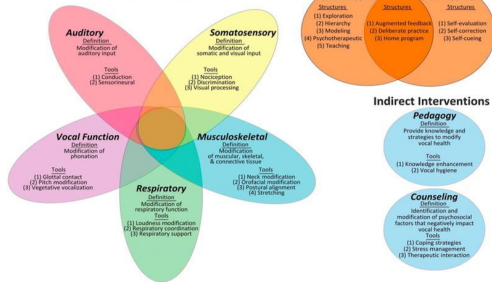
Cycle of Vocal Decompensation



What Even is Voice Therapy/Who Gets Voice Therapy?

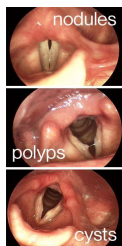
- Voice Therapy is essentially physical therapy for the vocal folds
- 3-4 main exercises that can be modified in SEVERAL different ways for patients based on their needs
 - Vocal Function Exercises
 - Resonant Voice Therapy
 - Stretching/Contracting Exercises
 - Variety of Semi Occluded Vocal Tract Exercises
 - Circumalaryngeal Massage
 - Singing Voice Exercises
 - Vocal Health and Hygiene

Direct Interventions



How do we choose what to do?

- Therapist's preference
- Patient's skills or capabilities
- Patient diagnosis
- Patient symptoms
- Patient response to exercise

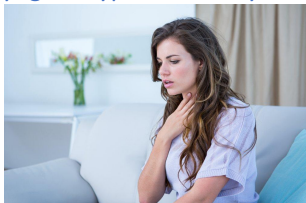


Hyperfunction



Hypofunction

Laryngeal Hypersensitivity



Other???

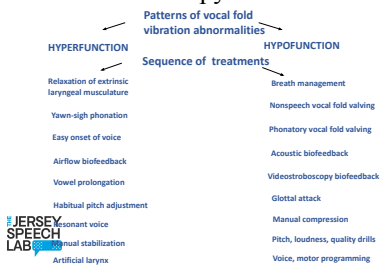
Common Diagnoses for Voice Therapy Candidates

- Hyperfunctional
 - Nodules
 - Polyps
 - Muscle Tension Dysphonia
 - Singer's Dysphonia
 - Chronic Laryngitis
- Hypofunctional
 - Parkinson's Dysphonia
 - Presbylarynx
 - Vocal fold paralysis/paresis

Common Diagnoses for Voice Therapy Candidates

- “Other”
 - Vocal Cord Dysfunction/Exercise Induced Laryngeal Obstruction (VCD/EILO)
 - Psychogenic/conversion dysphonia
 - Puberphonia
 - Gender Affirming Therapy
 - Alaryngeal
 - GERD/LPR
 - Accent reduction

Voice Therapy Alternatives



Voice Therapy Alternatives

- Voice Therapy Hierarchy
 - Syllables
 - Words
 - Phrases
 - Sentences
 - Contextual speech
 - Reading
 - Conversation
 - Singing

Goals

- Aronson, 1985 - the objective is “the best possible voice within a patient’s anatomic and physiologic capabilities”
- Colton and Casper, 1990 – “To restore the best voice possible, a voice that will be functional for purposes of employment and general communication”

Purposes

- To improve vocal communication
- To normalize voice function
- To maintain the current level of voice function as long as possible
- To reduce/eliminate use of ineffective compensatory behaviors
- To prevent further voice problems

Why Is Hydration Important?

- Supple and soft vocal folds
- Water
 - Tissue Hydration
 - Tissue Protection
- Dehydrated vocal folds are stiffer and harder to vibrate

“Be healthy”

- Eat things that don't have an expiration date
- Eat things where you recognize all the ingredients
- Exercise
- Sleep
- Everything in moderation

Vocal Hygiene



Good habits to help take care of your voice!

The Basics

- Do not SMOKE ANYTHING
- Eliminate habitual and frequent throat clearing
- Drink lots of water
- Control and limit vocal loudness
- Avoid excessive amounts of talking

More Basics

- Humidify your environment
- Use caution with OTC and naturopathic medications
- Learn to manage stress
- Give in to laryngitis

A few more...

- Time AND Intensity

A few more...

- Avoid yelling or screaming, and beware excessive background noise...
- Avoid speaking or singing out of your range for prolonged periods
- Avoid loudness for prolonged periods of time
- Preserve voice when tired or sick!

Body Health = Vocal Health

“Seek Medical Help When Needed”

- Voice Center
 - Laryngologist or Singing Voice Specialist
- Internist
- Masseuse
- Chiropractor
- Acupuncture

Resonant Voice Therapy

- Use any sound that produces a ‘buzz’ or increased energy in the front of face/mouth
 - Hums
 - Lip trills/tongue trills
 - Straw phonation
 - Fricatives
 - Y-buzz
- Certain sounds or sound combinations may be easier for one patient than another.

Vocal Function Exercises

- Series of systematic voice exercises designed to strengthen and balance the laryngeal musculature, increase or improve vocal fold adduction, and coordinate the subsystems of voice production

Joseph Stemple, Ph.D.: The Blaine Block Institute for Vocal Analysis and Rehabilitation; "Voice Therapy for the Twenty-First Century"

1. Warm Up Exercise
 - Sustain the vowel "eee" as quietly as you can for as long as possible on the musical note... (F) below middle (C) for males (F) above middle (C) for females
2. Stretching Exercise
 - Glide from your lowest note to your highest note on the word "knoll" – "whoop" – or – on a tongue or lip trill Goal = NO VOICE BREAKS
3. Contracting Exercise
 - Glide from your highest note to your lowest note on the word "knoll" – "whoop" – or – on a tongue or lip trill Goal = NO VOICE BREAKS
4. Power Exercise
 - Sustain the musical notes (C-D-E-F-G) for as long as possible on the word "old" without the /d/.



Flow Phonation

- Increase use of frontal energy/airflow while feeling no throat tightness.
- Four skill levels:
- Airflow release
 - Breathy phonation
 - Flow phonation
 - Clear speech/articulatory precision
 - best for patients who have increased [muscle tension](#) and who frequently exhibit breath-holding tendencies during phonation



In addition....

- Circumalaryngeal massage
- Easy onsets
- Tension reduction exercises
- Mindfulness
- Abdominal breathing
- Reflux management
- Cough suppression



Singing Voice Therapy

- Trills
- Tongue release
- Anchoring
- Messa di voce
- Straw phonation



Vocal Cord Dysfunction/EILO

- Pursed lip breathing
- Sniff
- Alternate nostril breathing
- Diaphragmatic breathing
- Olin EILOBI breathing technique



Thank you!

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