Pediatric Voice Disorders: To Yell or Not To Yell?

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Learning Objectives:
Upon completion of this course, each participant should be better able to:

- Understand laryngeal development from birth to adulthood.
- Identify/understand typical pediatric voice diagnoses.
- Assess the role and timing of voice treatment for the pediatric population.
- Discuss the role of voice therapy for behavioral voice disorders.
- Utilize resonant voice therapy techniques/methods in vocal training.

Learning Objectives:
Incidence of Pediatric Voice Disorders

- Voice disorders most common communication disorder throughout the lifespan
- Age group most at risk for dysphonia: preschool/elementary aged pop.
- 3-9% frequency (Verdolini & Ramig, 2001)
- 6% of kids ages 6-18 years old have clinically significant voice disorders
- Only 1% seen by SLP’s

Incidence of Pediatric Voice Disorders

- Hyperfunction/Phonotrauma is the most common cause of voice disorders in pediatric pop. (improper crying, yelling, shouting, playing) – aka “vocal abuse”
- Variety of causes of hoarseness in children-most of which are not malignant or life threatening
- In rare cases does the cause of voice dysfunction require immediate medical attention.

Incidence of Pediatric Voice Disorders

Voice Disorders in Newborns vs Older Children

- Hoarseness or abnormal crying in newborns is usually caused by congenital or neurological problems (ex. congenital web, tracheal stenosis).
- Hoarseness in children usually caused by problems that occur after birth including: vocal fold nodules, polyps, cysts, infections, papilloma, GERD etc.
Congenital Causes

- Laryngomalacia "floppy larynx"—common cause of noisy breathing in children. Typically develop noisy breathing during inhalation within weeks of birth. Usually high-pitched squeak that worsens with activity such as crying or feeding.

- Laryngeal Web—web of tissue remaining between vocal folds.

Congenital Causes (cont)

- Congenital Cysts/Laryngoceles—mucus-filled sacs that develop on or around the vocal folds. Usually result in abnormal cry.

- Hemangiomas (glottic/subglottic)—benign tumors made up of blood vessels that uncontrollably increase in number. When occurs on the vocal folds or inferiorally to them, usually hear a hoarse cry or noisy breathing.

Neurological Causes

- Vocal Fold Paralysis (unilateral or bilateral)—Bilateral paralysis causes more breathing problems than voice problems.

- Subglottic Stenosis

The Child’s Voice

- Growth is constant in the infant’s phonatory structure
- Developmental changes occur to the respiration, phonation and resonation systems.
- Progressive changes are occurring in size/position, epiglottic shape, and maturity of the laryngeal tissues.

The Child’s Voice (cont)

- Developmental laryngeal structure changes:
  - Age 2: Lower border of larynx descends to C5 from C3-4
  - Age 6: Lower border of larynx descends to C6
  - Age 15: Lower border of larynx descends to final position of C6-7; thyroid cartilage and hyoid bone separate during descent (Issacson, 1996).

- Resonance: high focus/nasal
- Pitch: high
- Loudness: increased
- Voice Onset: hard onset
- Breathing pattern: diaphragmatic (rest) lack of coordination with speech
- MPT/F0: 10-15 sec / >250 Hz
- Voice Quality: “thin” voice / reduced range

- Histological Distinctions: nondifferentiation of the vocal fold layers
- Minimal Calcification—resistant to blunt trauma
- High Laryngeal position (C3-C4)
The Child’s Voice (cont)

- **Vocal fold structure:**
  - Age 5: Little differentiation of the superior lamina propria and the deeper layers
  - Age 10: Differentiation of superficial vs deep layers of the lamina propria
  - Age 17: The layered structure of the lamina propria is complete around 17 years of age.

The Child’s Voice (cont)

- Perhaps the most interesting research relates to changes in vocal fold morphology:
  - Infant vocal folds may be protective against phonotrauma
  - Risk may increase as time from infancy increases

Childhood Voice Disorders

- Typically hoarseness in children is present for a long period of time. Family members do not typically notice the rough vocal quality until someone points it out to them. Once identified, often the family member cannot remember a time when the child did not sound that way.
- Vocal quality may vary/flareuate depending on the use of the voice.

Factors Affecting Child Vocal Function

- Medical conditions: allergies, infections, asthma, LPR (chronic cough), dehydration
  - May see phonotrauma secondary to the primary medical problem or as a habituated behavior after the medical problem has been resolved.
- Emotional Factors (distractibility, aggressiveness)
- Social Factors ("modern" life style, high expectations)
- Environmental Factors (noise, activities, pollution)

Typical Pediatric ENT Diagnoses

- Normal Larynx:
- Inflammation-typical causes are viral infections and LPR

Typical Pediatric ENT Diagnoses (cont)

- Vocal fold nodules:
- Vocal fold cyst/polyp (typically do not resolve without surgical intervention)
Typical Pediatric ENT Diagnoses (cont)

- Vocal fold cyst/polyp (cont)

Recurrent Respiratory Papillomatosis (RRP) aka “Papilloma”- caused by a viral infection by the human papilloma virus. Typically the growths require physical removal either with the laser, cold steel micro instruments or with a laryngeal debrider instrument.

Role of the SLP with Pediatric Voice Disorders

- SLP’s are an integral part of the voice team.
- Voice therapy is generally helpful in all conditions even where surgical intervention is required.
- Initial evaluation includes subjective voice description and objective voice measurements. This varies depending on the type of environment you work in as some SLP’s are the individual’s performing the direct laryngeal exams in coordination with the otolaryngologist.

What can be Done for Childhood Voice Disorders:

- Options:
  - Surgery
  - Vocal Hygiene (usually a part of voice tx)
  - Voice Therapy (direct intervention)
  - Wait and see

SURGERY

- Rarely indicated for childhood voice disorders unless secondary to a congenital etiology or cyst/papilloma
- Selected cases
  - Severe dysphonia
  - No voice improvement after voice therapy

VOCAL HYGIENE

- Research has exhibited that hygiene alone does not improve vocal function.
- Typically indicated in very early cases of mild dysphonia
- Young children
- Family participation
- Young vocal performers
- Goal: education and prevention!!!
What do we teach as vocal hygiene?

- Vocal Fold Function
  - Educate the family/patient how the vocal folds work. Adjust this to the age of your patient. “Vocal folds are your friends, they need to have fun together and not fight...take a vocal nap from each other”
- Keep the vocal folds moist
  - Hydration (depending on age, use new cups/add coloring, water bottles to school)
  - Educate how hydration helps “oil” the vocal folds and makes them easier to vibrate.

- Keep vocal folds free from irritants
- LPR-discuss diet, time of meals, possible medications

- Keep the vocal folds in good shape
  - Phonotraumatic behaviors
    - THE KEY IS TO EDUCATE NOT DICTATE!!!!!!!

VOICE THERAPY FOR CHILDREN

- TREATMENT OF CHOICE!!!!!!
- Hyperfunctional voice pattern associated with or without vocal fold lesion(s)
  - Candidacy: mild/moderate/severe dysphonia, hoarseness, breathiness and/or raspiness
  - When should therapy be started?
    - Controversial (age doesn’t matter)
    - Consider: severity of the dysphonia, social and academic implications, emotional impact on the child, family availability, child’s maturity

VOICE THERAPY FOR CHILDREN (CONT)

- Traditional Therapy used to focus on identifying and reducing “vocal abuse”
- Included a list of Do’s and Don’ts/Rules
- Found this to be Counterproductive!!!!
  - Theory: Little or none (incoherent)
  - Basic Science: Little or none
  - Applied Science: Little or none
  - Pragmatics: Output impoverished
  - Bottom line: Unclear benefits
  - Terms: Vocal abuse/misuse:
    - Ambiguous, Indistinct, potentially negative for therapy outcome (Bandura, 1977; Verdolini, 1999)
Problems with Traditional Approach (cont)
- Appropriate after 30-40 years to experience a paradigm shift. Doesn't discredit the other treatments, just allows for change.
- We are being called upon as a profession to develop theory on our treatments.
- The use of these techniques were unable to be proved clinically and the use of vocal conservation has been proven to not address the underlying vocal problem.

We Can Improve:
- Theoretically derived models
- Founded in basic science
- Tested empirically
- Emphasizing Function

Evolution of Voice Therapy
- 2000's: Instead of targeting the symptoms of the voice problems (i.e. directly targeting loudness, pitch, inflection, etc) emerged a physiological approach
  - Goal: balance the 3 subsystems of voice production:
    - Respiration
    - Phonation
    - Resonation
    - To permit appropriate quality, pitch and loudness!!!!!

Examples of Physiologic Voice Therapy
- Vocal Function Exercises (Joseph Stemple, PhD., CCC-SLP)
- Lessac-Madsen Resonant Voice Therapy (Kittie Verdonlini, PhD., CCC-SLP)
- Casper-Stone Confidential Flow Therapy (aka Airflow phonation)
- Accent Method (Smith)
- Lee Silverman Voice Therapy (Ramig)

VOICE THERAPY FOR CHILDREN
- Therapy focus
  - Teaching awareness of the problem (ex. Clapping the hands together)
  - Motivation for therapy (a key to success-patient/family may not be ready for therapy)
  - Structure of therapy (content of therapy/behavioral change)
  - Progress
  - Dismissal (Usually treat phonotraumatic voice disorders 1x/week for 6-8 total therapy sessions)
- Structure of therapy
  - Family education
  - Vocal hygiene
  - Vocal training

Family Education/Vocal Hygiene
- It is essential to involve all members of the family in voice therapy.
- Education of the vocal mechanism should involve the patient and the parents.
- Identify the situations that enhance/worsen vocal function
- Review vocal hygiene (discussed earlier) and how to functionally incorporate those recommendations into the family's daily life.
- Voice models influence our early vocal behavior a great deal!!!!
Family Education/Vocal Hygiene (Cont)

- Discuss vocal function and how our voices are unique to us as people. Use this to enhance that we should be using “people voices” vs “animal voices”
  - Teach vocal friendly substitution sounds for kids games/playing (ex. Lip/tongue trills, humming)
  - To simply tell a family their child cannot “yell or scream or make noises” is doing the child a disservice and not empowering the family unit. Teach them to do ALL of these behaviors but in a safe manner!!!!!!!

VOCAL TRAINING

- Assess general posture/body tension
  - Increased general body tension?
  - Hyperextension of head/neck?
  - Increased upper chest tension?
  - Posture
- Body tension typically leads to high clavicular breathing pattern

VOCAL TRAINING (Cont)

- Key to vocal behavior modification training:
  - Biomechanically favorable tasks (easy, simple tasks)
  - Multimodal explorations (feel, see, touch, use mirror)
  - Models provide visual and auditory input

VOCAL TRAINING (Cont)

- Research by various voice researchers has found that “barely touching” or barely separated vocal folds produce:
  - Strong Voice Output
  - Low impact stress
  - Minimal physiological effort
- Modification of Tonal Focus (i.e. Resonant Voice) has been found to achieve these voice objectives.
  - Resonant voice (RV):
    - Involves oral vibratory sensations—usually on the anterior alveolar ridge/lips/bones of the face
    - Always produced during easy phonation
    - RV is a continuum of oral sensations and easy phonation built from basic speech gestures through conversational speech
    - The single training of resonance focus is expected to affect multiple levels of physiology (breathing and laryngeal function)
    - Attention of therapy is to the vocal effects, not biomechanics or verbal expressions
    - Large # of repetitions are used in varying speech tasks
**VOCAL TRAINING/RESONANT VOICE THERAPY**

- Resonant voice therapy:
  - Extreme forward focus is required with appropriate breath support feeling for forward/oral vibrations/sensations.
  - Patient productions should be relaxed and easy
  - Use play! Imagination! Fantasy! (ages 2-7)
  - Use competitive play! (Ages 7+)
  - Parent Involvement is essential!

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**RESONANT VOICE THERAPY (CONT)**

- Minimal "exercises" at home are prescribed-emphasize home “play” with targeted behaviors in everyday activities. Home exercises should be part of real life, not time out from it!!!
- Be Creative! Find out about the family's daily routines!

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**Basic Training Gesture (BTG)**

- The initial training gesture from which to teach the patient resonant voice (i.e. voicing with forward vibrations that is easy to produce)
- GOAL: strong-easy-clear voice
- Adapt the BTG based on the patient/age:
  - Use m/n/ng phonemes (b/c nasal)
  - Introduce variations such as bird calls, owl hooting, cow mooing, cat meows, airplane flying, motor boat, humming songs
  - Can also use character identification (Cinderella vs Step Sisters, Superman/Robbers)

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**Progression of tasks:**

- Advance from isolated BTG to voiced-voiceless contrasts/infection
  - Ex. Talking toys (bboom...bedeboom...pee tee boom), Humming CV pairs to nursery rhymes or age-appropriate songs (me pe mo...mamama...nemo...yo ho yo ho)
- Bridge from CV targets to common phrases/sentences
  - Have the patient and or family come up with common everyday phrases. Practice holding the /m/, /n/ and /ng/
- I and you phrases: “I say yes, you say no”....use with opposites.
- Reading books: hold the /m/ and /n/ to feel forward vibrations (age 6+), adapt with younger children- have the child tell you what they see in the book
- Read aloud: to simulate class reading requirements (make fun by having them bring in age-appropriate magazines, books, etc)
- Marco Polo/Hide and Seek (“Yoo hoo-over here!”)
- Mother May I make ____ steps? (If you use throat/“hard” voice, back to the beginning)

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**RESONANT VOICE THERAPY (CONT)**

- Bridge to everyday speaking situations (including soft and loud talking)
  - Play activities
    - Messa di voice exercises: soft-loud-soft productions (can use with the /m/, counting, days of the week, alphabet)
    - Role play (depending on age of child...can pretend to be their sibling and have a fight)
    - Phone conversations with friends/stang speech with similar inflections/contexts
- Incorporate negative practice exercises
  - New vs old way of speaking...can use character voices
  - Teaching patient to control their voice vs their voice controlling them.
**GENERAL COMMENTS**

- Involve families!!! Recommend having the child come up with a “voice sign” to be used in the family to help remind them to use their “new way” of speaking.
  - Consult/collaborate with parents throughout the therapy regimen. Troubleshoot challenging situations and continue to make home carryover suggestions.

**Practice with Resonant Voice Techniques**

- Explore...Have fun....
- Should we be telling our pediatric patient to not yell? NO- teach them to yell/project safely!
- Questions?

**Trouble Shooting:**

- Not getting strong-easy-clear voice???
  - Use negative practice – some children respond well to a “point system” throughout your session.
  - Multi-modality modeling (verbal, auditory, tactile cues)
  - Consider palpation of the laryngeal and peri-laryngeal regions (circumlaryngeal massage/reposturing)
  - Have fun EXPLORING laryngeal focus/oral focused sounds. (Be creative using gargling, creaky door, etc)

**DISCHARGE**

- Count on natural development – child may not be 100% with resonant voice but is regularly using the new pattern.
- If vocal fold lesions were present–should be resolved by the end of the two-three month treatment regimen.

**RESOURCES**

- Adventures in Voice (Kids LMRVT program by Kittie Verdolini, PhD., CCC-SLP)
  - www.multivoicedimensions.org
- VFE (Vocal Function Exercises)/Physiologic Voice Therapy by Joseph Stemple, PhD., CCC-SLP
- Great internet source with descriptions/pictures:
  - www.voiceproblem.org
  - www.voicefoundation.org/health-science/voice-disorders/introduction