Voice Disorders and the School-Based Clinician
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Objectives

• Review normal laryngeal function
• Identify common voice disorders
• Discuss voice assessment
• Review voice therapy treatment techniques for the school-aged child
How do we produce voicing?

Breathing  Phonation

There are three subsystems

Or in other words
Creation of sound

Lungs- Power Supply

• Inhalation
• Exhalation
• Voicing

Vocal Folds-Vibrator
Cycles of sound

Supraglottic Vocal Tract - Resonator

- Supraglottis
- Hypopharynx
- Oral Cavity
- Oropharynx
- Nasal Cavity
- Nasopharynx

And when it all comes together it looks and sounds like...
Normal Laryngeal Function

Perceptual Assessment: Describe what you hear

- Hoarseness
- Vocal Strain
- Pharyngeal Resonance
- Glottal Fry
- Hard Glottal Attacks
- Increased/Decreased Intensity (loudness)
- Breathiness

- Diplophonia: Concerning
- Low (or high) speaking fundamental frequency (SFo)
- Stridor during breathing: Concerning

Perceptual Rating of Vocal Quality

1. Breathy mild moderate severe
2. Harsh mild moderate severe
3. Hoarse mild moderate severe
4. Related observations: pitch breaks aphonia phonation breaks glottal fry diplophonia tremor other
5. How does a higher pitch affect quality? Improves worsens no change
6. How does a louder level affect quality? Improves worsens no change
Pediatric Voice-Related Quality of Life (PVRQOL)

- 10 questions, < 5 minutes to complete
- Child or guardian


Remember, children are not “mini-adults”
- Smaller lung capacity
- Reduced vocal endurance/volume
- Coordination of respiration with phonation
- Change in instrument and body during puberty

IDEA-1997
- Identification
- Appraisal
- Referral for medical or other professional attention
- Provision of services for prevention
- Counseling and guidance
First and foremost,

What's the diagnosis?

Voice problems in school-age children
- The vocal over-doer
- The medical mystery
- The child performer

The Vocal Over-doer
Vocal Over-doers

• Nodules
• Cysts
• Polyps

Pathologies: Vocal Over-doer

• Nodules
  • What do you hear?

Pathologies: Vocal Over-doer

• Mutational Falsetto
• Edema
• Hemorrhage

Pathologies: Vocal Over-doer

• Mutational Falsetto/Puberphonia
  • What do you hear?
Pathologies: Vocal Over-doer

• Cysts
  • What do you hear?

The Medical Mysteries

• Stridor
• The breathy child
• The nasal child (hyper/hypo resonance)
• Asthmatic child
• The athlete who can’t breathe

Pathologies: The Medical mysteries

• (RRP) Papilloma
• Paralysis/Paresis
• Cleft Palate (VPI)
• Post tracheostomy/Subglottal stenosis
Pathologies: The Medical Mysteries

- Recurrent Respiratory Papilloma (RRP)

- What do you hear?

Why a diagnosis is so important (and why we never treat solely based on what we hear...)

Pathologies: The Medical Mysteries

- Paralysis/Paresis

- What do you hear?
Pathologies: The Medical Mysteries

• Cleft Palate and/or velopharyngeal incompetence (VPI)

Pathologies: The Medical Mysteries

• Post tracheostomy/Sub glottal stenosis
  • What do you hear?

Pathologies: The Medical Mysteries

• Spasmodic Dysphonia
  • What do you hear?
Pathologies: The Medical Mysteries

- Paradoxical Vocal fold motion disorder

- What do you hear?

The voice sounds normal but child complains of intermittent dyspnea

- Paradoxical vocal fold movement (PVFM)

- Also known as vocal cord dysfunction (VCD)

Good site for information
www.nationaljewish.org

The Performing Child

- The singer

- The actor
Normal vocal changes secondary to puberty

- Boys’ and girls’ voices both change
- Vocal folds lengthen (pitch)
- Shape of vocal tract changes (resonance)

Perceptual changes during puberty

- Pitch of voice drops (boys>girls)
- Voice breaks/cracks
- Vocal instability
- Change in vocal quality during transition
- Inconsistent pitch-matching

Assessment

- Case history
- Perceptual evaluation
- Acoustic evaluation (when possible)
- Trial therapy
Case History

• Who noticed the voice problem?

• What are the vocal complaints/changes?

• How long has the voice problem been going on?

• Was the onset sudden or gradual?

• Does the child sound like their siblings or parents?

Common Complaints

REALITY: Elementary school children likely won’t have complaints about their voice

• “My friends can’t hear me across the classroom/in the cafeteria”
• “My voice sounds rough”
• “My neck hurts/feels strained after I speak a lot”
• “The teacher can’t hear me when I ask questions or read aloud”

Vocal Demands—Elementary Students

• Through observation/discussion with teachers and parents determine child’s social interactions
Vocal Demands—Middle and High School Students

- Speaking
- Self rating scale
- Phone
- Extra-curricular activities
- Singing (if applicable)
  - How much are they singing?
  - Type of music/rehearsals/performances
  - Do they warm up their voice? If so, what do they do?
  - Do they have any training (private or choral experience)?

Assess the four systems of the voice

- I. Respiration
- II. Phonation (perceptual assessment of vocal quality)
- III. Resonance
- IV. Articulation

I. System Involvement: Respiration

- Disconnect between respiration and phonation?
  - Breath holding
- Over-powering the system (chicken or egg)
- Lack of release with inhalation (build up of upper body tension)
- Talking too long on one breath
Perceptual Assessment: Describe what you see
• Breath-holding pattern
• Clavicular breathing
• Overall body tension, particularly in the upper thoracic area
• Excessive extrinsic laryngeal muscle involvement

II. System Involvement: Phonation
• Any voice breaks in speech and/or singing?
  • Where in range?
  • Is range reduced?
• If poor vocal quality, may be caused by:
  • Glottal fry
  • Poor breath support
  • Speaking to end of breath
  • Differential mass affecting vibration
  • Resonance placement

III. System Involvement: Resonance
• Balanced/Forward focus—Optimal resonance
  • Voice travels without strain or pushing
  • Feels like it’s coming from front of face
• Laryngeal/pharyngeal locus—if voice sounds:
  • Pressed
  • Muffled
  • Like it’s coming from the throat or back of mouth
• Hyponasal
  • Sounds like child has a cold
  • Nasal obstruction
• Hypernasal
  • Nasal sounding
IV. System Involvement: Articulation
- Is it a problem with vocal quality or articulation?
- If articulation is not typical, what is the problem?
  - Strict articulation developmental delay?
  - Abnormalities in oral structures prevent production of some articulation sounds?
  - Searching/groping movements (apraxia)
  - Articulator weakness (dysarthria)
- Refer as needed

Acoustic Assessment
- PRAAT: Free online acoustic software program
- Gather data on:
  - Speaking fundamental frequency (SFo)
    - Is it appropriate for age and sex?
    - Intensity average during speech
  - Sustained phonation
    - Fo
    - RAP%
  - Maximum phonation time (MPT)
  - Physiological pitch range
  - High and low range, any pitch breaks?

Elementary School Age: Male*
- Speaking Fundamental Frequency (SFo)
  - Age 7: 294 Hz
  - Age 8: 297 Hz
  - Age 10: 270 Hz
  - Age 11: 227 Hz
- Maximum Phonation Time (MPT) Sustained [a]
  - Ages 5-12: 17.74 (SD 4.14)
- MPT S/Z Ratio
  - Age 5: 0.92
  - Age 7: 0.7
  - Age 9: 0.92
Elementary School Age: Female*

- Speaking Fundamental Frequency (SFO)
  - Age 7: 281 Hz
  - Age 8: 288 Hz
  - Age 11: 238 Hz

- Maximum Phonation Time (MPT) Sustained [a]
  - 14.97 (SD 3.87)

- MPT S/Z ratio
  - Age 5: 0.83
  - Age 7: 0.78
  - Age 9: 0.91

Middle to High School: Male*

- Speaking Fundamental Frequency (SFO)
  - Age 14: 242 Hz
  - Age 19: 117 Hz

- Physiological Pitch Range
  - Age 17-26: 80-764 Hz

- Maximum Phonation Time (MPT) Sustained [a]
  - Ages 13-65: 25.89 (SD 7.41)

- MPT S/Z Ratio: Adults 0.99

Middle to High School: Female*

- Speaking Fundamental Frequency (SFO)
  - Age 19: 217 Hz

- Physiological Pitch Range
  - Ages 18-38: 140-1122 Hz

- Maximum Phonation Time (MPT) Sustained [a]
  - Ages 13-65: 21.34 (SD 5.66)

- MPT S/Z Ratio: Adults 0.99
* Normative data taken from:


Specific Roles and Responsibilities of the School Based SLP

Prevention:

• Primary: Eliminating susceptibility/exposure
  • Classroom Strategies
  • Dissemination of materials to parents/teachers

• Secondary: Early identification and treatment

• Tertiary: Restoring function (treatment)

Specific Roles and Responsibilities of the School Based SLP

• Identification
  • Pre-referral
    • Observe classroom
    • Provide preventative strategies
    • Collect and review information
  • Assessment: The balanced assessment
    • Reliable and valid instruments
    • Combining norm referenced and descriptive
Evaluation: 4 core components to determining eligibility

- Communication strengths and needs
- Disorder/delay/difference
- Severity Rating: Federal/state guidelines
- Educational Relevance

*See Entry and Exit Criterion Charts in Appendix, ASHA (2000)*

Strengths and Needs

- Classroom
- Home
- Community

- Use as prognostic factors

Disorder/Delay/Difference

- Disorder: Eligible for services
- Delay: May not be eligible-state regulation
- Difference: Not eligible for services
Educational Relevance

- Signs:
  - Abnormal quality
  - Abnormal pitch
  - Abnormal resonance
- Social
  - Ridiculed, ignored, or excluded from playgroups
- Learning
  - Self confidence may suffer
  - Withdrawal from participation in class
  - Grades may fail

Severity Intervention Matrix

- Mild: 1 Service Unit/15-30 minutes per week:
  - Voice difference including hoarseness is minimal concern to parents, teacher, students, or physician
- Severe: 3 service units 61-90 minutes p/week
  - Voice difference is of concern. Voice is distinctly abnormal or age/gender
- Moderate: 2 Service Units /31-60 minutes p/week
  - Voice difference is of concern to parents, teachers, students, or physician. Voice not appropriate for age/gender
- Profound- 5 service units 91+ minutes p/week
  - Speech is largely unintelligible due to severe aphonia or hypernasality. Extreme effort for speech production

Service Delivery Models

- Monitor
- Collaborate/Consult
- Classroom based
- Pullout
- Self contained
- Community based
- Combination
For children who are ineligible for services...

- Recommend environmental modifications or strategies for communication behaviors as part of the core role responsibility of prevention.

For children who are eligible for services...

- Types of therapy approaches that may be appropriate:
  - Voice conservation or prioritization strategies
  - Educate on issues regarding vocal health/hygiene
  - Educate on anti-reflux diet & behavioral modifications
  - Resonant Voice Therapy

Replace poor vocal habits with healthier ones
Possible therapy techniques (cont.)

• Abdominal Breathing

• Modified Vocal Function Exercises (Joseph Stemple)

• Vocal flexibility exercises (pitch glides)

• Stretching/Relaxation exercises, including Circum-laryngeal massage

In Summary

• Therapy is based on:
  • Diagnosis by physician
  • Eligibility
  • Service Delivery Model
  • Stimulability to trial therapy
  • Child’s age and degree of awareness of voice problem

• Identify goals based upon what problems you noticed during the four point system assessment

Treatment: Voice over-doers and the child performer

• Identify areas in which vocal over-use may be occurring

• Teach voice prioritization

• Educate child and parent on vocal health/hygiene issues

• Optimize what voice they have to limit strain
Voice over-doers

- Rebalance systems—particularly respiration and phonation
  - Breathing exercises
  - Resonant voice therapy (age determinant)
  - Change seating in classroom

- Educate and work with family and teachers to aid child in crossing techniques over from therapy to classroom

- Are their vocal habits something the child might grow out of as they mature?

Work with all parties involved in treatment planning (include choir teacher, voice teacher, drama teacher, parents, etc…)

- Vocal prioritization should include after school activities
  - Bring teachers/coaches into this to aid in suggestions and child compliance (child may not want “to disappoint”)

Performance:

- Mark in rehearsals

- Utilize amplification devices

- Voice part in choir appropriate?
Treatment: The medical mystery

- Base treatment on what is perceptually heard, observed, and recommendations related to diagnosis
- Would an voice amplification device be helpful?
  - Would child use it?
- Has a hyperfunctional component developed due to disorder, which could also negatively affect voice?

In general if they’re sick and it’s negatively impacting the voice...

Any questions?
Thank you!