

Vocal Health & The Musicians Voice

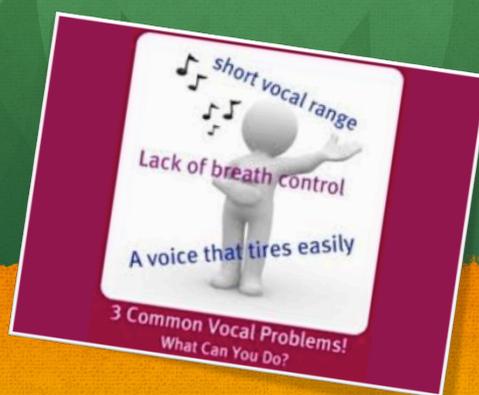
Carol J. Krueger, DMA

Vocal Cords

- The vocal cords do three things;
 - They allow you to swallow normally;
 - They allow you to speak;
 - They allow you to breathe.

Prevalence of Vocal Disorders

- Approximately 7.5 million people in the United States have trouble using their voices.
- **Gender**
 - Prevalence is higher in adult females than in adult males
 - In children significantly more prevalent in males than in females;
- **Age**
 - Higher in elderly adults;
 - In the pediatric population, the reported prevalence is approx. 6.0%;
- **Occupation**
 - Most at risk are teachers, manufacturing/factory workers, salespersons, trial lawyers, broadcasters, tour guides, and singers;



Vocal Injury & Fatigue

Vocal Injury and Fatigue

- Vocal folds vibrate to make pitches; rapidly collide into each other;
 - Middle C for one second = 256 collisions;
 - E above = 350 collisions per second;
 - A above = 440 collisions per second;
- Three minute song
 - Soprano = 80,000-90,000
 - Alto = 55,000-65,000
 - Tenor = 30,000-50,000
- How many in a 50 minute rehearsal? Talking/singing in one day?

Experiment

- Lightly tap the back of one hand; What does it feel like?
- Hit the back of your hand quite hard, ten times; (similar to loud singing- laryngeal muscles are working harder than they need to);
 - Redness indicates that the brain has recognized that trauma has occurred; signaled the blood vessels to enlarge and allow more blood into the air to promote healing;
 - If trauma continued the tissues would swell and eventually deposit fibrous material to protect underlying tissues
- There is a limit to the number of forceful collisions vocal folds can handle before they defend themselves.

Vocal Fold Inflammation

- Swelling means that the medial edges where the folds meet and collide is now microscopically lumpy and gaps occur where the folds meet, through which air leaks. (hoarseness);
- Swelling changes the way the brain coordinates its fine tuned, skilled muscle movement;
- Loss of upper pitch range as folds cannot be thinned out as much;
- Long term swelling can result in a habitual change in coordination; takes more effort to speak and sing.

Vocal Fatigue

- Result of too many forceful collisions;
- Voice tires quickly;
- Muscle aches in neck area;
- Bowed vocal folds;
- Vibrating edges of folds lose elasticity and 'collapse', creating a gap which results in a breathy sound;
- To over come the hoarseness and breathiness, singers will use extra muscle force; which exasperates the problem

Laryngitis

<http://www.youtube.com/watch?v=Rg09vEZks9c>

Inflammation of the larynx or 'voice box'

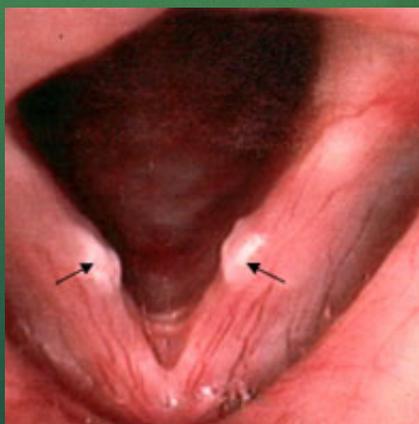
- Symptoms
 - Range from hoarseness to a soft whisper, coughing, difficulty swallowing, feeling swelling in the throat, swollen lymph nodes, congestion and fatigue.
- What is it?
 - Swelling of the membrane covering the vocal cords resulting in thickness or stiffness along the entire length of the vocal cord. Results in a lower pitch.
- Causes
 - Fungal, viral or bacterial infection;
 - Allergies, air pollutants, asthma inhalers,
 - Smoking, alcohol consumption;
 - Vocal trauma (overuse), gastric reflux disease.



What are vocal cord nodules?

<http://www.youtube.com/watch?v=bDVYpu6pXcc>

- Vocal cord nodules are benign (noncancerous) growths on the medial edges of both vocal cords that are caused by vocal abuse.
- Over time, repeated abuse of the vocal cords results in soft, swollen spots on each vocal cord. These spots develop into harder, callous-like growths called nodules.
- The nodules will become larger and stiffer the longer the vocal abuse continues.



What are vocal polyps?

www.youtube.com/watch?v=KeKy1TyvfGU

- Polyps can take a number of forms.
 - Polyps appear on either one or both of the vocal cords.
 - They appear as a swelling or bump (like a nodule), a stalk-like growth, or a blister-like lesion.
 - Most polyps are larger than nodules and may be called by other names, such as polypoid degeneration or Reinke's edema.
 - The best way to think about the difference between nodules and polyps is to think of a nodule as a callous and a polyp as a blister.



<http://www.asha.org/public/speech/disorders/NodulesPolyps/#sthash.AoMXf7hj.dpuf>

What are signs and symptoms of vocal cord nodules or polyps?

- Folds can not close properly causing breathiness and hoarseness;
 - a "rough" or "scratchy" voice
 - a "lump in the throat" sensation
- Range and stamina of the voice goes down;
- Voice gets more fatigued;
- Body fatigue;
- Shooting pain from ear to ear;
- Neck pain;
- In many cases, vocal nodules are present since childhood, and it is not necessarily a compromising condition.
- Some vocalists who have small nodules are not adversely affected.

What treatments are available for nodules and polyps?

- **Surgical Intervention**
 - Remove the nodule or polyp from the vocal cord. This approach only occurs when the nodules or polyps are very large or have existed for a long time. Surgery is rare for children.
- **Medical Intervention**
 - Treat medical problems to reduce their impact on the vocal cords.
 - Includes gastroesophageal reflux disease (GERD), allergies, and thyroid problems.
 - Medical intervention to stop smoking or to control stress is sometimes needed.
- **Behavioral Intervention**
 - Voice therapy
 - involves teaching good vocal hygiene, reducing/stopping vocal abusive behaviors, and direct voice treatment to alter pitch, loudness, or breath support for good voicing.
 - Stress reduction techniques and relaxation exercises are often taught as well.

What is a vocal hemorrhage?

www.youtube.com/watch?v=wJc05ZcAeTY

- Occurs when a small blood vessel located within the vocal fold bursts: Blood leaks into the vocal fold:
- Bruise
- Cause:
 - Forceful, aggressive, or incorrect voice use.



Vocal Hemorrhage

Symptoms

- Sudden hoarseness;
- Loss of range;
- Pain;
- Voice fatigue;
- If you ignore your symptoms or you are not diagnosed correctly, you risk *permanent vocal scarring. Scarring will result in permanent decreased range and permanent hoarseness.*

Treatment

- The only real treatment is voice rest.
 - (*i.e., no speaking, singing, whispering, throat clearing, etc*);
- If the condition persists, surgery may be required to fix the bleeding; this is rare.

What Smoking Does to Your Voice

- ◆ Reduces lung capacity: tar and other particulates in the smoke.
- ◆ Smoke contains chemicals that cause cords to swell (edema); can be so severe that it requires surgery;
- ◆ Can cause emphysema, cancer of the lungs, throat or tongue; second hand smoke can cause all of these as well.
- ◆ Can trigger and exacerbate Reflux.
- ◆ Nicotine can deaden nerves; nicotine is a sedative.
- ◆ Heat of smoke damages the throat and vocal folds. BURNS AT 122 TO 130 DEGREES;
- ◆ Nicotine also deadens the cilia in the bronchial passages; causes 'smoker's cough'; cough causes irritation to the vocal cords.
- ◆ Can cause refractory vocal nodules (thickening of the vocal cords)

Takes 6-9 months for substantial health improvement.

What smoking marijuana does to the voice

- Vocal cord scarring (decrease range);
 - IRREVERSIBLE DAMAGE TO VOCAL LINING;
- Cannibus burns at 500-700 degrees C.
 - Burns hotter than cigarettes as there isn't a filter.
- Laryngitis
- Traumatic injuries (polyps, nodules, etc.)
- Vaporization – minimum of 355-392 degree F; turns into a gas at around 220 degrees F.
- Pre-cancerous changes
- Lung disease

Vocal Health – Medical

- Gastro-Esophageal Reflux Disease (GERD)
 - Besides smoking, one of the most damaging factors to the vocal cords;
 - Sphincter muscle that separates the stomach from the esophagus is weakened (hiatal hernia) or overpowered; acid seeps into larynx;
 - Raise head of bed 6", etc
 - Diet, etc.

Vocal Health-Medical

- Depression can have a dramatic impact on the sound we make, as the intonation of the voice goes flat, and mental stress causes strain on the vocal cords.
- Respiratory
 - Bacterial infections: treated with antibiotics
 - Viral infections: treatment-body's natural defenses
 - Only a throat culture can determine bacterial or viral;

Vocal Cord Paralysis & Paresis

- Paralysis is the total interruption of nerve impulse, resulting in no movement;
- Paresis is the partial interruption of nerve impulse, resulting in weak or abnormal motion of laryngeal muscles.
- Paresis/paralysis can happen at any age,
 - Physicians are unable to detect the cause in about half of all vocal fold paralysees,
 - Paralysis or paresis can be caused by a viral infection affecting the voice box nerves (RLN or SLN), or the vagus nerve
 - Injury during surgery or intubation;
 - Neck or chest trauma;
 - Tumors

TREATMENT: VOICE THERAPY OR SURGERY TO RESHAPE THE FOLDS

USC Running Back, Stafon Johnson, Neck Injury

- Weightlifting accident
- Bench pressing 276 lbs.
- Crushed his larynx; broke it into two parts; muscles were 'blown apart'.
- 7 hour surgery: "We were trying to put it back together so it would work, so he could use his larynx, so that he could breathe on his own, that he'd be able to swallow on his own and potentially be able to speak again someday."
- Jason S. Hamilton, MD FACS
 - Director of Facial Plastic and Reconstructive Surgery for the Osborne Head and Neck Institute, Cedars-Sinai;
 - Piper High School Choir
 - All-State Choir
 - Quarterback;
 - Honor Society;
 - Scholarship to Duke
 - Medical College of PA



How do I
prevent
vocal abuse?

Vocal Health

- Hydrate well; results in abundant and thin mucous flow;
 - Acts as oil in a motor;
 - Need to clear the throat often indicates dehydration;
 - Avoid caffeine and alcohol as they cause water loss and reduces the sensitivity of the sensorimotor nerves that 'operate' the voice;
 - Breathe air that is 40-60% humid; fill tub with hot water; hang wet towels;
- Physical rest is necessary to maintain optimal vocal health.
- Avoid drastic or prolonged body temperature changes.
 - Over 50% of body heat is lost from neck up;

Vocal Health

- Balance voice use with voice rest;
 - Do not sing/speak louder or longer than your voice can comfortably and healthily do;
- Avoid pushing your voice;**
- If laryngeal muscles tire, and your voice becomes hoarse or fuzzy, then it's time to rest folds with silence.
 - Adverse vocal strain from everyday activities is often the cause of laryngitis and other vocal illnesses;
- Take care when singing while pre-menstrual;

Vocal Health – Environment

- Keep your singing and speaking voice environment clean
 - No smoking, No drugs; No alcohol;
 - Dehydrates and irritates by depositing toxins;
 - No yelling at sporting events, etc.;
 - Avoid smoke-filled venues;
 - Avoid steroids; Permanently lowers the voice;
 - Avoid talking on an airplane or bus (noisy, dry air);

**Don't smoke, drink or chew. . .
or hang around those who do!**



Vocal Health – Diet

- Avoid diets high in acid, spicy foods, citrus, etc. as they irritate the vocal folds;
 - Older red wines are better because they are less acidic than white wines;
- Avoid eating late at night;
- Avoid carbonated beverages-increases gastric pressure;
- Chocolate lovers will be pleased to know that dark is OK but milk is not;
- Salt isn't the enemy as it helps us retain fluids, while tea and coffee contain caffeine which is a diuretic so it makes us lose fluid.

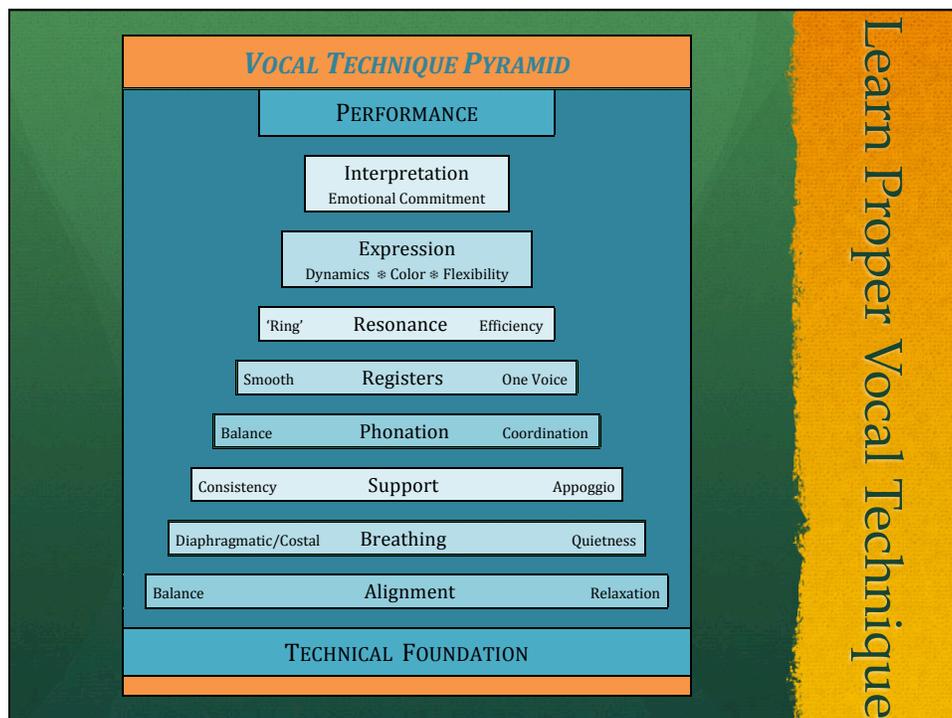
Vocal Health – Medical

- If at all possible, do NOT sing with an inflamed or sore throat; Singing when suffering from allergies, cold, or swollen cords can result in devastating vocal conditions that last months.
 - Increase water intake to flush respiratory system;
 - Avoid medication with "antihistamine"; avoid throat/nose spray that contain 'anesthetic' and/or menthol;
 - Use aspirin substitutes as aspirin may increase the possibility of vocal fold hemorrhaging;
 - Maintain air humidity: breathe through hot, wet washcloth;
 - Gargle with warm salty water;
 - Nasal irrigation;

Vocal Health – Prevention

Major season changes make physical demands on our bodies which makes a cold, flue, etc. more possible;

- BE COMMITTED to hydration, rest, diet, exercise, appropriate dress, etc.
- Have periodic voice checks;
 - Identify at risk blood vessels;



Vocal Health – Vocal Production

- Learn proper vocal production;
 - Good posture and body alignment are crucial in creating a healthy work environment where respiration, phonation, resonance, and articulatory systems can work together efficiently.
 - Complementary therapies such as Yoga, Pilates, Alexander technique, and Feldenkrais help to develop awareness and are very useful in the development of core stability and strength, balance, and flexibility.
 - Appropriate breathing
 - Breathing for singing is simply an extension of the natural functioning of the respiratory system. The system is designed to meet our basic needs for sufficient air.
 - Ironically, not content with “sufficient”, singers struggle to take in more breath than they actually need, locking tension in the respiratory muscles, and actually restricting air intake and blocking the natural flow of vocal energy.

Vocal Health – Vocal Production

- Learning proper vocal production, cont.
 - Well-balanced phonation requires coordination between the vocal folds and the flow of breath.
 - The vocal folds function as a valve on top of the airway. For optimal vibration, they must position themselves in a nearly closed position, where minimal breath will set them into vibration.
 - Pushing too much breath will blow the vocal folds too much apart, weakening the tone and resulting in excessive laryngeal muscle tension, as the singer tries to bring them together again.
 - Holding back with the breath will result in laryngeal strain as well. For good phonation a balance is required, not holding back with the breath and not forcing it forward.

Vocal Health – Vocal Production

- Learning proper vocal production, cont.
 - The articulatory system has a major and sometimes unrecognized impact on voice quality and resonance.
 - The tongue and jaw must be very strong to assist in chewing and swallowing but both can have a very negative effect on singing.
 - Singers who habitually constrict the jaw and base of the tongue often complain of vocal fatigue, restricted range, and loss of pitch flexibility.
 - For optimal resonance a maximum pharyngeal space with lifted soft palate is required. The jaw should hang nicely in place with a flexible ready tongue.

Vocal Health – Vocal Production

- It is important to note that correct vocalization is the most critical factor in keeping the voice young.
- When everything is working in balance the singer will experience:
 - active posture,
 - natural abdominal movements as breath flows in and out,
 - no strain at the laryngeal level,
 - vibrations in the head, and
 - feelings of ease and pleasure in singing.



Rehabilitation – Sing!

Rehabilitation

- Maintaining excellent overall body fitness will help keep the voice healthy.
 - Incorporate healthy physical exercises in the warm-up;
 - Exercise daily; general body conditioning, walking, swimming, etc.;
- Appropriate medical supervision of medications and their effect on the voice, cardiac and respiratory functions, etc.;
- Adherence to healthy vocal hygiene: daily water intake, sufficient sleep, balanced diet, fitness (daily exercise);

Rehabilitation

- Systematic daily healthy vocal exercises;
 - Sing appropriate vocalizes;
 - Read a book or paper aloud for 10-15 minutes, 2 or 3 times a day;
 - Sing with the radio and/or sing in the shower, etc.
 - Keeps the larynx muscles strong
 - Steam lubricates the voice box.
- Professional guidance from a voice therapist or voice coach;

Choral Warm Up

- Employ a systematic approach to voice building;
- Energize the Body and Engage the Mind;
- Incorporate physical movement;
- Singers should be aware of the purpose of each vocalize;
- Limit the number of lifts and the length of vocalizes;
- Give feedback; reinforce desired skills;
- Teach singers to listen, assess, and adjust; Active vs. Passive;
- Incorporate major/minor vocalizes;
- Use chromatic, whole-tone, octatonic, and random movement;
- Limit the use of keyboard instruments. Develop the ears.
- Mature (aging) voices can be rehabilitated;

A conductor spends 95% of his/her
time telling the choir/band/
orchestra
to read what's on the page.

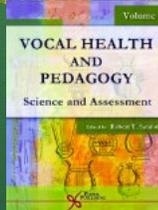
Teach them to read and write,
to aurally differentiate (assess sound),
how to fix the problem, and
how to be musically expressive.

It begins with the warm-up.
Make it count!

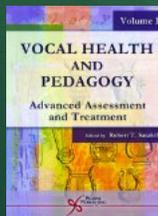
- Vocal Anatomy
 - www.vocalfocus.com/vocal-anatomy.html
 - www.lionsvoiceclinic.umn.edu/page2.htm
- Vocal Health
 - www.TheSingersResource.com/vocal_health
- Video Stroboscopy of the Vocal Cords - YouTube
 - www.youtube.com/watch?v=ajbcJiYhFKY
 - www.youtube.com/watch?v=v9Wdf-RwLcs
 - www.youtube.com/watch?v=-XGds2GAvGQ

Resources on the Web

Resources



- *Vocal Health and Pedagogy: Volume I Science and Assessment*
Robert Sataloff
San Diego, CA: Plural Publishing, Inc.



- *Vocal Health and Pedagogy: Volume II Advanced Assessment and Treatment*
Robert Sataloff
San Diego, CA: Plural Publishing, Inc.



There are no shortcuts to any place worth going.

~Beverly Sills ~