Evidence Based Practice

“The term evidence-based practice refers to an approach in which current, high-quality research evidence is integrated with practitioner expertise and client preferences and values into the process of making clinical decisions.”

External Scientific Evidence

- Randomized, double-blind, placebo controlled studies
Establishing Scientific Evidence
(Challenges of Clinical Research)

- Prioritizing of clinical research questions,
- Divide between clinical research and clinical practice,
- The globalization of clinical trials,
- Issues of paying for clinical trials,
- Narrow incentives for participation in clinical research,
- Shrinking clinical research workforce,
- Administrative and regulatory requirements,
- Recruitment and retention of patients.

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Challenges of Clinical Research

- We're human...and so are our patients/clients/kids

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Seeking out scientific evidence

- Systematic Reviews
  - ASHA’s Evidence Maps (http://ncepmaps.org)
  - ASHA/N-CEP’s Compendium of Guidelines and Systematic Reviews
  - Cochrane Collaboration
  - Campbell Collaboration
  - What Works Clearinghouse (U.S. Department of Education)
  - Psychological Database for Brain Impairment Treatment Efficacy
  - speechBITE™: Speech Pathology Database for Best Interventions and Treatment Efficacy
  - Evidence-based Communication Assessment and Intervention (EBCAI) Journal

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ASHA Evidence Map
http://ncepmaps.org
Seeking out scientific evidence
- Online bibliographic database
  - **MEDLINE**: the world’s largest online bibliographic database of health-related studies.
  - **CINAHL**: Cumulative Index to Nursing and Allied Health Literature, is valuable. CINAHL is more likely than MEDLINE to contain studies with negative findings.
- Publication in a peer-reviewed journal is not a guarantee of scientific quality.
- **Gray literature**: body of research that is not published in peer-reviewed literature:
  - technical reports, conference proceedings, testimony and other unpublished evidence.
  - Typically done through conversations with content experts, relevant professional groups/organizations, and internet search engines.

Clinical Expertise
- **Education**: past, present, future
- **Experience**: life experience
- **Clinical experience**: educational experience
- **Role models**: resources

Clinical decision making
- Ability to make clinical judgement is what makes you a clinician.
- What are the communication priorities?
- What is medically important?
- What is socially important?
- What if we do nothing?

Client Preferences
- Who is this person?
- What is important to the individual/family?
- What other concerns are present?
- Communication disorder, behavioural issues, getting to therapy sessions, siblings, attitude of parents, etc...
EBP Summary
- Recognize the needs, abilities, values, preferences, and interests of individuals and families,
- Integrate those factors along with best current research evidence and clinical expertise,
- Maintain the knowledge and skills that are necessary to provide high quality professional services,
- Evaluate prevention, screening, and diagnostic procedures, protocols, using recognized criteria described in the evidence-based practice literature;

(Montgomery, 2003)
- “Statistically significant” is not synonymous with “clinically meaningful,”
- “Clinical judgement is ALWAYS required.”
- “Randomized controlled trials may either be impractical (if not impossible), or inappropriate for answering clinical questions.”
- “No substitute for clinical experience in choosing what is appropriate for an individual patient.”

EBP Summary
- Evaluate the efficacy, effectiveness, and efficiency of clinical protocols for prevention, treatment, and enhancement using criteria recognized in the evidence-based practice literature;
- Evaluate the quality of evidence appearing in any source or format,
- Monitor and incorporate new and high quality research evidence having implications for your clinical practice.

EBP is a continuing process.
It is a dynamic integration of ever-evolving clinical expertise and external evidence in day-to-day practice.
Current High Quality Clinical Trials

- Pediatric Voice Therapy
  - Yes?
  - No?

Voice Therapy Efficacy

Lee and Son (2005) found improvements in children with hyperfunctional voice disorders (mostly nodules):

- Perceptual analysis (GRBAS), Pitch, Jitter, Shimmer, noise-to-harmonic ratio

Mori and Hirano (1995) retrospective of 179 children (mostly nodules, 12 with polyps):
- 6% improved with vocal hygiene alone (12 nodules, 1 polyp)
- 60% who had therapy improved (78 nodules, 2 polyps)
- At 7 month follow-up
- 89% of surgery patients improved (9 polyp, 2 nodules)

Tezcaner et al. (2009) found post-therapy improvements in jitter, shimmer, noise-to-harmonic ratio and perceptual (GRBAS) assessment in a study of 39 children with nodules age 7-14. Therapy consisted of both indirect (vocal hygiene, reduce vocal abuse) and direct (relaxation, resonant voice, accent method) – but therapy strategies not consistent.

Trani et al. (2006) in 16 patients age 6-11, with different pathologies (nodules, cyst, scar) noted improvement in perceptual assessment (GRBAS), no statistically significant changes in objective assessments, but a trend toward improvement. Type of therapy was not described.

Voice therapy efficacy

- Ramig and Verdolini (1998) reviewed the literature. In children, both vocal hygiene and direct therapy programs were found to improve voice quality.
- Tezcaner et al. (2009) found post-therapy improvements in jitter, shimmer, noise-to-harmonic ratio and perceptual (GRBAS) assessment in a study of 39 children with nodules age 7-14. Therapy consisted of both indirect (vocal hygiene, reduce vocal abuse) and direct (relaxation, resonant voice, accent method) – but therapy strategies not consistent.
- Irani et al. (2006) in 16 patients age 6-11, with different pathologies (nodules, cyst, scar) noted improvement in perceptual assessment (GRBAS), no statistically significant changes in objective assessments, but a trend toward improvement. Type of therapy was not described.
- Long term results of treatment and rehabilitation of childhood dysphonia.
- Adolescents (n=29) aged from 15 to 20 who were treated during their pre-mutational period (i.e. between 5 and 12 years of age).
- The pre-mutational therapy was comprised of proper breathing pattern training, voice exercises and psychological counseling.
- Laryngostroboscopic examination and perceptual analysis of voice were performed in each patient before treatment and also to four years after mutation was complete.
- Complete regression of the childhood dysphonia was observed in all male patients (n=14).
- Voice disorders regressed completely in 8 out of 15 girls.
- Symptoms of dysphonia documented on perceptual scale persisted in the remaining seven patients.
- Complex voice therapy implemented in adolescence should be considered as either the treatment or preventive measure of persistent voice strain, especially in girls.

Effects of voice therapy in school age children.
Akin Şenkol O, Çiyltepe M. J Voice. 2013
- Overall efficacy of voice therapy for dysphonia in school-age children in two different cities in Turkey.
- 99 outpatients aged 7-15 years with persistent hoarseness for at least 2 months.
- Ratings of the GRBAS scale, s/z ratio, and maximum phonation time (MPT).
- Voice therapy outcome data collected on three types of voice therapy (physiological, hygienic, and symptomatic).
- Changes of the overall degree of voice deviation were statistically significant before and after therapy.
- Significant changes were found in the s/z ratio.
- Changes in MPT were statistically significant for all types of voice therapy.
- Symptomatic voice therapy was found to be a successful method of therapy.
- Working directly on pitch, loudness, resonance, nasality.

Future
- UW Madison Pediatric Voice Clinic
- Anecdotal evidence, and a recent study of SLPs in Australia, suggests that management of pediatric voice disorders may vary depending on individual clinician preference and experience in combination with service provider policies.
- Researchers at University Wisconsin-Madison are interested to document practice within the United States, to explore influencing factors to management, and to compare and contrast management approaches internationally.
- Survey is currently being conducted
- US only

Voice
- When a child’s vocal anatomy and physiology are normal, and they are not under some kind of threat, they will talk and sing if they have heard other people do so.

Duchan, 1994; Campbell, 1998
Pediatric Dysphonia

- 1-23% of children have a voice problem
- General acceptance of research numbers – 6-9%
- Issues in measurement of pediatric dysphonia:
  - Lack of consistency of measurement
  - Variability in listener judgment

The prevalence of pediatric voice and swallowing problems in the United States.
Bhattacharyya N. Laryngoscope. 2014 Sep 15.

- An estimated 839 ± 89 thousand children reported a voice problem.
- Overall, 53.5% were given a diagnosis for the voice problem and 22.8% received voice services.
- Laryngitis and allergies were the most common diagnoses.
- A total of 16.4% graded the voice problem as a "big" or "very big" problem.

Listeners' attitudes toward children with voice problems.
Ma EP1, Yu CH. J Speech Lang Hear Res. 2013 Oct;56(5)

- Attitudes of school teachers toward children with voice problems in a Chinese population.
- The participants were required to make attitude judgments on 12 voice samples using a semantic differential scale with 22 bipolar adjective pairs.
- The voice samples were collected from 6 children with healthy voices and 6 children with dysphonia.
- The 22 bipolar adjective pairs were intended to cover non-speech characteristics about the child's personality, social characteristics, and physical appearance.

- The mean attitude ratings received by children with dysphonic voice were significantly less favorable than those with healthy voices.
- The results suggest that voice problems in children warrant attention, and their effects on the child should not be underestimated.
- The findings also highlight the importance of early identification and intervention for children with voice problems.

Perceptions of Dysphonia

- Sick
- Sad
- Unpleasant
- Ugly
- Dirty
- Cruel
- Bad
- Worthless
- Dishonest
Vocal Fold Anatomy

- Gross Anatomy of the Larynx
  - Cartilaginous structures
  - Muscles
  - Bone (1)

Layer Structure of Vocal Folds

- Cover
  - Epithelium and superficial layer of lamina propria
  - Least stiffness
  - Most movement – vibrates most markedly during phonation
  - Source of visible mucosal wave/upheaval
  - Pliability of this layer is largely responsible for clear voice production

- Transition
  - Intermediate and deep layers of lamina propria
  - Intermediate stiffness
  - Intermediate movement
  - Contributes to maintenance of longitudinal stability during phonation
Layer Structure of Vocal Folds

- Body
  - Vocalis/thyroarytenoid muscle
  - Most stiffness
  - Least movement
  - Responsible for maintenance of oscillation and vertical stability during phonation

- Each layer must maintain these independent properties for clear voice production

- Disruption in the relationship of these layers will result in a voice disorder

Vocal Fold Development

- Age related changes in vocal fold structure and function have been documented

- Vocal fold pathology may present differently along the age-span
**Vocal Fold Development**

**Infant larynx**
- Layer structure is absent
- No vocal ligament is found (non muscular portion of the lamina propria made up primarily of densely packed elastic fibers and collagenous fibers.)
- 51% of collagen found in the adult larynx

**Young child**
- Structure of superficial vs. deep layers appeared in children > 10 years
- Absence of superficial layer/layer structure for children < 10 years may result in severe mechanical stress with increased voice use.
- May correspond to period of so-called “pediatric hoarseness.”
- Vulnerability may also be attributed to vascular immaturity

**Teenage years**
- Differentiation of superficial and deep layers (vocal ligament)
- Emergence of mucosal wave
- Increased ability to tolerate impact stress during phonation
  - Layer structure
  - Increased % of collagen
- Prepubertal female laryngeal dimensions are closer to adult size than male counterparts, suggesting less growth per unit time during puberty

**Puberty**
- Laryngeal cartilages grow faster in males than females
  - 3 x faster in males than females
- Absolute growth in height, width and length of thyroid and cricoid cartilages greater in males than females
- Male membranous vocal fold undergoes over twice the growth of the female VF
Male voice change with puberty:
- Decreased stability with larger changes in growth (vs. females) of cartilages and muscle
- Fluctuations in pitch may be due to diminished control of longitudinal tension in vocalis.
- Fundamental frequency drops
- Increased density of collagen, which changes mass of the vocalis
- Layer structure becomes more defined and adult-like
- Growth of resonating chambers of pharynx, nose and face

Gender differences
- Males have longer vocal folds
- Males have higher % of collagen
- Males have larger cartilages

Geriatric larynx
- Decrease in lamina propria thickness
- Increased collagenous fibers
- Increased fo in males with aging
- Decrease in fo for females with aging
- May be due to estrogen changes with menopause
- Vocal muscle thins as does other skeletal muscle

Normal pediatric larynx
- The larynx is higher in children than in adults, with the hyoid bone found at the C2-3 level in the youngest children (newborn to 2 years).
- The subglottic airway is narrowest in the youngest children.
- The hyoid bone was the only laryngeal structure ossified in any of the children. A thin line of high density was seen in the expected location of the thyroid cartilage in some children.

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Normal pediatric larynx

- Uncalcified laryngeal cartilaginous structures.
- The supraglottic airway contour is triangular or oval, the glottis was shaped like a teardrop, and the subglottic contour was oval.
- Hudgins et al., 1997
- The subglottic airway increases considerably in size during the first 2 years of life (from 13 to 28 mm). Further growth seems to follow a linear mode.
- Eckel et al., 2000

Summary of differences in pediatric larynx

- Not a mini me
- Size
- Position
- Consistency
- Shape

Normal vibratory characteristics in kids

- Patel et al.
- Increased open phase
- Posterior gap (boys and girls, but more common in girls)
- Hourglass closure without lesions (boys)
- Large glottic cycle aperiodicity
- Hypothesis
- Larger cartilaginous glottis as compared to membranous vocal fold.
- Rate of growth of membranous vocal fold
- Differences in layer structure and viscoelastic properties
- Immature body-cover
Production of Sound

- Subglottic pressure
- Supraglottic pressure
- Glottic closure
- Glottic tension
- Mucosal wave
- Shaping of sound

Voice Disorder

- Change in:
  - Quality
  - Resonance
  - Pitch
  - Loudness
  - Effort

- Negative impact on:
  - Communicative effectiveness
  - Social development
  - Scholastic performance
  - Self-esteem

Onset of Pediatric Dysphonia

- Since Birth
  - Congenital
  - Neurologic

- After Birth
  - Anatomic
  - Neurologic
  - Neoplastic
  - Inflammatory
  - Infectious
  - Iatrogenic

Pediatric Dysphonia

- Kids are susceptible to the same voice disorders as adults
  - Nodules (bilatera)
  - Cysts
  - Polyps
  - Edema
  - SRF
  - Irritable larynx
  - Chronic Cough
  - Paradoxical Vocal Fold Motion

- Subglottic Stenosis
- Muscle tension dysphonia
- Vocal fold paralysis
- Laryngeal web
- Laryngomalacia
Typical pediatric laryngeal pathology
- Subglottic stenosis
- Nodules
- Laryngomalacia
- Dysphonia without pathology
- Vocal fold paralysis

Dobres, et al. 1990

Pediatric Voice Team
- Pediatric ENT
- PCP/Pediatrician
- Speech Language Pathologist
- Pediatric Asthma/Allergy Specialist
- Pediatric Pulmonary Specialist
- Pediatric Gastroenterologist
- Pediatric Neurologist
- Pediatric Psychologist

Evaluation of Pediatric Dysphonia
- History
- Baseline data
- Visualization
- Diagnosis

History
- Complete case history
- Pregnancy and birth
- Developmental
- Other medical issues
- Date of onset
  - Since birth
  - New onset
- Associated difficulty
- Swallowing
- Breathing
- Patterns of hoarseness
  - Intermittent
  - Recurrent
  - Persistent
  - Progressive
Vocal hygiene questions

- Evidence of:
  - Yelling
  - Screaming
  - Making odd noises with voice
  - Extreme emotions

- Behaviour patterns:
  - Activity level
  - Sleeping
  - Eating
  - Siblings

History

- Signs/Symptoms of reflux
  - Burning in throat
  - Burping
  - "Owlie" burps
  - Lump in throat
  - MTU's (Mini throw ups)
  - Coughing
  - Throat clearing
  - Worse at night or morning

Laryngopharyngeal Reflux and Children

http://www.entnet.org/?q=node/1455

- Chronic cough
- Hoarseness
- Noisy breathing (stridor)
- Croup
- Reactive airway disease [asthma]
- Sleep disordered breathing (SDB)
- Spitting up
- Feeding difficulty
- Turning blue (cyanosis)
- Aspiration
- Pauses in breathing (apnea)
- Apparent life threatening event
- Failure to thrive (a severe deficiency in growth such that an infant or child is less than five percentile compared to the expected norm)

Laryngopharyngeal Reflux and Hoarseness

- Various studies
  - 62% of hoarse children
  - 72% of children with otolaryngologic symptoms
  - 70.5% of children with hoarseness for more than 6 months.

- Behavioural management
- Medical management
- H2Blockers
- PPI
- Typical recommendation
  - 3-month prescription, 1-2x daily, 10-20mg (dependent on weight)
  - 30 minutes before dinner, or, 30 minutes before competition/physical exercise.
GERD and Asthma
- Allergy/Asthma history
- 50-60% incidence of GERD in children with asthma
- May cause, aggravate or trigger bronchial obstruction

Symptoms
- Hoarseness
- Sore throat
- Thoracic pain
- Cough
- Wheezing

Pediatric Voice Handicap Index
Zur et al., 2006

Pediatric Voice Outcomes Survey
Hartnick et al., 2002

Pediatric Quality of Life
“...The PVRQOL is a more comprehensive survey than the previously validated Pediatric Voice Outcomes Survey and is another valid instrument to examine the health-related quality-of-life issues in pediatric voice disorders.”
Boseley et al., 2006
GRBAS scale - Scale of 0-3

- Grade
- Roughness
- Breathiness
- Asthenicity
- Strain

Example: G3R2B3A3S2

The rating is made by assessing day of evaluation conversational speech or when reading a passage.

Instrumental/Non-instrumental Voice Assessment

- Perceptual assessment
- Pediatric Voice Handicap Index
- Pediatric Voice Outcomes
- Pediatric Voice Related Quality of Life
- GRBAS
- CAPE-V
- Maximum Phonation Time
- S/Z ratio
- http://www.fon.hum.uva.nl/praat/
- Audio recording
- Video recording
- Other acoustic parameters if you have the equipment/software
  - Fundamental frequency
  - Frequency range
  - Intensity range
  - Jitter
- Free Acoustic Software: http://www.fon.hum.uva.nl/praat/

Laryngeal Visualization

DO NOT TREAT WITHOUT IT
Assessment of Structure
- Halogen light
  - Gross assessment of laryngeal structure
  - Glottic margins
  - Color of laryngeal tissue
  - Symmetry of arytenoid complex
  - Arytenoid movement
- Signs of LPR
  - Erythemic (red) laryngeal tissue, particularly in posterior larynx
  - Edema – particularly of the infraglottic edge
  - Described in literature as “pseudosulcus”

Assessment of Function
- Xenon/Stroboscopic light
  - Pliability of vocal fold mucosa
  - Edge pliability
  - Mucosal wave/mucosal upheaval
  - Adynamic segments
  - Glottic closure pattern
  - Symmetry
  - Periodicity
  - Open/Closed Quotient
  - Hyperfunction

Flexible Fiberoptic Nasendoscopy
- Important to have right equipment - infant and pediatric flexible endoscope
- Important to have knowledge and skills necessary for airway evaluation

Flexible Endoscopy
- Allows view of the infant and pediatric larynx
- Allows view of entire larynx and nasopharynx
- Images during connected speech
- Smaller overall laryngeal image
- Cannot always see stroboscopic assessment
- May miss small pathologies
- About 40% of laryngeal pathologies are missed with flexible endoscopy when stroboscopic light is not used
Rigid Endoscopic Assessment

- Rigid endoscopy
- Allows increased magnification of the larynx
- Better able to see mucosal wave if light is adequate
- Better able to see laryngeal detail for more accurate diagnosis of disease (MD) and laryngeal function (SLP)
- Can only assess phonation on sustained /ɪ/

Flexible vs Rigid

- Flexible
  - Birth to 8
  - Complete upper airway exam
  - Velopharynx
  - Optics not as good

- Rigid
  - 8 and up
  - Depends on anatomy
  - Great optics
  - Larynx Hypopharynx
  - Not tolerated by some

Reasons to look

- Kids will surprise you!
- And so will the teenagers!

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Clinical Assessment Questions

1. Is the child’s vocal quality what you would expect given how the laryngeal tissue functions?

2. Is the child using more effort than needed to produce voice?

3. Is there a role for the SLP when the laryngeal tissue appears severely-profoundly permanently damaged?

Is the child’s vocal quality what you would expect given how the laryngeal tissue functions?

- Yes - your therapy goals may target:
  - Reducing effort
  - Reducing phonotrauma
  - Improvement of laryngeal tissue, e.g., nodules, cyst, edema
  - Preservation of laryngeal tissue, e.g., hemorrhage

Is the child using more effort than needed to produce voice?

- This may be a second therapy goal, or
- This may be just as important as clearer vocal quality.
- The perception of effort is a sensitive measure of improvement in therapy.
- Can you help differentiate effort vs. strain?
Is there a role for the SLP when the laryngeal tissue appears severely/profoundly permanently damaged?

- Occasionally, there is little hope of improving vocal quality, e.g., scarring, repeated surgery for RRP.
- Decreasing effort in spite of this may dramatically improve the child's quality of life even if vocal quality does not improve.

Options for treatment

- Do nothing
- Vocal hygiene alone
- Medico-surgical management
- Behavioural Voice therapy

Do nothing

- No medical complications
- Not having an impact on life
- Family or child does not wish to pursue
- Anticipate limited compliance (very hard to judge)

Vocal hygiene alone

- At least one session with parents/caregivers
- Provide written material
  - Pleasing to the eye
  - Easy to read
- Bring back for re-evaluation in 12 weeks
- May have phone contact with family
- Always leave open option for treatment
Medico-surgical management
-Extremely rare.
-Airway compromise,
-Recommend complete course of voice therapy prior to phonosurgery (with the possible exception of RRP).
-Requires at least 24 hours of voice rest and 1-2 weeks of voice conservation,
-Risk for scar tissue
-Risk for recurrence.

Visual biofeedback
-Review examination with the child and parents.
-Explain why laryngeal findings cause hoarseness.
-Explain risks of lesions.
-Reassure it is not cancer or other life threatening problem.
-Help child and parent understand short and long term benefits of behavioral therapy and empiric treatment for reflux.

Behavioural voice therapy
-The child, the family and the speech language pathologist must:
-Understand the diagnosis
-Understand the impact of the voice disorder on communication
-Be Motivated, Cooperative and Reliable
-Be COMPLIANT!

Behavioural voice therapy
-Ages 1-4
-Behavioral management of communication environments by parents, caregivers
-Education of parents regarding
-voice use and vocal hygiene,
-Level of emotions while speaking (parent and child)
-Encouraging quiet time
-Education of siblings for support
-Importance of communication
Behavioural Voice Therapy

- Age 4 and older (some exceptions to this guideline)
- 6-8 sessions
- 50 minutes each
- Weekly at first, then spaced out further
- Begin with basic exercises, gradually build to conversation
- Home practice is important!
- Collaboration with any other speech pathologists involved

Role of parents and family members

- Addressed directly in first session, reminders and discussion as needed thereafter
- Good for your voice / Not-so-good for your voice
- Hydration-water, avoidance of caffeine
- Behavioural management of Reflux (if needed – plays a role for many children with nodules, even when asymptomatic medication, avoidance of / moderation with reflux-associated foods, other precautions)
- Good vocal health-avoid yelling and screaming, periodic voice rest, non-vocal creative/energetic activities, resting the body, etc.
- Education rather than admonishment
- Discussion of choices

In the treatment session

- Child as clinician
- Immediately begin training self-judgment skills.
- Children will require more direct feedback than adults [contrary to motor learning principles]
- Identification of clinician productions
- Positive/negative practice
- Self-judgments of productions
- Rating scales

Role of parents and family members

- Increasing motivation
- Positive feedback
- Approach from perspective of fun, not punishment
- Especially for pre-operative voice therapy
- Voice rest does not equal thumb twiddling
- Find ways to make it special for the child
- Need to be concrete in recommendations
- Functional reminders throughout the day
- Charting home practice
- From Post-It notes to Turkey baster

In the treatment session

- Child as clinician
- Immediately begin training self-judgment skills.
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Goals

- Goals are relatively the same from peds to adults
  - Improve vocal hygiene
  - Decrease/eliminate phonotrauma
  - Improve voice quality
- Considerations for pediatric population
  - Abstract concepts
  - Importance/motivation/compliance
  - Attention span
  - Self-monitoring skills
- Some targets are easier for kids than adults
  - Decrease/eliminate shouting
  - Animal noises
  - Muscle tension
  - Throat clearing
- Improve shouting technique
  - Lessac “Call”

Include goals specific to the child

- Decrease/eliminate
  - Shouting
  - Animal noises
  - Muscle tension
  - Throat clearing
- Improve shouting technique
  - Lessac “Call”

Hydration

What we know

- Dehydration of the vocal folds increases phonation threshold pressures
- Some evidence for increased systemic and superficial hydration in promoting laryngeal health
- In bench models, hydration treatments may optimize vocal fold biomechanical properties
- In human subjects, investigations on the beneficial phonatory outcomes of current hydration treatments (e.g., increasing water intake, humidifying ambient air, nebulizing solutions into the airway) have revealed positive trends of varying degree.

What we don’t know

- What clinical recommendation is the best?
- Is there an optimal treatment that has sustained, beneficial effects on voice?
- Is hydration, systemic or superficial, prophyactic or therapeutic?

Hydration

Systemic hydration

- Internal hydration of the entire body that keeps the skin, eyes, and all other mucosal tissue healthy.

Superficial hydration

- The moisture that keeps the epithelial surface of the vocal folds slippery enough to vibrate easily.
Hydration Recommendations
- Combination of systemic and superficial hydration methods
- Systemic hydration is good for all bodily systems
- Superficial hydration
  - Increase ambient humidity
  - Get mouth to water to activate mucous secreting system
  - Hard candies
  - Wet snacks
  - Mucolytic/Guaifenesin
  - Steam inhalation
  - Humidifier

Pre-operative Voice therapy
- For kids undergoing surgery
- Two to three days complete voice rest,
- No whispering, laughing, throat clearing, etc.,
- Three days gradual reintroduction of voice,
- Limit talking to asking/answering questions,
- Frequent completion of voice exercises,
- Strict vocal hygiene
- Three days continued reintroduction of voice,
- Frequent voice rest, continued use of exercises

Post-operative voice therapy at one week

Relaxation and breathing exercises
- Teach parents and recommend daily practice.
- Blow up chest like a balloon, let the air out
  - s-l-o-w-i
- Hiss like a snake to let the air out
- Rag doll relaxation
- Continuum: lying, slouching, sitting up
- Put with voiceless, then voiced sounds to reinforce pattern in speech activities
- Feather/Paper blowing contests
- Physical stretching - head and neck release
- Yawn-sigh

Resonant Voice Therapy
- Goal: achieve barely abducted, barely adducted glottal configuration
- Barely aBducted -> not pressed -> decreased respiratory drive/effort
- Barely aDducted -> sharp and complete shut-off of flow -> bigger changes in density of air in sound wave -> sensation of facial vibration
Resonant Voice Therapy
- High amplitude but low impact stress
- Strong, functional voice (vs. confidential voice therapy)
- Follows principles of motor learning
- Paying attention to effects of a motor activity as a target (anterior vibrations)
- Focus on kinesthetic awareness to solidify learning

Resonant Voice: Hierarchy of Targets
- Lip trills—a good warm-up
- Mmmm
- Sustained, pitch glides
- M+vowels, repeated
  - /mamama/, /mumumu/, /mimimi/
- Chanted and exaggerated prosody can help bridge to natural production
- M-initial words, phrases

- Voiced continuants (/v, z, n, r, l/, “-ng”) Sustained, pitch glides
- Positive/negative practice helps with these
- Voiced continuant loaded words, phrases
  - /u/ vowels and /m, n/ will be facilitators room, vacuum, lion, zoom, lemon, etc.
- Draw attention to “buzzy sounds” to facilitate success
- Use chant and/or exaggerated prosody as needed
- Sentences
- Reading
- Conversational activities

Resonant Voice
- Immediate need for real world applications of “buzzy voice”
- Begin addressing carry-over ASAP
- Ideas for this:
  - Imagery—find a name for the forward voice
  - Start pointing out spontaneous use of clear/scratchy, buzzy/not buzzy in conversation right away
  - Family member names
  - Functional sentences
  - Embedding targets in session activities (i.e., memory with /m/ cards, Guess Who, reading, 20 questions)
Resonant Voice

- Child as clinician
- Immediately begin training self-judgment skills
- Improve sensory awareness, imagery
- Children will require more direct feedback than adults
- Identification of clinician productions
- Positive/negative practice
- Self-judgments of productions
- Rating scales

SOVT (semi-occluded vocal tract)

- Lip trills
- Tongue trills
- Straw phonation
- Lax Vax
- Kazoo buzz
- Card buzz
- Cup buzz
- Straw bubbles
- "buzzy" humming


Vocal Function Exercises (Stemple)

- "A series of direct, systematic voice manipulations (exercises), similar in theory to physical therapy for the vocal folds, designed to strengthen and balance the laryngeal musculature, and to improve the efficiency of the relationship among airflow, vocal fold vibration, and supraglottic treatment of phonation."

- Warm-Up
- Stretching and Contraction
- Power

LSVT type exercises (www.lsvtglobal.com)

- Loudness
- Effort
- Loudness drives the system
- Systematic scaling up of the communication mechanism

- Ah – loud, as long as possible
- Ah to high pitch
- Ah to low pitch
- **Functional phrases
Laryngeal Massage/Reposturing

Step 1: Put your pointer and middle fingers horizontally across your throat (larynx).
Step 2: Swallow to find the notch of the thyroid cartilage (also sometimes called your “Adam’s Apple”).
Step 3: Once you have found that notch, move your fingers up until you feel the bone above the soft tissue (Hyoid bone).
Step 4: Put your pointer finger and your thumb on both sides of the hyoid bone, so that you feel the bony ends of it.
Step 5: Begin to massage above the bony ends of the hyoid bone in a back and downward motion, until you feel the muscles loosening.
Step 6: Continue to massage your larynx (throat) while pulling downward.

Challenge with kids

Some children may not ever have had normal (not hoarse) voice production.

Awareness questions

- How is your voice?
  - Same
  - Better
  - Worse

- Beginning and End of session

- Show me how you are doing your exercises at home.
  - When do you do them?

- What did you learn about your voice today?

Increasing motivation (and compliance)

- Physical motivators
  - Less tired
  - Less pain
  - Feels good

- Social/communicative motivators
  - Ability to be heard
  - Ability to be understood
  - Sound like other kids
  - Not teased
Increasing motivation

- The COOL factor
- Strawberry smoothie voice, Superman voice, Motorboats
- Functional reminders throughout the day
- Turkey baster
- Post-it notes
- Limit parent criticism
- Assure them they don’t have to be the “Voice Police”

Paradoxical Vocal Fold Motion

- Breathing attack—trouble breathing in, in response to a trigger.
- Laryngeal airway disorder defined as approximation of the vocal folds during inspiration rather than abduction, which can result in upper airway obstruction and stridor.
- Can co-occur with asthma (50-75%)
- Often misdiagnosed as asthma (inhalers don’t work)
- Highly competitive female teenage athletes
- Multiple chemical sensitivity


Paradoxical Vocal Fold Motion

- Spirometry
  - Asthma – truncated exhalation
  - PVFM – truncated inhalation

Paradoxical Vocal Fold Motion

- Before the Speech Path:
  - Evaluate/treat/Rule-out
  - Asthma
  - Cardiac contributors
  - Chest x-ray
  - Reflux

- Once other airway disease has been diagnosed and treated, persistence of unmanaged breathing attacks should be referred to the specialized Laryngologist and Speech Language Pathologist.
Childhood Singers

- Singers may be significantly impaired by subtle laryngeal changes that may be considered within the normal range of variability in the general population.
- Singers as athletes
  - Using a higher percentage of total vocal ability

Childhood singers

- Motivation and compliance
  - Willingness to explore
  - More attuned to subtle changes?
- Emotional concerns
  - Consequences of dysphonia
  - The connection of the voice to self-concept

Assessing the Singer

- Adult vs. adolescent singers
  - Fully developed vs. developing larynx
- "Trained" vs. "untrained" singers
  - Training varies widely
  - Classical training or voice coaching?
- Professional vs. avocational singers
  - Demand on vocal mechanism
  - Different stress levels (money, career, etc.)
  - Commitment is high in both groups

Adolescent Voice

- Type of training
  - Classical
  - Musical theatre
  - The "Annie Syndrome"
    - Belting
    - Strenuous laryngeal muscle use
    - High collision
    - Shearing forces on the vocal folds
- Parental dynamics and expectations
  - Enjoying singing vs. meeting parental hopes
- Director dynamic and expectation
  - Enjoying singing vs. meeting director wants/needs
Childhood singers
- If you have a child who is serious about singing:
  - Treat the instrument
  - Get a good voice teacher

My Voice Book
Easily adapted for any age

My Voice Book
- Anatomy and physiology
- Vocal awareness
- Vocal hygiene
- Sensory awareness
- Exercises

Anatomy and Physiology
My vocal folds are two muscles in my throat.

When I breathe in, they blow up like a balloon.

My lungs are like two sacks in my chest.

Air from my lungs moves my vocal folds.
When my vocal folds move, they make a sound I call my voice.

I have two bumps on my vocal folds that make my voice sound hoarse.

I use my mouth, lips teeth and tongue to talk to people.

Vocal awareness and hygiene
Ages 1-4

I LIKE TO PLAY
OUTSIDE

I USE MY VOICE
TO TALK TO MOM
AND DAD

Ages 1-4

I CAN STRETCH
TALL

I CAN BE RAG
DOLL
Vocal awareness and hygiene

- Things I can do to help my voice.
- Things I do to hurt my voice.
- I know the places where I use my voice correctly.
- I know the places where I use my voice incorrectly.
- Games I can play with a quiet voice.
- Changes we can make at home to help my voice.
Things I do to help my voice:

- Yelling
- Calling
- Working

Words to describe voices:

- Sinister
- Nework
- Softer
- Caused
- C. T.
- A.
- Bad
- Ender
Sensory Awareness

- Things that are rough.
- Things that are smooth.
- My voice feels good when...
- My voice doesn’t feel good when....

Some other ideas

- Fishing game
- Sensory awareness tasks
- Voice use chart
  - Have the child generate activities
- Reinforcement chart
  - Have parents help with positive reinforcement
- Quiet time chart
  - Have the child generate activities
  - Maintain involvement of parents

Fishing game

- Pretend to call mom with a loud voice.
- Pretend to call mom with a soft voice.
- Close your eyes and say....
- Where do you feel your voice?
- Hum with your lips closed tight.
- Hum with your lips loose.
- Which one felt better?
- Which felt tight?

Voice use chart

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<td>DRINK WATER</td>
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<tr>
<td>I PLAYED OUTSIDE, AND DID NOT YELL OR SHOUT</td>
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<tr>
<td>I TOOK CLOSE TO MOM AND DAD WHEN I TALKED TO THEM</td>
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<td>I WENT TO FIND MOM INSTEAD OF YELLING FOR HER</td>
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<tr>
<td>I WENT TO FIND DAD INSTEAD OF YELLING FOR HIM</td>
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<td>I PRACTICED MY VOICE EXERCISES</td>
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Quiet time chart

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<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
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<tr>
<td>Read</td>
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<td>Life</td>
<td></td>
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<tr>
<td>Puzzles</td>
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<tr>
<td>Angelina</td>
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<tr>
<td>Read</td>
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<td></td>
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<tr>
<td>Play with puppets</td>
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<tr>
<td>(regular quiet voice)</td>
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</tbody>
</table>

Journal

- Dependent on age
  - Reflux symptoms
    - When
    - After what meal
- Voice awareness
  - Better/worse in morning
  - Muscle tension (whole body)

Journal - Stressful situations

- Who
  - Coaches
  - Teachers
  - Parents
  - Peers

- What
  - Homework
  - Sports
  - Classes
  - SCHEDULE!
Case example

- 8 year old boy adopted from Chinese orphanage
- Bilateral true vocal fold nodules
- Flexible fiberoptic nasendoscopy

Treatment

- Initial findings/concerns
  - Hourglass closure
  - Significant extrinsic muscle tension
  - Impaired conversational intelligibility
  - Voice breaks
  - Voice loss

- 10 tx visits, including prep for class presentation
- Voice book for kids
- Great parental support
- Classroom presentation
- Examination presentation
- Vocal hygiene poster
- Stickers
- Tuna can/rubber band demonstration

Stickers for classmates

You have no choice, use your voice!
PROPERLY!

Help Us OUT-
Please Don’t Shout

I Scream!
You Scream!
Don’t Scream!

Your voice is a gift
Don’t wear it out.

Post treatment visualization –
Was therapy successful if the lesions are still there post treatment?

- YES!
  - Goals met:
    - Improved glottic closure
    - Decreased musculoskeletal tension
    - Improved vocal hygiene
    - Improved quality and intelligibility
    - Decreased aphonic breaks
    - Eliminated episodes of voice loss

Successful treatment of pediatric hoarseness

- **Complete** investment and support of parents, caregivers.
  - Home follow through
  - School support
  - Compliant with medication
  - Compliant with therapy appointments
  - Compliant with supporting home exercises
  - Good voice models

Successful therapy

- How important is voice to the child?
  - Can you help explain importance of voice?
  - Participation in sports
  - Communication with friends
  - Singing
  - Theatre
  - Pain/soreness/discomfort

Successful Therapy

- Child aged 2-4 should have some very simple degree of understanding
  - Right/wrong way to call mom in the house
  - Inside/Outside voice
Successful Therapy

- Older kids
  - Hoarseness must be having an impact on their life.
  - Healthy voice production must be meaningful to the child
    - Feels better
    - Sounds better

Don’t shy away from voice therapy

- Plenty of resources.
- Have a good understanding of WHY the exercises work.
- Very rewarding therapy for child and clinician.

Advice to the SLP performing pediatric voice therapy from Maia Braden, Manager Pediatric Voice Therapy UW -Madison

- Go beyond vocal hygiene
- Teach children healthy voice exercises
- Teach children a healthy way to use their voice
- Replace (rather than eliminate) unhealthy vocal behaviors
- Help them develop a voice that is functional and comfortable. Once it **feels** easier, generalization becomes easier
- You don’t need fancy equipment – you can use your ears and eyes

Advice to the SLP performing pediatric voice therapy from Sarah Blakeslee, MA CCC-SLP

- Focus on **actual vocal technique** for talking, not just DO’s and DON’Ts.
- Make it **simple and concrete** – How does it sound? How does it feel? Be able to demonstrate [+] and [-] in your own voice to help them learn.
- Make it **rewarding** – stress why this is important to their daily lives [being heard/understood, less pain, less effort, not losing voice, etc.]
- Make it **meaningful** – use relevant stimuli (family member names, sentences they say often, conversation about favorite topics)
- Make it **fun!** – play games, be silly, let them judge your productions, etc.
Resources

- Net connections for communication disorders:
  - [http://www.mnsu.edu/comdis/kuster2/sptherapy.html#voice](http://www.mnsu.edu/comdis/kuster2/sptherapy.html#voice)
- Teachers Pay Teachers
  - A lot of speech material and a lot is free, or very low cost
  - [http://www.teacherspayteachers.com](http://www.teacherspayteachers.com)
- Lax Vox
- Titleze Straw video link
  - [https://www.youtube.com/watch?v=OyDwmmB1M](https://www.youtube.com/watch?v=OyDwmmB1M)

NCVS – [www.ncvs.org](http://www.ncvs.org)

### Information for Young Explorers

- **An Incredible Journey**
  - About thirty years ago, there was a neat movie called *Fantastic Voyage*. In it, a group of scientists shrunk themselves (and their submarine) into teensy proportions and traveled through a human's body to save his life. Well, we thought that idea was just too cool to ignore. So, take your own incredible journey inside the body's vocal system.

- **Science Fair**
  - The investigations of the National Center for Voice and Speech conduct experiments to learn more about how people talk and sing. But you won't need to be a PhD to try some of the fascinating science explorations we'll present here. (Hint: Some of the ideas would make great school projects.)

- **Beastly Babble**
  - A set of explanations, quizzes and exercises to jumpstart your thinking: how do animals communicate differently than humans? How do members of the same species always understand one another? Is animal chatter understandable between different species?

- **How We See How We Sound**
  - We know that voice is really just air formed into sound waves that we can hear. So, how do scientists and doctors study the voice? Finding out if a person has a broken voice can't be as easy as finding out if someone has a broken leg. Or is it?

- **What's Your Vocal IQ?**
  - How much do you know about how your voice works? Sure, there's stuff about speaking and singing, but we didn't forget the fascination about ho-ho-ho, whispering, burping or giving somebody the raspberry either. Immediate scoring lets us know how much vocal homework you may need to do...

Oldie but a goody


KayPentax

- [www.kayelemetrics.com/](http://www.kayelemetrics.com/)
- Software packages with the Computerized Speech Lab and the VisiPitch IV, offer customizable computer games that motivate with activities for voicing, timing, pitch level and control, and amplitude
Great voice techniques

- Lessac A., The Use and Training of the Human Voice

Boone Voice Therapy Program
proedinc.com

- Changing Horizontal Focus
- Changing Loudness
- Changing Vertical Focus
- Chewing
- Ear Training
- Eliminate Hard Glottal Attack
- Establish New Pitch
- Explanation of Problem (Counseling)
- Masking
- Open Mouth
- Pushing
- Yawn-Sigh
Voice Volume Scale

0 = No Talking
1 = Whisper
2 = Soft Voice
3 = Regular Voice
4 = Loud Voice
5 = Yelling

Making Kazoos

Materials:
• Paper
• Scissors
• Tape

Instructions:
1. Cut a piece of paper into a half circle.
2. Tape the two sides together to form a cone.
3. Blow into the cone to make a noise.

Homemade Stress Balls

1. Cut a piece of paper into a half circle.
2. Roll the paper into a cone shape.
3. Place a small object inside the cone.
4. Tape the sides together to hold the object inside.

The teacher is talking to someone who is hurt.

You are playing with a friend at their house.

You and some friends are in your mom's car. It's snowing, hard and your mom is nervous.


http://www.asha.org/CE/for-providers/Evidence-Based-Practice-CE-Providers Accessed October 12, 2014