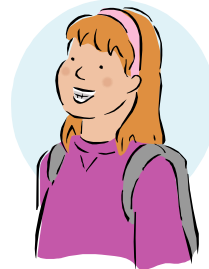


Voice disorders: Children



This booklet aims to assist Speech Pathologists with their assessment and treatment procedures when working with voice disordered children.

1. Common questions
2. Assessment procedures
 - a. Background Information
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1. Common questions when treating a child with a voice disorder

Who are children with Voice Disorders?

Speech Pathologists will most likely encounter a school aged child with a voice disorder in their caseload (Hooper, 2004; Lee et. al., 2003; Glaze, 1996).

The frequency of occurrence of children with a voice disorder is 1%-23.4% (Hooper, 2004; Lee, Stemple, Glaze, & Kelchner, 2003). The referral for the assessment and treatment of a child with a voice disorder may come from a variety of sources, including a family member, family doctor or a school teacher.

What types of voice disorders do children develop?

Children with a hyperfunction voice disorder represent a large proportion of the Speech Pathologist's child voice caseload (Glaze, 1996).

The common symptoms of a hyperfunction voice disorder are:-

- ❖ dysphonia (hoarse, breathy or rough voice)
- ❖ intermittent aphonia
- ❖ voice and pitch breaks
- ❖ excessively loud voice and/or
- ❖ effortful or strained voice

(Glaze, 1996; Hooper, 2004; Lee, et. al., 2003)

The most common behavioural cause of a child's hyperfunction voice disorder is excessive shouting.

Other common behavioural causes may be :-

- ❖ a habit of yelling from room to room in the house
- ❖ screaming to another child in the playground
- ❖ speaking with funny noises or character voices
- ❖ excessive talking
- ❖ poor breath support for voicing

All of these behaviors — shouting, screaming, yelling, excessive talking — can result in serious vocal abuse problems.

A voice disorder may have organic causes:-

- ❖ vocal nodules
- ❖ vocal fold paralysis
- ❖ polyps on the vocal folds
- ❖ papillomatosis
- ❖ submucosal cysts

Other causes may be environmental or psychosocial e.g. cultural, family divorce, a death in the family.

The following disorders may co-exist or contribute to a child's voice disorder:-

- ❖ articulation disorders
- ❖ language disorders
- ❖ mild hearing impairment
- ❖ upper respiratory tract infections
- ❖ allergies
- ❖ asthma
- ❖ gastroesophageal reflux

Should children with voice disorders be treated?

There are differing opinions as to whether a child with a voice disorder should be treated. Some researchers believe treating voice disorders in children is "unnecessary or potentially harmful" (Lee, et al., 2003). While other researchers strongly advocate treating a voice disordered child (Glaze, 1996; Hooper, 2004). These researchers believe that as the voice disordered child grows and develops, the child may have trouble "outgrowing" their voice disorder and may develop a permanent "bad" voice. Also those who advocate treating voice disorder in children believe that if a child's voice disorder is not treated, secondary issues may develop (Hooper, 2004).

Such issues may include:-

- ❖ low self esteem
- ❖ poor academic performance
- ❖ reduced motivation
- ❖ increased aggression

Does the voice therapy provided differ between children and adults?

No!!!

However there are subtle differences to be considered when planning treatment. Speech Pathologists need to consider

- the child's changing and developing vocal anatomy compared to an adult's developed vocal anatomy. Some therapy activities may not be as responsive due to the child's developing vocal tract, developing respiratory anatomy or when a child is experiencing "vocal changes related to puberty".
- the child may not have a predetermined awareness of a normal voice having grown up with a disordered voice
- the child may not have the motivation to change their disordered voice

What are the treatment programs for children with voice disorders?

Researchers have reported that the most effective treatment programs for children incorporate several therapy techniques (Glaze, 1996; Hooper, 2004; Lee, et. al., 2003). Researchers (Hooper, 2004; Glaze, 1996) advocate that treatment programs involve the child's parents and school. The treatment programs for children with voice disorders include:-

- ❖ Education
 - General awareness of vocal behaviours
 - Change specific vocal behaviours
- ❖ Vocal hygiene programs
- ❖ Direct vocal therapy / vocal production activities
- ❖ Generalization / carryover activities

Surgical procedures are a treatment option, however they are rarely recommended.

The Speech Pathologist may also need to provide therapy for other aspects of communication including speech and language, speech or voice related to a hearing loss, interpersonal / pragmatic skills and/or psychological issues e.g. family breakups.

References:-

- Glaze, L.E. (1996). Treatment of Voice Hyperfunction in the Pre-Adolescent. Language, Speech, and Hearing Services in Schools, 27, 244-250.
- Hooper, C. R. (2004). Treatment of Voice Disorders in Children. Language, Speech, and Hearing Services in Schools, 35, 320-326.
- Lee, L., Stemple, J.C., Glaze, L., & Kelchner, L.N. (2003). Quick screen for voice and Supplementary Documents for identifying Pediatric Voice Disorders. Language, Speech, and Hearing Services in Schools, 35, 308 - 319.

2. Assessment procedures

Assessment procedures for children with voice disorders involve gathering background information and a voice analysis.

a) Background Information

The best method to obtain relevant background information is talking to the child's

- ❖ Parents
- ❖ caregivers
- ❖ school teachers
- ❖ doctors

It is important that the Speech Pathologist gathers background information on

- ❖ Medical / health history e.g.
 - hearing
 - upper respiratory infections
 - colds, sinus, tonsillar infections, congestion, post nasal drip, asthma, allergies
 - reflux / heartburn
- ❖ Vocal Demands e.g.
 - talking too long, too loud, too much effort
 - communication competition
 - yelling around the house or outside, calling from room to room
 - against background noise e.g. television, radio, other appliance noise
- ❖ Psychosocial e.g.
 - family relationships e.g. divorce, death
 - peer relationships
 - attention deficit disorders
 - anxiety disorders
 - child's personality
 - behaviour issues
- ❖ Developmental history e.g.
 - Does the child have a history of speech, language or other communication issues that may have caused a vocal disorder?

Once the relevant background information is obtained, the Speech Pathologist must gather objective and perceptual voice measurements. If the child is not responsive, ask the caregiver to help elicit the voice tasks. Multiple trials may be required.

i) Checklist handout

The following checklist can be used to gather background information of the child's voice disorder with parents, teachers and other significant individuals of the child's life.

- Coughs, clear throat, chokes frequently
- Experiences breathing and swallowing problems
- Frequent sore throat
- The child's voice sounds rough, hoarse, breathy, weak, strained
- Loss of voice whenever a cold occurs
- Voice sounds "stuffed up" or speaking through their nose
- Voice sounds worse in morning, after school or evening
- Continually shouts, screams, cries
- Likes to sing and perform
- Frequently uses character voices
- Voice sounds like it's being pushed out
- Voice "runs out of gas" or tires easily
- Yells and screams at sports activities
- Unfamiliar listeners have difficulty understanding your child
- Talks loudly, even in quieter environments
- Voice problem is affecting school performance
- Voice is unusually quiet
- Stays up late
- Is unhappy or tired a lot
- Is experiencing difficult social changes e.g. death, divorce, financial problems in the family
- Does not express emotions
- Lives with a family of loud talkers
- *Smokes or exposed to smoking environments
- *Drinks alcohol
- Frequently eats junk food, complains of sour taste in mouth or burning sensation in throat
- Drinks caffeinated beverages (coffee, tea, Red Bull)
- Drinks little water per day
- Suffers from allergies, asthma or respiratory problems
- Hearing loss or frequent ear infections (what type?, Hearing Aids?)
- Medication (further details)
- Any injuries to the head, neck, throat (further details)

- Surgeries (further details)
 - Any history of intubation at birth or later (further details)
 - Chronic illness / disease (further details)
- *cultural influence

Adapted from:

Oates, J. (2003). HCS 22CVL Disorders of Voice and Laryngectomy Rehabilitation. Bundoora.: La Trobe University.
Lee, L., Stemple, J.C., Glaze, L., & Kelchner, L.N. (2003). Quick screen for voice and Supplementary Documents for identifying Pediatric Voice Disorders. Language, Speech, and Hearing Services in Schools, 35, 308 - 319.

b) Voice Measurements

*1. Elicit a spontaneous speech sample for approximately 1 minute.

You may ask the child to describe a picture; play games; read a story; talk about the child's favourite music, pets, food, school activities etc...

* Audio record the child's speech sample for objective voice analysis - pitch analysis.

While the child is speaking, perceptually observe and record:-

Respiration technique for voicing

Voice Quality and Resonance Quality - record observations according to the Russell & Oates Profile (Handout section)

If you suspect a resonance disorder, further testing may require the child to recite the following phrases

Chocolate chips	66 sausages
Big blue bus	Fish for fish
Man	Mean man
Vowel prolongations	

Note:- hyponasality or hypernasality, nasal escape, nasal emission, audible nasal escape, nasal grimace or mirror test.

2. Loudness

Ask the child to count 0 - 10 loudly

Ask the child to count 0 - 10 softly but not whisper

Model the task, and/or ask the caregiver to have a turn.

Observe and record according to the Russell & Oates Profile (Handout section)

3. Maximum phonation times

Ask the child to take a big breath and then say the sound _____ for as long as possible. Model the task, and/or ask the caregiver to have a turn.

Ask the child to say the sounds /a/, /i/, /u/, /m/, /s/, /z/. Record the times with a stopwatch. Use the values for /s/ and /z/ to calculate [s]/[z] ratios.

Compare results to normative data

4. Vowel prolongations

Ask the child to say sounds for a shorter time now.

Ask the child to take a breath and then say the sound _____ for 4 seconds. Model the task, and/or ask the caregiver to have a turn. Ask the child to say the sounds /a/, /i/, /u/.

Audio record the sounds for objective voice measurements of jitter, shimmer and harmonic-to-noise results. Compare results to normative data

*5. Maximum pitch range

Ask the child to "make your voice go from low to high". Model on the /la/ upward glide, and/or ask the caregiver to have a turn.

Now ask the child to "make your voice go from high to low". Model on the /la/ downward glide, and/or ask the caregiver to have a turn.

May use a fire siren sound or use a toy car pretending to go up and then down an imaginary hill.

* Audio record the child's speech sample for objective voice analysis - maximum and minimum pitch.

Perceptually observe and record the child's Voice Quality - record observations according to the Russell & Oates Profile (Handout section)

* As the child's voice anatomy is growing, pitch and pitch range tasks are used to observe and record vocal quality e.g. strain, voice breaks, vocal flexibility. Audio recording for computer analysis may be conducted for objective results.

Adapted from:

Oates, J. (2003). HCS 22CVL Disorders of Voice and Laryngectomy Rehabilitation. Bundoora: La Trobe University.
Lee, L., Stemple, J.C., Glaze, L., & Kelchner, L.N. (2003). Quick screen for voice and Supplementary Documents for identifying Pediatric Voice Disorders. Language, Speech, and Hearing Services in Schools, 35, 308 - 319.

c) ENDOSCOPY

If you suspect that an endoscopy procedure is required you must be aware that medical / surgical procedures may frighten a child. Below are some ideas to help reduce the anxiety that a child may experience.

- ❖ Explain the process - "The procedure is called laryngoscopy / nasendoscopy. An Ear Nose and Throat doctor looks at your voice box. The doctor tells the Speech Pathologist what your voice box looks like and how it is working when you speak"
- ❖ Involve the parent / caregiver to take part
- ❖ Show the equipment that is involved
- ❖ Meet the Ear Nose and Throat doctor
- ❖ Go on an excursion to visit the ENT's clinic
- ❖ Watch videos of the procedure
- ❖ If you have a younger child, perform a role play of the procedure. Pretend a toy needs to have a check up of the voice.
- ❖ Request the child's classroom teacher if the "Speech Pathologist" can visit the class to discuss the ENT procedure

d) Child Voice Normative Data

Table 1. Habitual Level - Child MALE

Age Range (years)	Reading Hz (Colton & Casper, 1996)	Speaking Hz Voice Manual (Oates, 2003)	/a/ Hz (Stemple, Glaze & Gerdeman, 2000)
Child		235 (range 170-310)	
7	294		226 (6 - 10 years)
10	270		
11	227		
14	242		

Table 2. Habitual Level - Child FEMALE

Age Range (years)	Reading / Hz (Colton & Casper, 1996)	Speaking Hz Voice Manual (Oates, 2003)	/a/ Hz (Stemple, Glaze & Gerdeman, 2000)
Child		235 (range 170-310)	
7	281		238 (6 - 10 years)
8	288		
11	238		

Scale Singing - Child (Voice Manual (Oates, 2003))

Mean range - 170 - 600Hz

Table 3. Maximum phonation times for vowels

Age Range (years)	Voice Manual (Oates, 2003)	Normal Mean in Seconds (Range) (Lee, Stemple & Glaze, 2003)
CHILD	10 to 15 secs (9-30 secs)	
3		7 (3-11)
4		9 (5-15)
5		10 (5-16)
6-7		13 (5-20)
8-9		16 (5-29)
10-12		20 (9-39) Males 16 (5-28) Females
13-17		23 (9-43) Males 20 (9-34) Females
18+		28 (9-62) Males 22 (6-61) Females

Table 4. [s] / [z] ratio

S/Z ratios indicate laryngeal-respiratory functioning.

Age Range (years)	Male (Colton & Casper, 1996)	Female (Colton & Casper, 1996)
CHILD		
5	0.92	0.83
7	0.70	0.78
9	0.92	0.91
10+	0.99	0.99

Jitter

Jitter refers to the aperiodicity or irregularity of vibratory behaviour of the vocal folds.

Normal jitter values should not exceed 1% (CSL) or 2% (Visipitch) of the mean fundamental frequency (Oates, 2003).

Shimmer

Shimmer refers to the variation of amplitude of the vocal folds from one vibratory cycle to the next during sustained vibration. Amplitude perturbations (shimmer) greater than 4% (CSL) indicate instability in vocal fold behaviour (Oates, 2003).

Harmonic - to - noise

Harmonic-to-noise (H/N) ratio is reflective of random, aperiodic noise at the level of the vocal folds. The average ratio is 11dB (Colton & Casper, 1996). A ratio below 1dB (Colton & Casper, 1996) can be a result of air rushing against the vocal folds or irregularity of vocal fold vibration.

Table 5. VOICE QUALITY "Description" (Oates, 2003)

Abnormal Quality	Physiological Correlate
Breathiness <i>Characterised by audible air escape</i>	Breathiness is a result of incomplete closure of the vocal folds
Roughness <i>Characterised by a lack of clarity</i>	Roughness is a result of irregular vibration of the vocal folds.
Strain <i>Characterised by the auditory impression of excessive vocal effort.</i>	Strain is a result of increased laryngeal muscle tension and constriction. Children may describe strain as tightness around neck or throat region when speaking.
Phonation Breaks <i>Characterised by uncontrolled breaks in the voice</i>	Phonation breaks are due to sudden cessation of vibration of the vocal folds
Glottal Fry <i>Characterised by the impression of a rapid series of 'pops' or 'taps'.</i>	A longer closed phase of vocal fold vibration than normal
Pitch Breaks <i>Characterised by sudden, short, unexpected and uncontrolled changes in pitch.</i>	Pitch breaks may be due to stiff vocal folds or increased laryngeal tension.
Voice arrests <i>Characterised by stoppages of voicing</i>	Uncontrolled closure of the vocal folds
Diplophonia <i>Characterised by the perception of two pitches simultaneously</i>	Diplophonia is rare and not understood.
Tremor <i>Characterised by a "quavery" sound i.e. regular, rhythmical variation in the pitch or loudness.</i>	A result of neurological impairment and is not under voluntary control.

Objective data for Abnormal Voice Qualities (Oates, 2003):-

Rough	Jitter exceeds 2% (Visipitch) or 1% (CSL) Shimmer exceeds 4% (CSL) Harmonic-to-noise ratio <1dB
Breathy	Low intensity Harmonic-to-noise <1dB
Strained formant	Low level of the fundamental frequency relative to the first formant
Glottal fry	Low fundamental frequency. Excess jitter and shimmer
Falsetto	High fundamental frequency

Adapted from:

Oates, J. (2003). HCS 22CVL Disorders of Voice and Laryngectomy Rehabilitation. Bundoora: La Trobe University.
Lee, L., Stemple, J.C., Glaze, L., & Kelchner, L.N. (2003). Quick screen for voice and Supplementary Documents for identifying Pediatric Voice Disorders. Language, Speech, and Hearing Services in Schools, 35, 308 - 319.
Stemple, J.C., Glaze, L.E., & Gerdeman, B. (2000). Clinical voice pathology: theory and management 3rd Ed. San Diego : Singular/Thomson Learning.
Colton, R.H., & Casper, J.K. (1996). Understanding voice problems: a physiological perspective for diagnosis and treatment 2nd Ed. Baltimore : Williams & Wilkins.

3. Treatment

Research has advocated that the primary aim of a child's voice therapy is to teach a healthy, non-abusive voice production pattern (Glaze, 1996; Hooper, 2004; Lee, et. al., 2003). Researchers believe that to achieve this goal education, direct vocal therapy, and relaxation techniques are to be used (Glaze, 1996; Hooper, 2004; Lee, et. al., 2003; Moncur & Brackett, 1974). To achieve the best outcomes when treating the voice disordered child, the Speech Pathologist may work with the parent and/ or child's school.

Below are some ideas that a Speech Pathologist may use

a) Education

- begin by educating the child and family about the nature of the problem, including its signs and symptoms, causes and risk factors

- educate the child and family to understand the normal anatomy and physiology of the "voice box" (larynx)
 - use images; the child (or parent, teacher) may learn better if visual images are available

- educate the child about voice production: respiration (breathing), phonation (how the sound is produced by the vocal folds), resonance

- ask if the school teacher can incorporate educational programs as part of the school curriculum, such as:-
 - ❖ "taking care of your voice"
 - ❖ "the respiratory system"
 - ❖ teacher may list:-
 - "What are good voices? What makes a bad voice?"

- educate the "rules of speaking" e.g. turn-taking, not to interrupt, use appropriate loudness, walk up to school friend/family member to talk to them rather than shouting across the room etc...

b) Direct vocal therapy

- vocal hygiene strategies
- diaphragmatic breathing
 - o teach the child to use appropriate breath support for voicing
 - o may teach the breathing patterns by either
 - sitting, lying down on floor, standing
 - encourage child to "feel" the sensations of appropriate breath support
- Svends's accent method
 - o teach the child to incorporate respiratory support and voicing
- resonance training
 - o resonance training helps children to be taught the safe method to "project" their voices, rather than using a loud strained voice.
 - o learn to produce resonance in different parts of the vocal tract: e.g., "chest" voice, "head" voice, and "nasal" voice, and front and back oral resonance.
- Stemple's vocal function exercises
 - o teach the child to increase vocal stamina
 - o teach warm up and cool down exercises for the voice muscles
- Yell Well: an alternative treatment for vocal nodules in children (Bagnall, 1995).
 - o A video that discusses treatment and vocal exercises for children with vocal nodules

c) Psychosocial

- provide counseling to child
- use activities to encourage vocal confidence, higher self esteem

Handouts of treatment material are located in the "handout" section. The treatment handouts include:-

- Deem and Miller's (2000) educational information for parents
- Therapy games to play with children for increasing awareness of vocal care (McLeod, 1990)

References:-

- Bagnall, A. (1995). Yell Well: an alternative treatment for vocal nodules in children. North Adelaide : AB Voice International.
- Deem, J.F., & Miller, L. (2000). Manual of voice therapy 2nd Edition. Texas: PRO-ED
- Glaze, L.E. (1996). Treatment of Voice Hyperfunction in the Pre-Adolescent. Language, Speech, and Hearing Services in Schools, 27, 244-250.
- Hooper, C. R. (2004). Treatment of Voice Disorders in Children. Language, Speech, and Hearing Services in Schools, 35, 320-326.
- Lee, L., Stemple, J.C., Glaze, L., & Kelchner, L.N. (2003). Quick screen for voice and Supplementary Documents for identifying Pediatric Voice Disorders. Language, Speech, and Hearing Services in Schools, 35, 308 - 319.
- McLeod, S. (1990). Great ideas: Therapy Games and Ideas for Speech Pathology. Lidcombe: University of Sydney.
- Moncur, J. & Brackett, I. (1974). Modifying Vocal Behaviour. New York: Harper & Row.

d) Relaxation

Relaxation activities may be used in therapy to teach children how to reduce vocal tension. When performing relaxation activities, ensure the activities are performed in a quiet place, with no distractions or interruptions and that the child is calm.

Below are some activities you may try with your child client.

❖ Simple stretches

Rationale

To help child reduce body and laryngeal tension

Procedure

Perform all the stretches with a relaxed body

- Arms reach for the sky
- Bend down and touch your toes
- Arm rotations (windmill) for a looser, relaxed upper body

❖ Imagery

Rationale

To use words that reminds and encourages the child to reduce vocal effort and strain when speaking

Procedure

The clinician / parent are asked to say the words of "gentle, easy, soft" as cues for the child to be reminded of a relaxed voice when speaking.

❖ Body games

Rationale

To help the child become aware of the relaxed and appropriate laryngeal tensions for voicing by comparing different laryngeal tensions

Procedure

Child is asked to feel their neck, or to look in a mirror, for excessive neck muscle tension around the larynx when speaking. Then the child is asked to mimic and interpret contrasting vocal postures when speaking. Ensure the vocal postures are brief.

Vocal postures include e.g. tight vs. relaxed, hard vs. relaxed, strain vs. relaxed. Discuss the "better" relaxed neck vs. "bad" excessive neck muscle tension.

❖ Yawn - sigh techniques

Rationale

Yawning and sighing stretches the vocal folds and reduces vocal fold tension

Procedure

Attempt several stages of yawning

1. first gently,
2. more deeply
3. Yawn vigorously, closing your eyes and stretching the muscles of your mouth and throat.

Adapted from:

Moncur, J. & Brackett, I. (1974). Modifying Vocal Behaviour. Harper & Row: New York.

4. Reward and Reminder System

It is extremely important to reward the child's good vocal behaviours and responses to therapy. It is important to reward the child's good vocal behaviours not only for improving the voice but also to improve self esteem and motivation.

It is also important for the child to be reminded of their vocal success and to maintain their homework.

Here are some ideas:-

- ❖ The clinician and parent speak to the child with positive language e.g. excellent, good work, fantastic, your voice box remembered etc...
- ❖ Reward the child with gifts for good work e.g. food, stickers, stamp, book, game, special outing
- ❖ Create a chart to record homework, vocal rest, good or bad vocal behaviours, the amount of water consumed per day etc...
- ❖ To ensure adequate hydration is achieved, provide the child a special water bottle to be used at home, school, day care etc...
- ❖ Ask the child to write a journal or diary
- ❖ Put obvious reminder signs around the house to help the child remember aspects of voice therapy. Change the reminders regularly so that the child does not get used to seeing them and no longer performs them. Changing the reminders may become a fun game for the child, that is, where is the reminder today?, what do I need to do today?.

The reminders may be:-

- Helpful notes around the house, school classroom etc...
- Create a computer screen saver e.g. drink water!
- Place musical note stickers or radio pictures around the house or school classroom etc. to remind the child to practice vocal exercises

- Daily charts on the home fridge doors, school board to maintain voice techniques e.g. school water chart - child drank 3 bottles of water today
- Change the ring tone on the parent s' phone. Whenever the phone rings, it will remind the child to practice a particular voice technique.
- Give permission for a few people that the child works closely with e.g. school teacher, to help remind the child of specific voice techniques. If the child is embarrassed, work out a discrete reminder system e.g. hand gesture

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