K. J. Lee: Essential Otolaryngology and Head and Neck Surgery (IIIrd Ed)

Chapter 6: Speech, Language, and Voice

Communication, the exchange of verbal or written messages between man, includes the expression and comprehension of symbols or the process of encoding and decoding.

This exchange is made possible through the parameters of speech, language, voice, and hearing.

Speech

Speech is the mechanical aspect of communication. One must consider the physiology of respiration, phonation, resonation, and articulation, when appreciating the necessity and complexity of the system of speech.

Upon the expiration of air from the lungs, the vocal folds of the larynx are set into vibration and produce cound. Thus the larynx may be considered the source of sound. The sound travels up the vocal tract and resonates off the walls of the pharynx, oral cavity and, in the case of nasal sounds, such as /m/, /n/, and /ing/, resonation will occur to a great extent in the area of the nasal cavity. At this point the sound is still nondifferential and generally carries little meaning as a symbol. The action of the articulators, however, shapes and modifies the sound waves into consonants and vowels, which are coarticulated or blended to produce or express the smallest components of communication. These components, or morphemes, are the symbols learned and recognized to carry specific meaning.

Misarticulation

Speech disorders are most salient to the pediatric population, but, if left untreated, carry over into adulthood. A child may substitute one sound for another in a word (thoup for soup) or the production of a sound may be distorted (as in the same example of the word "soup", the /s/ may be slurred or otherwise altered), in either case creating confusion in the listener or destroying the meaning of the word. A child also may completely omit a sound. (If the final /p/ were omitted, "soup" would then become a woman's name and not something to eat.) Finally, a child may add a sound that does not belong to aword, for instance, adding an /a/ sound to our example would give the word an accentuated pronounciation. Thus we can see that the substitution, distortion, omission, and addition of sounds when articulated in words, can most definitely affect the word itself, altering its meaning or making it unintelligible. These speech disorders are commonly referred to as misarticulations and can occur to one or may sounds consistently, in either the initial, medial, or final positions of words. The greater the misarticulation, the more unintelligible speech becomes.

It should be noted that a child will not develop all the sounds of a language at once, but establishes the correct pronounciation over time. Certain sounds appear during specific stages of development. By 3years old, the child would have acquired the following vowels and diphthongs: e, i, e, a, o, u, oo, ooo, o, a, ur, u, a, i, ou, oi. At this stage, 75% of all children would be ablce to produce the following consonants correctly: b, d, f, g, h, k, m, n, p, t, w. Mastery of double and triple consonant blends would be complete by the time they

are 4.5 years old.

A prerequisite for proper articulation is adequate hearing acuity. Therefore, upon the referral of a child to a speech/language pathologist by a pediatrician, parent, or schoolteacher for a spech evaluation, the child's hearing ability must be assessed before any speech testing. Assuming this has been done by an audiologist, the spech/language pathologist may then conduct an evaluation of the subject's articulatory skills through articulation testing and an examinaiton of the speech musculature structure (teeth, tongue, lips, hard and soft palate) through an oral-peripheral examination. The results are then studied and proper recommendations are made. A program of therapy would include the correction of each misarticulated sound in isolation as well as in syllables, words, and sentences, with the final goal being the correct pronounciation of the sound in connected speech.

Dysarthria

An impairment of speech usually affecting the adult population is known as dysarthria. It is characterized by a slurred, sometimes thick speech, which, depending upon its severity, may either make the speech slightly abnormal or totally unintelligible. Dysarthria is oftentimes caused by a stroke, but could result from a mere lack of dentures. The speech/language pathologist, following an evaluation of the person's communicative ability, and through a program of therapy will stress slow speech, exaggerated movement of the speech musculature compensatory to the degree of weakness, and self-auditory monitoring.

Apraxia

Another speech impairment that occurs with a cerebral vascular accident or other neurological problem is known as apraxia and is characterized by substitutions and additions of sounds in words. This is similar to a child's misarticulation in its representation; the difference being that the child has never really learned the proper production of a sound, while the adult has simply forgotten the proper coordination of the speech musculature necessary for producing a sound. Retraining for affected sounds in isolation and later on the word level, is the therapeutic goal in such cases. Once again, proper hearing acuity is of utmost importance if the person is to feed back the sound production and measure it for accuracy.

Stuttering

A speech disorder that affects the communicative ability of many ages, childhood through adulthoo, is a disorder of speech timing known as stuttering. It may be characterized by hesitations, repetitions, or prolongations of a sound, word, or phrase. These dysfluencies may be accompanied by secondary behavioral characteristics such as eye blinking, head jerking, or twitching of some kind that seem to develop and be habitually retained as an aid to the production of a sound or word. The cause of stuttering is largely unknown. Some of the theories explain the stammered speech to result from an organic condition, a delay in auditory feedback, or a learned behavior. The speech/language pathologist will analyze the stuttering in depth, then begin therapy. Strategies are geared toward teaching the patients to self-monitor and control their speech in a step-by-step fashion, until they can correctly form sounds, syllables, words, and sentences in a slow, positive, confident manner.

Language

According to Webster's dictionary, language may be defined as the "expression of ideas by words or written symbols". Symbols of gesture, as in sign language, also express ideas. In addition, clear messages can be sent through facial expressions or body movement, as well as through specific intonation patterns, via the voice. Simply stated then, symbols can be sent and received through various devices, predominantly verbal, graphic, and gestural.

Language is learned receptively in the first instance. If the infant's hearing mechanism is intact, it is used to capture the words heard, storing large reservoirs of symbols. Once the functions of respiration, phonation, and articulation are coordinated, sounds begin to emerge expressively. These carry distinc meanings, expressing ideas of hunger, pain, discomfort, amusement, and contentment. They occur again and again and develop into meaningful words as the basic utterances are understood and positively reinforced, first by our own auditory skills and then by the listener.

Table 6-1. Sequence of Linguistic and Auditory Milestones in Relation to Age

1	Alerting
1-1.5	Social smile
3	Cooing
4	Orientation to voice
5	Orients to direction of bell sound
5	"Ah-goo"
5	Razzing
6.5	Babbling
7	Orients to direction of bell sounds then locates bell
7.5	Gesture
8	"Mama/Dada" (inappropriately)
9.5	Orients and locates bell sound immediately
10	"Mama/Dada" (appropriately)
11	One word
12	One-step command (with gesture)
12	Two words
14	Three words
15	One-step command without gesture
15	Four to six words
15	Immature jargoning
18	Seven to 20 words
18	Mature jargoning
18	Identifies one body part
21	Identifies three body parts
21	Two-word combinations
23	Identifies five body parts
24	50 words
24	Two-word sentence
24	Use of pronouns (I, me, you; inappropriately).

As in the case of the development of sounds, there is a correlation between the development of receptive and expressive terms and other developmental stages (Table 6-1). This development will only take place in a normal sequence if the function of audition is present, including the normal functioning of the ears' anatomy and physiology from pinna to the auditory cortex.

Disorders of Language

Some children have most conditions intact, but still learn language at a rather slow speed. They are usually categorized as being language delayed. They may be missing a functional language model, be that the parent, television, or sibling. Oftentime these children manifest an overall developmental delay, but they are not considered organically retarded. Rather, the term "environmentally deprived" is generally supplied.

Some children lack the ability to effectively experience and process a receptive stimuli and tend to repeat what is said to them as in the case of echolalia. This is accompanied by a delay in the development of expressive vocabulary. Others, for various reasons, never develop language on their own and are considered nonverbal.

A physical handicap like cerebral palsy can prevent a child from learning language in a normal way. These children usually live their lives in a limited environment and are usually overprotected, further limiting learning experiences and, hence, language development. Many times these children also have speech and hearing difficulties. It should be noted that children who are bilingual or multilingual may sometimes show a delayed language development because they are really learning two or more languages at one time.

To monitor language development effectively, hearing acuity must be tested (and the mechanism aided if necessary) by an otologist and audiologist, respectively. Then, as language develops, it must be tested at intervals, receptively and expressively, considering all modalities: verbal, graphic, gestural, and visual. Measurements are made and usually matched against developmental norms to determine just how much language the individual has and how muchg deviation is considered normal. The cause for deficient development may not be readily apparent and may require deeper investigation to seek out such malfunctions as short auditory or visual attention spans, visual and/or auditory closure problems, or behavioral problems. Once the investigation is completed, recommendations are made and individualized therapy programs are designed with a goal of bringing linguistic skills to as near a normal level as is possible. Successful intervention in a language-impaired individual generally calls for an investigation by a team of professionals.

In the case of the adult, we can assume that most language problems are the result of some neurologic deficit, incurred once normal language development has been completed. Head trauma, cerebral vascular accident, hemorrhage, or tumor will cause specific areas of the brain (Broca's or Wernicke's area of the left hemisphere in most instances) to be damaged and not function properly. The dysfunction generally involves the decoding of incoming linguistic stimuli as in receptive aphasia and/or the inability to encode outgoing linguistic stimuli as in expressive aphasia.

Once referred to a speech/language pathologist, the brain-injured patient with normal or aided hearing acuity would be screened or be given a deep language evaluation, assessing the skill of all expressive and receptive modalities. When the differential diagnosis has taken place, the caregiver will develop a program of word retrieval with a goal of bringing the patient to a level of communicative ability that is at least functional, if not very near normal.

Voice

Voice or phonation is considered sound. This sound is produced by the vibration of the vocal folds, which are set in motion by the expiration of air from the lungs with the aid of subglottic pressure which builds just before the initiation of vibration. The various frequencies or tone pitches of the voice may be altered or modified by the action of the laryngeal cartilages and intrinsic and extrinsic muscles of the larynx. Frequencies are considered "optimal" for adult males at about 125 Hz, and for adult females at 225 Hz (Harryman E et al, 1978).

A voice within the ranges of what is considered optimal has a clear sound quality, a volume strong enough to be heard under normal circumstances, and has a resonance that sounds evenly balanced between the larynx, pharynx, oral cavity, and nasal cavity. A voice that call attention to itself or is perceived as different auditorially may sound harsh, hoarse, or breathy in quality, may be too soft or weak so that listeners must strain to hear the message, have an inappropriate pitch, as in the case of abnormally low-pitched female or abnormally high-pitched male, or a resonance that seems restricted to the laryngeal or to just the nasal cavities. Therefore, voices that fall outside the perception of what is considered normal may fall into certain classifications according to the features of intensity, pitch, and quality.

Disorders of Intensity

The problem of intensity can be very serious communicatively; in the extreme it is manifested by the total lack of voice or aphonia, which may arise from an emotional problem or stress factors, as in the case of hysteric aphonia. The loss of voice in this situation usually begins suddenly: in the middle of a sentence the individual may find it impossible to complete his message verbally. This condition may seem to originate with a cold or laryngitis, but often it is associated with deep emotional conflict. Upon examination the physicianwill usually find no organic pathology, or possibly observe a bowing of the folds upon phonation, whereas abduction may occur too easily. Approximation of the vocal folds may occur, however, in conjunction with the acts of coughing or clearing the throat. Aphonia is also the direct result of a laryngectomy.

Dysphonia refers to the partial loss of voice. Spastic dysphonia occurs when an individual emits some words of a sentence clearly and with ease, then struggles to produce sound for the remainder. Many times this syndrome may be perceived auditorially, as in stuttering. Automatic speech, singing, or nonmeaningful asides may be expressed easily, but all meaningful utterances may be accompanied by tension and strain, along with their resulting distortions. Besides functional causes, such as vocal abuse and misuse, this condition also may be associated with CNS diseases, such as cerebral palsy.

Disorders of Pitch

Pitch disorders are manifested by frequencies that are too high or too low (most common) for the individual's age and sex, or those with little or no inflectional pattern, many times due to fatigue, boredom, depression, or an improper use of pitch. Also included are pitch breaks to a higher or lower frequency, falsetto voice, or the use of a very high pitch, and the less common tremulous voice or quavering speech due to fear, anxiety, or organically, to athetoid cerebral palsy.

As in the case of the bass strings on any string instrument, the thicker the mass of the vocal cord, the lower the pitch. Therefore, if mass is added to the cord, the result will be a lower-than-normal-pitched voice. Mass can be added by edematous folds or the growth of nodules or polyps. When the vocal folds vibrate over the lower part of the pitch range, creating a bubbly, cracking sound, it reveals the presence of a voice problem known as glottal fry. Conversely, the vocal folds are tightened by such conditions as tension, fear, and stress. These, as well as trying to speak louder, will make the folds thinner or reduce their normal mass and abnormally raise the pitch. Organic causes for this condition may occasionally be found. These include a laryngeal web or abnormal approximation of the folds. Use of too high a pitch may cause vocal fatigue, nodules, or myasthenic laryngitis.

Another pitch problem is referred to as a falsetto. Boone describes the physiology as follows:

"... the folds approximate with posterior vocal process adduction. The posterior cartilage portion is so tightly adducted that there is little or no posterior vibration. The lateral portions of the thyroarytenoid muscles are not contracted. The inner vocalis section is extremely tightened and contracted around the vocal ligament; the glottal edge is extremely thin and is the primary vibratory structure during falsetto." (Boone, 1971, pp. 34-35).

Causes for this condition may be the underdevelopment of the laryngeal mechanism, endocrine dysfunctions, fears that go with assuming the responsibilities of adulthood, or an avoidance of other deviant voice or speech problems such as stuttering or pitch breaks.

Pitch breaks are sudden variations in pitch from low to high or high to low and many times break in a direction of the optimal or appropriate pitch of the speaker. Boone (1971) suggests that those experiencing pitch breaks are usually employing an habitually unstable pitch that is either too high or too low, resulting in a break.

Disorders of Quality

The quality of voice often is affected by disorders of phonation, characterized by harshness, breathiness, and hoarseness. Atypical laryngeal size, edema, laryngeal growths, and laryngeal paralysis are among the organic factors, while vocal abuse and misuse may contribute to a functional origin. Common types of vocal abuse may be screaming, yelling, throat clearing, cigarette smoking, coughing, excessive talking, strained vocalizations, and talking in the presence of loud noise. Vocal misuse may be best defined as the incorrect use of pitch and volume. An added causative factor is vocalfold approximation problems: under and over approximation may cause the above-stated vocal qualities. Voice disorders of

resonance include mainly hyper- and hyponasality, where too much or too little sound is resonated by the nasal cavity walls. There are only three sounds that require the degree of nasality produced by an open velopharyngeal port: /m/, /n/, and /ing/. These occur approximately 11% of the time in connected speech.

Hypernasality may be caused by velopharyngeal incompetence resulting from inadequate function or structure. The absence of tissue necessary to effect proper closure as in a cleft or short palate, or the result of tumors, or surgery to remove adenoids, may all contribute to hypernasal speech. Any tears or perforations of the bony palate or velum because of injury or trauma also may contribute to hypernasal speech. Hyponasality, or the lack of resonance for the three sounds /m/, /n/, /ing/, may result from a partial or complete obstruction in the nasal tract.

Upon any voice referral to the speech/language pathologist a complete case history is always the first order of business. The sound of the patient's voice is analyzed in the course of the verbal question-and-answer period, usually accompanying the development of a case history. This is retained on tape and is further analyzed as to the nature of the voice disorder, its duration, and previous means of intervention. The clinician will take an in-depth look into the patient's total life-style in an effort to detect possible misuses or abuses of the voice. A therapy program will generally direct itself toward eliminating vocal abuse, teaching the patient a correct oronasopharyngeal resonance balance, locating and maintaining an optimal pitch, and working with correct breathing patterns and relaxation techniques.

The most devastating voice disorder, cancer of the larynx, leaves the patient with no voice. Following the surgical removal of the larynx, the speech/language pathologist will offer the patient alternate means of communication via an electrolarynx and instruct the patient on its most effective use until the patient's communicative ability is considered functional and adequate by the clinician. When the laryngologist deems the patient ready to learn esophageal speech, the speech/language pathologist will begin to teach the patient to produce a burping or belching sound upon command. A progression of instructive levels will follow until the patient produces the sound consistently and stretches it in length to form words, phrases, then sentences. Via a new sound source - the vibration of the esophageal walls - the laryngectomized individual can communicate clearly once again.

Another means of sound production for use by the laryngectomized individual occurs following a tracheoesophageal (TE) puncture, which directs pulmonary air into the esophagus by means of valved voice prosthesis. Severe different types of prostheses are currently being developed and perfected by laryngologists and speech/language pathologists working together.

The TE prosthesis provides a laryngectomee communication that is more natural and fluent.

Miscellaneous

Speech Sounds

Speech sounds are generally classified as consonants, vowels, or diphthongs. Vowel sounds are produced by a modification in size and shape of the resonating cavities without

obstruction or interference with the breath stream. Consonants are speech sounds which are produced with some degree of restriction or obstruction of the breath stream by the organs of articulation. Diphthongs are vowel-like sounds made by gliding two vowels together. The most common diphthongs are: (aI) as in ice, (oI) as in boy, (aU) as in house, (eI) as in bay, (oU) as in hoe. Consonants are often classified according to:

1. Place of articulation.

2. Manner of articulation.

3. Element of vocalization.

The place of the production of sound, that is the locus of the blockage, constriction, or diversion of the air stream may be designated as follows: labial (p, b, m, w); labiodental (f, v); linguadental (voiced and unvoiced th); alveolar (t, d, n, l); postdental (s, sh, z, zh); palatal (y as in yellow, r as in red); velar (k, g, ng); glottal (h).

When classifying consonants according to the manner of articulation, the terms plosive, fricative, affricate, nasal, lateral, glide, and semivowel are used.

Plosives

Plosives are produced by stopping and then suddenly releasing the stream of breath. The plosive sounds are (p, b, t, k, g).

Fricatives

Fricatives are produced by a partial closure of the articulators which results in the creation of a restricted passage of the breath stream. This may take place as a result of grooving of the tongue or by having other organs of articulation come close together. The fricative sounds of speech are (f, v, voiced and unvoiced th, s, z, zh, and h).

Nasal Sounds

Nasal sounds are those which are emitted through the nose rather than the mouth. The nasal sounds in American speech are (m, n, ng).

Affricates

Affricates are blends of two sounds, one of which is a fricative and the other of which is a plosive. The affricates are (ch, dzh).

Lateral Speech

The lateral speech is produced by having air emitted at both sides of the tongue or the tip of the tongue is in contact with the gum ridge. The only lateral sound in American speech is the /l/ sound.

Glide

A glide consonant is characterized by a continuous movement of the articulator or articulators while a sound is being made. The glide consonants include (w, y as in yellow, and r as in red).

Semivowel

The semivowel is related to the glide in that there is movement involved in its consonant function. The semivowels are (w, r, y as in yellow, and l). The element of vocalization as a means of classifying consonants depends upon whether the vocal folds are in vibration when the sound is produced. If they are, the sound is said to be voiced and if it is not, the sound is said to be unvoiced. A labiodental voiced fricative would describe the consonant /v/ is produced during the three factors of place, manner, and vocalization.

Cleft Palate and Adenoidal Speech

Two types of speech problems which are frequently seen by the otolaryngologist are associated with abnormal nasal resonance. The nasality is "hyper" if there is too much and "hypo" if there is too little.

In the case of a normal speaker, the soft palate effectively seals off the nasal cavity for most sounds, but allows the nasal sounds (m, n, ng) to pass through the nose. For the cleft palate speaker who has insufficient velopharyngeal closure, all sounds tend to pass through the nose and the speech becomes hypernasal. Both vowels and consonants are adversely affected. The vowels are given excessive nasal resonance and hence sound distorted. The most common articulatory error is the substitution of some nasal equivalent for the plosive and fricative sounds. The voiceless plosives (p, t) are usually preceded by a sharp nasal puff and a pinching of the nostrils. The velar plosives (k, g) are among the most difficult to make since they require an air pressure buildup behind the tongue. This is virtually impossible without sealing off the nasal cavity. Fricative sounds usually are accompanied by nasal snorts. The nasal snort frequently is substituted for the s and sh. This type of speech may, in severe cases, be extremely unintelligible. Good test words to show velopharyngeal insufficiency are cool, coca cola, quack quack.

The hypernasality and articulatory problems associated with cleft palate speech also occur when there is no actual cleft of the palate. It may occur with a soft palate that is paralyzed, sluggish, or too short. A child with a short palate may be able to avoide excessive nasality by compensating with hypertrophied adenoid tissue. However, if the adenoidal tissue is removed surgically, hypernasality may result. For this reason, surgical removal of adenoidal tissue should be given careful consideration prior to this undertaking.

Adenoidal Speech

Hyponasality (or denasality) is often called "cold in the nose" speech. It is primarily a substitution of (b, d, g) for the nasal (m, n, ng). The quality of other sounds is also somewhat affected. Hyponasality is usually associated with some structural pathology such as hypertrophy of the adenoids or polyps.

Outline

Speech, Language, Voice

Introduction on Communication

Components: Speech
Language
Voice.

I. Speech

A. Definition: Mechanical aspect of communication. The forming of sounds and words etc on phonation.

B. Physiology: Need systems of respiration, phonation, resonation, articulation.

C. Disorders of Speech:

1. Misarticulations:

a. Substitutions: th for s
thoup for soup.

b. Distortions: slurring s in soup.

c. Omissions: sou_ for soup.

d. Additions: soupa for soup.

e. Development of speech sounds.

f. Evaluation of speech: Articulation test and oral-peripheral.

g. Therapy: Correct sounds in isolation, syllables, words, connected speech.

2. Dysarthria:

a. Definition: Slurred, thick speech.

b. Etiology: CVA, lack of dentures.

c. Evaluation: Subjective auditory measurement, assessment of the speech musculature.

d. Therapy: Stressing slow speech, exaggerated movement of the speech musculature, self-auditory monitoring.

3. Apraxia:

a. Definition: Inability to coordinate the speech movements necessary in producing a word or words.

b. Etiology: Usually CVA or other neurologic problems.

c. Evaluation: Articulation testing.

d. Therapy: Retraining for affected sounds.

4. Stuttering:

a. Definition: Hesitations; prolongations; repetitions of sounds, words, phrases, sentences; secondary behavioral characteristics.

b. Etiology: Largely unknown.

(1) Theories:

(a) Organic.

(b) Delayed auditory feedback.

(c) A learned behavior.

c. Evaluation: Analyze stuttering in depth.

d. Therapy: Self-monitoring, slow speech, reshaping.

II. Language

A. Definition: Expression of ideas - verbally, gesturally, facial expression, body movement, intonation patterns, graphically.

B. Development of language.

C. Disorders of language.

1. Language delay: Behind in the development of receptive and expressive vocabulary.

a. Echolalia: Repeat what is said due to an inability to process incoming information accompanied by a delay in expressive vocabulary.

b. Nonverbal: Very behind in the development of linguistic concepts.

c. Cerebral palsy: Show a delay due to a limited experience, accompanied by speech and hearing difficulties.

d. Bilingual/multilingual: Difficult to learn two or more languages at once.

2. Aphasia: Inability to use symbols of language either receptively or expressively - a word retrieval problem.

a. Etiology: Neurologic problem to the speech and language areas of the brain.

b. Evaluation: Of hearing acuity; of receptive and expressive linguistic skills, including verbal, auditory, visual, graphic, and gestural.

c. Therapy: Word retrieval to a funcional linguistic level.

D. Evaluation:

1. Complete audiologic workup.

2. Tests of receptive and expressive language skills and modalities.

3. A comparison to the norm.

4. Outside referral for language-related testing.

E. Therapy: Individualized therapy and home program directed at bringing linguistic skills to as near a normal level as possible.

III. Voice

A. Definition: Sound produced by the vibration of the vocal cords.

1. Optimal pitch for adult male = 125 Hz.

2. Optimal pitch for adult female = 225 Hz.

B. Normal voice: Falls into these frequencies, has clear sounding quality, adequate volume, proper resonance balance.

Abnormal voice calls attention to itself because it significantly deviates from the norm.

C. Abnormal voice:

1. Disorders of intensity:

A. Aphonia: Total lack of voice.

(1) Hysteric: Associated with deep emotional conflict.

(2) Laryngectomy.

b. Dysphonia: Partial loss of voice.

(1) Spastic dysphonia: Strain of the voice and hence distorted or unintelligible utterances.

2. Disorders of pitch:

a. High pitch: Due to tension - falsetto.

b. Low pitch: Glottal fry - due to the addition of mass to the folds.

c. Monopitch: Little or no inflection.

d. Pitch breaks: Sudden variations in pitch.

e. Falsetto: High pitch in all speech output.

f. Tremulous voice: Quavering overlay of voice.

g. Glottal fry: Bubbly, crackling sound.

3. Disorders of phonation:

a. Harshness.

b. Breathiness.

c. Hoarseness.

d. Functional origin:

(1) Vocal abuse.

(2) Vocal misuse.

e. Organic origin.

(1) Improper approximation.

(2) Atyipical laryngeal size.

(3) Edema.

(4) Laryngeal growths.

(5) Laryngeal paralysis.

4. Disorders of resonance.

a. Hypernasality.

b. Hyponasality.

D. Evaluation:

1. Complete case history.

a. Voice sample taped as a baseline for measurement.

b. Detection of vocal abuses and misuses.

c. Voice analysis.

E. Therapy for most voice disorders includes:

1. Identification and elimination of vocal abuses.

2. Instruction on obtaining correct resonance balance.

3. Locating optimal pitch.

4. Maintenance of optimal pitch.

5. Respiration training.

6. Relaxation exercises.

F. Therapy for a laryngectomy patient.

1. Introduction and instruction of alternate means of communication (electrolarynx).

2. Family counseling regarding rehabilitative stages of a laryngectomy patient.

3. Training in esophageal voice production.

4. Tracheoesophageal puncture/voice prosthesis.