Transgender Speech Feminization/Masculinization: Suggested Guidelines for BC Clinicians

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Copies of this manual are available for download from the Transgender Health Program website: http://www.vch.ca/transhealth. Updates and revisions will be made to the online version as necessary. For more information or to contribute updates, please contact:

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Scope

Transgender* individuals may require assistance to feminize/masculinize speech, voice, and non-verbal communication (gestures, posture, facial expressions, eye contact, etc.). Changes to the gendered aspects of communication can help reduce gender dysphoria and/or facilitate gender presentation that is consistent with the felt sense of self, resulting in improved mental health and quality of life. With all parameters of communication, the goal is to allow the outside – speech, voice, movement – to reflect what the client feels inside. While peer support resources can be highly beneficial in changing overall appearance and presentation, speech and voice modification is best assisted by a trans-competent speech professional. The clinician will provide a comprehensive evaluation, design an effective treatment program, and help prevent vocal problems that may arise from changes to habitual fundamental frequency or voice quality.

Trans-competency involves both the ability to interact in a respectful way with transgender individuals (sometimes termed *cultural competence*) and also clinical knowledge and skill specific to speech feminization/masculinization. This document is intended for speech clinicians who have already taken transgender sensitivity/awareness training or have experience working with the transgender community, and are seeking more advanced guidance on how to be clinically effective in work with transgender clients. We outline clinical protocols for conducting a trans-specific speech assessment, providing feminizing/masculinizing speech treatment, and conducting a trans-specific outcome evaluation.

Some transgender individuals seek speech services not to feminize or masculinize communication, but rather to address voice quality (e.g., hoarseness or raspiness following pitch-altering surgery), loss of singing range following changes to habitual speaking pitch range, or feelings of disconnection from the voice resulting from rapid hormonal or surgical changes. While clinicians working with transgender clients on these issues should be familiar with relevant trans-specific physical and psychosocial issues, the same clinical protocols generally used to deal with these concerns in other clients can successfully be used with transgender clients – i.e., no special trans-specific clinical protocols are needed. This document focuses on clinical protocols that are unique to speech feminization/masculinization, an area that (unless associated with vocal pathology) is considered trans-specific.

These recommendations are based on published literature specific to transgender speech (see *Transgender Speech Literature Review* at http://www.vch.ca/transhealth/resources/library) and interviews with expert clinicians. In the literature and in our discussions with clinicians we noted that decisions about practice protocols were often significantly impacted by budget constraints, the logistics of the clinical setting (e.g., university-based student clinics running from September to April), and/or protocols necessary for conscientious research (but not necessary in regular clinical practice). While there are administrative and logistical realities that need to be considered, we felt it was important to base our recommendations on what we felt to be optimal practice from a *clinical* perspective, based on the evidence currently available.

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* In these guidelines, *transgender* includes any person who: (a) has a gender identity that is different from their natal sex, and/or (b) who expresses their gender in ways that contravene societal expectations of the range of possibilities for men and women. This umbrella term includes crossdressers, drag kings/queens, transsexuals, people who are androgynous, Two-Spirit people, and people who are bi-gendered or multi-gendered, as well as people who do not identify with any labels.

More research is needed into transgender speech and for this reason some recommendations are based on current practices or theoretical rationale where the literature is inconclusive or absent. We critically need input from clinicians and researchers to develop the best protocols for helping this population. It is an exciting area and we welcome the input of our colleagues in the ongoing task of shaping best practice guidelines.

Introductory Comments

Research suggests that speech services are an important aspect of transgender care. In a recent BC-wide survey of transgender health service users (n=179), 23% reported a current need for speech therapy.[1] In studies done outside BC, feminization of communication was rated extremely important by 73% of male-to-female* (MTF) transsexual participants (n=11),[2] and as "very important" by over half of MTF transsexual respondents in another study.[3] A study of sixteen female-to-male (FTM) transsexuals found that 88% of participants considered masculinization of communication as important or more important than sex reassignment surgery.[4]

There is great variation in the extent to which speech changes are undertaken or desired by transgender individuals. Some seek maximum feminization/masculinization, while others experience relief with a more androgynous presentation. Some transgender individuals seek to develop two speech patterns (one more masculine, one more feminine) either because they identify as bi-gendered or because external pressures (family, employment, cultural community, friends, etc.) prevent living full-time in a way that is consistent with felt sense of self. Most current transgender speech protocols do not support bi-modal speech as a treatment goal, based on the belief that to effect maximal change it is necessary to have a consistent single speech pattern. Switching back and forth between two speech/voice patterns may be too difficult for some clients, and inconsistent use decreases practice opportunities to acquire the new speech/voice pattern. However, the human capacity to learn and speak more than two languages, develop a specific accent for an acting role, and develop a singing voice that is different than speaking voice suggests it may be possible to develop bi-gender speech/voice. We encourage clinicians to be open to this possibility and not to routinely exclude clients who have two speech patterns as the treatment goal. We recommend that speech services be made available to the full spectrum of the transgender community.

Speech feminization is widely recognized as a vital component of transgender care.[2,5-20] Unfortunately, speech masculinization has not been as well studied.[4,7,9,21,22] Generally, the literature surveyed assumed that testosterone always results in drop in pitch sufficient to allow FTMs to live as men.[5,7,9,10,12,21-24] However, a study of sixteen FTMs who had taken testosterone for at least one year found that 25% were sometimes perceived as female on the phone, with 31% expressing interest in therapy to further masculinize speech.[4] The speech needs of FTMs who do not take testosterone were not discussed in any of the literature surveyed.

As with other transgender care, we recommend that speech services be offered in the context of a complete approach to transgender health that includes comprehensive primary care and a coordinated approach to psychologic and social issues. Speech services must be individualized

* Published transgender speech research focuses on transsexual women, with only a few studies involving male crossdressers or female-to-male transsexuals. In this document we use "male-to-female" (MTF) broadly unless otherwise noted, to describe a spectrum of people who were assigned "male" at birth and who wish to feminize/de-masculinize their speech (including male crossdressers, transsexual women, and bi-gendered or androgynous people born male). Similarly, "female-to-male" (FTM) refers to people who were assigned "female" at birth and who wish to masculinize/de-feminize their speech. This breadth of terminology is used to promote inclusion of non-transsexual clients who may seek speech feminization/masculinization services.

based on the individual's goals, the risks/benefits of treatment options, and consideration of social and economic issues.

Responsibilities of the Speech Professional

In British Columbia, speech feminization/masculinization services are delivered primarily by speech-language pathologists (speech therapy) and laryngologists (vocal surgery). While speech professionals do not need to be experts in every realm of transgender care to work with transgender clients, it is expected that those providing speech feminization/masculinization services have a basic understanding of the processes involved in gender transition, the potential impact of testosterone on female-to-male (FTM) speech, and trans-specific psychosocial issues that shape clients' goals and treatment options. Understanding of basic sensitivity protocols such as use of preferred gender pronoun and name is essential, but is outside the scope of this project. The Transgender Health Program (Appendix A) can provide training in these areas.

To assist in greater understanding of transgender speech issues, the client's permission should be sought to share anonymized assessment data with other speech professionals. In our review of the literature we found a paucity of evidence in the area of transgender speech, particularly in clinical practice. Early clinical research reported single subject case studies;[11,25-29] more recently small group studies have reported outcomes of speech therapy[3,6,22,30] and pitch-elevating surgery,[3,23,31-35] but more research is needed to evaluate specific techniques and protocols. As with all research, it is important that transgender clients' involvement in research be fully voluntary – i.e., it is not ethical to make service contingent on agreement to be studied.

Trans-Specific Speech Assessment

The first step in transgender speech treatment is a thorough assessment to guide the development of a therapeutic evaluation and treatment plan. The following section discusses recommendations relating to establishment of therapeutic rapport, recording of client history and objectives, evaluation of speech parameters, assessment of potential for change, determination of therapeutic goals, discussion of therapeutic options, and preparation for change. The additional evaluation required prior to pitch-elevating surgery is discussed in the section on surgical treatment protocols (pages 19-20).

Building therapeutic rapport

The relationship between client and clinician begins with the first interactions. In initial sessions, the clinician is not only assessing the client, the client is also assessing the knowledge and supportiveness of the clinician. A relationship grounded in mutual respect, trust, and genuine care for the client's well-being facilitates open communication and encourages active engagement in therapy; conversely, it can be difficult to build therapeutic rapport if conflicts arise in initial sessions. Many transgender individuals have had negative experiences with ill-informed or unempathetic health professionals, and there may be wariness about entering unreservedly into a relationship around communication – which is, by its nature, highly personal.

Because the assessment process sets the stage for all future interaction, it is extremely important to make the client feel respected and safe, and to create a feeling of positive anticipation for the therapy process. Issues that speech professionals need to consider in the intake process include storage of information, privacy issues in setting appointment times, client name preference, use of

the client's preferred pronouns, and therapist bias and judgments about transgenderism as issues that speech professionals need to consider in the intake process.[12]

Recording relevant history

Client history should include information about both trans-specific concerns and also general issues that are known to impact therapeutic options and potential outcomes. While some transgender individuals are very comfortable talking about their history, others are more private. In some cases it may be appropriate to revisit sensitive questions after therapeutic rapport is well established, or to lead with general questions unrelated to trans-specific issues. As with the general population, some clients respond well to informal intake (e.g., the question "What brings you to see me?" may elicit a great deal of information), and in other cases a more structured interview process or intake form may be beneficial. Sample intake forms are included as Appendix B.

As with any client presenting for speech services, initial intake should include a general medical history, with particular attention to history of nose/throat complaints, respiratory ailments, hearing difficulties, voice disorders (including problems stemming from self-directed attempt to modify voice or heavy use of voice), or any other conditions that could impact speech.[9,22,36] To assist in coordination of care, other health professionals involved in the client's general and trans-specific care should be noted.[22,37] Clients who present with difficulty swallowing, a dysphonic voice, or other symptoms that may indicate voice disorder (e.g., vocal fatigue, loss of range, or throat discomfort) should be referred for laryngological examination.[38] All current medications (including feminizing or masculinizing hormones) should be recorded.

History of behaviours that may negatively impact speech, such as smoking (tobacco, cocaine, marijuana, etc.) and drinking alcohol should be explored.[9,36,39] Because the stigma associated with substance use makes it difficult to get accurate information about current patterns of use, it may be useful to ask if a client "has ever…" rather than asking about current behaviour at the original intake (this can be revisited as part of treatment planning). It may be useful to inquire about personal, professional, and recreational use of voice (e.g., involvement in singing/acting), both to explore any areas of concern and to determine if previous training could be tapped during therapy.

Previous attempts to feminize/masculinize speech should be investigated, including techniques used, duration of self- or professionally-directed therapy, and the client's subjective feelings about the outcome.[5,8,15,36,37] Trans-specific history should also include information about other feminization/masculinization treatments that relate directly to speech (e.g., testosterone therapy in female-to-males, facial feminization surgery in male-to-females), and any noted impact on speech following these treatments.[5,12,22,36,37] It is not necessary to inquire specifically about trans-specific treatments that are unlikely to directly impact speech; relevant areas to explore include:

- consideration of the impact of any planned surgeries on the timing of speech therapy
- any factors relating to transition that the client feels are important in terms of motivation and timing of speech therapy (e.g., wish to have speech change complete by a specific date to facilitate job change)
- any medical or psychosocial issues that the client feels may affect ability to engage in speech change (e.g., some transgender people report changes to concentration and emotional lability as a side effect of hormone regimens)

Evaluating current speech parameters associated with gender

Thoroughly assessing the client's speech gives a baseline against which to measure change and provides information about which changes would be most useful.[12,28,40] While some voice parameters can be measured objectively (e.g., fundamental frequency, speaking frequency range), many speech characteristics associated with gender cannot be objectively quantified (e.g., melody, vocal timbre). A complete clinical impression should include the clinician's objective and subjective findings, and also the client's subjective assessment.[2,6-10,14,36,40-42]

Following standard practice in a speech/voice evaluation, the clinicians we interviewed made audio recordings of the client's performance across a variety of tasks such as reading, picture description, and conversation. These recordings assisted the client and clinician in analyzing current communication patterns and in setting goals for therapy. They also served as a baseline against which to measure change and as a resource to train student speech professionals. Some clinicians videotaped the assessment session and then reviewed the tape with the client, looking at speech parameters and also non-verbal communication features such as gestures, movement, and facial expressions. However, other clinicians preferred not to use video footage as clients reported finding it intrusive and intimidating.

To gather objective data in an assessment, a computer program that measures fundamental frequency, intensity, and vowel formants is necessary. Popular programs include Kay Elemetrics CSL (Computer Speech Lab) 4300 and Dr. Speech (Tiger DRS Inc).[8,22,29,37] Free software programs that measure F_0 may be downloaded from the internet and can be useful for practice by clients who have computer access.

Client's subjective assessment

Because the client's goals for speech feminization/masculinization relate directly to both self-perception and feelings about the perceptions of others, it is important to understand the client's perspective and expectations in both of these areas.[5,7,8,22,36] This may be done through informal discussion and/or formal measures (e.g., standardized questionnaire[3,6,22]). If informal interview is the only tool used, to facilitate later assessment we recommend that the clinician use the same questions in pre- and post-evaluation (e.g., "Describe three situations in which you are not comfortable with your voice", "Can you tell me 3 specific things you would like to change about the way you speak?"). A standard speech questionnaire like the Vocal Handicap Index or Voice Symptom Scale can be modified to include trans-specific concerns (a local example is included in Appendix C; the La Trobe Communication Questionnaire[6] is an example in the published literature). It may also be informative to ask clients to rate identity, self-perceived behaviour, appearance, and speech on a masculinity/femininity and male/female scale, both to gain a clearer picture of the client's identity and also to aid in discussion of the client's feelings about possible discrepancies between gender identity and gender expression.[22]

Concern about others' perceptions often relates to *passability* – being perceived by others as a man or a woman. The desire to pass is a complex feeling that may be influenced by the client's self-defined gender, community norms, beliefs and expectations of people close to the client (friends, family, coworkers, etc.), internalization of transphobic shame/stigma, degree of social support, and experiences of mistreatment (as individuals who are visibly transgender are more vulnerable to transphobic harassment, discrimination, and violence). Because norms relating to social interactions and speech are context-dependent, it is important to know the context for speech that the client is particularly concerned about (employment, social relationships, etc.).[19,37] As the client first starts to change his/her speech, reactions of those close to the client (e.g. family, friends, coworkers, community peers) should be noted.[5,8,13,36,37] For clients concerned with passability, the reactions of

strangers are important and these should be recorded either through informal estimate or formal means (e.g. diary).

While some transgender individuals may seek speech services because they have difficulty passing on the telephone or in face-to-face communication, others are more concerned about reducing a perceived discrepancy between speech and identity. Assessing self-perception relates to the fit (or lack of fit) for the client between their current speech and their felt sense of gender – i.e., how the client feels hearing herself/himself talk. The question of how well speech fits with the client's perception of self may be easy for the client to answer right away, or it may come over time with experimentation, practice, and observation of role models. Both the literature and the clinicians we interviewed discussed the importance of a "good fit" between the speech and the client rather than attempting to conform to an external stereotype of femininity/masculinity.[7,19] Finding this good fit requires introspection on the client's part and an informed opinion about what is possible.

Clinician's evaluation

1. Pitch

Research suggests that while there are several factors that together determine attributions of gender to a speaker, fundamental frequency is primary in perception of a speaker as male or female.[2,6,41,43] While mean F_0 for non-transgender men and women overlap from 145-165 Hz,[7,8] studies of transsexual women's voices suggests that bringing F_0 into the range of overlap may not be sufficient, by itself, to shift the gender perception of listeners. For example, transsexual women with F_0 below 155-160 Hz (i.e., within the "neutral" range) are usually judged as male.[44,45] There are no comparable data on F_0 norms for FTMs.

Speech analysis software (e.g., Kay Elemetrics) can be used to measure the average speaking pitch and pitch range across several tasks.[8,22,29,37] Data should be recorded in both hertz and semitones to facilitate clinical evaluation, using one of the readily available conversion tables.[46] The visual display of a software analysis program can provide valuable information for a client about habitual and target average speaking pitches, particularly if the client is already knowledgeable about male and female speaking pitch ranges.

In addition to noting fundamental frequency and frequency range, it is useful to note if the pitch is higher (for MTFs) or lower (for FTMs) in a less complex task like reading than in spontaneous conversation. If so, the client may already be consciously or unconsciously attempting voice feminization/masculinization.

One clinical expert suggested speaking pitch is more accurately obtained by collecting data in situations familiar to the client, and also with both male and female conversational partners. While this wider baseline would be informative, achieving it may also present practical difficulties.

2. Intonation/Inflections

Intonation is also considered important in gender perception, particularly when frequency is in the "gender-neutral" range (the overlap between male and female norms).[14,19,44,45] Women tend to be more variable in intonation than men, generally using more upward glides and avoiding downward glides and level intonation patterns.[2,7,9,10,19,37,45,47]

Intonation patterns should be recorded using speech analysis software at the same time that frequency is recorded. The visual display recording can then be viewed with the client, to see patterns associated with gender (e.g., repeated and dramatic decrease in pitch at the end of a sentence is typically considered a male speech pattern, while variability in intonation is more

typically female). Abnormally exaggerated intonation shifts may be observed in some transgender women trying to mimic non-transgender women,[2] and if present these should be pointed out to the client.

It is also useful to make clinical judgments about inflections during speech. Conversation or a sample of reading can be recorded, then played back with both the client and the clinician listening to the vocal inflections. During the subsequent discussion the clinician can assess the acuity of the client's perceptions. If the client is unable to hear what the clinician perceives to be important, the clinician can then give guidance, "Listen to how your voice stays flat when you say…" or "Listen to how your voice moves around when you say that. That is what we are looking for."

3. Resonance

The term *resonance* is typically used in the speech literature to describe three distinct aspects of speech: (a) the effects of the vocal tract on the sound produced by the larynx (formant frequencies), (b) the vocal quality that corresponds to vibrations of the sound wave in various parts of the body, and/or (c) the function of the nose as a resonator. There is evidence that vowel formant frequencies, which are dependent on the size of the vocal tract (typically larger in males than females) significantly influence the perception of the speaker as male or female.[7,8,39,41,42,48] Vowel formant frequency is estimated at 20% lower in adult men than adult women.[7,8,13,41] Measuring the "corner vowels" /i/, /u/, /a/ may be useful in assessing transgender speech,[29,44] as these vowels represent the maximal range of formant frequencies in vowel productions in many (if not all) languages.[49]

The role of the other types of "resonance" is less certain. Singers often refer to "chest resonance" as the full, rich sound that is produced in lower notes and accompanied by a feeling of the voice vibrating in the chest; "head resonance" describes a brighter, forward sound that accompanies sensations of the voice ringing or resonating in the mouth, nose, sinuses, or upper part of the head. While some authors suggested that "chest resonance" is associated with male speech while "head resonance" is associated with female speech,[7,9,10,50] this is a subjective phenomenon, with no way to objectively measure or assess it. There is no empirical evidence that increasing "head resonance" or decreasing "chest resonance" increases the perception of MTF speakers as female.[8] Further study is necessary to see if using these perceptions in training voice production produces difference in vowel formant frequencies.

4. Loudness/Intensity

Vocal intensity may be measured with a sound level meter, available at low cost from Radio Shack. In North America, the meter is usually placed 30 cm from the lips; at this distance, norms are 68-76 dBA for adult males and 68-74 dBA for adult females.[51] Despite the evidence that there is little sex-mediated difference in the loudness of actual speech, it is a common societal stereotype that women tend to speak more softly than men, so some clinicians include this speech parameter in assessment and treatment planning.[5,8,9,13,43] We recommend objectively measuring intensity if the client reports it as a problem or if the clinician subjectively feels it may be an issue.

Some transgender individuals who are self-conscious about speech may adopt insufficient vocal intensity to avoid public attention, or MTFs may speak quietly to try to "soften" the voice.[8] This can result in difficulty maintaining desired speech characteristics in situations where a higher vocal intensity is needed to counter high environmental noise or to convey intensity of emotion.

5. Voice quality

Most measures of voice quality are not consistently associated with categorization of voice as masculine or feminine,[40] with the exception of “breathiness”, which is associated with female speech.[2,7,8,10,19]

Voice quality is primarily measured subjectively according to the speech professional’s acoustic impression, or recorded on perceptual rating scales (e.g., Oates and Russell Perceptual Voice Profile[37]). Jitter and shimmer data may be collected by a software acoustic analysis package to support the clinical impression, but these parameters can be hard to measure accurately, requiring a very quiet space, rigid protocols, and finely calibrated equipment.

The client should be referred for a laryngological examination if the voice is judged to be dysphonic.

6. Articulation

Subjective impression may be made about the quality of articulatory productions. It is suggested that women tend to articulate more clearly than men but in a light manner, while men tend to make harder articulatory contacts and “punch out” their words,[5,10] and that men tend to drop final phonemes (e.g., “walkin” instead of “walking”) and reduce or alter the production of some speech sounds (e.g., voiced “th”).[7,13,37]

Some clinicians reported making subjective observations about habitual lip, tongue and jaw positions, although there was no agreement about correlation with gender associations.[7,13,37,43]

7. Durational Characteristics

Several expert clinicians observed whether the client sustained voicing through speech sounds, words, and phrases, or used a more staccato speech style, where words and phrases were produced more separately. It was suggested that a longer mean duration of voicing during phrases and isolated words, and lingering on occasional vowel sounds, is considered a more feminine pattern.[5,43]

8. Language/Discourse

While there are strong social stereotypes about gender norms and language (e.g., use of slang, size modifiers, and tag questions), gender-associated norms of language and discourse are so dependent on an ever-shifting social context that findings from studies done in past decades may not be reflective of current patterns and trends.[13,19] Additionally, there is strong interplay between gendered language norms and norms relating to culture, class, and age,[52-56] so norms appropriate for one client would not be appropriate for another. If there are habits relating to modifiers, qualifiers, indirect vs. direct speaking style, etc. that the client finds discomforting or the clinician feels may contribute to perceptions that don’t fit the client’s self-image, we recommend that the clinician offer feedback in these areas, encouraging the client to weigh research findings or the clinician’s suggestions against her/his own experience.

Rather than attempting to memorize lists of qualifiers or artificially adopt set phrases, we recommend that modification of language and discourse be based on the client’s own observations of gender markers in the specific environmental context of concern to the client (e.g., work, home, cultural community, social setting). Clients with strong beliefs about “appropriate” language may benefit from clinician assistance to explore stereotype vs. actual observed behaviour of peers.

9. Non-verbal communication

Norms relating to posture, gestures, and other non-verbal aspects of communication are strongly influenced by cultural, class, and age norms. Generally, in the dominant culture of North America, maintenance of eye contact, increased smiling, nodding/inclining toward others, increased use of hand/arm gestures, and occasional touching of the listener are associated with feminine/female communication patterns.[5,10] While it is not within the typical scope of practice of a speech-language pathologist to provide a detailed assessment of non-verbal communication behaviours, anything that is striking to the clinician (or to the client) should be noted as part of the subjective evaluation.

Subjective third-party evaluation

In some cases it may be helpful to have one or more naïve listeners provide subjective impressions of a recording of the client's speech. This may be useful when clients are particularly concerned with passability, or when clients are unable to appreciate changes that have taken place (for example, one study found that MTF clients did not rate their speech as more feminine following therapy, but observers did[22]). To be considered "naïve", the listener should not be a speech clinician or student SLP, and should also not be familiar with the client's goals. If passability is the goal, the listener should rate not only femininity/masculinity but also be asked to judge whether the speaker was male or female.

Assessing potential for speech/voice change

In our discussions with expert clinicians and throughout the literature, there was the opinion that diagnostic therapy was important in setting realistic goals for speech and voice therapy. Clients vary, for example, in ability to achieve certain pitches, match a target pitch, and follow models of intonation or articulatory productions.[4,6,8,19,22,30] Using an exploratory diagnostic process helps determine how physically and psychologically easy or difficult it may be to effect change, and gives information about the sort of intervention that may be necessary in therapy. For example, if a client has difficulty matching pitches auditorily, using a visual pitch display will probably be necessary. If the pitch range appears restricted, a lower (MTF)/higher (FTM) frequency pitch target would be more appropriate, and specific exercises to increase vocal range (e.g. Stemple's vocal function exercises) should be considered. If there is a seamless transition into falsetto (MTF), some falsetto notes may be available for widening the upper range of vocal inflections.

1. Speaking pitch

There are a number of ways of exploring average speaking pitch and speaking pitch range:

- The client glissandos around in the upper (MTF) or lower (FTM) range, without moving into falsetto (MTF), then sustains a pitch and uses it to intone a word and short phrase. This is recorded and then evaluated for quality and ease of phonation. This is repeated several times throughout the range. The client is also asked to intone words and phrases in higher pitches (MTF) or lower pitches (FTM) to ensure there is room for vocal inflections.[37,50]
- An arbitrary target pitch is set by the clinician and the client matches it. Then, choosing pitches above or below that one, they decide on an initial target. It should be noted that this pitch is for practice purposes only and can be changed at any time.
- A pitch that is one fourth of an octave (as in the initial interval in *Auld Lang Syne*, or *"Here comes the bride")* above/below the habitual speaking pitch is set by the clinician and the client matches it.

- The clinician models a frequency within the lower range of female norms (MTF) or upper range of male norms (FTM) on a visual display in a computer voice analysis program, and the client produces a pitch that stays above (MTF) or below (FTM) it.
- The client says a phrase in her most feminine (MTF) or his most masculine (FTM) voice.

For MTFs with low pitch, diagnostic therapy should be done to see if facilitation techniques enable higher pitches. Using sounds that facilitate efficient vocal fold vibration (e.g. /m/, /z/, lip trilling, tongue trilling), the client phonates in a higher pitch, either randomly or matching a pitch set by the clinician. Feelings of ease (no sensation in the throat) and resonance (strong feelings of vibrating or buzzing in the front of the face) are the goals. If the client is unable to produce a higher pitch without throat sensation or fatigue, the clinician may want to start with some standard voice therapy exercises to reduce inappropriate habits; a referral to an otolaryngologist may also be indicated.

For FTMs with high pitch, it may be useful to explore facilitation techniques that give sensations of ease and resonance in the “chest” register – the lowest register of the voice.

2. Inflections

A short sentence is read by the client and examined for its inflectional variation. For those seeking to feminize speech, the goal is an inflectional pattern that is wide but still natural-sounding; for those seeking to masculinize speech, the goal is an inflectional pattern that is narrower but not “flat” sounding. If the pattern is consistent with the client’s goals relating to feminine/masculine speech norms, this is noted; if not, the clinician can model a more consistent inflectional pattern and the client can copy it. The result is played back for the client to hear the effect. This exercise gives information on the client’s ability to hear and model vocal inflections, and also gives the client feedback about how the voice may sound if a different inflectional pattern is adopted.

3. Other parameters

Changes to other parameters such as tongue carriage, articulatory productions, vocal quality, and vocal loudness can be used in diagnostic therapy, if either the client or clinician thinks they may be important to address.

Assisting the client to determine therapeutic goals

To help the client determine fully informed, considered, and achievable therapeutic goals, it is useful for the clinician to provide a synopsis of the client’s baseline speech and voice characteristics, physiologic limitations and estimated potential for change, and an informed professional opinion about the parameters that would be beneficial to address to achieve the client’s stated objective.[2,3,7,8,11,13,36] For example, if a MTF client presents with the primary concern that her voice is not perceived as female, it may be appropriate to target a higher fundamental frequency if her habitual speaking pitch is 100 Hz. If her average pitch is higher than 150 Hz, it may be more appropriate to target resonance, inflection, and other speech characteristics that are believed to have a greater influence on gender perception when pitch is above the norms for male speech.

The table on the following page summarizes aspects of speech that are associated with sex and gender attribution, and associated norms. Norms should be considered as a spectrum rather than two isolated poles, to encourage speech professionals and clients to carefully consider therapeutic goals that fit with sense of self.

Table 1: Communication Norms Associated with Sex/Gender

		Female/Feminine Norms	Male/Masculine Norms
Considered highly salient to gender attributions	**Pitch**	• mean: 196-224 Hz • range: 145 Hz-275 Hz • higher upper/lower limits of range	• mean: 107-132 Hz • range: 80 Hz -165 Hz
	Formant frequencies	• higher	• lower
	Intonation	• More variable in intonation, more upward glides	• more level intonation, more downward glides
Weaker evidence to support role in gender attributions	**Loudness**	• 68-74 dBA	• 68-76 dBA
	Breathiness	• perceived as mildly breathy • softer speech onsets	• not perceived as breathy • harder speech onsets
	Articulation	• clear, light	• forceful onsets • drop phonemes, reduced use of voiced "th"
	Duration	• longer mean duration of phrases and isolated words; lingering on vowels	• staccato speech style
	Non-verbal	gendered norms relating to eye contact, smiling, nodding/inclining toward others, hand/arm gestures (specifics depend on nature of relationship between speaker/listener)	

Assisting the client to understand therapeutic options

Some transgender individuals have sophisticated knowledge about gender-related speech parameters and therapeutic options, and come to the initial assessment with a clear direction they wish to pursue. Others have no knowledge and expect guidance from a professional. During the initial evaluation it is important to assess the individual's knowledge of speech. Consumer education materials discussing treatment options are included as Appendix E. In all cases, care should be taken to ensure that clients understand potential benefits and risks relating to both non-surgical and surgical voice change, and recommendations to prevent vocal fatigue or voice disorder.[7,8,11,13,23,28,30,35,37,57]

Because changes to specific acoustic voice characteristics affect numerous perceptual variables, a well-rounded speech treatment plan will target "constellations of related voice characteristics rather than independent acoustic variables" (p. 99).[2] For example, raising pitch may increase laryngeal tension and vocal tract constriction, influencing shimmer, jitter, signal-to-noise ratio, and resonance (and thus subjective perceptions of voice quality). For this reason, an optimal speech therapy program should target all parameters of speech, not just those related to pitch.

Preparing for the process of speech modification

The expert clinicians interviewed for this project all agreed that speech feminization/masculinization is a long process requiring considerable work on the client's part. While therapy outcomes cannot be predetermined, the estimated amount of daily practice time and expected duration of the course of therapy should be discussed, as should the factors that can influence the course of therapy.[6] As changing speech requires altering deeply ingrained communication habits and behaviors that can be difficult to modify, it may be useful to use the "Stages of Change" model[58,59] or other behavioral change tools to assist in anticipating and addressing barriers to implementing change.

If pitch-changing surgery is sought, there should be discussion of the parameters of speech that will still need work after surgery, as well as an estimation of the healing time involved and the time required to stabilize the new pitch.[8,18,31]

Speech Feminization/Masculinization Protocols

Non-surgical (speech therapy)

Speech therapy goals

As discussed earlier in the assessment section, we recommend that the clinician assist the client to determine therapeutic goals, recognizing that transgender individuals have diverse identities and objectives regarding feminization/masculinization and that the clinician should not be directive in promoting specific goals. The range of therapeutic goals may include any or all of the following:

1. Preparation for therapy: assessment and information

Some clients are interested primarily in a speech assessment and a professional opinion on what would be involved in changing elements of speech. Information about therapeutic options can help with decisions regarding the timing of gender transition. One program offered three to four introductory sessions that provided information about gender differences in communication, information about vocal hygiene and prevention of voice disorders, and exercises to increase flexibility of voice production.[8]

2. Enhanced observation and awareness of speech patterns of self and others

While transgender individuals are often highly skilled at observing others, practice may be needed to understand, observe, and analyze the specific components of speech.[11]

3. Changes to speech

Average speaking pitch, pitch range, inflections, formant frequency, breathiness, loudness, articulation, tongue position, language, facial expressions, and gestures may be targeted to feminize/masculinize speech.[7-11,22,26-30,32,36,50] Specific objectives relating to voice modification depend on what is feasible to produce without strain, what fits with the client's self-image, and how important passability is to the client (some clients may be comfortable with gender-neutral speech, while others will want to aim for a voice that is perceived by listeners as male or female). For clients who are concerned about "fitting in" or about passability, rather than adopting an artificial set of speech norms it is recommended that clients observe communication patterns in their social, cultural, and work environments to develop a context-specific set of norms.[7]

4. Prevention of vocal fatigue

Use of the vocal tract in non-habitual ways can cause strain. Important therapeutic goals are the maintenance of efficient and easy speech, establishing appropriate practice, and informing the client about how best to maintain vocal health.[7,8,10,13,22,28-30]

Treatment format

Traditionally, speech therapy has emphasized 1:1 work to facilitate the personalized intervention necessary to modify and monitor change in target behaviours. However, speech therapy groups (typically comprised of four to six clients) have successfully been used to work with specific populations (e.g., individuals with aphasia, people recovering from traumatic brain injury, clients with fluency disorders). Group therapy can facilitate peer support and encouragement, and reduce self-consciousness that may be experienced when the client is working alone with the therapist.

It has been our experience that both individual and group therapy are important components of transgender speech care. We recommend that both formats be made available, with the option for a client to take part in either or both depending on therapeutic needs and goals.

Components of a transgender speech therapy program that can be done well in a group include:

a) Education/information

Clients undergoing speech feminization/masculinization need to understand how the voice is produced, how physiological differences in male/female voice production system affect the voice and listener perception, physiologic and social norms relating to gender and speech, treatment options/outcomes/risks, and techniques to prevent strain associated with voice change. While some transgender individuals are extremely well-informed about speech, others have no knowledge or have been exposed to inaccurate information via the internet or peer groups.

b) Discussion

Group format is ideal for participants to share observations, insights, and practical advice. In the *Changing Keys* speech groups run in Vancouver (Appendix D), participants have commented on how useful they found these discussions.

c) Speech therapy exercises

Components of a therapy program that are the same for all individuals (ear training, relaxation exercises and basic exercises that train efficient vocal technique) can be done efficiently in a group setting. There are several advantages to this. Some individuals feel self-conscious about doing speech exercises; participating in a group has a normalizing effect. Role-playing is more easily done in a group, and the opportunity to observe others can give valuable insight into participants' own practice. Additionally, the group provides a safe setting to learn listening skills, and to practice observing speech in a way that will not be intrusive in a real-world setting.

The necessary repetition of training exercises can be done in a group as long as the therapist is able to monitor the progress of all the participants and give individual input and feedback as required. The group can be divided into pairs to give practice time in both talking and listening.

Some interventions require 1:1 work with a therapist, including:

- determining appropriate target pitch
- training target pitch if the individual has difficulty matching pitches auditorily
- significantly changing individual characteristics associated with "feminine" or "masculine" speech

- individualized, specific input on anything the individual has difficulty understanding or doing in the group setting: this applies to all exercises but is especially important in training an efficient voice that is resistant to vocal fatigue or dysphonia

Length of treatment time

Treatment time varies greatly depending on the degree of change sought, the client's vocal abilities, and psychosocial issues. There is no professional consensus on the optimal length of treatment for maximal treatment efficacy: while one study found that there was a modest correlation between the number of therapy sessions and mean pitch achieved at the end of therapy,[30] another found that client satisfaction was not related to the number of therapy sessions, and that clients tended to become frustrated and discouraged when therapy continued over a long period of time.[22] It has been our experience that treatment generally ranges from a minimum of 15 hours to a maximum of one year of weekly sessions, and that shorter, more intensive treatment times encourage motivation and accommodate changes to life circumstances more readily than prolonged treatment.

Psychosocial adjustment is an important part of changing speech. Participants may require time to get in touch with what sort of voice best matches the person within. This is by necessity a process that takes time and professional input as to what is possible. Many transgender individuals begin with the goal of having a pitch that is unrealistically high (MTF) or low (FTM); only with experimentation and practice will it become apparent that this is probably not achievable, necessary, or even desirable. Additionally, it can take time to feel that an altered voice is an authentic expression of self rather than an artificial "mask". If psychosocial issues are significantly impacting treatment, referral to a trans-competent mental health therapist or social worker may be useful.

Therapeutic techniques

We recommend that speech-language pathologists working with FTMs be clear that they are using a trial protocol, and seek client permission to record, evaluate, and publish information on the efficacy of the protocol. In an extensive review of speech literature, we did not find any published protocols for speech therapy with FTMs. It is unclear if techniques used to treat puberphonia may be effective to lower pitch in FTMs; there are no parallels for the other aspects of speech that may be targeted to masculinize speech (intonation, resonance, loudness, articulation, duration, language, facial expressions, gestures, etc.).

There are numerous published protocols for speech feminizing therapy.[5,7,9-11,19,29,36,37,50] As an example of a local protocol, Appendix D describes the *Changing Keys* program. *Changing Keys* involves individual initial and final assessment, with a mixture of group and individual therapy over the course of nine weeks.

Although treatment protocols must be flexible enough to address each client's goals, physiologic parameters, and psychosocial needs, therapy should be grounded in current knowledge of best clinical practice of speech and voice therapy. In the absence of empirical evidence testing the efficacy of specific techniques to feminize or masculinize speech, we evaluated speech therapy protocols (published in the literature or discussed in interviews with expert clinicians) on the basis of *clinical rationale* – a clearly articulated, logical, and valid reason for choosing a specific protocol or technique. On this basis, we feel the following strategies are supportable:

- *Imitation of non-transgender people observed in daily life.*[3,7,9-11,29,50]
  This input from the real world is useful in helping clients develop spontaneous speech habits that "fit" in their particular community.

- *Progressively complex practice while maintaining good voice quality*.[7,11,29,36,50]
  Integration of pitch, pitch range, and inflections is typically done in progressively complex practice (vowels, monosyllabic words, phrases, sentences; reading, answering questions, interactive dialogue). Motor learning theory suggests that, initially, simple behaviours are acquired more easily than complex ones. However, behaviours that are to be done together must be learned together.

- *Vocal flexibility exercises to maintain vocal range and voice quality.*[36]
  Vocal range and flexibility exercises are a standard part of a voice therapy protocol.

- *Motor training*.[7]
  As speech is a motor act, input is most useful when it is given at the motor-sensory level. Matching a sensory target (e.g., "Does your voice feel easy or stuck?" "In the face or in the throat?") is a more effective method of training the desired production than giving verbal instructions (e.g., "Do this with your jaw").[60]

- *Identifying and altering voice qualities when coughing, laughing, and clearing the throat*.[5,7-9]
  These vegetative and spontaneous laryngeal functions may be higher or lower in pitch than the client desires and may respond to therapeutic input.

- *Experimentation with a broad range of voice styles*.[10]
  Experimentation with a broad range of voice styles, including ones that might be considered "over the top" (far beyond what the client would actually want to use) expands the range of possibilities, and makes smaller changes – ones the client may actually use – feel less extreme.

Non-verbal communication: Facial expressions, posture, and movement

Some transgender individuals are keen observers of non-verbal behavior and are acutely attuned to gendered norms relating to non-verbal communication. Others may seek assistance from a speech therapist. While recognizing that non-verbal communication is extremely important, some speech-language pathologists feel unqualified to offer input; others may feel more comfortable doing so. Depending on an individual clinician's expertise in this area and the client's financial resources, options can include:

- *Focus on strengthening the client's observational skills.*
  Experimentation and observation are more useful than learning and following rigid patterns of behaviour.

- *Offer general feedback on the client's self-defined parameters for change.*
  Based on observation of community peers, the client can identify desired parameters for change, practice these changes in the therapy session, and receive subjective feedback from the clinician. Parameters for change may include smiling, eye contact, facial expressions, posture, and gestures while speaking and listening. Feedback depends on the desired goal (e.g., did the client smile more/less? when?) and also the clinician's subjective sense of whether the change seemed appropriate.

- *Offer general feedback about social conventions relating to masculine/feminine expressions and movement.*
  The client should be informed of the culturally-specific nature of non-verbal communication norms and the limits of the clinician's expertise in this area. It can be helpful to discuss the

difference between stereotypes/norms and observed behavior and also the clinican's input in light of the client's own experience and perspective.

- *Refer to peer support resources.*
  While the level of knowledge about non-verbal communication varies greatly among peer support providers, peer support (1:1 or group) may offer experiential insights and an arena for practice. As peer knowledge often has strong currency, it can be important to remind clients to weigh the suggestions of peers against their own experience.

- *Refer to a trans-competent clinician who has training in non-verbal communication.*
  At present this is only an option for clients who are financially privileged and able to travel, as there are no funded, locally available workshops. Sandy Hirsch, a private consultant who directs the "Give Voice" program, offers workshops for transgender women in Seattle (http://www.givevoice.com/authenticity.shtml). Movement coaches in theatre training programs may be able to assist in finding or developing local resources.

Habituation

As with any speech therapy, habituation and generalization of feminized/masculinized communication is both challenging and necessary. There is a huge gap between being able to maintain a pitch change on a prolonged vowel in a clinical setting and sustaining changes throughout speech in everyday life, particularly when making offhand remarks in casual conversation (when self-monitoring may not be as vigilant) or when the client is under stress or fatigued.[19] Strategies to promote carryover into everyday life may include:

- practicing words that are typically part of daily conversation (e.g., hi, bye, yes, no)
- in clinical practice of conversational speech, focus on situations/topics related to the client's life, and role plays suggested by client to match real-life situations that pose the most difficulty (e.g., job interview, coffee shop[11,61])
- experimenting with emotional intensity by practicing sentences expressing joy, sorrow, irritation, anger, etc.
- practicing outside the clinic setting (including telephone and in-person)

Follow-up Sessions

A small study (n=10) found that a longer treatment time for MTF transsexuals was correlated significantly with stable elevation of pitch over time.[30] In view of this observation, follow up sessions after the initial treatment has finished, or facilitated support groups for ongoing practice, may be important in maintaining change. Clinically supervised followup also provides an excellent opportunity to gather much-needed data about the effectiveness of a program over time.

1. Followup sessions (group/individual)

There is not yet any empirical evidence regarding the optimum frequency for followup sessions, the optimum content, or the criteria for termination. In the absence of data, we suggest that refresher sessions be initially offered three months after treatment and then at 4-6 month intervals, or as the clinician and client deem appropriate.

Followup sessions should include a discussion of successes, problems, strategies, and difficulties the client has experienced since the end of therapy; a review of the core exercises of the program (to ensure the client is practicing correctly and to determine if the exercises are still appropriate); and time to address any concerns that have arisen since the end of treatment. Ideally, followup would

include re-evaluation of the same parameters measured in the pre-treatment assessment, both to assess the maintenance of the desired changes and also to evaluate the effectiveness of refresher sessions.

If the initial therapy was provided in a group setting, a group setting is a natural forum for refresher sessions. As with group format for initial therapy, group format for refresher work offers valuable opportunities for clients to compare experiences. In our experience this can be most useful and encouraging, especially for those in the early stages of gender transition. Individualized followup may be more appropriate than group format if the client has numerous concerns or unusual concerns that require individual attention, or if the client feels uncomfortable in a group setting.

2. Client-run speech support groups

Self-help groups are commonly organized for people who are living with speech and language disorders such as aphasia and stuttering. They may also be useful for transgender individuals who have completed clinical treatment and are seeking peer support to maintain or strengthen speech changes. Client-run speech groups can provide motivation to maintain practice, a forum to practice and to share ideas and concerns, and an opportunity to socialize and do specific role-playing. Client-run groups can also foster the client's sense of ownership and control of speech and voice production, rather than feeling dependent on the therapist.

In any self-help group there is a danger that an individual may inappropriately assume a professional clinical role. In a speech group, this could be circumvented by providing group facilitation training to members, having the speech-language pathologist as guest visitor from time to time, and by having self-help sessions along with therapist-run refresher sessions.

Modification to improve accessibility and utility to clients with access barriers

The transgender community is tremendously diverse, and protocols must be flexible enough to address diversity of service needs and issues relating to access. In the transgender speech literature reviewed for this project, there was little discussion of modification to address the needs of clients who have difficulty accessing the typical setting or format of speech service – including individuals who have speech, hearing, cognitive, or learning disabilities; are not highly fluent in English or are not literate; or are geographically isolated or cannot leave a residential facility (prison, long-term care, etc.). Without empirical evidence to guide practice, we offer the following suggestions based on our experience providing services to a diverse range of transgender clients.

Individuals who are physically unable to attend speech therapy or are awaiting speech therapy services could benefit from an information package available through the mail or internet. This kind of "distance program" is currently under development at La Trobe University in Australia.

Such a distance learning program could include information on the mechanics of speech and voice production, gendered aspects of speech and voice, tips on observing and listening to conversations of men and women in the client's own community, evaluation of commercial speech training programs available on the internet, and phonosurgery risks and benefits – similar to the factsheets in Appendix E. Clients could use telephone or email to consult with a clinician, on the understanding that the clinician would not be able to give input on specific therapy issues (it is not possible to do actual speech therapy at a distance, as therapy requires a comprehensive evaluation, regular monitoring of the client's performance and specific training input). Video hookup connecting a rural health unit with an urban speech program may be feasible both to train rural practitioners and to provide some level of service to geographically isolated clients.

For individuals who do not speak English, an information package could be translated into a variety of languages. Providing speech service in another language is not possible unless the clinician speaks the client's language well, as subtleties of inflections, inflectional range, word stress, and semantic and syntactic choices require a thorough knowledge of the language; the only direct therapeutic input that could perhaps be given would be in changing the average speaking pitch. SLPs who are multilingual could be supported to take trans-specific training, perhaps working in consultation with a more trans-experienced clinician to provide service in the client's primary language. If the client is partially fluent in English, wishes speech therapy in English, and will be speaking English in everyday life, therapy delivered in English can be beneficial as the client has the opportunity of learning more feminine/masculine patterns of speech as she/he acquires the language. For individuals who are only partially fluent in English the therapeutic process will likely be longer and will require much more 1:1 input.

Transgender clients with speech or hearing disabilities who are able to attend speech therapy sessions may find great benefit from using visual input during speech therapy. This has been used with good success with other populations (e.g., using palotography and ultrasound to work with phonological disorders in people who are hard of hearing). For transgender clients, there are a number of software programs that record fundamental frequency and allow the creation of a "model wave". The clinician could record a desired average speaking pitch or an intonation pattern and the client could then use the visual input to copy it; alternatively, the clinician could record the lowest (MTF) / highest (FTM) desirable frequency and the client could use the visual input to keep the speaking pitch above (MTF) or below (FTM) this line.

If a client has cognitive or learning disabilities, depending on the nature of the disability it may be useful to include a loved one or care aid in the therapeutic process. This person could help the client establish a regular practice schedule and give input to the exercises, under the guidance of the speech-language pathologist. A different format may be useful for the client who has difficulty processing the information necessary to change speech habits. Rather than using an approach that requires introspection (e.g., "How does that sound? Am I feeling my voice in my face?"), the clinician may be more directive in determining which exercises would be most useful and could be done appropriately by the client; the clinician and client together would draw up a practice schedule, and the client would simply practise the motor movements outlined. Individualized attention is likely more effective than group work to provide the client with more intensive input. To be successful, this kind of format would require regular clinical intervention and support outside the therapy room.

Self-guided speech feminization

There are a variety of videos, websites, and other materials available for self-guided speech feminization. We cannot comment on the efficacy of these materials, but we are concerned that (a) many are not produced by speech professionals, and (b) there are risks associated with attempting to change voice without professional assistance. Speech feminization/masculinization involves substantial changes in habitual production and so has the potential to cause a voice disorder or aggravate an existing one. We strongly recommend that anyone seeking to feminize or masculinize speech first be assessed by a speech-language pathologist, that a speech clinician be involved in monitoring progress, and that a speech clinician be consulted if there are any symptoms of vocal fatigue or negative changes to vocal quality. Additionally, we recommend that consumers be cautious of any materials promoting a rigid set of speech norms, as speech is too individually and culturally driven to be guided solely by a set of generic rules. Consumer education materials relating to self-guided speech change are included in Appendix E.

Surgical (pitch-elevating surgery)

Surgical techniques to elevate pitch are based on the physiological components of pitch:[35]

$$F_0 = 1/2 \text{ vibrating length of vocal folds} \times \sqrt{\left(\frac{\text{Mean vocal fold tension}}{\text{Vocal fold density}} \right)}$$

Fundamental frequency can thus be raised by shortening the folds, decreasing the total mass of the folds, or by increasing the tension of the folds.[17,23,62] Surgical techniques to achieve this include anterior commissure advancement, creation of an anterior vocal web, cricothyroid approximation, induction of scarring along the vocal folds, or vocal fold reduction (by intracordal steroid injection, laser evaporation of the vocal fold, or composite reduction/reconstruction of the vocal fold).[3,7,17,18,23,24,31,32,35,62-66] Consumer information on all techniques is included in Appendix E. To date, we feel that cricothyroid approximation is the only method that has been assessed with sufficient rigor to be considered a viable treatment option.[3,7,18,22,23,31,32,34]

Thyroid chondroplasty may be done at the same time as vocal surgery to reduce the laryngeal prominence (Adam's apple).[17,18,31,32,35,63] As this is a cosmetic procedure that does not affect the voice, it is not included in this review (for further information, see *Guidelines for Facial Feminization Surgery*).

Risk-benefit ratio

There is a paucity of outcome data for pitch-elevating surgery, particularly longitudinal data to monitor outcomes over time. In general, professional opinion is mixed about voice surgery, with some clinicians stating that it is not a viable treatment option, [5,67] and others recommending that voice surgery be considered a treatment of last resort for MTFs who have not experienced satisfactory increase in pitch following speech therapy.[7,31,63,68] Certainly the reported negative effects (compromised voice quality, diminished vocal loudness, adverse impact on swallowing or breathing, sore throat, wound infection, and scarring) and variable outcomes are a concern.[7,8,18,23,24,31,32,57,63,65,67,68]

However, some proponents of voice surgery suggest that surgery can protect the voice from damage caused by strain to elevate pitch through non-surgical means.[18,23,32,65] Given this, while there are clear risks of vocal surgery and the decision to pursue vocal surgery should be carefully considered, we feel the decision about risk-benefit ratio and preferred technique is best left to the patient, with input from both a trans-experienced surgeon and a trans-experienced speech-language pathologist.

Pre-surgical assessment

In addition to the standard screening done prior to any surgery (assessing for risks relating to anesthesia, infection, etc.), assessment prior to pitch-elevating surgery should include anatomical and functional assessment of the larynx, subjective auditory assessment by both a speech-language pathologist and the surgeon, and computer recording and analysis of pitch range.[18,23] Care should be taken to ensure the patient understands the risks and anticipated outcome of the technique that will be used.

After finding that some subjects have strained and unnaturally elevated voices following surgery, attributed to habitually speaking at an artificially elevated pitch for sustained periods of time prior to surgery, one surgical group reported testing for ability to phonate at a pitch within the masculine range as part of preoperative consultation. Clients who are unable to do this were felt to have the

equivalent of a muscle tension dysphonia, and were referred for preoperative voice therapy to recover the ability to produce relaxed phonation.[23]

Estrogen is associated with risk for deep vein thrombosis and pulmonary embolism. If the patient will be immobilized for a prolonged period during or following surgery, consultation with the prescribing physician is necessary to discuss the advisability of tapering estrogen use before surgery.

Smoking increases the risk of complications from anesthetic and impairs healing, and there is evidence that smoking following voice surgery can negatively impact on voice quality and pitch.[31] Patients should be informed of the risks associated with smoking and of smoking cessation resources, and strongly encouraged to not smoke prior to or immediately following surgery.

Post-surgical care

Post-surgical care depends on the specific surgical technique employed. The surgeon should review aftercare instructions with the patient as part of informed consent prior to surgery. The surgeon should also be accessible for questions relating to post-operative complications. The patient's local primary care provider should consult with the surgeon to determine appropriate followup.

In the literature reviewed voice surgery was typically performed as an inpatient procedure, with hospital monitoring for subcutaneous emphysema and infection for at least 24-48 hours after transfer from post-anesthetic care.[31] Followup evaluation by the surgeon (or post-operative care coordinator if the surgeon is outside BC) is recommended at one week, four weeks, twelve weeks, and six months after surgery to monitor healing and recovery. Immediately following surgery, temporarily decreased pitch, diminished voice quality, and edema were commonly reported, with spontaneous recovery in most cases. Less common complications that required medical intervention included mild emphysema, neck abscess, negative response to the sutures/plates used in cricothyroid approximation (requiring removal of the material), and loosening of the sutures used in cricothyroid approximation (requiring further surgery).[18,31]

For most techniques, it is recommended that patients not use the voice at all for one to seven days after surgery, and then use the voice cautiously until any discomfort (e.g., due to postoperative edema) has passed.[18,32,64] For the more invasive combined thyroid cartilage and vocal fold reduction, two weeks vocal rest is suggested.[35] Following cricothyroid approximation, steam inhalation may be recommended to hydrate and lubricate the vocal cords, to promote healing.[32]

Speech therapy is recommended following surgery to help the patient adapt to and stabilize the new voice.[18,31] If pitch-elevating surgery was performed before other components of speech had been satisfactorily altered, resonance, articulation, and other components may also need to be addressed via speech therapy.[8,18]

Outcome Evaluation

Evaluation is a continuous process in speech care, with various informal and formal methods that may be used to determine progress and shape the direction of future treatment.[11,22,29] We recommend that, at minimum, the baseline assessment be repeated immediately following the end of therapy, and post-treatment data compared to pre-treatment findings. If the client is agreeable to long-term followup, given the paucity of long-term data it would be ideal for the client to be re-evaluated six months, one year, five, and ten years after treatment (for transient clients this degree of followup may not be possible, but even data at 6 and 12 months would be a significant contribution to the field).

In addition to re-evaluating objective and subjective impressions of speech (as per the initial assessment), we recommend that clients be invited to evaluate satisfaction with the outcome of treatment.[6,22,26,29,36,50] Several trans-specific studies found a discrepancy between subjective satisfaction and objective/subjective changes to voice, with some clients pleased with the outcome despite minimal objective change, and others perceiving less change than that reported by naïve listeners.[22,26,30,44] This raises the question of what is considered a "successful" intervention. Some authors interpreted the findings as evidence that clients cannot accurately judge "successful" voice change;[26] others felt that discrepancy between subjective satisfaction and objective changes to voice may have stemmed from increased passability in other dimensions (e.g., from hormones or electrolysis), a good working relationship with the clinician, or satisfaction with the availability/cost of the service.[30] It is also possible that client goals shifted over time or that clients' goals for speech did not center on pitch or passability (the typical measures employed for evaluation). At the beginning of this document we suggested that the primary goal of speech feminization/masculinization is to decrease discrepancy between speech and the client's sense of self; it is, we think, highly relevant to ask about client feelings about "fit" between speech and identity, even if the client did not explicitly state this as an objective at the start of treatment.[22] Another relevant measure might be the client's report of being able to use the desired speech consistently in the settings that were identified as the targets at the outset of therapy.[36,50]

We also encourage clinicians to invite clients to evaluate the quality of service provided. In some cases the clients may be very satisfied with the clinician's performance despite minimal changes to speech; whatever the outcome, clients may have constructive critical feedback to offer the clinician regarding the ability to relate information clearly and accurately, sensitivity and respect in communication, overall familiarity with transgender concerns, efficient coordination with other clinicians, accessibility of treatment, etc.

If long-term followup is feasible, in addition to the standard re-evaluation of speech it may be useful to inquire about clients' continuation of therapeutic exercises, and symptoms of vocal fatigue.[22,30] One long-term study found that after speech therapy had ended, three out of five participants attempted further change through techniques learned from the internet or in books.[22] It may be useful to offer consumer education regarding risk prevention and/or ongoing monitoring to clients who are interested in pursuing techniques outside a professional setting.

Summary of Recommendations

Purpose of transgender speech treatment

1. Transgender speech services should be offered in the context of a complete approach to transgender health that includes comprehensive primary care and a coordinated approach to psychological and social issues.

2. The primary goal of speech feminization/masculinization is to change speech so the client's speech more closely approximates the client's sense of self.

3. Feminizing/masculinizing speech involves non-habitual use of the voice producing mechanism. To prevent the possibility of vocal damage, professional evaluation and assistance are essential.

4. Self-guided speech change without professional supervision is not recommended. Clients intending to pursue self-guided speech change should be encouraged to, at minimum, have an initial professional assessment and then to consult with their primary care provider if they develop symptoms of vocal fatigue or negative changes to vocal quality. Self-help speech groups should have appropriate clinical support.

Clinical competence

5. Speech professionals working with transgender individuals must have a basic understanding of transgender health (including hormonal and surgical feminization/masculinization) and trans-specific psychosocial issues, and must be familiar with basic sensitivity protocols such as use of preferred gender pronoun and name.

6. Transgender individuals who are seeking speech services for reasons other than speech feminization/masculinization can be treated by trans-sensitive speech professionals, using standard speech protocols. Speech feminization/masculinization requires additional clinical expertise and special clinical protocols.

Client inclusion/exclusion

7. Speech services should be available to the full spectrum of the transgender community, including male-to-female (MTF) and female-to-male (FTM) transsexuals, crossdressers, bi-gendered people, androgynous people, and others who desire to feminize/masculinize their speech.

8. Need for speech services should not be evaluated based on hormonal use, pursuit of sex reassignment surgery, or length/percentage of time cross-living.

9. Services should be adapted as needed to fit a client's individual needs, including accommodation relating to hearing/speech disability, mental illness, cognitive disability, learning disability, physical disability, geographic isolation, or incarceration.

Treatment decisions

10. The client is responsible for treatment decisions, supported by the clinician's informed professional opinion, assessment data, and any loved ones the client wishes to be involved.

11. To support fully informed treatment decisions, clients should be fully informed of potential risks and benefits associated with treatment options, the estimated duration of treatment, and the factors that can influence the outcome/duration of treatment.

12. Existing protocols for speech feminization with individuals in the MTF spectrum should be reviewed and considered in developing an individualized treatment plan for speech feminization. As there are no established protocols for speech masculinization with people in the FTM spectrum, FTMs seeking this service should be informed the protocol is a trial.

13. While modification of existing protocols is encouraged, all treatment plans (including those using new or experimental techniques) are expected to be based on a clearly articulated, logical, and valid clinical rationale. Departure from existing protocols should be explained as such to the client as part of fully informed consent, and should be documented in detail to facilitate evaluation.

Assessment

14. Assessment prior to speech feminization/masculinization should include:

    - general medical history
    - subjective and objective evaluation of current speech, including pitch, intonation, vowel formant frequencies, loudness, voice quality, articulation, semantic and syntactic choices, discourse habits, and non-verbal communication (facial expressions, gestures, etc.)
    - potential for change
    - knowledge regarding treatment options for speech feminization/masculinization
    - psychosocial issues that may impact on speech, voice, or treatment

15. As there is evidence that pitch changes tend to degrade over time, periodic re-evaluation is recommended following treatment, with further clinical assistance as needed.

Speech therapy

16. Speech therapy should be individualized based on the individual's goals, the risks/benefits of treatment options, and consideration of social and economic issues.

17. Rather than adopting a rigid and artificial set of speech norms, it is recommended that clients be assisted to develop an individualized and context-specific set of norms based on communication patterns in the client's social, cultural, work, and home environments.

18. It is clinically optimal to be able to offer both individual sessions and group treatment, with the proportion of time in each format depending on the client's therapeutic needs and goals.

19. Therapeutic techniques may include:

    - imitation of non-transgender people observed in daily life
    - progressively complex practice integrating changes to pitch range, average conversational pitch, and inflections, while maintaining good voice quality
    - vocal flexibility exercises
    - motor training to modify speech output towards the desired goals
    - maintaining desired voice pitch when coughing, laughing, and clearing the throat

Pitch-Elevating Surgery

20. As there is no professional consensus regarding the effectiveness and risk/benefit ratio of pitch-elevating surgery, care should be taken to ensure that clients are fully informed of potential risks, post-operative care requirements, and possible outcomes (including decreased pitch).

21. Assessment by a voice surgeon and speech-language pathologist is recommended prior to surgery.

22. Prior to surgery, the surgeon should discuss aftercare instructions with the patient and provide written aftercare instructions.

23. If surgery is to be performed outside BC, the surgeon should consult with the patient's primary care provider to coordinate appropriate peri- and postoperative care, as well as long-term followup. If the client is taking estrogen, it is necessary to consult with the prescribing physician to discuss tapering of estrogen prior to and immediately following surgery to prevent potentially fatal blood clots.

24. Speech therapy should be offered following surgery to help the patient adapt to and stabilize the new voice.

Outcome Evaluation

25. Outcomes should be rigorously evaluated.

26. At minimum, the baseline assessment should be repeated immediately following the end of therapy. Ideally, re-evaluation would take place at six months, one year, five years, and ten years after treatment.

27. Evaluation should include client satisfaction with the treatment outcome and with the quality of care provided, as well as perceptual and objective measures of speech/voice change.

28. Informal or formal sharing of outcome data with colleagues must only be done if the client has provided fully informed and voluntary written consent.

Research

29. There is a paucity of data relating to speech feminization/masculinization. Further research in this area is strongly recommended.

30. To ensure that participation in research is voluntary, services should not be offered solely as part of a research protocol.

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Appendices

Appendix A: BC transgender resources

Appendix B: Sample trans-inclusive speech intake form

Appendix C: Sample self-report transgender speech questionnaire

Appendix D: The *Changing Keys* program

Appendix E: Consumer education materials relating to speech feminization/ masculinization

- E1: How the Voice Works
- E2: Gender and Speech
- E3: Changing Speech: Making Treatment Decisions
- E4: Taking Care of Your Voice

Appendix A: BC Resources

Transgender Health Program

The Transgender Health Program is an anonymous and confidential free service for anyone in BC who has a transgender health question or concern. Services are available by phone/TTY, by email, or in person.

Services for transgender people and loved ones include:

- help finding health and social services, and assistance to navigate health and social service systems
- information about best practice guidelines, standards of care, and client/patient rights
- peer-based exploration of gender identity, gender expression, and life stresses in a non-judgmental setting
- support and information for family members, partners, friends, and other loved ones
- free condoms and needle exchange
- outreach to transgender individuals working in the survival sex trade
- free training sessions for peer support volunteers
- information about transgender community groups

Services for clinicians include:

- free training sessions on transgender health and transgender medicine
- assistance in care planning for transgender clients/patients and loved ones
- information about best practice guidelines and standards of care
- assistance with development of trans-inclusion policies and procedures
- information about transgender health research findings and implications for practice
- joint program planning and research initiatives with non-profit community groups and governmental services

The Transgender Health Program is an initiative of Vancouver Coastal Health.

For more information, contact:

Transgender Health Program
Three Bridges Community Health Centre
#301-1290 Hornby Street
Vancouver, BC V6Z 1W2
Phone/TTY/TDD: 604-734-1514 or 1-866-999-1514 (toll-free in BC)
Fax: 604-633-4241
Email: transhealth@vch.ca
Web: http://www.vch.ca/transhealth

Speech professionals with listings in Transgender Health Program resource guide

For up-to-date listings, see http://www.vch.ca/transhealth/resources/directory/subjects/genderspecialty.html#voice

1) **Shelagh Davies, MSc, S-LP(C)**
   Tel: 604-261-4364
   Email: shelaghdavies@shelaghdavies.com
   Web: http://www.shelaghdavies.com

   Registered speech language pathologist, providing speech and voice therapy. Extensive experience with speech feminization for MTFs.

   Client criteria: Older teenagers and adults.
   Languages: English.
   Wheelchair accessible: No.
   Fees: $125 for assessment session; $90 per hour for speech/voice therapy.
   Referral needed by GP, ear/nose/throat specialist, or Transgender Health Program.

2) **Dr. Murray Morrison, MD, FRCSC**
   4th floor, Willow Pavilion, Vancouver General Hospital,
   805 West 12th Avenue, Vancouver, BC V5Z 1N1
   Tel: 604-875-4640
   Web: http://www.pvcrp.com

   Laryngeal surgery for MTF voice feminization.

   Wheelchair accessible: Yes.
   Fees: Consultation and laryngoscope = $137.56 (cash/cheque only); surgery fee is extra.
   Referral needed by GP.

3) **Cindy Reynolds**
   Department of Speech-Language Pathology, Lions Gate Hospital,
   231 East 15th Street, North Vancouver, BC V7L 2L7
   Tel: 604-984-5747
   Fax: 604-984-5744
   Email: cindy.reynolds@vch.ca

   Voice feminization services for clients residing in the North Shore/Coast Garibaldi health service delivery area (North Shore, Sunshine Coast, Sea-to-Sky).

   Languages: English and Japanese.
   Fees: $60 per hour.
   Referral needed by GP.

For up-to-date listings of peer support resources, see the Transgender Health Program listings: http://www.vch.ca/transhealth/resources/transgroups.html

Appendix B: Sample Trans-inclusive Speech Intake Form

All information on this form is confidential and will be kept in a private and secure location.

IDENTIFYING INFORMATION

Legal name: _____ Date of birth: _____

Preferred name (*if different than legal name*): _____ Today's date: _____

Are you comfortable being contacted by: ❑ Phone (home) ❑ Phone (work) ❑ Email

Home phone: _____ Is it OK to leave a message at this number? ❑ Yes ❑ No

Work phone: _____ Is it OK to leave a message at this number? ❑ Yes ❑ No

Email: _____

Emergency contact person: _____ Their phone: _____

Please inform staff if your contact information changes.

REASON FOR SEEKING SPEECH SERVICES

Describe concerns relating to speech in order of importance.

	Concern	How long has this been a problem?
1.	_____	_____
2.	_____	_____
3.	_____	_____

Have you tried any treatments for this in the past (on your own or with another professional)? ❑ No ❑ Yes

If yes, please describe when, what you tried, and the results: _____

_____

_____

Have you ever had a hearing test? ❑ No ❑ Yes Date: _____ Result: _____

Does your speech change depending on how much you use your voice? How?: _____

_____

Does your voice change when you are under stress? How? _____

_____

MEDICAL HISTORY

Current medication (name + dose): _____
include herbs/supplements
_____

Allergies: _____

Surgeries, serious illnesses, injuries, and hospitalizations: Date:

1. _____ _____
2. _____ _____
3. _____ _____

Please check if you have ever had:

- ❑ Allergies
- ❑ Asthma
- ❑ Chronic congested nose
- ❑ Chronic cough
- ❑ Chronic headaches
- ❑ Chronic heartburn/acid reflux
- ❑ Chronic runny nose
- ❑ Chronic sore throat
- ❑ Difficulty breathing
- ❑ Difficulty swallowing
- ❑ Ear infections
- ❑ Frequent need to clear throat
- ❑ Hearing loss
- ❑ Hoarseness
- ❑ Loss of voice
- ❑ Pain in ears
- ❑ Pain in jaw
- ❑ Ringing in the ears
- ❑ Sensation of lump in throat
- ❑ Sinus problems
- ❑ Sleep apnea

Have any individuals in your family had serious illnesses or speech/hearing problems? Describe:

_____

_____

OTHER FACTORS THAT MAY AFFECT VOICE

Daily intake of water and other non-caffeinated, non-alcoholic drinks (e.g., milk, juice): _____

		Approx. start	Approx. end		Current daily consumption
Caffeine *(coffee, tea, soft drinks, chocolate)*	❑ Past	_____	_____	❑ Current	_____
Alcohol	❑ Past	_____	_____	❑ Current	_____
Smoking					
• Tobacco	❑ Past	_____	_____	❑ Current	_____
• Marijuana	❑ Past	_____	_____	❑ Current	_____
• Crack/Cocaine	❑ Past	_____	_____	❑ Current	_____
• Amphetamines	❑ Past	_____	_____	❑ Current	_____
• Other	❑ Past	_____	_____	❑ Current	_____

All information on this form, including answers in this section, is confidential. We do not discriminate on the basis of past or present drug use.

Do you use your voice in your work? Describe: _____

_____

Do you use your voice for recreation (singing, acting, etc.)? Describe: _____

_____

OTHER HEALTH PROFESSIONALS INVOLVED IN CARE

To assist in coordination of care, it is helpful to know about other health professionals you are seeing. ***Other care providers will not be contacted without your permission***, unless there is a medical emergency.

Name of primary care provider (GP, nurse, etc.): _____

Phone: _____

Other care providers (specialists, counsellors, etc.)

	Name	Phone
1.	_____	_____
2.	_____	_____
3.	_____	_____

Other: _____

OTHER RELEVANT INFORMATION

If there is additional information you would like us to know, please write in the space below:

If you have any questions or concerns, please let us know.

adapted from intake forms used by several programs reviewed for the Trans Care Project

Appendix C: Transgender Self-evaluation Questionnaire

How do you rate your voice? (overall)

Currently my voice is:

- O Very female
- O Somewhat female
- O Gender neutral
- O Somewhat male
- O Very male

My ideal voice would sound:

- O Very female
- O Somewhat female
- O Gender neutral
- O Somewhat male
- O Very male

RATING SCALE

1 = never
2 = almost never
3 = sometimes
4 = almost always
5 = always

How often do you experience the following?

				1	2	3	4	5	
F	1	People have difficulty hearing me in a noisy room.	never	O	O	O	O	O	always
P	2	I have trouble finding a vocal range that feels authentic to me.	never	O	O	O	O	O	always
E	3	My voice makes me feel less feminine(MTF)/masculine(FTM).	never	O	O	O	O	O	always
F	4	I feel the pitch range of my voice is restricted.	never	O	O	O	O	O	always
P	5	The sound of my voice varies throughout the day.	never	O	O	O	O	O	always
F	6	I feel my voice gets in the way of me living as a woman(MTF)/ man(FTM).	never	O	O	O	O	O	always
F	7	I use the phone less often than I would like.	never	O	O	O	O	O	always
E	8	I'm tense when talking with others because of my voice.	never	O	O	O	O	O	always
E	9	I tend to avoid groups of people because of my voice.	never	O	O	O	O	O	always
E	10	People seem irritated with my voice.	never	O	O	O	O	O	always
P	11	People ask, "What's wrong with your voice?"	never	O	O	O	O	O	always
F	12	I speak with friends, neighbours and relatives less often because of my voice.	never	O	O	O	O	O	always
F	13	I avoid speaking in public because of my voice.	never	O	O	O	O	O	always
P	14	I feel my voice sounds artificial to others.	never	O	O	O	O	O	always
P	15	I have to strain to make my voice sound like I want it to.	never	O	O	O	O	O	always
E	16	I feel frustrated with trying to change my voice.	never	O	O	O	O	O	always
F	17	My voice difficulties restrict my personal and social life.	never	O	O	O	O	O	always
P	18	The pitch of my voice is unreliable.	never	O	O	O	O	O	always
P	19	When I laugh, cough or sneeze, I sound like a man(MTF)/ woman(FTM).	never	O	O	O	O	O	always
F	20	I feel my voice doesn't match my physical appearance.	never	O	O	O	O	O	always
P	21	I use a great deal of effort to speak.	never	O	O	O	O	O	always
P	22	My voice is worse in the evening.	never	O	O	O	O	O	always
F	23	My voice causes me to lose income.	never	O	O	O	O	O	always
E	24	I don't feel my voice reflects the "true me".	never	O	O	O	O	O	always
E	25	I am less outgoing because of my voice.	never	O	O	O	O	O	always
E	26	I feel self-conscious about how strangers perceive my voice.	never	O	O	O	O	O	always
P	27	My voice "gives out" in the middle of speaking.	never	O	O	O	O	O	always
E	28	I find it upsetting when I'm perceived as a man(MTF)/ woman(FTM) on the phone.	never	O	O	O	O	O	always
E	29	I am envious of other women(MTF)/men(FTM) who have more feminine(MTF)/masculine(FTM) voices than mine.	never	O	O	O	O	O	always
E	30	My voice embarrasses me.	never	O	O	O	O	O	always

Appendix D: The *Changing Keys* program

Program description

Changing Keys is a speech feminization program offered by a speech-language pathologist (Shelagh Davies) as part of the Transgender Health Program's services. The program is held at a multidisciplinary inner city community health centre that serves large numbers of transgender clients and houses the Transgender Health Program and a transgender peer support group. The program involves:

- a one-hour individual speech and voice evaluation at the start of the program
- weekly two-hour speech and voice therapy group sessions, for seven weeks
- individualized sessions midway through the seven weeks
- homework: speech therapy exercises to be done between groups
- a one-hour individual speech and voice evaluation at the end of the program
- a refresher session held 3 to 4 months after the course has ended

The program is limited to six self-identified transgender women who want to feminize their voice, don't have coverage for speech therapy through Extended Health or other benefits, can commit to coming to all of the sessions and doing practice sessions between groups, feel comfortable working on voice in a group setting, and are able to read and speak comfortably in English (individual speech therapy is recommended for clients who are not fluent in English, to allow more clinician attention). It is not necessary that participants be living as women, be on hormones, or have had surgery. Participants are encouraged (but not required) to present as women at the therapy sessions, as this facilitates practice of feminine voice.

The program is subsidized by Vancouver Coastal Health to make it possible for low-income transgender women to participate. Participants are asked to pay what they feel they can afford, on a sliding scale of $0-$100 for the entire program (assessments and weekly sessions).

Application procedure/client screening

The program is advertised extensively by notices and posters to service providers who work with transgender women, and online announcements to community mailing lists. Interested participants are asked to apply to the Transgender Health Program by providing contact information and answering seven questions relating to eligibility:

a) What is your goal for taking part in Changing Keys?
b) This pilot is restricted to people who self-identify as transgender women/male-to-female. Does this fit for you?
c) This pilot is restricted to people who don't have coverage for speech therapy through Extended Health or other benefits. Do you have benefits that pay for speech therapy? (If so, we recommend you use those benefits to pay for private sessions.)
d) Have you read over the dates, and can you commit to coming to all the sessions?
e) What are your preferred times for the pre- and post-group assessment?
f) Are you comfortable listening to information about voice and doing practice exercises with other transgender women in a group?
g) Are you able to read and speak comfortably in English? (If not, please contact the Transgender Health Program to discuss options.)

Program structure

1. Initial assessment

The purpose of the assessment is to evaluate the client's current speech and voice production habits, to get a sense of how well the speech matches the inner sense of self, to see what changes would be beneficial, and to evaluate how easy or difficult the changes would be.

Speech/voice parameters assessed include average speaking pitch, speaking pitch range, impression of vocal inflectional patterns, and voice quality. If vocal loudness subjectively appears to be outside normal female range it is objectively evaluated by measuring the average, maximum and minimum speaking loudness. Speech and voice are assessed in oral reading, picture description, and spontaneous conversation. Discrepancies of parameters among tasks are noted. The assessment is audiotaped so it can be reviewed at the end of the program and compared with the follow-up evaluation.

A subjective evaluation is also done. The client describes three specific things she would like to change about her speech/voice or three situations in which she would like to sound more feminine. She also fills in a questionnaire describing how her current speech and voice affect her life.

The client is also asked to identify real-life situations (ranging from easy to difficult) in which she can practice generalizing what was learned in the sessions. This helps her try things out while still having the support of the group. It also allows participants to take ownership of the techniques as they are learning them and can be a powerful motivator to continue practice.

The assessment also includes trial therapy, to see how easily the client is able to make changes in her speech and voice. Parameters assessed may include producing voice at a higher pitch, varying vocal inflections, changing voice quality, and modifying characteristics of articulation.

At the end of the assessment the results are discussed with the client, and together the client and the therapist establish goals for specific therapy. The therapy process is explained to the client, the expected commitment is described, and any questions about the therapy program are answered. The client should leave the evaluation with a clear idea of what changes are possible and useful, and have a sense of the processes involved.

2. Weekly sessions

Six two-hour sessions are held weekly. Sessions are divided into four parts:

- checking in on previous week's practice, observation and carryover activities – what worked, what didn't, what needs to be modified (exercises or the individual's practice)
- voice training, with the goals of producing an easy, resonant voice at the target pitch and generalizing it into speech of increasing complexity
- exercises directed at a specific topic: e.g., increasing vocal inflections
- information/discussion: e.g., pitch-raising surgery, gender markers in communication

3. Individualized sessions

Halfway through the program there are 30-minute individual sessions with each participant. These are used to give 1:1 input into particular areas of difficulty and to modify exercises to suit each client. For example, if the client has difficulty sustaining the voice at a target pitch, specific voice training is given or a more suitable pitch is used. These sessions are often client-driven, with the client providing the focus for the session.

4. Homework

As this is a short, intensive program, participants are expected to do substantial practice between sessions. Although homework requires substantial commitment, clients are often highly motivated and diligent in practice. Homework consists of three parts:

a) *Basic vocal training exercises*: These exercises are taught the first day of therapy and are to be done for 10 minutes twice a day. Instructions are written in the course manual and recorded on a CD or tape.

b) *Weekly topics of practice*: These include specific practice of the speech parameters discussed in the weekly therapy session – transferring a higher speaking pitch into different real life situations (e.g., asking for a transfer on a bus or answering the phone), using wider vocal inflections, being an active listener, etc.

c) *Observations*: Becoming familiar with gendered differences in communication is essential to making changes, but unstructured observation can be overwhelming and ineffective. Each week, participants are asked to observe a specific aspect of women's speech. For example, questions relating to inflection may include: How does a woman's voice move around during speech? How are inflections different among women? Do inflections vary with the age of the speaker, the speaking situation, how the woman may be feeling emotionally, her conversational partner? Other topics have included: Do women laugh/smile at different times than men? How do women take turns in conversation? What do women do when they are listening? What is it about speech that makes it sound feminine/masculine?

5. Final Assessment

The parameters measured in the initial assessment are re-measured and the client again completes the subjective evaluation form. The pre- and post- measurements and the tape recordings are compared and changes noted. Suggestions for modification and continuation of practice are discussed. The client's input about the course is sought (e.g., Should anything be changed? What worked well and what could work better?).

6. Refresher Session

A two-hour refresher session is held three to four months after the completion of the program. Participants bring a completed self-evaluation questionnaire and vocal parameters are reassessed. The basic exercises of the program are reviewed and there is time to discuss successes and challenges of using their new voice in the real world. This session serves as both a motivator for continued practice and a chance to get input on any difficulties.

Voice training

One of the goals of the Changing Keys program is to develop the production of a higher speaking pitch range that is efficient and easy to produce (this is a common goal of most course participants). The protocol used is based on the Lessac Marsden Resonant Voice Therapy program, developed by Katherine Verdolini, (as outlined in her upcoming book with Ingo Titze, Vocology, to be published in 2006). Verdolini developed this therapy protocol for treating voice disorders, using input from both traditional singing and speaking voice pedagogy and current concepts in voice science and psychology. Although the protocol was not developed specifically to train transgender women its nature makes it an attractive one to use. The twin focuses of ease and forward resonance sensations train efficient voice production that helps protect the vocal folds from damage. The forward focus may also help increase vowel formants, helping the voice be perceived as female.[19]

The core exercise program is taught in the first session and includes stretching, relaxing exercises, and producing the voice at a target pitch. Specific sounds that have been shown to encourage efficient vocal fold vibration and maximize forward resonance sensations are used to train the higher pitch. Voice training takes approximately one hour in the first session, and then 20-30 minutes in subsequent sessions. Participants are instructed on how to monitor their practice. Difficulties that occur in practice, such as throat tightness or effortful production, are addressed in subsequent sessions and individual instruction is given as necessary.

Voice training: Core exercise program

1. Relaxation

We begin with standard general relaxation exercises to relax the head/neck area, jaw/tongue, face, and mid-body respiratory muscles; additional exercises may be suggested for individual participants as needed. A goal during this time is to increase general awareness of how the mind and body feel at this particular point in this particular day: tired/rested, anxious/calm, focused/scattered, tight shoulders, breath-holding, etc.

2. Facilitating production in the upper pitch range

Using a voiced bilabial fricative (“raspberry”) or a tongue trill (Spanish “r”) the clients glide the voice around in the middle to upper pitch range. This technique is used in both voice therapy and singing pedagogy and has been described in Joseph Stemple’s Vocal Function Exercises.[69,70] According to Stemple, going to the end ranges of the voice has a similar effect as stretching a muscle to end range; the exercise facilitates ease and efficiency in the middle ranges. For our purposes, we are exploring the sensations of producing a higher-pitched voice easily and efficiently.

Sensations during the exercise are carefully monitored; the voice should feel resonant and easy in the throat at all pitches. If the throat begins to tighten in the higher pitches, voice therapy facilitation techniques are used. The goal is to produce a resonant, easy sound throughout the upper pitch range. Going into falsetto register is fine in this exercise. Although the target speaking pitch should be in modal (not falsetto) register, it has been my clinical experience that some transsexual women are able to use the falsetto occasionally when using a wide pitch range and it sounds acceptable as long as it is well blended with the rest of the voice.

After this voice training program, the voice should not feel tired: it should feel warmed up and ready to use. If the voice begins to feel tired or if there is throat sensation, this is a signal that some intervention needs to be done in the way of modifying voice production technique. The exercise of gliding around in the upper part of the voice is then expanded into vowels.

3. Producing a higher pitched voice

Raising the average speaking pitch is a common goal among group participants, and is supported in the literature and by experienced clinicians. However, there is a wide range of opinion about how to train a higher pitched voice and what pitch is optimal to target. Most clinicians agree that a goal is to train a voice that is somewhere in the “middle range” between non-transgender men’s and women’s voices – between 155 and 185 Hz. However, transsexual women frequently prefer a higher target pitch, so some experimentation may be necessary to establish what is both possible and optimal.

Once the body and voice have been “warmed up” using the previous exercises, we start the voice on a 2 to 3 second /m/ at F3 or 185 Hz. Because this is a group program, we use one pitch for practice; in 1:1 sessions it would be possible to choose a target pitch that matches a client’s individual goals and existing vocal capacity. F3/185 Hz is a training pitch, not a target for average speaking pitch: it is higher than what I would reasonably expect most transsexual women to use in everyday speech. However, I find it beneficial

for participants to experience the sensations of producing a voice that is much higher than their accustomed pitch without strain, and in my experience, by using a protocol such as the LMRVT60 most clients can accomplish this. If this pitch produces strain for any participants, we lower the target pitch to one that can be produced with feelings of ease. Interestingly, a number of participants have commented this pitch is too low and they use a higher one when doing this practice at home.

In accordance with the LMRVT protocol, I ask clients to monitor two things as they practice: does the voice feel easy to produce, and does the sound feel like it is going up and out (or does it feel like it is getting caught – in the throat or anywhere else)? If the person doesn't have these sensations of ease, we do specific facilitation exercises. We then use the LMRVT protocol to expand this sensation of easy, resonant voice production into sounds and words. The goal is to generalize this easy, resonant, higher-pitched voice – first in structured speech, then into spontaneous speech in increasingly difficult situations.

4. Extending the higher-pitched voice into speech

Generalizing the use of higher pitch follows standard speech/voice therapy protocols, starting with easier tasks and gradually working into more challenging ones. Speech tasks are those that are common in a speech/voice therapy, progressing from single words to short phrases, greetings, short oral reading tasks, picture descriptions, structured Q/A, etc. While the voice is first produced at only one pitch, as in chanting, as soon as possible, regular speech inflections are introduced.

Maintaining elevated pitch in a resonant voice that feels easy to produce is a vocally athletic thing to do – you are sustaining a pitch that the mechanism was not constructed to produce. It must be done efficiently, both to sound like natural female speech and also to avoid the development of voice problems. Transferring this easy, resonant, efficient method of producing a higher pitched voice into everyday life is both challenging and important.

In doing these exercises the client begins to develop a physical sense of how she can produce a feminine voice and an aural sense of what it sounds like. It will necessarily sound very different from her male voice. This altered perception can be quite disorienting and it is essential to have a time period of adjustment to play around with what is possible and what may be the best fit with the participant's personality and sense of self.

As pitch work progresses, the average speaking pitch is checked periodically. We do not expect average pitch to remain at the target training pitch of 185 Hz, but if it drops below 155 Hz there needs to be further work producing a higher voice in sustained sounds.

At this point, practice in vocal inflections is begun, along with practice in producing the higher pitches.

5. Vocal inflections

Treatment begins with a discussion about masculine/feminine use of vocal inflections, to see what the client's perceptions are. In feminizing vocal inflections there are three goals: decreasing flat inflections, increasing inflectional range, and increasing vocal flexibility (the amount the voice moves around within the phrase, rather than the extent of pitch excursions).

As always, we start with listening. For this purpose I use a tape of eight speakers describing a picture. The speakers are males and females of different ages and cultural backgrounds. We listen specifically to the vocal inflections used by the speakers, paying particular attention to different patterns used by men and women. Clients are also instructed to listen to conversations in their community and pay particular attention to vocal inflections.

To someone who has habitually used little vocal inflection in speech, expanding the inflectional range can feel embarrassing and artificial. In exploring vocal inflectional range I encourage clients to go "over the top"

– far beyond what they would realistically use in speech. This can have a freeing effect and also allow them to experiment without being restricted by what would be considered appropriate; there is time for that later.

Exercises initially use limited vocabulary so the client must use a range of vocal inflections to convey meaning and emotional expression. As in any standard speech therapy protocol, the complexity of the task increases as the person's performance improves. Carryover into everyday life can be facilitated by choosing a specific phrase or sentence that the client uses frequently.

Work with inflections continues throughout the program, as this is an important aspect of speech and also one that usually takes time to change and habituate. As with pitch, clients frequently report they need to monitor these vocal parameters constantly during conversation. For this reason it is useful in the early stages of therapy to choose specific practice times when the client will be conscious of speech/voice production and use the techniques learned in therapy. The client is asked to begin with a person or place in which she feels most comfortable and gradually extend the practice, rather than confronting very difficult situations right away. Building confidence in the new speech/voice is an important part of the therapy program.

6. Vocal quality: Breathy vs. resonant

Numerous studies have found that breathy speech is associated with feminine voice and many transgender women have already adopted a breathy voice by the time they seek therapy. Mild breathiness also has the advantage of automatically modifying hard attacks on consonants and vowels, giving speech a softer quality. However there is a contradiction between resonant voice, which we train in Changing Keys, and breathy voice. A breathy quality is produced with less efficiency so the voice may be more prone to vocal fatigue and not be heard against background noise.

We discuss this contradiction in the group and participants generally find their own ways of dealing with voice quality issues. For participants experiencing throat pain or vocal fatigue, the resonant voice works best as it lasts longer and is louder. Other participants feel more comfortable with a breathier quality as it better conveys the impression they want. Still others adopt a resonant voice in loud situations and a breathier one in quiet ones. This ability to change vocal qualities requires good control over voice production and may be a reasonable goal for some transgender women who are concerned about voice quality issues.

7. Vocal loudness

In my experience, transgender women struggle more with achieving adequate loudness in a noisy environment than speaking inappropriately loudly. Using a resonant voice increases loudness in an efficient and effective way, and can be trained specifically to be used where there is a lot of background noise. Sometimes we do a vocal exercise where the same phrase is said with differing levels of loudness. The goal is to increase the loudness by increasing resonance sensation, not by pushing from the throat.

I have never worked with a transgender woman who I felt needed to reduce loudness. However, if the resonant voice is judged as too loud, there are specific training exercises that reduce loudness while maintaining forward focus; as discussed earlier, adopting a breathy quality will automatically reduce loudness.

8. Motor speech characteristics

Hard onsets on initial vowels and consonants are generally considered a masculine speech characteristic.[5,10] Adopting a breathy voice quality may be enough to soften the onsets so they are no longer perceived as abrupt; conversely, softening the onsets may give a softer, breathier quality to the voice. As it is easier to modify a general feature of voice production than to specifically change each

production of an initial phoneme, paying attention to voice quality may be the easier way to achieve a cluster of goals. We discuss articulation as we are experimenting with voice quality so participants are aware of the interaction.

Encouraging more connected speech production can also help reduce the abrupt interruptions in speech flow that hard onsets create. (This technique is similar to vocal prolongation used in fluency therapy; however, in this instance, the speech rate is maintained at a normal or near normal level.)

In working with articulation we listen to examples of “feminine” and “masculine” patterns or listen to the speech of a group participant who already uses connected speech and gentle onsets. The group then repeats specific phrases or words, to get the feeling of that kind of production. However, because our time is so short we generally don’t do a lot of practice with this feature. If it is of particular concern to an individual we may do some 1:1 intervention in a private session.

9. Language and discourse pragmatics

Although language choice and speaker-listener interaction during conversation are influenced by many factors other than gender, there is a body of work in the sociolinguistics (and popular) literature specific to gender influences on communication. We discuss this literature in Changing Keys, both to give a point of reference and to stimulate debate and observation skills. Participants then see whether or not what is written in textbooks is actually happening in their own communities. This encourages context-specific norms that are flexible and can easily be adapted to suit the client’s personality and situation. Also, since word choice and interaction in conversation vary greatly from person to person and situation to situation, training specific behaviours is too rigid. The participants are encouraged to consider what women and men in their own communities are doing, and to see if these patterns feel comfortable to them.

Topics discussed include:

- the use of qualifiers and tags: “isn’t it”, “sort of”, “kind of”, “don’t you think”, “I think that”, “could you possibly”, etc.
- sharing difficulties and problems as a means of establishing connection
- confirming the speaker’s emotional messages
- making comments about another woman’s clothing or appearance
- direct vs. indirect confrontation
- listening styles and behaviors
- cues relating to conversational turn-taking and interruptions

Therapy exercises that target language choice and discourse pragmatics can be done effectively by role playing. As examples, if the purpose of the exercise was to use words that convey more emotional content, the participants could describe a picture, focusing on its emotional impact. To develop active listening skills participants may practice in pairs (one speaker, one listener); the listener is instructed to encourage the speaker and actively show that she is paying attention, while the speaker must seek the listener’s opinion and involvement in the conversation. If the goal was to make a casual connection with another woman in a public place, two participants could role-play having a casual conversation – chatting in a lineup at a cashier, trying on clothes, or waiting at a bus stop. A useful carryover exercise would be for the participants to try to replicate the situation in the real world; often the homework after that session would be to go out and practice what was targeted in the session.

Appendix E: Consumer Education Materials

E1: How the Voice Works

E2: Gender, and Speech

E3: Changing Speech: Making Treatment Decisions

E4: Taking Care of Your Voice

Note: Page numbers have been removed to facilitate copying for clients. Booklet versions of these materials are available from the Transgender Health Program (Appendix A).

Speech Factsheet 1: 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 factsheet 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.

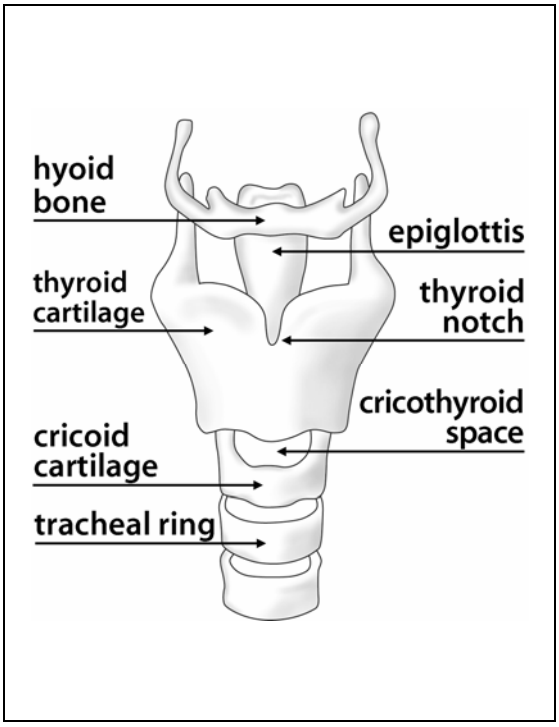
SOUND SOURCE – The larynx

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.

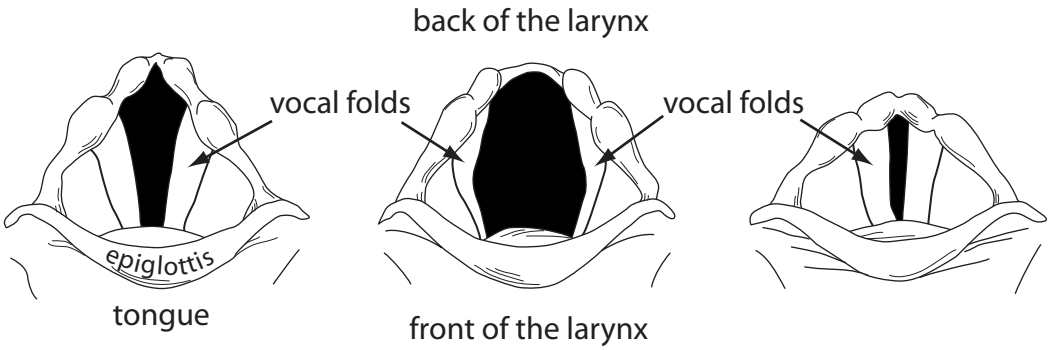
The outer structure of the larynx includes the *hyoid bone*, the *thyroid cartilage*, and the *cricoid cartilage*.

- 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.



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.

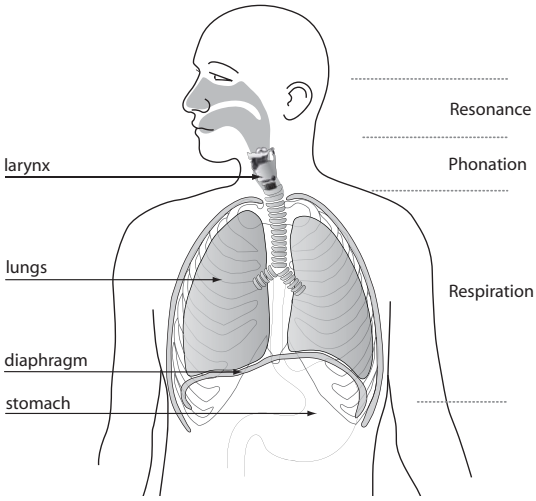


Position of vocal cords in normal breathing | Position of vocal cords in deep breathing | Position of vocal cords during voice production

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!

Speech Factsheet 2: Sex, Gender, and Speech

Speech is a complex process that involves physical structures (see Factsheet 1), 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 factsheet 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 Factsheet 1) 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 in

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 Factsheet 3).

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	• range considered within female norms: 145-275 Hertz (Hz) • average pitch for adult females: 196-224 Hz • higher upper & lower limits of range compared to men	• range considered within male norms: 80-165 Hz • average pitch for adult males: 107-132 Hz
Resonance	• higher overtones compared to men	• lower overtones compared to women
Intonation	• more varied intonation (sometimes described as "musical") • more upward shifts in tone	• 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.

PERCEPTIONS 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	• more breathy • start words more softly	• voice usually not perceived as breathy • start words more forcefully
Articulation	• clear and precise pronunciation • more forward tongue position	• dropped letters (e.g., “thinkin” instead of “thinking”), slurred words
Duration	• take longer to say words and phrases • lingering on vowel sounds for emphasis (e.g., “*sooo* gorgeous”)	• 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	• increased eye contact • look directly at speaker, with head and eyes facing forward when listening • in negative interaction, tend to lower eyes	• 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	• smile more often • more facial expressions in response to what the speaker is saying • tend to smile and nod head when listening	• smile less often • fewer facial expressions in response to what the speaker is saying • tend to frown and squint when listening
Gestures	• gesture toward self when talking	• gesture away from self when talking
Posture	• take up less physical space • tend to bring arms and legs toward the body • lean forwards when listening	• take up more physical space • tend to stretch arms and legs away from the body • lean backwards when listening
Touching	• do not approach men as closely in terms of personal space	• 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.

We hope this factsheet helps you experiment with the aspects of speech that are associated with gender, to find what feels right for you.

to read more about the studies described in this factsheet, contact the Transgender Health Program, 1-866-999-1514 (toll-free in BC) or transhealth@vch.ca

Speech Factsheet 3: 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 Factsheet 2): 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 Factsheet 4) 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)

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 below). 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.

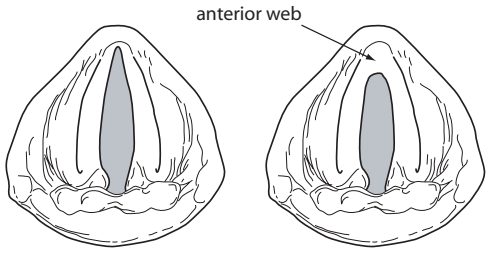
For most techniques, it is recommended that patients not use their voice at all (not even to whisper) for 1-7 days after surgery, and then use it cautiously until discomfort from swelling has passed. For technique 5(c) described below, which is more invasive, two weeks vocal rest is suggested.

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 pictures adapted from Anne Lawrence, http://www.annelawrence.com/voicesurgery.html

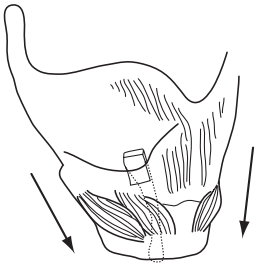


Before After

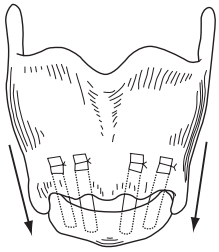
3. **Cricothyroid approximation** (CTA) mimics the contraction of the cricothyroid muscle that is used naturally in speech to tense the vocal folds. The thyroid cartilage is pushed down against the cricoid cartilage below it, and clamped in place at the front by stitches or metal plates. Pulling the 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.



thyroid cartilage pushed down against the cricoid cartilage



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 vocal fold, with the intention of causing a scar that irreversibly stiffens the folds, increasing the rate of vibration. Voice quality may be damaged.

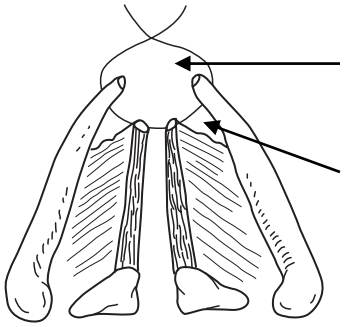
5. **Reduction of the vocal fold mass** may be accomplished by one of three methods:

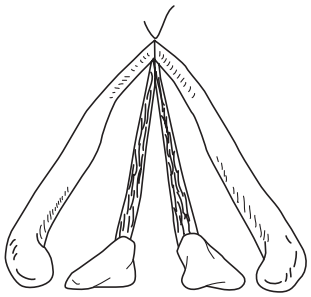
   a) Steroids injected into the folds cause the folds to atrophy.

   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 right, 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 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. Most articles simply stated that FTMs don't need speech services because testosterone will cause pitch to drop. This ignores the needs of FTMs who don'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.

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

to read more about the studies described in this factsheet, see the Transgender Health Program on-line library at http://www.vch.ca/transhealth/resources/ or contact the THP

Speech Factsheet 4: Sound Advice – Your guide to a strong, clear, easy 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

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

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

Acid reflux

If you have acid reflux, treat it to protect your larynx. 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.

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 to produce a higher/lower voice in a way that doesn't strain your throat
- warm up your voice if you will be doing a lot of talking
- 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)