



Trans Care

Gender transition

Changing speech

How the Voice Works

When we want to speak or sing, the brain sends signals to the various parts of the voice production system (breathing muscles, larynx, throat, and mouth). This section explains how these various parts work together, and how they shape your speech. This information will help you understand how changes are produced by speech therapy and voice surgery.

Power source – The breathing muscles

The breathing muscles supply the energy for the voice. When you speak or sing, the muscles of inspiration contract and suck air into your lungs. Once your lungs are as full as they need to be, the breathing muscles carefully manage how the air is driven back out of the lungs. They allow exactly the right amount of air to be released for each phrase, to fit how long the phrase is and how loudly you want to say it, what sounds the phrase contains, and the inflections involved in the phrase. As with normal breathing, the decision on how much air is needed is made by the brain without you having to consciously think about it.

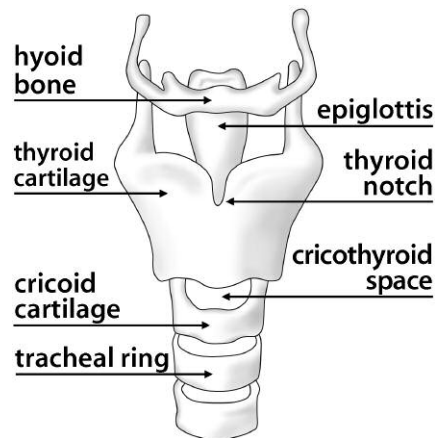
Sound source – The larynx

As air goes into and out of the lungs it passes through the trachea (windpipe) and the larynx (voice box), which sits on top of the trachea. The main structures of the larynx are the hard bone-like cartilages, which form its framework, and the vocal folds (or cords) that vibrate to produce the voice. A flap of cartilage called the *epiglottis* sits directly above the larynx and helps block off the passage to your lungs when you swallow.

The outer structure of the larynx includes the hyoid bone, the thyroid cartilage, and the cricoid cartilage.

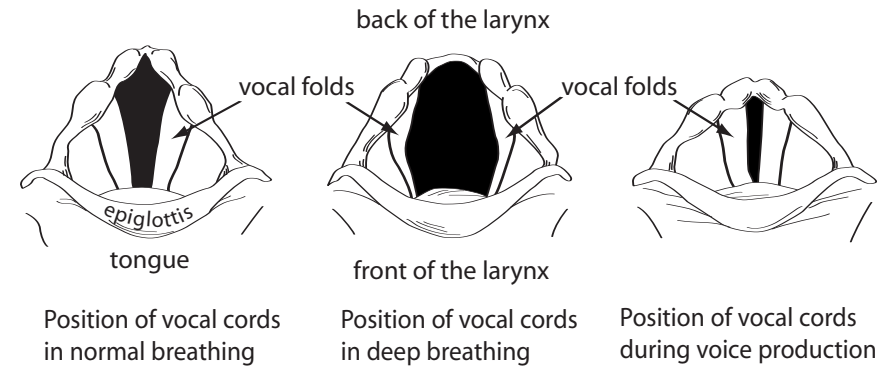
- Top: the hyoid bone bridges the tongue and the body of the larynx. Many of the muscles of the tongue, jaw, and neck attach to the hyoid bone.
- Middle: the thyroid cartilage has a notch at the front where the front of the vocal folds attach. This point under the notch is often called the Adam's apple (the medical term is *laryngeal prominence*).
- Bottom: The cricoid cartilage forms the top of the trachea.

Some kinds of pitch-raising surgery work by changing the shape of this external structure; other types of surgery work directly on the vocal folds. Speech therapy can't change bone and cartilage, but can improve control of the laryngeal muscles to be better able to modify the voice.



Picture adapted from the Milton J. Dance Jr. Head & Neck Rehabilitation Center, <http://www.gbmc.org/voice/anatomyphysiologyofthelarynx.cfm>

Vocal folds (also known as vocal cords) stretch from the front to the back of the larynx. At the front they attach to the thyroid cartilage; at the back they attach to small cartilages (*arytenoids*) that rotate and swivel to change the position and tension of the vocal folds.



Pictures adapted from Regina Morris, <http://studentweb.fontbonne.edu/~rmorr565/webbit>

When we breathe, the vocal folds are pulled apart at the back, creating a “V” shape that allows air to pass between them. When we speak or sing, the vocal folds come close enough together to be vibrated by the air from the lungs. Vocal fold vibration is very fast – average speaking pitch is typically 80–275 Hertz (abbreviated as “Hz” – the number of vibration cycles per second). This vibration creates a sound wave. The pitch (frequency) refers to how high or low we hear the voice and is determined by how fast the vocal folds vibrate. At a pitch of 100 Hz the vocal folds vibrate 100 times per second. At a pitch of 200 Hz, they are vibrating 200 times per second – twice as fast, so we hear the voice as sounding twice as high. The sound produced by this vibration is quiet and thin sounding. It needs amplification to be heard and to give it its characteristic quality in the same way vibrating guitar strings need the guitar body to produce a finished sound.

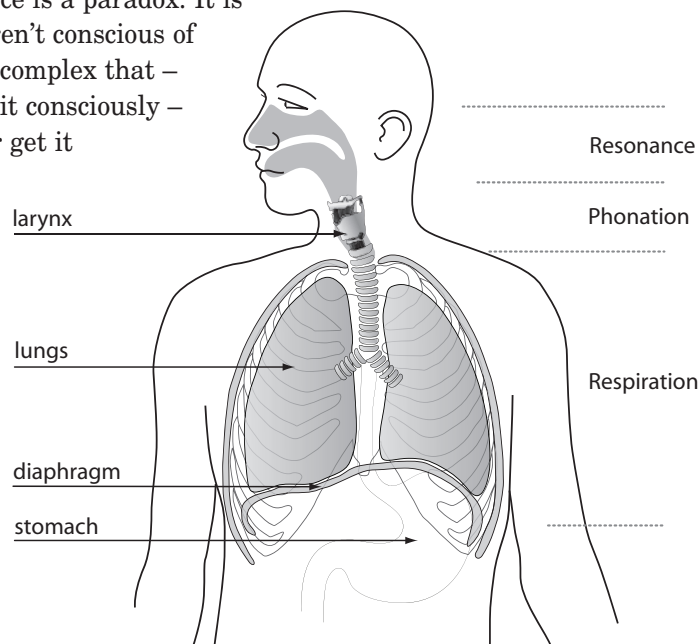
Amplification source – Throat, mouth and nose

The amplification of the voice takes place in the resonating spaces of the throat, mouth and nose. Certain frequencies are damped, others are amplified, and the sound takes on the character of the space it passes through. It turns into your voice rather than someone else's, becoming louder and richer in the process.

Turning the voice into words

At the back of your throat the voice is simply raw sound; by the time it leaves your lips it has been transformed into speech. During its passage, the voice is stopped, started, amplified, squeezed, and narrowed. It is turned into words by a series of precise, high-speed maneuvers. This shape-changing is done by the muscles in the walls of the throat and mouth and also by the articulators – the tongue, lips, jaw and soft palate. Speech therapy can help modify this process.

Producing voice is a paradox. It is so simple we aren't conscious of doing it and so complex that – if we had to do it consciously – we would never get it done at all!



Sex, Gender, and Speech

Speech is a complex process that involves physical structures (see *How the Voice Works*), social expectations, emotional influences, and also our conscious decisions about what we say and how we want to say it. Each of these parts of speech is in turn affected by multiple factors: for example, the vocal tract is physically affected by smoking, drinking, and age; emotions are affected by hormones and by environmental stresses.

For trans people who want to sound more feminine or more masculine, it is helpful to understand the ways that sex and gender influence speech. But many of the popular books about men, women, and communication (e.g., *Men are from Mars, Women are from Venus*) promote sexist stereotypes (e.g., women as passive, men as dominant), don't take cultural/class/regional/age differences into account, and overemphasize biological differences. In this section we look at some of the ways that sex and gender contribute to physical and social aspects of speech, and the implication for trans people who want to change their speech.

Physical influences on speech

Size and shape of the vocal tract

The size and shape of the *vocal tract* (see *How the Voice Works*) is greatly influenced by the increase in testosterone at puberty (in both sexes but to a greater extent in males):

- the cartilages in the larynx grow larger and thicker, increasing the height and front-to-back dimensions of the larynx
- the thyroid cartilage tilts to a different angle in the neck, creating an “Adam's apple” and changing the position of the vocal cords
- the vocal folds grow longer and thicker, making them vibrate more slowly
- as the facial bones grow, they create bigger spaces in the mouth, nose, and back of the throat, giving the voice more room to resonate

The changes in the larynx produce a drop in voice pitch. *Pitch* refers to how we hear different frequencies of sound – as high or low tones. Because people born male typically produce more testosterone during puberty than people born female, pitch is usually deeper in males than in females – i.e., men typically have deeper sounding voices than women, and also typically

sound deeper when they laugh or cough. But just as there is great variation among males and females in facial hair, muscle mass, sex drive, and other physical characteristics that relate to testosterone, there is also great variation in voice: some men have high voices, and some women have deep voices. For this reason, there is overlap in what is considered standard for men's voices and women's voices.

While there are physical limits to how high or low an individual's voice can go, everyone has the potential of making a variety of pitches from low to high. Speech therapy can help trans people consciously shift the average pitch they use when speaking, to a higher or lower place within their physical range – bringing the pitch closer to standard female norms (for MTFs) or male norms (for FTMs).

If FTMs take testosterone as adults, the testosterone makes the vocal folds grow thicker. However, they do not grow longer, and the bones and cartilage in the vocal tract do not grow (these changes can only happen during puberty). For MTFs, after the voice drops in puberty, estrogen and other feminizing hormones will not reverse this change: only surgery can change the physical structure of the vocal tract. Pitch-elevating surgery has mixed results (see *Changing Speech: Making Treatment Decisions*).

The brain

The brain is the control center for all communication. It receives signals from the ear, decodes those signals into language, decides how to respond, then sends signals to the speech-producing system to form words and sentences. Sex chromosomes and sex hormones affect some of the parts of the brain involved in this process (for example, parts of the language centres of the cortex are proportionally larger in females than in males). There has been a great deal of speculation about the impact this physiological difference might have on differences between male and female communication patterns, but it is still not understood whether differences in brain structure affect the ways that men and women talk. It is also not known how hormones taken by MTFs and FTMs affect the brain over the long-term. While there is evidence that trans people taking estrogen and testosterone may experience changes to the brain relating to memory and spatial ability, there is no evidence that taking hormones changes how the brain deals with speech.

Social norms of speech

Just as social rules determine norms for which clothes are considered appropriate for a particular gender, social rules determine norms about what speech patterns are considered “feminine” or “masculine.” In many languages and cultures there are gendered norms and stereotypes relating to:

- how the voice sounds: e.g., pitch, loudness, breathiness, the way particular sounds are produced
- vocabulary (specific words used)
- non-verbal behavior associated with talking: facial expressions, eye contact, smiling, hand/arm gestures, touching

There is no universal norm for how women and men are expected to speak. Norms vary depending on many factors, including the specific norms of the language being spoken and the norms of a geographic region, personal characteristics (age, ethnicity/culture, class, etc.) of both the speaker and the listener, the relationship between the people who are talking, the environmental context (work, social setting, etc.), the intended purpose of the discussion, and the mode of communication (telephone vs. face-to-face). Also, many societal beliefs about differences between men's and women's speech are inaccurate stereotypes. For example, it is commonly believed that men interrupt more frequently than women, but studies have found that women interrupt as much or more than men (but often for different reasons than men).

For this reason, if you're working with a speech professional to change the way you talk, we recommend that rather than adopting a predefined set of how men or women “should” talk, you work with the speech therapist to learn how to observe specific differences between men and women's speech patterns in your immediate community. This will help create goals that are relevant to the specifics of your life, help you observe what people actually do vs. stereotypes of men and women, and also give you the chance to think about how you want to talk – which socially stereotypical aspects of speech you want to adopt and which you don't, depending on your cultural norms, personal/political beliefs, and how important it is to you to pass as male or female.

Perceptions of a speaker as male or female

Studies have shown that infants as young as seven months can distinguish between men and women’s voices. In adults, research has been done using trans people, non-trans people, and computerized speech to try to understand what makes people decide the person speaking is a man or a woman. These studies suggest that average speaking pitch is the most important factor, but pitch range, resonance, and intonation are also important.

Pitch has already been explained as the perception of sound frequency as high or low tones, with pitch range being the range between the highest and lowest tone you can produce. Intonation is the variation in tone – how much your voice rises or falls as you talk. *Resonance* (also called “timbre”) refers to the richness or quality of a sound that gives it a distinct character. In music, resonance is what makes a violin sound different from a flute even if they are playing the same note. Differences in resonance between one voice and another are created by the unique shape and movements of every person’s vocal tract.

There are societal norms for speaking pitch, range of vocal inflections, and resonance characteristics in the voices of men and women. However, these norms cover a wide spectrum of pitches and may be different across different languages and cultures. Many people (trans or not) fit somewhere between what are conventionally thought of as the norms for women and men. The following table shows the norms for English-language speakers in North America:

	Norms for Women	Norms for Men
Speaking pitch	<ul style="list-style-type: none"> range considered within female norms: 145–275 Hertz average pitch for adult females: 196–224 Hertz higher upper & lower limits of range compared to men 	<ul style="list-style-type: none"> range considered within male norms: 80–165 Hertz average pitch for adult males: 107–132 Hertz
Resonance	<ul style="list-style-type: none"> higher overtones compared to men 	<ul style="list-style-type: none"> lower overtones compared to women
Intonation	<ul style="list-style-type: none"> more varied intonation (sometimes described as “musical”) more upward shifts in tone 	<ul style="list-style-type: none"> more level intonation more downward shifts in tone, especially at the end of sentences/statements

As this table shows, there is an overlap in the standard pitch ranges of women and men. The 145–165 Hz range might be considered “gender neutral” for North American English speakers, as it is within the speaking pitch ranges for both men and women. However, even though some women have an average speaking pitch as low as 145 Hz, most use a much higher pitch – around 196–224 Hz. This is nearly 90% of an octave above the average speaking pitch for males (107–132 Hz).

In the “gender neutral” pitch range, other aspects of the voice, such as resonance and intonation, may become very important cues that signal the gender of the speaker. (This might explain why actor Sean Connery isn’t perceived as female, despite having an average speaking pitch of 158 Hz.) It may also explain why MTFs are sometimes perceived as male even if they have an average speaking pitch above 155 Hz.

What does this mean for trans people who want to change their voices? One study suggests that the interaction between average speaking pitch, pitch range, intonation, and resonance was the key in determining whether a speaker is perceived as male or female, not any of these qualities alone. For trans people who are focused on passability, this means working on clusters of speech characteristics together, rather than trying to deal with them in isolation. This can be done through speech therapy.

Perception of femininity and masculinity

There are additional characteristics that do not seem to determine whether a speaker is perceived as female or male, but do affect perceptions of femininity or masculinity. Voice quality refers to the way a voice sounds to the listener – rough, raspy, smooth, etc. Of the many aspects of voice quality, only breathiness has been shown to consistently be associated with gender. *Articulation* refers to the way consonant sounds (e.g., “m, t, b, sh, ch, z”) are produced in the mouth. *Duration* measures the length of time it takes to say a sound, word, or phrase.

As with other aspects of speech, there is a wide range of what is considered normal for men and women in voice quality, articulation style, and duration. These speech norms are heavily influenced by culture, class, and other social norms and will vary with the language being spoken.

	More Feminine	More Masculine
Voice quality	<ul style="list-style-type: none"> • more breathy start words more softly 	<ul style="list-style-type: none"> • voice usually not perceived as breathy • start words more forcefully
Articulation	<ul style="list-style-type: none"> • clear and precise pronunciation • more forward tongue position 	<ul style="list-style-type: none"> • dropped letters (e.g., “thinkin” instead of “thinking”), slurred words
Duration	<ul style="list-style-type: none"> • take longer to say words and phrases • lingering on vowel sounds for emphasis (e.g., “sooo gorgeous”) 	<ul style="list-style-type: none"> • short, choppy, rapid speech style

There are also gender norms associated with non-verbal elements that relate to speech – the way we move our face, hands, arms, and body as we speak. This is often called “body language”. Norms relating to body language are culturally specific, so there is no one universal set of norms. However, within North America there are strongly held stereotypes of gender and non-verbal communication:

	Stereotype of Women	Stereotype of Men
Eye contact	<ul style="list-style-type: none"> • increased eye contact • look directly at speaker, with head and eyes facing forward when listening • in negative interaction, tend to lower eyes 	<ul style="list-style-type: none"> • decreased eye contact • look at the speaker from an angle (e.g., head cocked to side) when listening • in negative interaction, tend to stare
Facial expressions	<ul style="list-style-type: none"> • smile more often • more facial expressions in response to what the speaker is saying • tend to smile and nod head when listening 	<ul style="list-style-type: none"> • smile less often • fewer facial expressions in response to what the speaker is saying • tend to frown and squint when listening
Gestures	<ul style="list-style-type: none"> • gesture toward self when talking 	<ul style="list-style-type: none"> • gesture away from self when talking
Posture	<ul style="list-style-type: none"> • take up less physical space • tend to bring arms and legs toward the body • lean forwards when listening 	<ul style="list-style-type: none"> • take up more physical space • tend to stretch arms and legs away from the body • lean backwards when listening
Touching	<ul style="list-style-type: none"> • do not approach men as closely in terms of personal space 	<ul style="list-style-type: none"> • tend to approach women more closely in terms of personal space

As with any stereotype, we recommend critically thinking about whether or not these kinds of conventions fit for you. There is nothing wrong with behaving in a way that is conventional, but there should be no pressure to adopt something artificially to become a “real” man or woman.

Changing Speech – Making Treatment Decisions

Everyone makes treatment decisions differently. Some people like to do their own research and know exactly what they want out of treatment, while others want guidance from a professional; some people make decisions on their own, while others want loved ones to be involved. However you make decisions, in deciding on a treatment plan to feminize or masculinize your speech, we encourage you to consider the treatment techniques that can be used, the changes that typically happen, and the risks that may be involved, so you can make a fully informed decision.

Understanding what you're starting with – The baseline assessment

Changing your speech can produce strain in the larynx and other structures in the vocal tract. Whether you're trying to change your speech on your own or with professional assistance, an assessment by a trained professional before you start can help you know where you're starting and also detect any voice problems you might not know you have.

Every speech professional has a unique approach, but baseline assessment usually involves:

- questions about your goals for speech change
- questions about your general medical history, including conditions that could impact speech
- questions about behaviors that can impact your voice (e.g., smoking, drinking alcohol, work that involves use of voice)
- discussion about past experiences trying to feminize/masculinize your speech (what worked, what didn't work, were there any negative side effects?)
- assessing your current speech (see *Sex, Gender and Speech*): pitch, intonation, resonance, loudness, inflections, voice quality, articulation, phrasing, tongue/lip/mouth position, and non-verbal communication
- trying practice exercises to get a sense of how easily your voice changes

After the assessment is complete, the speech professional should explain the results to you, including a summary of the characteristics of your voice, the flexibility/limits of your voice (what can and can't be changed), and their professional opinion on what aspects of speech would be helpful to change to reach your goals. They may also recommend particular types of treatment. It is up to you how much to weigh the clinician's opinion in making the decision about where to go from here: you may disagree with the clinician, want another opinion, or want time to think it over, or you may feel comfortable going ahead with their suggestions.

If the clinician who does the assessment has any concerns about possible voice problems, throat problems, or other medical conditions, you may be referred to a doctor for further assessment.

Treatment options – An overview

The goal of speech treatment is to change your speech in the ways you want while protecting your voice from fatigue, strain, or damage. There are three options to change the voice: speech therapy on its own (FTM and MTF), or in combination with hormones (FTM) or surgery (MTF). Speech therapy may be combined with surgery or hormones to target aspects of the voice that surgery/hormones don't change, or to help you get used to the changes of surgery/hormones and learn how to use your new voice as efficiently as possible.

Speech therapy

In BC, speech therapy is usually provided by speech-language pathologists. Speech therapy is not covered by the BC Medical Services Plan (MSP), although it may be available through an outpatient hospital or health unit program. It may also be included in benefit plans for people who have extended health coverage through work or school. Speech therapists with trans experience are listed at <http://www.vch.ca/transhealth/resources/directory/subjects/genderspecialty.html#voice> and are also listed in the private practice roster of the BC Association of Speech-Language Pathologists and Audiologists (<http://www.bcaslpa.bc.ca>). For MTFs who do not have extended health coverage, a 9-week group program, *Changing Keys*, runs once or twice a year in Vancouver at a sliding cost of \$0–\$100; contact the Transgender Health Program (1-866-999-1514) for more information.

Speech-language pathologists can:

- assess your voice and voice production habits
- answer your questions about therapeutic options
- discuss the connections between speech, sex, and gender
- provide information about prevention of voice strain, fatigue, and damage
- help you increase the flexibility of your voice
- train you to observe and analyze your own speech and other people's speech
- work with you to modify aspects of your voice (e.g., average speaking pitch, pitch range, intonation, resonance, voice quality, loudness, articulation, tongue/lip/mouth position)
- help you adjust to changes to your voice caused by hormones/surgery

Speech therapy may be offered in group or one-on-one sessions. The choice of a group vs. one-on-one depends on what you are comfortable with and also your specific goals. Education, discussion, and introductory exercises can be done in a group; significant changes are most effectively made in a one-on-one setting where you get personalized attention.

The length of speech therapy depends on the degree of change you want to accomplish, and how hard/easy it is for you to make these changes (some people find the changes easier than others). Some people need one year or more of weekly sessions. It's important to find a balance between getting enough therapy to make long-term changes and not getting frustrated with it dragging out too long. Because speech changes tend to fade over time, it can be useful to have "refresher" sessions (group or one-on-one) every four to six months after you finish the initial therapy.

There are a variety of videos, websites, and other materials available that give tips for feminizing the voice – essentially a self-paced form of speech therapy. The quality of these varies widely. Most are not produced by speech professionals, and the recommended exercises in some are unhelpful at best and potentially damaging at worst. If you want to follow exercises from a speech book, video, or website, consider consulting a speech professional before you start and as you go to make sure you are not harming your voice. Being aware of early signs of vocal strain (see *Taking Care of Your Voice*) can help you catch problems early on.

Hormones (FTM)

In FTMs who are taking testosterone, the vocal cords will grow thicker. This causes a drop in pitch (both average speaking pitch and pitch range). The degree of change varies and while many FTMs find their pitch drops enough for their voice to be perceived as male, others find the pitch does not drop very much. Pitch changes typically start within the first few months of taking testosterone but may take a year or longer to complete. Other vocal tract structures (cartilage, bone) do not change after puberty, and other aspects of voice (resonance, intonation, etc.) are not changed by taking testosterone.

Pitch-elevating surgery (MTF)

At puberty, testosterone causes irreversible changes to the vocal tract (see *Sex, Gender, and Speech*). For MTFs, after the voice drops from exposure to testosterone in puberty, estrogen will not reverse this change. Speech therapy can be helpful in raising pitch and also addressing resonance, intonation, and other aspects of speech that are associated with gender. For some MTFs, speech therapy alone doesn't bring the pitch high enough for the voice to be perceived as female. Surgery on the vocal tract attempts to raise pitch by shortening the vocal folds, decreasing the total mass of the vocal folds, or increasing the tension of the vocal folds. Depending on the technique, laryngeal shave ("thyroid chondroplasty") may be done at the same time to reduce the size of the Adam's Apple. This doesn't usually affect the voice.

The kind of care you need after voice surgery depends on the specific technique that was used (see the next three pages). Ask your surgeon for detailed instructions. Your surgeon will want to see you periodically to keep checking your healing and recovery. It is common to experience temporarily decreased pitch, decreased voice quality, and swelling after surgery; in most cases these problems resolve on their own.

Estrogen increases your risk of blood clots (which can be fatal), and this risk is particularly high when you are lying still for periods of time during and after surgery. If you take estrogen, it's recommended that you talk with your doctor about tapering your use down before the surgery and gradually starting it back up after you have recovered.

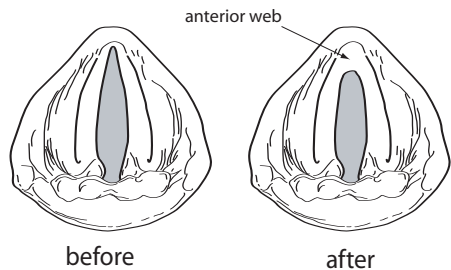
Smoking cigarettes increases the risk of complications from anesthetic and slows healing after surgery. A study of MTFs who underwent voice

surgery found that those who smoked after surgery had lower pitch and poorer voice quality compared to those who did not smoke. Your GP can provide information about options to help cut down or quit smoking.

For most techniques, it is recommended that patients not use their voice at all (not even to whisper) for 1–7 days after surgery, and then use it cautiously until discomfort from swelling has passed. For technique 5(c) described below, which is more invasive, two weeks vocal rest is suggested.

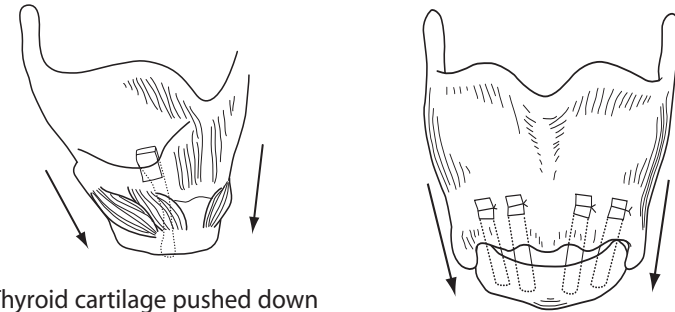
There are five types of surgery that can be done to elevate pitch. Of these five, not all are done in BC. Costs are not covered by the Medical Services Plan whether surgery is done in or out of the province.

1. **Anterior commissure advancement** involves removing a section of thyroid cartilage and then using splints to wedge the section of cartilage forward by several millimeters. This pulls the vocal folds tighter (increases the tension). The surgeons who have used this on MTFs recommend that it only be used if cricothyroid approximation is not successful, as they feel it is a difficult surgery to perform.
2. **Creation of an anterior vocal web** is done by scraping the front section of the vocal folds. The scar tissue that forms creates a web of tissue between the folds fusing them together. This shortens the folds. There is an estimated 33% risk of permanent hoarseness with this technique. There are also concerns that if, in future, the patient had a breathing emergency and needed a breathing tube, the narrowed opening of the windpipe might make it difficult to get the tube in.



All surgery pictures adapted from Anne Lawrence, <http://www.annelawrence.com/voicesurgery.html>

3. **Cricothyroid approximation** (CTA) mimics the contraction of the cricothyroid muscle that is used naturally in speech to tense the vocal folds. The thyroid cartilage is pushed down against the cricoid

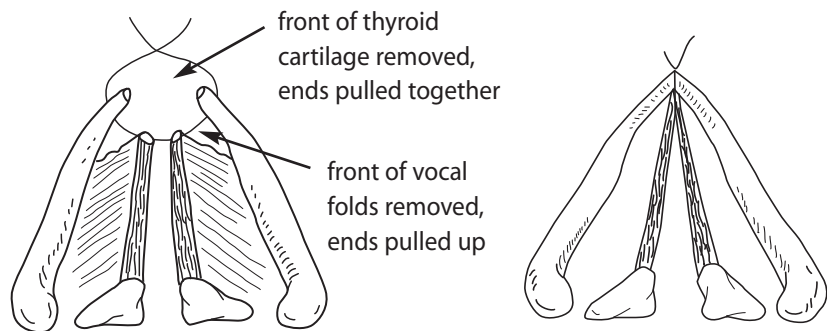


Thyroid cartilage pushed down against the cricoid cartilage

cartilage below it, and clamped in place at the front by stitches or metal plates. Pulling the cartilage down stretches the vocal folds. In theory, CTA is reversible – but in some cases scar tissue has permanently fused the cartilages together. Where this fusion has not happened, the stitches/plates can loosen over time, causing the cartilage to move back to its original position and the pitch to drop. Because the vocal folds aren't directly surgically changed by this technique, it may be possible to do further surgery if the CTA is not sufficient.

This is the most commonly done type of pitch-elevating surgery.

4. **Induction of scarring** has been used to raise pitch in non-trans women who have low voices. A deep cut is made along the fold with the intention of causing a scar that irreversibly stiffens the folds which increases the rate of vibration. Voice quality may be damaged.
5. **Reduction of the vocal fold mass** may be accomplished by one of three methods:
 - a) Steroids injected into the folds cause the folds to atrophy.
 - b) Carbon dioxide laser can be used to evaporate part of the vocal fold. *Laser Assisted Voice Adjustment* (LAVA) is the most commonly used laser technique in MTFs. The procedure is irreversible.
 - c) *Thyroid cartilage and vocal fold reduction* (also called “feminization laryngoplasty”) involves multiple changes to the vocal tract. As shown in the picture on the next page, a strip at the front of the thyroid cartilage is removed. Parts of the vocal folds are then removed (making them shorter and decreasing their mass). A loop of stitching through the ends of the cartilage and the



vocal folds pulls the folds tighter and stretches them. The larynx may also be raised in the neck to shorten the resonance chamber. The surgeons who perform this technique warn that voice quality will likely be negatively affected.

Research findings

Speech masculinization – what works for FTMs?

In reviewing all the research on speech care for trans people, we did not find any specific protocols for treatment of FTMs or studies on how effective treatments are. With only a few exceptions, most articles stated that FTMs don't need speech services because testosterone will cause pitch to drop. This ignores the needs of FTMs who don't want to or can't take testosterone, the reality that testosterone doesn't always drop pitch low enough for FTMs to be perceived as male, and the speech elements other than pitch that are connected to gender (resonance, voice quality, intonation, loudness, articulation, etc.). A study of one FTM who went into speech therapy to lower his pitch and deal with vocal strain found that his voice slowly dropped from 148 Hertz to 113 Hertz with less vocal fatigue than before therapy – but details are not given on how this was done.

Without any research to show what is most effective, what should FTMs who are having trouble with their speech do? At this point, all we can recommend is cautious experimentation with speech therapy techniques (e.g., exploring inflectional patterns and speaking range) to see if you can find something that works for you. It may be that some of the techniques used in speech therapy with MTFs can be modified to be used with FTMs. Speech therapy is used to treat males who still have a high-pitched voice

after puberty (“puberphonia”), but it is not known if these protocols are helpful for FTMs. To help other FTMs, you and your clinician can evaluate the success of the treatment and then make those results available to other clinicians and FTMs to learn from.

Speech feminization – what works for MTFs?

Between 1976 and 2005 there have been five published reports on work with individual MTFs and six studies done on small groups of MTFs. While all of the studies are too small to be conclusive, there is evidence that in some cases speech therapy can be helpful in addressing all of the aspects of speech associated with sex/gender – pitch, resonance, intonation, etc. – and that these changes can be maintained over time. A study of ten MTFs 1–9 years after they completed speech therapy found that average speaking pitch rose for all participants right after therapy (by an average of 43 Hertz), with most dramatic change for those who started out with lower pitch; seven of the ten had an average pitch over 165 Hertz by the time they finished therapy. Over time pitch decreased for 90% of the participants but they still maintained at least half of the gain in pitch over the long term. In another study of 12 MTFs who received speech therapy, 42% had fundamental frequency greater than 155 Hertz at the end of therapy, and 83% sustained this over time, with an overall average increase of 20 Hertz compared to baseline values. In two case reports clients who were perceived as male before speech therapy reported being perceived as female after speech therapy.

Although speech therapy has a positive effect, the degree of change varies from person to person, and may not be enough to achieve full passability. In one study of twelve MTFs who had speech therapy and then pitch-elevating surgery, 52% of participants said that although they found speech therapy exercises easy or very easy in a clinic setting, they had difficulty putting those exercises into practice in real life settings, and 30% said they relapsed into their old male voice often or always – especially in stressful situations. In one case report, three and six months after speech therapy, the client reported only being perceived as a woman 50% of the time on the telephone. Passability is not everyone's goal, but for MTFs who are very concerned about passability, this may or may not be achievable by speech therapy.

Surgery is an additional way to try to elevate pitch. Research shows mixed results. A number of studies on groups of MTFs who had vocal

surgery found that in looking at all the cases together pitch did increase, but analyzing each case within that group, surgery decreased average speaking pitch for some individuals. There are also serious risks, including reports of permanently disordered voice quality, difficulty speaking loudly, difficulty swallowing, difficulty breathing, sore throat, wound infection, decreased vocal range, and severe scarring. Despite the problems associated with surgery, patient satisfaction was around 60% in two studies.

Comparing the risks to the benefits of vocal surgery, speech professionals have mixed opinions. Some (including surgeons) believe the current techniques are too risky to attempt at all. Others feel current surgical techniques are good enough to be considered as a way to raise pitch for MTFs. Many speech professionals take the middle position – speech therapy should be tried first, but voice surgery can be considered as a treatment of last resort if speech therapy doesn't adequately raise pitch. Because surgeons and speech-language pathologists often have different perspectives, it can be helpful to consult with both as part of making a decision about surgery.

Choosing a speech professional

Like all other aspects of deciding on treatment, deciding on professional assistance is different for everyone. Some people choose a speech therapist or surgeon who was recommended by another trans person, some try out a couple different professionals and pick the one they feel best about, and some people randomly select a name out of the phone book.

Depending on where you live, there may not be any speech professionals in your area who have experience working with trans people (call the Transgender Health Program at 1-866-999-1514 or see <http://www.vch.ca/transhealth/resources/directory/subjects/genderspecialty.html#voice> for a list of trans-experienced speech professionals). The Transgender Health Program and Transcend have worked together to create training for speech professionals working with trans people (call 1-866-999-1514 or see <http://www.vch.ca/transhealth/resources> for more information).

If you can travel to Vancouver and you have extended health coverage or can afford to pay privately, you have more options about who to see. To find a speech-language pathologist (SLP) in private practice who provides service to transgender people, go to the website of the professional

association of BC speech-language pathologists (<http://www.bcaslpa.bc.ca>), click on “private practice” (left side of screen), then choose “Find a practitioner” and choose the nearest city/town. Trans-experienced SLPs include “Transgender Voice” in the description of their services.

Some health providers provide a free initial interview or phone consultation. This gives you a chance to ask about their experience, expertise, and attitudes relating to trans issues, as well as find out more about the practical logistics such as fees and waitlist for services. The types of questions you ask depend on your personal preferences and needs. Some questions suggested by trans people and loved ones from focus groups in Victoria are:

Logistics & policies

- Are you open to everyone, or are there limits on who is eligible for your services?
- Do I need to get a referral from another service provider to see you?
- Do you have an intake process?
- How long is your waiting list?
- What are your fees?
- Are there stairs into your office? Is the bathroom wheelchair accessible?
- What are the limits of your services and powers? What can/can't you do?

Training & experience

- What is your background and training? What kinds of education and experience do you have?
- Have you ever worked with trans people or their family members? Have you worked specifically with ___ (Two Spirit people, trans people of colour, MTFs, FTMs, intersex people, transsexuals, crossdressers, etc.)?
- Are you familiar with the language used to talk about gender issues and sexual orientation?
- What kinds of expertise do you have that you think I might find useful?

Attitudes & sensitivity

While most health professionals would get defensive if asked directly

about their attitudes to transgender people or just say “I don’t discriminate,” during your initial consultation you can try to get a sense of their sensitivity to transgender issues. Some areas suggested by trans people and loved ones include:

- What is their approach to gender and to gender diversity? Do they seem to perceive transgenderism as a mental illness?
- What is their approach to physiological diversity? Do they seem to perceive intersexuality or disabilities as physical abnormalities?
- Do they understand how societal issues (such as transphobia, racism, sexism, etc.) affect trans people’s health and well-being?
- Do they seem open to advocating on your behalf if you are having difficulty with other service providers?
- How comfortable do they seem talking explicitly about gender issues and being around trans people?
- Does it seem like they value diversity and honour the client’s perspective?
- Do they seem open to hearing your opinions and concerns?

Overwhelmed with all the things to consider?

Deciding what to do can be overwhelming. If you or your loved ones want support, you can talk with one of the staff at the Transgender Health Program. They are not speech professionals so can’t give you any medical advice, but can help you understand what your options are, work out a plan, and provide peer support. They can also help you with referrals to speech therapists or surgeons if you need professional help to explore your options.

Taking Care of Your Voice

What’s good for you generally is good for your voice. However most people (including the people who wrote this) don’t live a 100% healthy lifestyle – eating things we know aren’t good for us, not getting enough sleep or enough exercise, etc. But even small changes are better than no changes. Cutting down smoking by one cigarette a day, drinking an extra glass of water, or anything else that moves you towards health is a good thing. So...have a look at this advice and think about what you can do at this point...even making one change is a good start!

1. Keep your larynx hydrated

Drink: 8 to 10 glasses/day of non-caffeinated, non-alcoholic liquids; more if exercising, using your voice a lot, or taking dehydrating medications (e.g., spironolactone). Water is easiest and it’s what your system needs. Caffeine (coffee, tea, most soft drinks) and alcohol have a drying effect on your body. How can you tell if you are drinking enough water? Follow the dietician’s advice to “pee pale.” Check your urine – if it is pale yellow, you are well hydrated; if it is dark yellow and concentrated, reach for the water bottle.

Steam: Breathing in humidified air rehydrates the vocal folds from the outside. It can be useful if you have an upper respiratory infection, your throat feels tired or sore, you have been doing a lot of talking or singing (breathing through the mouth dries out the vocal folds), or you are in a dry environment.

Things you can do: Steam for 5 to 10 minutes, twice a day.

- Take a hot shower or bath
- Put your face over a bowl of hot water and drape a towel over your head (you get a facial at the same time)
- Use a hot water vaporizer (not cold-mister)
- Buy your own personal steamer (around \$50)

2. Keep your larynx healthy

Clean air: Ideally, the only thing that should touch the vocal folds is clean, moist air: anything else can irritate them. While the vocal tract has a housecleaning system that cleanses the mild, common pollutants from the vocal folds, it cannot cope with the two main sources of laryngeal irritation – smoking and acid reflux.

Smoking (cigarettes, pot/hash, crystal, crack, heroin, PCP, etc.) brings hot gases into contact with your larynx, drying the lining of your vocal folds; crack and freebase cocaine can get hot enough to cause serious burns. Smoking also exposes your larynx to an assortment of chemicals. The tar in cigarettes and cigars is particularly toxic: people who smoke more than 20 cigarettes a day have double the risk of getting cancer of the larynx, with an even higher risk for people who drink alcohol as well as smoke. Pot is also high in tar – four times as much tar is deposited in your lungs from smoking an unfiltered joint than in smoking a filtered cigarette.

Things you can do: Reduce your exposure to smoke.

- Stopping smoking is the single best thing you can do for your voice. If you want to quit but you're finding it hard to, talk to a doctor or nurse about medical options.
- Avoid second-hand smoke as much as you can.
- If you are trying to cut down on smoking:
 - don't cut the filter off cigarettes: this lets more toxic chemicals into your lungs
 - don't smoke "mild" (or "light") cigarettes: studies have found that with "mild" cigarettes smokers take deeper puffs to get more nicotine, which results in more tar deposit

Protect your larynx from acid reflux: If you have it, treat it. The medical terms – "gastro-esophageal reflux disease" (GERD) or "laryngeal-pharyngeal reflux" (LPR) – refer to a leakage of acids from the stomach back up into the esophagus (GERD) or into the larynx/pharynx (LPR). The larynx sits right at the entrance to the esophagus, so acids leaking up can spill over directly onto the vocal folds. This inflames and irritates the vocal folds and may also cause the muscles around the larynx to tighten. Reflux is frequently a background issue in voice problems.

Do you have reflux? Common symptoms include:

- gravelly voice and irritated throat, especially first thing in the morning
- frequent need to clear the throat or cough
- feeling of something stuck in the throat
- difficulty producing the voice, especially at higher pitches

If you notice some of these symptoms, ask your doctor if you have reflux.

Things you can do: If you have reflux, follow your doctor's advice. This may include the following:

- Don't eat for 2 to 3 hours before going to bed.
- Elevate the head of your bed about 6" by putting blocks or old phone books under the bed frame at the head end, so you are sleeping on a bit of a slant. (Propping yourself up on extra pillows is not recommended as it can hurt your neck and you may slide down during the night.)
- Reduce or avoid eating foods that promote reflux. These include alcohol, caffeine, and foods that are spicy, fatty, or acidic (e.g., tomatoes, oranges, orange juice).
- Reducing excess weight around the waist can be helpful.
- Your doctor may suggest antacids or prescribe medicines that reduce or block acid production. Typically these are prescribed for 1 to 3 months and the patient is reviewed again at the end of that time. You must follow the reflux protocol as well as taking the medication.

Protect your larynx from pollution: Dust and chemicals can irritate the delicate tissues of the larynx. If you are exposed to these pollutants, consider increasing ventilation or wearing a mask over your mouth and nose.

3. Keep your larynx harm-free (if it hurts your throat, don't do it)

To achieve the voice they want, trans people often speak in pitches higher or lower than the larynx was designed for. To sustain a pitch that is basically outside its physiological range, you need to use good vocal technique.

Things you can do to help your voice sound good and last well:

- get professional training in how to produce a higher/lower voice in a way that doesn't strain your throat
- warm up your voice if you will by doing a lot of talking
- keep the sensation of your voice up in your face rather than down in your throat
- don't compete against loud background noise at parties, restaurants, or bars: in a noisy environment you may be using your voice for longer and much more loudly than you realize, and end up hoarse (a sign that there has been some damage to the vocal folds)

Questions? Contact the Transgender Health Program:

Office: #301-1290 Hornby Street, Vancouver, BC V6Z 1W2
Phone/TTY/TDD: 604-734-1514 or 1-866-999-1514 (toll-free in BC)
Email: transhealth@vch.ca
Web: <http://www.vch.ca/transhealth>

The Transgender Health Program is an anonymous and confidential free service for anyone in BC who has a trans health question or concern. Services for trans people and loved ones include:

- information about trans advocacy, medical care, hormones, speech change, and surgery
- help finding health/social services, and help navigating the trans health system
- non-judgmental peer counselling and support
- information about trans community organizations and peer support groups



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For more copies, email the Transgender Health Program at trans.health@vch.ca or call/TTY 1-866-999-1514 (toll-free in BC) and quote Catalogue No. GA.100.C362.