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A Longitudinal Study of the Effects of Three Specific Communication Techniques in Vocal Rehabilitation

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A LONGITUDINAL STUDY OF THE EFFECTS OF THREE SPECIFIC COMMUNICATION TECHNIQUES IN VOCAL REHABILITATION

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INTRODUCTION AND RATIONALE

Communication theorists tell us that the human organism uses communication as a problem-solving behavior to adapt to his environment (Bruner, 1961; Lecky, 1969). He is no more successful than his ability to understand the environment and to learn new responses when necessary (Lecky, 1969).

> Learning therefore is problem-solving, and the number of solutions achieved constitutes the organism's preparation. The more adequate the preparation . . . the greater the organism's freedom of choice and action. . . . Stability is a function of preparation (Lecky, 1969, p. 77).

Bruner (1961) perceives the human organism as an information-processing system that receives stimuli from the environment, organizes them appropriately, and is able to choose adaptive responses from this resulting information (Zubek, 1969). If there is a breakdown in communication, then the organism fails to make an adaptive response and change does not occur (Bruner, 1961; Lecky, 1969). Hence, communication is essential to successful adaptation to one's environment (American Speech and Hearing Association, 1971; Bruner, 1961).

Understanding this basic role of communication is particularly important to those professionals concerned with vocal rehabilitation (American Speech and Hearing Association, 1971; Barnlund, 1968). The patient with vocal fold pathology has a problem. During the development of his problem, the voice patient may have voicing difficulties that jeopardize his livelihood, or he may face a variety of social problems (American Speech and Hearing Association, 1971). One of his first problem-solving behaviors may be to seek medical attention.

The communication that takes place during the initial diagnosis is of the nature that Bruner (1961) presents. It is communication to reduce uncertainty. The uncertainty in this instance is the voice problem. The rehabilitation can be no better than the quality of the communication that takes place between the rehabilitation professional and the vocal fold pathology patient (Barnlund, 1968). The physician needs to communicate with the patient to learn about the problem. In turn, the voice patient needs to communicate with the physician to learn an adaptive response (Lecky, 1969).

> When we undertake to communicate with another, we address ourselves to him with the expectation that he will respond. We expect that the meanings we are trying to convey will activate certain meanings in him out of which he will

> reply, and that each will continue in a mutual and reciprocal exchange of meanings until some purpose has been accomplished (Howe, 1963, p. 21).

During the course of diagnosis and treatment, the physician receives information as he talks with the patient, listens to and observes symptoms, fills out a case history form, and examines the patient's laryngeal area (Boone, 1977; Laguaite, 1972; Wilson, 1972). At the same time the patient is referencing and understanding the questions and responses given to him by the physician. The physician and patient use the information-processing system (Bruner, 1961) in order to find out about their environment. In this case, the patient's voice problem is the "environment". The physician uses the examination results and what the patient says to understand the problem and finally plan treatment. The interpretive responses that the physician gives the patient is usually called verbal advice (Zwitman & Calcaterra, 1973).

Successful communication is essential throughout the vocal rehabilitation sequence (Barnlund, 1968). The physician has several treatment options that are used: (1) physician's verbal advice (Arnold, 1962; Rubin & Lehrhoff, 1962; Wilson & Rice, 1977); (2) written information in the form of a voice pamphlet

(Brackett, 1971; Ingram, 1976), and (3) voice therapy (Arnold, 1962; Boone, 1977; Brackett, 1971; Moore, 1971; Wilson & Rice, 1977).

Physician's Verbal Advice as a Treatment Option

This treatment usually involves the physician telling the patient that he needs to change his phonation habits (Wilson & Rice, 1977). The physician assumes that telling the patient to stop abusing his voice or to change his way of phonating is an appropriate communication. The assumption is that the patient understands the message rationale and will be able to self-correct his voicing problem (Zwitman & Calcaterra, 1973).

Several kinds of advice may be given by the physician in conjunction with a surgical or non-surgical recommendation: (1) stop abusing the voice (Ballantyne & Groves, 1961; Cooper & Nahum, 1967; Zwitman & Calcaterra, 1973); (2) voice rest (Arnold, 1962; Ballantyne & Groves, 1971; Boone, 1977; Cooper, 1974; DeWeese, 1964; Greene, 1972; Kleinsasser, 1968; Rubin & Lehrhoff, 1962; Toohill, 1975; Van Riper & Irwin, 1958; Wilson, 1972; Wilson & Rice, 1977); and (3) stop smoking (Arnold, 1962; Ballantyne & Groves, 1971; Greene, 1972; Kleinsasser, 1968; Wilson, 1972;

Wilson & Rice, 1977).

Stop abusing the voice. The physician usually views the vocal folds and the pathology by indirect laryngoscopy and says to the patient "You have a vocal nodule (or polyp) on your vocal folds and this is caused by vocal abuse which may be yelling, screaming, or loud talking. You must stop yelling, screaming, or talking loudly" (Ballantyne & Groves, 1971; Cooper & Nahum, 1967; Zwitman & Calcaterra, 1973).

Voice rest. The purpose of voice rest is to reduce the number of times that the vocal folds approximate in order that the operated tissue may heal and begin to return to normal (Arnold, 1962; Boone, 1977; Kleinsasser, 1968; Toohill, 1975; Wilson & Rice, 1977). Arnold (1962) defined voice rest as the avoidance of vocally abusive behaviors and a reduced amount of speaking. Wilson and Rice (1977) recommend at least 50 to 75% reduction in the amount of talking. Arnold (1962) advises modified voice rest (as do Kleinsasser, 1968; Toohill, 1975; Wilson & Rice, 1977) in place of complete voice rest. Arnold perceives the latter as "impractical and emotionally traumatic" (p. 214). Coughing and throat clearing should also be eliminated during voice rest since their effect is as damaging as talking (Rubin & Lehrhoff, 1962). Rubin and Lehrhoff mentioned a special

technique called aphonic whispering in which the patient forms words on his lips during normal exhalation without forcing. Patients are instructed that if they must communicate, a soft normal voice rather than a loud whisper is preferred (Kleinsasser, 1968).

Rubin and Lehrhoff (1962) offered several points: (1) when voice rest is initiated the pathology often dissipates; (2) in the event the pathology does not resolve completely, surgery is thus confined to a smaller area; and (3) in the case of bilateral vocal nodules, the smaller nodule often will disappear, reducing the need for surgery to only one cord. Arnold (1962) stated that in adults, if the vocal pathology is acute (small and soft) voice rest for several weeks should reduce and/or eliminate the pathology (Ballantyne & Groves, 1971; Greene, 1972; Van Riper & Irwin, 1958).

Most vocal rehabilitation experts advocate a week to 10 days of complete voice rest immediately following surgical intervention (Arnold, 1962; Boone, 1977; Cooper, 1974; DeWeese, 1964; Greene, 1972; Kleinsasser, 1968; Wilson, 1972). Voice rest alone is not a cure, cautioned Wilson and Rice (1977). It is important for the patient to locate and change the source of his vocal abuse.

In summary, voice rest may be initiated (1) in an attempt to reduce and eliminate the vocal fold pathology without surgery, or (2) as a post-operative procedure to promote healing of the vocal folds (Arnold, 1962; Boone, 1977; Kleinsasser, 1968; Toohill, 1975; Wilson & Rice, 1977).

Stop smoking. The physician may advise the patient to stop smoking because tobacco is considered to be an aggravating factor in the formation and maintenance of vocal fold pathology (Arnold, 1962; Ballantyne & Groves, 1971; Greene, 1972; Rubin & Lehrhoff, 1962; Wilson, 1972; Wilson & Rice, 1977). Cigarette smokers are told by Kleinsasser (1968) not to smoke at least one week post-operatively.

The assumption in each of these advice options is that the patient will understand the physician's message and be able to self-correct his voicing problem (Zwitman & Calcaterra, 1973). Occasionally, this verbal advice suffices; the patient does understand, is able to produce the necessary change, and his problem is solved (Moore, 1971). There are many times however, that this does not happen (Zwitman & Calcaterra, 1973).

Written Communication: The Vocal Abuse Pamphlet

Brackett (1971) observed that changing of vocal

behavior would not be successful unless the client was fully informed concerning the processes involved and perceived the therapeutic process as reasonable, understandable, and felt a sense of satisfactory achievement. "The client needs to be informed as much about the 'abnormality' of his vocal output as he is about the change he is to achieve," stated Brackett "for these provide the basis of comparison and accurate reinforcement" (p. 461).

Often it is not economically practical for the physician to provide lengthy verbal explanations of the vocal mechanism, vocal abuse, and rehabilitative measures for the patient (Brackett, 1971; Zwitman & Calcaterra, 1973). Written communication allows the physician to provide the patient with information concerning (1) proper functioning of the respiratory system, (2) normal and abnormal phonatory process, and (3) the etiology and physiology of organic pathologies such as cord thickening, vocal nodules, and vocal polyps and their related vocally abusive behaviors (Boone, 1977; Moore, 1971; Wilson & Rice, 1977; Zwitman & Calcaterra, 1973). The voice pamphlet "Helping Your Voice to Get Better" (see Appendix A for complete derivation), outlines these three critical areas. The pamphlet also deals with advice for the patient

regarding elimination of the vocal abuse and principles of voice rest. The following concepts are written in the voice pamphlet so that the patient can understand his voice problem (Caton, 1976).

Proper function of the respiratory system. It is common knowledge that respiration performs the basic function in which oxygen is supplied to the blood in exchange for and removal of carbon dioxide (Sheets, 1973; Van Riper & Irwin, 1958). The respiratory flow to and from the lungs proceeds along the respiratory tract or airway composed of the nose and mouth, pharynx, larynx, trachea, bronchi, and lungs (Boone, 1977; Moore, 1971; Van Riper & Irwin, 1958). Boone (1977) described the mechanism of respiration:

> On inspiration, as the thoracic cage increases in size, the elastic lung tissue follows the thoracic expansion, increasing the size of the lungs. As the lungs increase in size, the air already captured within them from previous inhalation is reduced in total pressure, since the same amount of air has more space. This decrease in air pressure within the lungs (intrapulmonary pressure) represents a minus value differential between intrapulmonary pressure and the outside air pressure. . . . and the outside air rushes in to fill the vacuum. When the intrapulmonary and atmospheric pressures are equalized, the expiration process begins. It is characterized by a decrease in the size of the thorax and an elastic recoil of the lungs, resulting in an increase of intrapulmonary pressure. When the intrapulmonary pressure exceeds that of the atmosphere, there is an immediate outflow of air until the two pressures are equalized, at

> which time the inhalation process begins again (p. 16).

It is important for the patient to understand that during inhalation, he takes air in through his nose and mouth, the air travels down through the larynx and trachea to his lungs, and as the air is exhaled, it passes over two flaps of skin in the larynx called vocal folds. When the vocal folds are set into vibratory motion and the air is exhaled, the voice is created (Boone, 1977; Moore, 1971).

Normal phonatory process. The vocal folds are located in the larynx superior to the trachea and serve a valvular action (Boone, 1977). They allow air to pass in and out of the lungs but prevent the entry of liquids, food, and foreign bodies. The vocal folds consist of approximately an anterior two-thirds known as thyroarytenoid muscle (Arnold, 1962). If the arytenoid area is to be included, there is a cartilaginous posterior third, or the vocal process (Arnold, 1962; Rubin & Lehrhoff, 1962). Kleinsasser (1968) described their appearance:

> When viewed under intense light, the squamous epithelium over the vocal cords appears pure white and glistening. . . . The subepithelial capillaries, shining through the healthy vocal cord epithelium, are easily recognized. . . . Increased tortuosity, curled formation, and changes in the caliber of the capillaries are not seen in the healthy larynx. . . .

> When touched with a probe, the vocal cords appear taut and elastic (p. 30).

Arnold (1962) further characterized the vocal folds as "devoid of any mucous glands" (p. 212).

In human beings a second respiratory and laryngeal function has evolved--that of phonation (Boone, 1977; Sheets, 1973). A rapid intake of air is followed by a sustained period of exhalation with the locus of control maintained at the level of the vocal folds (Sheets, 1973; Van Riper & Irwin, 1958). Major vibratory activity is performed by the cords' muscular portions. The action is similar to an oscillating sphincter with combined vibratory movements of "up-out" and then back "down-in" (Arnold, 1962; DeWeese, 1964; Rubin & Lehrhoff, 1962). "The midpoint of the membranous vocal cord corresponds to the junction of the anterior and middle thirds of the total length of the vocal cord. . . . and their mid-points meet with the greatest force" (Rubin & Lehrhoff, 1962, p. 152). Greene (1972) explained the phonatory process:

> In phonation the vocal cords are delicately poised and tensed in the midline by the intrinsic and extrinsic laryngeal muscles to meet the phonic air flowing from the lungs. When the pressure builds up sufficiently, the vocal cords are blown apart in an upwards and outwards motion. This is followed immediately by a reduction in air pressure in the larynx when the cords revert to the midline in an elastic recoil and a downward and inward

> movement. This excursion of separation and approximation is known as one cycle, and the frequency of occurrence of the cycles determines the fundamental pitch of the note produced (p. 6).

The elastic recoil decribed by Greene is interpreted by Boone (1977) as the Bernoulli vacuum effect, in which the folds are drawn "even closer together than they are in their neutral approximation state" (p. 26).

The patient should be aware that during speaking or singing situations, the vocal cords vibrate from 50 to 1,000 plus times per second (Rubin & Lehrhoff, 1962). Only through high speed photographic study have the vocal fold movements been slowed enough to appreciate their movement and to observe an undulating grace and rhythm (Moore, 1963; Rubin & Lehrhoff, 1962).

Abnormal phonatory process. When the vocal folds do not adduct (close) and abduct (open) in the manner previously described, there is faulty vocal fold approximation (Boone, 1977). Boone suggests this is an inefficient method of phonating. Particular emphasis is placed on hyperfunction or excessive force in phonating (Arnold, 1962; Boone, 1977; Brackett, 1971; Greene, 1972; Wilson, 1972; Wilson & Rice, 1977). When the closed (approximated) phase lasts longer than either the adducting or abducting phases, hyperfunction is present (Boone, 1977). The prolonged closure causes

increased subglottal air pressure (Boone, 1977; Greene, 1972). When there is insufficient or erratic air flow, greater force is required to vibrate the vocal folds and to maintain appropriate volume (Greene, 1972). There is a feeling of tension (Wilson & Rice, 1977) and strain (Cooper & Nahum, 1967) in the laryngeal area which is common following excessive talking, teaching, or lecturing (Greene, 1972).

One of the major causes of vocal hyperfunction is vocal abuse, or vocally abusive behaviors (Arnold, 1962; Ballantyne & Groves, 1971; Boone, 1977; Cooper & Nahum, 1967; Perkins, 1971; Shipp & Huntington, 1962; Wilson, 1972; Wilson & Rice, 1977; Zwitman & Calcaterra, 1973).

> Continued talking, excessive laughing and crying, talking loudly over background noise, and screaming and yelling all take a toll, reducing the efficiency of the laryngeal mechanism (Boone, 1977, p. 6).

Included in the list of vocally abusive behaviors are shouting, throat clearing (Cooper & Nahum, 1967; Wilson, 1972); heavy smoking and excessive use of alcohol (Arnold, 1962; Wilson, 1972); excessive coughing (Cooper & Nahum, 1967; Greene, 1972; Wilson & Rice, 1977; Zwitman & Calcaterra, 1973); hard glottal attack (Boone, 1977; Shearer, 1972; Wilson, 1972; Wilson & Rice, 1977); inappropriately low pitch (Boone, 1977; Cooper, 1974; Shipp & Huntington, 1965; Wilson & Rice,

1977); and emotional and situational stress (Perkins, 1971).

Etiology of vocal fold pathologies. Vocally abusive behaviors, when repeated excessively over a prolonged period of time, produce inflammatory changes in the vocal fold structure and subsequently create vocal fold pathologies such as cord thickening, vocal nodules, and vocal polyps (Arnold, 1962; Ballantyne & Groves, 1971; Boone, 1977; Brackett, 1971; Cooper & Nahum, 1967; Drudge & Philips, 1976; Fisher & Logemann, 1970; Greene, 1972; Holbrook, Rolnick, & Bailey, 1974; Kleinsasser, 1968; Moore, 1971; Rubin & Lehrhoff, 1962; Shearer, 1972; Toohill, 1975; Van Riper & Irwin, 1958; Wilson, 1972; Wilson & Rice, 1977; Zwitman & Calcaterra, 1973).

In cord thickening, the vocal folds appear rough and pink, the small blood vessels are engorged, and there is a general thickening of the mucosa and subsequent alteration of the vocal fold mass (Ballantyne & Groves, 1971; Boone, 1977; Moore, 1971). In advanced cases, stated Moore, the alteration of the approximating folds can produce breathiness or hoarseness.

Kleinsasser (1968) identified mechanical factors caused by excessive voicing as an integral factor in the etiology of vocal nodules. Moore (1971) discussed the cause of vocal nodules as "prolonged vigorous use

of the voice" (p. 547). Ballantyne and Groves (1971) compared this mechanical trauma to the formation of calluses on the epidermis of the hands or feet in response to repeated rubbing or constant pressure. Ballenger (1969) related the proneness of the vocal fold structure to vocal nodules:

> The genesis of vocal nodules is related to the peculiar anatomy of the true vocal cords. At the free margin of the membranous vocal cord is a subepithelial potential space (Reinke's space). . . . This potential space is easily infiltrated by edema fluid or blood and this is what probably occurs at the onset of the condition due to the trauma of vocal abuse (p. 351).

This description is supported by Arnold (1962), Moore (1971), and Toohill (1975). Wilson (1972) detailed the development of vocal nodules in three stages:

> The development of a vocal cord nodule usually involves three stages. First, a localized slight reddening appears on the free margin of the vocal cord with the submucosa showing dilation of the thin-walled blood vessels. This may be the sign of a very small hemorrhage or a mucous gland beginning to close. Second, there then occurs a localized swelling or thickening on the edge of the vocal cord with or without reddening. Third, a definite nodule forms with the thickening being replaced by fibrotic tissue and the nodule appears white, the same color as the free margin of the vocal cord (p. 32).

It is generally agreed that vocal nodules are composed of layers of epithelium (Arnold, 1962; Greene, 1972; Kleinsasser, 1968; Moore, 1972; Van Riper & Irwin,

1958; Wilson, 1972; Wilson & Rice, 1977). Many researchers believe that vocal nodules are predominantly bilateral in occurrence (Arnold, 1962; Ballantyne & Groves, 1971; Boone, 1977; Greene, 1972; Moore, 1971; Wilson, 1972; Wilson & Rice, 1977). Vocal nodules are usually situated at the junction of the anterior third and posterior two-thirds of the vocal folds, also known as the mid-point (Arnold, 1962; Cooper, 1971; Greene, 1972; Moore, 1971; Rubin & Lehrhoff, 1962; Toohill, 1975; Wilson, 1972; Wilson & Rice, 1977).

> Since nodules are an inflammatory response to mechanical trauma they would be expected to exhibit progressive inflammatory changes. Young or early nodules tend to be soft and reddish. . . . More mature nodules will be more firm and contain areas undergoing fibrosis and hyalinization. Mature nodules, as seen in professional singers, are fibrous and pale (Ballenger, 1969, p. 351).

In early stages of development, vocal nodules are indistinguishable from vocal polyps (Moore, 1971; Rubin & Lehrhoff, 1962). Fibrosity of the nodule can sometimes be determined by coloration; young nodules are pink (Arnold, 1962; Wilson & Rice, 1977) and advanced nodules are pearly white due to their epithelial covering (Arnold, 1962: Kleinsasser, 1968; Wilson, 1972; Wilson & Rice, 1977).

Vocal nodules in adults rarely exceed 1.5 millimeters in diameter (Kleinsasser, 1968). Nodules are

usually larger and softer in children, with 3 millimeters considered a large vocal cord nodule (Toohill, 1975; Wilson, 1972). Wilson and Rice (1977) regard 6 millimeters as a very large nodule in children.

Rubin and Lehrhoff (1962) reported the size of the nodule bears no direct relation to the extent of vocal disability. The nodule may (1) prevent complete closure along the midline during the approximation phase, or (2) "weight" the folds with its mass and cause the folds to vibrate in an uncoordinated manner (Brackett, 1971; Boone, 1977; Fisher & Logemann, 1970; Rubin & Lehrhoff, 1962). The voice quality would be described in terms of hoarseness, breathiness, or vocal roughness (Boone, 1977; Brackett, 1971).

Kleinsasser (1968), Moore (1971), and Boone (1977) cited excessive vocal use and mechanical trauma as possible precipitators of vocal polyps. Cord thickening and small hemorrhages usually precede the formation of the polyp (Boone, 1977). Polyps are typically unilateral (Arnold, 1962; Boone, 1977; Moore, 1971; Wilson, 1972). According to Wilson (1972), polyps are the most common benign tumors of the larynx. Moore (1971) stated that unlike vocal nodules, the trauma that precedes vocal polyps need not be of long duration. Polyps may result from one incident of vocal strain

(Wilson, 1972). The vocal polyp is located within Reinke's space, as are vocal nodules (Moore, 1971).

Polyps are described as vascular, gelatinous or fibrous in consistency, broad-based or narrow-necked in attachment, and range in size from a few millimeters to near occlusion of the glottis (Arnold, 1962; Boone, 1977; Kleinsasser, 1968; Moore, 1971). After continued vocal abuse, numerous small polyps may form along the free edges of the vocal folds, called polypoid degeneration (Cooper, 1971; Wilson, 1972). If the polyp interferes with approximation there may be breathiness, low pitch, and diplophonia (two voices) (Wilson & Rice, 1977).

The last section of the voice pamphlet "Helping Your Voice to Get Better" (Ingram, 1976) instructs the patient concerning voice rest with or without surgery. The advice follows the guidelines previously discussed under voice rest and verbal advice.

The patient reads the written material and when the change is successful, stated Moore (1971), the patient is able to reduce and eliminate the vocal abuse. Verbal and written advice sometimes do not work because (1) the patient does not understand the information and thus cannot apply the rehabilitative concepts to his own problem; or (2) he <u>does</u> understand the advice but is

insufficiently motivated to change (Boone, 1977; Brackett, 1971; Cooper & Nahum, 1967; Moore, 1971).

When the Patient Lacks Understanding of the Problem

The physician's verbal advice and the written voice pamphlet are of little benefit to the patient unless they are presented in a way that the patient can understand and accept the problem (Barnlund, 1968). If the communication is not successful, the patient is not able to understand. The rehabilitative value of the diagnostic evaluation and the physician's advice are lost (Fearing, 1970). The communication has not been relative to the patient's need-value-demand system (Barnlund, 1968; Howe, 1963).

The Theory of Self-consistency and Resistance

What if the patient does understand the problem but is reluctant to change? Why would the verbal and written advice approaches be infrequent in their success? Barnlund (1968) described this communication as neutral because it adds information but does not affect the underlying attitudes or values. Lecky (1969) in his theory of self-consistency, summarized their inappropriateness to the situation:

> [learning] difficulties and social maladjustments are both conceived of as due to resistances arising from the subject's

> conception of himself. . . . he must endeavor to behave in a manner consistent with his concept of himself. . . . If the contradiction can be demonstrated from his own viewpoint, a reorganization becomes compulsory (pp. 129-131).

Lecky continued

> only the individual himself can solve his problem, and he must necessarily solve it in his own way. Preaching to the subject, telling him what he ought and ought not to do, trying to get him to accept our ideas and standards is ineffective for the reason that he has already accepted other ideas. His resistance to our suggestions is not due to obstinancy but to inability to accept them until the contrary ideas have been reconsidered and rejected (p. 133).

Based on past experiences, each person predicts in advance whether new situations will be soluble or insoluble and whether or not these incoming stimuli will strengthen or weaken his self-concept if he faces the problem (Lecky, 1969). Within this cognitive framework lie his attitudes and values, "the line between acceptance and avoidance" (Lecky, 1969, p. 78). So as the patient references what the physician says or the voice pamphlet tells him, it may conflict with his beliefs. This conflict may cause psychological discomfort, or dissonance. Festinger's theory of cognitive dissonance (1957) states

> dissonance. . . . being psychologically uncomfortable, will motivate the person to try to reduce dissonance and achieve consonance and. . . . in addition to trying to reduce it, the person will actively avoid situations and

> information which would likely increase the dissonance (p. 3).

The Structuring of a Third Communication Technique

Lecky (1969) proposed a therapeutic technique for overcoming this resistance and unperceived error performance:

> the technique consists in making the subject aware of his own inconsistency. The inhibiting definitions must be seen as useless burdens from which he must try to free himself, rather than as assets to be justified and retained. . . . it will not be rejected unless it seems inconsistent from the subject's standpoint. We do not aim at consistency with the demands of society, but only at self-consistency (p. 136).

In addition, the patient must understand about the vocal abuse and hyperfunction (Moore, 1971). Moore observed that

> Modification of the environment of an adult who has a voice problem is usually accomplished through direct work with him. Discussions about laryngeal trauma and its consequences provide insight for the patient into such vocal abuses as excessive speaking, shouting at sporting events, loud singing, and loud talking in noisy working situations. As a consequence, the individual arrives at an understanding of what he must do to improve his voice (p. 136).

Vocal fold pathologies such as cord thickening, vocal nodules, and polyps thought to be caused by vocal abuse often respond favorably to voice therapy efforts (Arnold, 1962; Ballantyne & Groves, 1971; Bloch & Gould, 1974; Boone, 1977; Brackett, 1971; Cooper,

1971, 1974; Cooper & Nahum, 1967; Deal, McClain, & Sudderth, 1976; Drudge & Philips, 1974; Fisher & Logemann, 1970; Greene, 1972; Kleinsasser, 1968; Laguaite, 1972; Moore, 1971; Perkins, 1971; Rubin & Lehrhoff, 1962; Toohill, 1972; Van Riper & Irwin, 1958; West & Ansberry, 1978; Williams & Farquharson, 1975; Wilson, 1961, 1972; Wilson & Rice, 1977; Zwitman & Calcaterra, 1973). Similarly, Ballantyne and Groves (1971) emphasized voice therapy to help the patient reduce and eliminate bad habits and vocal abuse. Otherwise, their continuation "will almost certainly result in recurrence" (p. 552).

The speech pathologist-patient relationship is a one-on-one situation (Boone, 1977). Voice therapy for the individual typically follows a hierarchical sequence: (1) discrimination (Boone, 1977; Brackett, 1971; Cooper, 1971; Moore, 1971; Rubin & Lehrhoff, 1962; Wilson & Rice, 1977), (2) confrontation (Boone, 1977; Brackett, 1971; Drudge & Philips, 1976; Van Riper, 1972; Wilson, 1972), (3) searching (Andrews, 1973; Boone, 1977; Brackett, 1971; Deal et al., 1976; Drudge & Philips, 1976; Moore, 1971; Wilson, 1972; Wilson & Rice, 1977), (4) stabilization (Brackett, 1971; Van Riper, 1972; Wilson, 1972), and (5) generalization (Brackett, 1971; Deal et al., 1976; Wilson, 1972).

Discrimination. It is important for the patient to understand the difference between the correct and incorrect kinds of voicing (Boone, 1977; Brackett, 1971; Rubin & Lehrhoff, 1962). Moore (1971), Wilson (1972), and Boone (1977) advocate a review of the normal processes of inhalation, exhalation, and phonation as a valuable reference point during the initiation of the rehabilitative sequence. Moore (1971) stated

> Since vocal sound and the phonatory disorders are generated in the larynx, this organ offers an appropriate place to begin a detailed description of the mechanisms of voice production (p. 17).

A simplified description of the etiology and physiology of organic pathologies such as cord thickening, vocal nodules, and vocal polyps related to vocally abusive behaviors should be included (Boone, 1977; Moore, 1971; Wilson & Rice, 1977; Zwitman & Calcaterra, 1973). The explanation of the problem is followed by a technique described as ear training in which the patient learns to listen and discriminate the correct and incorrect behavior in others (Boone, 1977; Cooper & Nahum, 1967; Moore, 1971; Van Riper, 1972).

The goals of discrimination training are to help the patient understand (1) the physiology of normal respiration and phonation, (2) the etiology and

physiology of organic pathology such as cord thickening, vocal nodules, vocal polyps, and their direct relationship to vocally abusive behaviors, and (3) the correct and incorrect voicing behavior in others (Boone, 1977; Moore, 1971; Wilson, 1972; Wilson & Rice, 1977). In discrimination, the patient realizes when others make the error, but not when he does it (Brackett, 1971).

Confrontation. The purpose of confrontation is to create within the patient insight into his own error behavior so that he becomes motivated to change (Drudge & Philips, 1976; Mysak, 1970; Van Riper, 1972). The moment of confrontation provides the patient a unique communication experience. The assumption is that he will perceive his own error behavior, experience dissonance (Zajonc, 1970) or conflict (Lecky, 1969), and subsequently become motivated to change or search out a more appropriate response (Boone, 1977; Van Riper, 1972; Wilson, 1972; Zajonc, 1970). "We tend to learn most efficiently when our errors are immediately known to us" (Holbrook et al., 1974, p. 298). Lecky (1969) discussed learning as a direct result of conflict:

> If it be true that learning is essentially a means of resolving conflicts, it follows that a conflict must always be present before learning can occur . . . And yet [human beings] cannot continue to develop, or succeed in maintaining their unity, except by repeatedly facing new conflicts and risking the security

> [they] wish to attain. Learning is not mechanical but adventurous (p. 104).

Confrontation is a special kind of communication based on inter- and intra-circuit feedback principles (Barnlund, 1970). Both of these feedback circuits must operate to allow the patient to (1) receive the environmental information, (2) analyze and form an opinion concerning the message, (3) engage in private interpretation of his own behavior as a result of insight, (4) realize that a balanced state does not exist (thereby producing tension), (5) become motivated toward the reinstatement of inner balance, and (6) engage in interpersonal communication to restore balance and reduce uncertainty (Barnlund, 1968, 1970; Zajonc, 1970). The patient uses inter-circuit feedback to process (a) the physician's advice, (b) the voice pamphlet, and (c) the discrimination training. Intra-circuit feedback is involved to create the awareness and understanding of the problem the same way that everyone else perceives it, e.g., the laryngologist, the patient's friends and family (Barnlund, 1970). This is why the verbal or written advice model may not work. The dissonance either is not created, or the patient engages in avoidance behavior and does not switch to intra-circuit feedback to allow confrontation

(Howe, 1963; Lecky, 1969; Zajonc, 1970).

When the communication between the speech pathologist and the patient proceeds successfully, the patient (1) understands what the problem is, (2) is able to gain insight and confront himself with the problem, and (3) becomes motivated to search out the correct response (Boone, 1977; Moore, 1971; Van Riper, 1972; Wilson & Rice, 1977).

Searching. When confrontation has been successful, vocal rehabilitation returns to the advice model to help the patient locate a better voice (Boone, 1977; Brackett, 1971; Drudge & Philips, 1976; Moore, 1971; Wilson, 1972; Wilson & Rice, 1977). Lecky (1969) postulated that the

> ability to foresee and predict environmental happenings, to understand the world one lives in, and thus be able to anticipate events and prevent the necessity for sudden readjustments is an absolute prerequisite for the maintenance of unity. The subject must feel that he lives in a stable and intelligible environment in which he knows what to do and how to do it, and his attitude of confidence and certainty is supported by this conviction (p. 84).

In the process of learning about his environment, the patient gradually develops vocally abusive behaviors, or habits over time (Ballantyne & Groves, 1971; Boone, 1977; Moore, 1971; Wilson, 1972). When a stimulus event conflicts with this predicted frame of

reference, incongruency occurs, and the system is challenged (Lecky, 1969; Zajonc, 1970). In this anxious state, the patient seeks to re-establish balance (Zajonc, 1970). Barnlund (1968) considers the rehabilitative process a learning experience in which the clinician helps the patient to clarify and interpret the conflict and make an appropriate adjustment. Lecky (1969) believes that in the rehabilitative situation, the patient "finds strength and support which enables him to assimilate experiences which he could not assimilate before" (p. 122). Gibb (1961) talked about facilitative communication in which the clinician is open, friendly, interested, accepting, and non-evaluative. This non-defensive model is supported in theory by Howe (1963) and Barnlund (1968). Communication is encouraged to help the patient gain insight into his problem and organize his self-concept.

Searching techniques are facilitative in that they provide opportunities for the production of a better voice (Boone, 1977; Zwitman & Calcaterra, 1973). Boone described the use of these techniques:

> As part of every clinical session, we must probe and search for the patient's best voice. When an acceptable production is achieved, we use it as the patient's target model in therapy. The patient's own best voice becomes his goal (p. 101).

In a 1976 study, Drudge and Philips demonstrated the process of learning and shaping of behavior in voice therapy. Results revealed that:

> (1) the client's behaviors in this vocal rehabilitation program reflected a learning process; (2) facilitating techniques were used to modify or shape behavior through successive approximations to the terminal goal; (3) self-evaluation is an important factor needed to bring about successful changes in behavior; (4) analysis of client's behaviors in relation to the learning process can aid in evaluating the effectiveness of the facilitating techniques; and (5) from such evaluation intraclient and interclient program changes are derived hopefully resulting in a greater success rate and maximum benefits from time spent in therapy (p. 398).

Successive searching behaviors allow the patient to locate the target, or good voice (Boone, 1977; Dickson, 1974; Van Riper, 1972; Wilson & Rice, 1977).

Stabilization. Once the patient understands his voice problem and demonstrates the ability to produce a more approprite response, stabilization of his new voice is initiated (Brackett, 1971; Wilson, 1972). It is important to realize that this new response (the new voice) is very delicate and elusive (Boone, 1977; Van Riper, 1972). Practice for the new voice during repetition of vowels is used to strengthen the response. The patient learns the "feel" of the new behavior during the most comfortable situations (Boone, 1977). Hilgard and Marquis (Kimble, 1968) defined this learning

as "a relatively permanent change in behavior potentiality which occurs as a result of reinforced practice" (p. 6). After achieving the simple vowel level, the patient may progress from easy to difficult vocal situations (Van Riper, 1972). This hierarchical progression is from vowels to words to phrases to sentences (Boone, 1977; Rubin & Lehrhoff, 1962). Holland (1967) presented two basic rules regarding approximations:

> (1) Begin with a form of behavior which the learner is fully capable of emitting and (2) move rigorously and precisely in small steps from this initial performance, differentially reinforcing each step, to progressively closer approximations of the desired final behavior (p. 11).

Generalization. In this fifth and final step of the hierarchy, the patient attempts to "carry over" his new voice into his external environment (Brackett, 1971; Wilson, 1961, 1972). Brackett defined this sequence:

> Once the client understands the parameters of his own vocal profile and demonstrates the ability to change the functions of structures toward a more desirable use, therapy is directed toward the stabilization of appropriate vocal characteristics and the application of these to communicating with the environment (p. 461).

Lecky (1969) views this final stage as an acceptance. The patient has gone through a process of "revision and reorganization" (p. 123) and thus learning has taken place. Festinger (1957) would define generalization as

the final step in restoring balance and thereby reducing dissonance.

The plan of the rehabilitative sequence is to change the patient's existing cognitive elements, attitudes, and values about his voice (Boone, 1977; Van Riper, 1972; Wilson, 1972; Zajonc, 1970). According to Barnlund (1968), the new voice evidences the success of the communication technique:

> Interpersonal communications are regarded as therapeutic when they provoke personal insight or reorientation, and when they enable persons to participate in more satisfying ways in future social encounters (p. 614).

Review of Previous Voice Therapy Studies

Much research has been performed concerning vocal fold pathologies and vocal rehabilitation efforts (Andrews, 1973; Baynes, 1966; Deal et al., 1976; Drudge & Philips, 1976; Holbrook et al., 1974; Shearer, 1972; Toohill, 1975). A summary of these studies is presented in Appendix B.

Baynes (1967) studied children with vocal fold pathologies and attempted to control vocal abuse and develop less aggressive patterns of vocalization. Fourteen children with vocal nodules and cord thickening participated in group voice therapy 2 hours a week for 8 weeks. Twelve weeks after the program began, indirect

laryngoscopy revealed seven of the children had normal vocal folds and four showed significant size reduction in pathology. Three of the children did not complete the program.

A diagnostic team composed of a speech pathologist, laryngologist, and school psychiatrist participated in a 2 year study of voice disorders (Shearer, 1972). Approximately 80 pre-adolescents were screened by the speech pathologist. Results indicated 57% of those subjects referred to the clinic for indirect laryngoscopy had vocal nodules. Goals of therapy included reduction of vocal tension, development of new pitch levels, reduction of hard glottal attacks, and patient awareness of vocal abuse. Subjects were rechecked by the physician every 3 months. Data for reduction and elimination of the vocal fold pathology was not reported.

In another study, Andrews (1973) worked with four Head Start children. All four children exhibited hoarseness due to vocally abusive behaviors. One child had vocal nodules. A 7 month voice therapy sequence was designed to help these children learn to discriminate between vocally abusive behaviors. The final goal was to generalize this awareness to their own speaking habits through a series of progressions. Results

revealed the vocal nodules had cleared in the one child. Hoarseness was no longer a problem in any of the children.

Thirty-two adults and children were involved in the testing of an experimental feedback device called a "vocal intensity controller" (Holbrook et al., 1974). All but five subjects demonstrated vocal nodules, polyps, or contact ulcers directly related to vocally abusive behaviors. The remaining five subjects had hyperfunction only. Indirect laryngoscopy at 3 months indicated that 19 subjects had experienced significant or complete reduction of the vocal fold pathology, 3 subjects showed no improvement, 5 subjects discontinued treatment, and the 5 subjects with hyperfunction remained clear of pathology.

Toohill (1975) investigated the differential effectiveness of four treatment modes for 77 children with vocal fold pathology: (1) voice therapy within the school setting, (2) voice therapy within the clinical setting, (3) parental involvement and counseling, and (4) no treatment. There were 76 children with bilateral vocal nodules and one child with a unilateral nodule. More than 70% of the affected children were male. During the administration of the treatments, two subjects required surgical removal of the nodules.

One subject had a recurrence 2 months post-operatively; the second child received voice therapy and experienced complete vocal rehabilitation. Laryngoscopic examination 3 months from the initiation of the study revealed 58.5% of the children were cured or improved; 32.5% showed no improvement; and 9% were unavailable for follow-up. Disturbing to Toohill was the comparable progress made by the children in the other three treatments. He proposed physical and social maturational factors as explantion since six of the subjects who reached puberty had all recovered.

Following a voice screening in the public school, 31 children with vocal nodules were selected to participate in a vocal rehabilitation program conducted by Deal, McClain, and Sudderth (1976). Goals of therapy included the (1) reduction of vocal loudness, (2) easy initiation of phonation, (3) maintenance of phonation, and (4) parental and peer involvement. Voice therapy ranged 2 to 6 months and the sessions occurred two to three times per week. This represented 17 to 77 sessions. The physician used a subjective rating scale to determine nodule size: 1-clear, 2-tiny, 3-small, 4-moderate, and 5-large. Mean nodule ratings were recorded for the initial indirect laryngoscopy (3.48), and at 2 months (2.57), 4 months (1.68), and

6 months (1.42) post-initial indirect laryngoscopy. This progression represented a 2-point remission on the subjective rating scale over a 6 month period. At 6 months, 26 of the children had experienced significant reduction or elimination of the nodules and 5 were absent for the examination.

In a 2 month experimental study, Drudge and Philips (1976) sought to shape the behavior of three adult subjects who had vocal nodules by (1) elimination of the vocal abuse, (2) ease of phonation, (3) increase of clear phonation time, and (4) increase of loudness without accompanying tension. Sixteen therapy sessions were given over an 8 week period. Results of the indirect laryngoscopy showed two of the subjects had eliminated the vocal nodules and the third subject had significant reduction in size of the pathology.

In six of these seven studies (excluding Toohill, 1975) each experiment involved application of one specific voice therapy program to determine its effectiveness over time for the reduction and elimination of vocal fold pathology (Andrews, 1973; Baynes, 1967; Deal et al., 1976; Drudge & Philips, 1976; Holbrook et al., 1974; Shearer, 1972). Therapy techniques similar to those described by Boone (1977) and Wilson and Rice (1977) were implemented.

Toohill (1975) compared the differences between treatments in reduction and elimination of vocal fold pathology: (1) voice therapy in the school, (2) voice therapy in the clinic, (3) parental involvement and counseling, and (4) no treatment over a period of time. His investigation centered on pre-adolescents and results indicated a physical and social maturation to be as effective a "treatment" as any of the experimental treatments.

Non-surgical considerations. The results of these studies imply that voice therapy for non-surgical patients with vocal fold pathologies caused by vocal abuse is a viable alternative to surgical intervention (Rubin & Lehrhoff, 1962; Wilson, 1972). When young and soft, these pathologies can be reduced effectively by combined voice therapy and voice rest in 6 to 8 weeks (Boone, 1977). West and Ansberry (1968) predicted a reduction in vocal fold pathology size within 3 months of voice therapy. Wilson (1961) proposed significant reduction of vocal nodules within 3 to 6 months (Andrews, 1973; Boone, 1977; Deal et al., 1976; Drudge & Philips, 1976; Holbrook et al., 1974; Rubin & Lehrhoff, 1962; Toohill, 1975). Rubin and Lehrhoff (1962) favor voice rest in lieu of surgery when it appears the pathology might dissipate. They contend if

the pathology recurs following a period of voice rest in which there was a reduction in structural size, a change in vocal habits is needed. In their experience, Rubin and Lehrhoff found "where the necessity for surgery is questionable at the outset, this decision can be made in two to six months" (p. 157).

Surgical intervention. Arnold (1962) recommends surgery for advanced or fibrous nodules, any unilateral pathology (even if benign in appearance), all polyps, polypoid degeneration, and all cordal lesions in middle-aged or older patients. Ballantyne and Groves (1971) and Kleinsasser (1968) suggest surgery only after the efforts of the speech pathologist and voice rest have been unsuccessful. Large fibrotic nodules and polyps of long standing will not diminish in size with voice therapy and therefore surgery is advised (Ballantyne & Groves, 1971; Boone, 1977; Greene, 1972; Wilson, 1972; Wilson & Rice, 1977). Voice therapy must precede surgery and continue until the vocally abusive behaviors have been reduced and eliminated (Boone, 1977; Van Riper & Irwin, 1958; Wilson, 1972; Wilson & Rice, 1977). Voice therapy is essential to help the patient to identify, reduce, and eliminate vocal abuse; otherwise its continuation "will almost certainly result in recurrence" (Ballantyne & Groves, 1971, p. 552).

STATEMENT OF THE PROBLEM

The diagnosis and treatment in vocal rehabilitation can be no more successful than the quality of the communication that takes place between the rehabilitation professional and the vocal fold pathology patient (Barnlund, 1968).

It is generally accepted (Boone, 1977; Moore, 1971; Van Riper & Irwin, 1958; Wilson & Rice, 1977; Zwitman & Calcaterra, 1973) that the vocal fold pathology patient must receive an explanation of his problem related to (1) normal respiration, (2) both normal and abnormal phonation, (3) the etiology and physiology of organic pathologies such as cord thickening, vocal nodules, and vocal polyps, and (4) vocally abusive behaviors. The physician may provide this information (1) verbally to the patient on an individualized basis which is both time consuming and expensive to the patient and the physician (Zwitman & Calcaterra, 1973), (2) in written form, as in the voice pamphlet "Helping Your Voice to Get Better" (Ingram, 1976), and (3) by referral of the patient to a speech pathologist for vocal rehabilitation (Arnold, 1962; Ballantyne & Groves, 1971; Bloch & Gould,

1974; Wilson & Rice, 1977).

Previous studies support the effectiveness of vocal rehabilitation by the speech pathologist for surgical and non-surgical vocal fold pathology patients (Baynes, 1966; Deal et al., 1976; Drudge & Philips, 1976; Holbrook et al., 1974; Shearer, 1972; Toohill, 1975; Wilson, 1972). The comparative effectiveness of the physician's verbal advice or the written advice pamphlet to voice therapy implemented by the speech pathologist is not certain.

When the physician tells the patient to stop abusing his voice or to change his way of phonating, it is assumed that the patient understands and can self-correct (Zwitman & Calcaterra, 1973). Lecky (1969) admonished that we cannot tell someone what to do or get him to accept our ideas until his own beliefs about the problem have been reconsidered and rejected. There are instances when the physician's advice is adequate; however, if the vocally abusive behavior is well-integrated in the person's value system, the patient may be resistant to change and dissonance may interfere in the communication process (Festinger, 1957; Lecky, 1969). A more intensive communication technique, i.e., voice therapy, is required to resolve the conflict. When the patient receives insight into his own error

behavior and becomes motivated to change, thus resolving the conflict, he has experienced successful confrontation (Boone, 1977; Mysak, 1970; Van Riper, 1972; Wilson, 1972; Zajonc, 1970).

A question of clinical application was asked: If the vocal fold pathology patient receives verbal advice or written information from the physician, is the patient able to engage in self-awareness, perceive his error behavior, and become motivated to reduce and eliminate the vocal abuse? The purpose of this study was to investigate the effects of three specific communication techniques on the reduction and elimination of vocal fold pathology due to vocal abuse over time. The same communication techniques were compared for surgical patients by observation of the incidence of vocal fold pathology recurrence.

Clinical observation involved non-surgical and surgical conditions. Vocal fold pathology subjects in the non-surgical condition received one of three communication treatments: (1) physician's verbal advice only; (2) physician's verbal advice and the voice pamphlet; or (3) physician's verbal advice, the voice pamphlet, and voice therapy. The first hypothesis was (a) the subjects who received the verbal advice only would experience the least resolution of vocal fold

pathology for the three treatments over time; (b) the subjects who received the verbal advice and voice pamphlet would undergo greater resolution of the vocal fold pathology over time than those subjects who received the physician's verbal advice only; and (c) the subjects who participated in voice therapy in addition to the physician's verbal advice and the voice pamphlet would experience the greatest resolution of the three treatments.

A second hypothesis was given for the surgical conditions. It was predicted that (a) those subjects who received the verbal advice only would experience the greatest incidence of vocal fold pathology recurrence for the three surgical treatments; (b) the subjects who had the physician's verbal advice and the voice pamphlet would have greater incidence of vocal fold pathology recurrence than subjects in the voice therapy treatment, but less than subjects in the physician's advice only treatment; and (c) the subjects who were given voice therapy, the physician's advice, and the voice pamphlet would have the least incidence of vocal fold pathology recurrence of the three surgical treatments.

METHODOLOGY

Test Sites

The indirect laryngoscopic examinations were conducted at five physicians' offices within central Florida and involved patients of the eight physicians. The vocal rehabilitation sessions with the speech pathologist were performed at two of these offices.

Subjects

Indirect laryngoscopic evaluation identified 61 patients with vocal fold pathology due to vocally abusive behaviors. Forty-six of these patients returned for periodic laryngoscopic examinations and were used as subjects (Ss) in this study.

The physicians' professional judgment determined the placement of Ss within Groups 1, 2, and 3 (non-surgical conditions) and Groups 4, 5, and 6 (surgical conditions). The placement of Ss within groups is summarized in Table 1. There were 17 Ss in the non-surgical groups and 31 Ss in the surgical groups.

Ss were not informed of their experimental participation.

Table 1

The Number of Ss Within

Non-Surgical and Surgical Groups

Group	Number of Ss
Non-surgical	
Group 1	7
Group 2	2
Group 3	8
Surgical	
Group 4	9
Group 5	0
Group 6	22

Design

The independent variable for this study involved three communication techniques: (1) verbal advice from the physician, (2) a written voice pamphlet, and (3) individualized voice therapy from a speech pathologist. One or more of these communication techniques composed each of the six groups:

Non-surgical Conditions

Group 1 - physician's advice only

Group 2 - physician's advice and voice pamphlet

Group 3 - physician's advice, voice pamphlet, and voice therapy

Surgical Conditions

Group 4 - physician's advice only

Group 5 - physician's advice and voice pamphlet

Group 6 - physician's advice, voice pamphlet, and voice therapy

The physician's advice only conditions (Groups 1 and 4) were performed in all offices. The voice pamphlet and physician's advice conditions (Groups 2 and 5) were available to those three offices that did not have the services of a speech pathologist. The vocal rehabilitation sessions (Groups 3 and 6) were performed in the two offices that had previously employed the services of the speech pathologist.

The dependent variable for the non-surgical Groups 1, 2, and 3 was the observation of the expected reduction and elimination of the vocal fold pathology.

In the surgical Groups 4, 5, and 6, the incidence of vocal fold pathology recurrence following surgery was recorded.

Procedure

All Ss were initially examined by indirect laryngoscopy to determine the diagnosis, location, size rating, and treatment(s) recommended for the vocal fold pathology. The physicians were instructed to follow their normal examination and advice sequence (see Appendices C and D).

Based on the diagnosis, the physician made a non-surgical or surgical recommendation. This was combined with one or more of the three communication techniques: (1) verbal advice, (2) the voice pamphlet "Helping Your Voice to Get Better" (Ingram, 1976), and (3) voice therapy given by the speech pathologist.

Verbal advice. All Ss received the benefit of verbal advice offered by the physician. Possible recommendations were to observe voice rest, stop smoking, or stop abusing the voice. Ss in the surgical groups also received information about the surgical

procedure.

Voice pamphlet. Ss in non-surgical Groups 2 and 3 and surgical Groups 5 and 6 were given the voice pamphlet "Helping Your Voice to Get Better" (Ingram, 1976, see Appendix A for complete derivation). The pamphlet was divided into three sections. Section one described the normal voice, including aspects of inhalation, exhalation, and phonation with an emphasis on vocal fold activity during voicing. Section two concerned the identification and description of various types of vocal abuse and their physiological effects on the vocal mechanism. The third and final section was a form of written advice to the patient regarding the elimination of the vocal abuse and various types of vocal rest.

The voice pamphlet was given in addition to the physician's advice.

Voice therapy. Verbal advice, the voice pamphlet, and voice therapy were combined for Ss in Groups 3 (non-surgical) and 6 (surgical). Ss were seen by the speech pathologist a minimum of once every 2 weeks until they had been dismissed from voice therapy.

A voice therapy sequence based on a dissonance reduction and hierarchical approach as described in chapter 1 (pp. 21-30) was used.

Dependent variable procedure. The 46 Ss were examined by indirect laryngoscopy at 2 month intervals over a period of 2 to 6 months from the date of initial diagnosis. At each re-examination, the physician recorded the diagnosis, location, size rating, and treatment(s) recommended for the current vocal fold pathology, if present.

Periodic office visits and phone calls were made by the experimenter to the physicians and their office staff throughout the collection period to answer questions and receive data.

RESULTS

The Fisher exact probability test (McNemar, 1965) was performed on the dependent variable observations from the non-surgical and surgical groups. The results indicated that the two hypotheses under investigation were not supported (see Table 2). First, Ss in non-surgical Group 3 did not demonstrate the greatest resolution of the three non-surgical groups ($p = .67$). Secondly, Ss in surgical Group 4 did not experience greater incidence of vocal fold pathology recurrence than Ss in Group 6 ($p = .29$). Observational data for the non-surgical and surgical groups are summarized in Tables A, B, and C (see Appendix E).

Table 1 (p. 42) presents the placement of Ss within the six groups. Only two Ss in the non-surgical Group 2 were given the physician's advice and the voice pamphlet. No Ss were given the physician's advice and voice pamphlet in surgical Group 5. Observations for Groups 2 and 5 are not included in the following results.

Table 2

Clinical Observations of Non-surgical and Surgical Groups with Various Communication Techniques

Groups compared		p value
	Reduction	
Non-surgical		
1 (physician's advice)	5	
3 (physician's advice, voice pamphlet, and voice therapy)	6	.67
	Recurrence	
Surgical		
4 (physician's advice)	1	
6 (physician's advice, voice pamphlet, and voice therapy)	0	.29

Physician Participation

The larger number of Ss were found in offices 1 and 2. Physicians in offices 1 and 2 identified 14 of the 15 Ss in the non-surgical groups and 29 of the 31 Ss in the surgical groups. The remaining three Ss were examined in offices 3, 4, and 5. The services of the speech pathologist were provided in offices 1 and 2.

Indirect Laryngoscopic Examination

At the initial indirect laryngoscopic examination, the age and sex of each subject was recorded along with the diagnosis, location of pathology, size rating for the pathology, and recommended treatment(s). An analysis of the demographic data collected at the initial laryngoscopy indicated there were differences between treatment groups.

Age. The mean ages for Groups 1, 3, 4, and 6 were compared. Group 1 had a mean age of 49 years; Group 3, 26 years; Group 4, 51 years; and Group 6, 46 years.

A one-way analysis of variance (ANOVA) was performed to further analyze the mean age data. The difference between the mean for Group 3 (26 years) and the mean for Groups 1, 4, and 6 (48 years) was tested. The results revealed there was a significant difference between Group 3 and Groups 1, 4, and 6 ($p < .05$).

Males versus females. The data for the male-female ratio was analyzed by performing a Fisher exact probability test to assess the differences between the non-surgical Groups 1 and 3, and the surgical Groups 4 and 6. The results indicated there were no significant differences between the non-surgical Groups 1 and 3 (p = .1) or between the surgical Groups 4 and 6 (p = .2). Significance at the .05 level was obtained for differences between the non-surgical group (1 and 3) and the surgical group (4 and 6).

The frequency of males and females within age categories was measured to determine an interaction between the variables of age and sex. A Fisher exact probability test was performed to assess the differences between males and females in all possible pairs of age categories. The incidence of males in the 0-20 age category was significant compared to the number of females in the 41-60 age category (p = .0001) and the 61+ age category (p = .04).

Diagnosis. The diagnoses were grouped into three categories: (1) cord thickening, (2) unilateral and bilateral soft nodules and polyps, and (3) unilateral and bilateral hard nodules. Figure 1 illustrates the relationship of the three categories for Ss in the non-surgical Groups 1 and 3. Ss with cord thickening

Figure 1. Percentage of diagnoses for Ss within the non-surgical Groups 1 and 3. (CT = cord thickening; U/BSN/P = unilateral/bilateral soft nodules/polyps; U/BHN = unilateral/ bilateral hard nodules).

were placed in Group 1 (43%) more often than in Group 3 (12.5%). Unilateral and bilateral soft nodules and polyps were found in both groups in approximately equal proportions. The three Ss with unilateral and bilateral hard nodules were all placed in Group 3.

The placement of Ss in surgical Groups 4 and 6 according to diagnosis is diagrammed in Figure 2. Group 4 was composed solely of Ss with unilateral and bilateral soft nodules and polyps. Unilateral and bilateral soft nodules and polyps accounted for 81.9% of Group 6. The three Ss with unilateral and bilateral hard nodules who received surgery were all assigned to Group 6.

The data was further analyzed by performing Fisher exact probability tests to assess the differences between the groups according to diagnoses. A comparison of the diagnoses within non-surgical Groups 1 and 3 revealed no significance ($p = .12$). No significant differences were found between surgical Groups 4 and 6 ($p = .34$).

Size rating. A subjective size rating was assigned to each vocal fold pathology by the physician. Mean size ratings were determined for each group. Table 3 shows the mean size rating and range for each group. Group 1 had a mean size rating of 2.6; Group 3, 2.9;

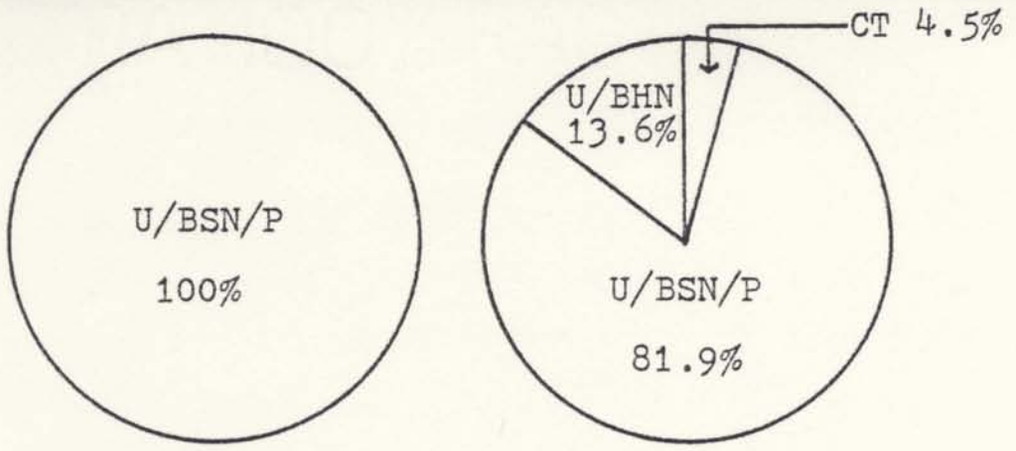


Figure 2. Percentage of diagnoses for Ss within surgical Groups 4 and 6. (CT = cord thickening; U/BSN/P = unilateral/bilateral soft nodules/polyps; U/BHN = unilateral/bilateral hard nodules).

Table 3

Mean Size Rating and Range of Vocal Fold Pathologies for Non-surgical and Surgical Groups

Group	1	3	4	6
Mean size[a]	2.6	2.9	3.9	3.4
Range	1-5	1-4	3-5	1-5
(n =)	(7)	(8)	(9)	(22)

[a] 1 = cord thickening
2 = tiny (less than 1 mm.)
3 = small (1 mm.)
4 = moderate (2 mm.)
5 = large (3 mm. or larger)

and Group 6, 3.4. There were no significant differences in mean size ratings between non-surgical Groups 1 and 3, or between surgical Groups 4 and 6.

Location of vocal fold pathology. The anatomical locations of all vocal fold pathologies are summarized in Figure 3. It was found that 78.3% of all vocal fold pathologies in this study were located at the junction of the anterior one-third, posterior two-thirds portion of the vocal folds, known as the true "middle" (Rubin & Lehrhoff, 1962).

Treatment recommended. Five treatment recommendations were available to the physician: (1) stop smoking, (2) stop vocal abuse, (3) voice rest, (4) surgery, and (5) voice therapy. A Fisher exact probability test analysis was chosen to analyze the data (see Table 4) between non-surgical Groups 1 and 3. No significant differences were found in the comparison of treatment recommendations from non-surgical Groups 1 and 3. Treatment recommendations for surgery and voice therapy were not included in the analysis because the subjects' placement within the groups depended on these two recommendations.

The Fisher exact probability test was employed to analyze the treatment recommendations data for surgical Groups 4 and 6. Table 5 presents the comparison of

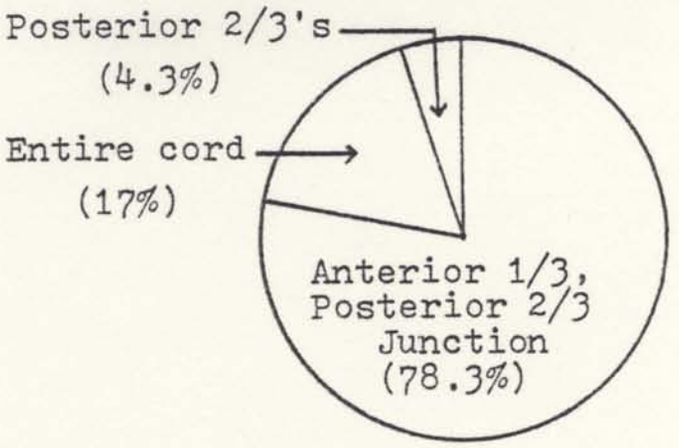


Figure 3. Percentage of vocal fold pathologies for all Ss according to anatomical location on the vocal folds.

Table 4

Fisher Exact Probability Tests of Treatment Recommendations for Non-surgical Groups

Treatment recommended	Group 1	Group 3	Value of *p*
Stop smoking	3	1	.23
Stop vocal abuse	2	1	.45
Voice rest	2	1	.45
(*n* =)	(7)	(8)	

Table 5

Fisher Exact Probability Tests of Treatment Recommendations for Surgical Groups

Treatment recommended	Group 4	Group 6	Value of p
Stop smoking	1	5	.42
Stop vocal abuse	8	15	.24
Voice rest	3	8	.61
(n =)	(9)	(22)	

the treatment recommendations between groups and their statistical difference. No significant differences were found in the comparison of treatment recommendations from surgical Groups 4 and 6. Treatment recommendations for surgery and voice therapy were not included in the analysis because the subjects' placement within the groups depended on these two recommendations.

Chronic versus acute. Duration of the problem was recorded for each subject. A recent history of vocal problems was defined as acute. Pathologies of long duration were labeled chronic (Boone, 1977). No relationship was observed between duration of the vocal problem and severity of the diagnosis. A Fisher exact probability test was performed to analyze the differences between acute and chronic histories of vocal fold pathologies in non-surgical Groups 1 and 3, and in surgical Groups 4 and 6. Results in Table 6 indicate no statistical significance for chronic versus acute pathology histories for Groups 1 and 3, or for Groups 4 and 6.

Vocal abuse. Sixteen specific vocally abusive behaviors were identified. Table 7 summarizes the incidence of these vocal abuses within groups. Smoking was identified most often as a vocally abusive behavior,

Table 6

Fisher Exact Probability Test for Non-surgical and Surgical Groups with Acute and Chronic Vocal Histories

Groups compared	Chronic	Acute	UK[a]	Value of p
Non-surgical				
Group 1	2	4	1	
Group 3	5	2	1	.21
Surgical				
Group 4	2	1	6	
Group 6	16	1	5	.28

[a]UK = unknown history not included in analysis

Table 7

Incidence of Vocally Abusive Behaviors

for Non-surgical and Surgical Groups

	Group				
Vocal abuse	1	3	4	6	Overall
Smoking	3	1	3	8	15
Yelling & screaming	0	5	0	7	12
Throat clearing	0	2	0	10	12
Coughing	1	2	0	7	10
Loud talking	1	3	0	6	10
Forcing	1	1	0	6	8
Emotional stress	1	2	0	5	8
Excessive talking	2	0	0	5	7
Crying	0	2	0	1	3
Low pitch	0	1	0	2	3
Hard glottal attack	0	0	0	2	2
Play sounds	0	1	0	1	2
High pitch	0	0	0	2	2
Using false folds	0	0	0	2	2
Gagging	0	0	0	1	1
Vocal fry	0	0	0	1	1
Abuse unknown	2	0	6	0	8

followed by throat clearing, and yelling and screaming. Coughing and loud talking tied for third place ranking.

The mean number of vocal abuses was determined for each of the groups. Ss in Group 1 had a mean of 1.6 vocal abuses; Group 3, 3 vocal abuses; Group 4, 1 vocal abuse; and Group 6, 3 vocal abuses.

Voice therapy. The mean number of voice therapy sessions was determined for non-surgical Group 3 and surgical Group 6. Group 3 had a mean of 6.4 sessions with a range from 1 to 19 sessions. Group 6 had a mean of 6.7 sessions with a range from 1 to 17 sessions.

The average length of voice therapy was 3.2 months for Group 3. The maximum length of therapy was 9 months. Group 6 had a mean of 2 months, with a maximum length of 8 months of voice therapy. For the non-surgical Group 3, all voice therapy began within 1 month of the initial diagnosis. Ten Ss in Group 6 received voice therapy 1 to 6 weeks prior to surgery. The remaining 12 Ss began voice therapy within 1 month post-surgery.

DISCUSSION

Data from this study were subjected to statistical analyses to determine the differential effectiveness of three communication techniques on the reduction and elimination of vocal fold pathology. The small number of Ss obtained for Groups 1, 3, and 4 made it difficult to analyze the data statistically. Non-parametric tests such as the Fisher exact probability test and descriptive statistics were used to describe the data. The research results revealed the following information.

Initial examination of the dependent variable observations from non-surgical Groups 1 and 3 (see Tables A and B in Appendix E) and surgical Groups 4 and 6 indicated there were no significant differences between the physician's advice and voice therapy as communication techniques. These results were confirmed statistically by the Fisher exact probability test and presented in Table 2. Ss in the non-surgical Group 3 who received all three communication techniques did not demonstrate significantly greater reduction of their vocal fold pathologies than did Ss in Group 1

(physician's advice only). One in nine Ss in the surgical Group 4 (physician's advice only) experienced a recurrence of vocal fold pathology following surgery. None of the Ss in surgical Group 6 (voice therapy) had a recurrence.

The results of the clinical observation data alone could not substantiate a rationale for voice therapy as proposed by Boone (1977), Rubin and Lehrhoff (1962), and Wilson (1972). These vocal rehabilitationists advocated voice therapy as a viable alternative to surgical intervention in which the patient changes his vocal habits and reduces and eliminates the vocal fold pathology. For those surgical patients, Ballantyne and Groves (1971) stressed that voice therapy is essential to help the patient identify, reduce, and eliminate his vocal abuse; otherwise its continuation "will almost certainly result in recurrence" (p. 552).

Further investigation of the demographic data was made to assess any possible differences between the non-surgical Groups 1 and 3 and between the surgical Groups 4 and 6. The results indicated there was a differential selection of Ss making up the non-surgical and surgical groups. Ss were placed within groups at the discretion of the physician. The physician had examined each patient and placed him in one of six

treatments according to differences in (1) the subject's age, (2) the etiology and severity of the diagnosis, (3) the size rating of the pathology, and (4) the duration of the problem. Thus, ethical considerations prevented randomization of Ss to assure group equality. see p. 70

Age and sex. Compared to Ss in the non-surgical groups, Ss in surgical Groups 4 and 6 tended to be female ($p < .005$) and 40 years or older.

The mean age for Ss in the non-surgical Group 3 was 26 years, with a range from 9 to 34 years. Ss in Group 3 were significantly younger than Groups 1, 4, and 6. Ss in Group 3 were also predominantly male (six males, two females). These findings are in agreement with Brodnitz (1963) who found that juvenile vocal fold pathology is seen more frequently in males, but that after puberty the reverse is true. Heaver (1958), Ballenger (1969), and Greene (1972) all reported that the incidence of males with vocal fold pathology is higher than the incidence of females until the age of 20 years. One possible explanation is that younger males may abuse their voices more in competitive play activities than females (Toohill, 1975).

In the older male, a deviant voice would probably be more socially acceptable than a hoarse voice in the female. A deviant voice quality in the female might

cause concern and the subsequent seeking of medical advice. Brodnitz (1963) also suggested hormonal changes as a precipitating factor in vocal fold pathologies for older females.

Diagnosis. Physicians placed the Ss in the surgical and non-surgical groups according to the severity of the vocal fold pathology. Ballenger (1969) and Wilson (1972) described vocal fold pathology as exhibiting progressive inflammatory changes. The beginning reddening and swelling is termed cord thickening. Wilson (1961), Arnold (1962), and Kleinsasser (1968) all related fibrous nodules as advanced pathology. The more severe the vocal fold pathology and the larger its mean size rating, the greater the tendency was for the physician to advise surgery (Figures 1 and 2). The medical literature advocates the surgical removal of more severe vocal fold pathologies (Ballantyne & Groves, 1971; Greene, 1972; Wilson, 1972; Wilson & Rice, 1977). The findings of this study generally support this concept.

One exception in this study involved three Ss with bilateral hard nodules. The three Ss were placed in the non-surgical voice therapy treatment. These Ss were from offices 1 and 2. The patients' age or medical reasons prompted the physicians to select a

conservative non-surgical treatment approach through voice therapy. One subject cleared the bilateral hard nodules within 4 months. Two Ss reduced their pathology significantly. Surgery was eventually required to remove what had been reduced to a tiny fibrous nodule in one subject. Rubin and Lehrhoff (1962) are in favor of voice therapy in lieu of surgery "where the necessity for surgery is questionable at the outset, this decision can be made in two to six months" (p. 157).

Statistical significance was not reached for differences in severity of diagnoses in non-surgical Groups 1 and 3, or in surgical Groups 4 and 6; however, the descriptive data (Figures 1 and 2) show that Ss with more severe vocal fold pathologies were referred for voice therapy. Six Ss were identified with unilateral or bilateral hard nodules in this study and all six Ss were referred for voice therapy. It was concluded there was a trend for the physicians to select the more intensive communication technique (voice therapy) for their patients with more severe vocal fold pathology, regardless of the surgical or non-surgical decision.

Treatment recommended. No significant differences for the selection of treatment recommendations were

found in the non-surgical groups or in the surgical groups. The physicians were apparently giving the same advice to Ss whether or not voice therapy was recommended.

Chronic versus acute. Statistical analysis did not support any differences in the incidence of chronic versus acute vocal fold pathology histories for Groups 1 and 3, or for Groups 4 and 6. The "acute versus chronic" variable may not have been sensitive enough to reveal differences between the groups. The observational data (see Table C, Appendix E) showed that there were wide variations in the duration of chronic vocal histories. For example, chronic vocal histories for surgical Group 4 ranged from 1 to 2 years, while the range for Group 6 was 1 to 20 years, with a mean of 7 years.

Comparison of Ss with and without chronic histories and the reduction of their vocal fold pathologies over time indicated there were differences in Groups 1 and 3 (see Table C in Appendix E). In Group 1 (physician's advice only), there were two Ss with chronic histories. One subject took 11 months to clear the diagnosis of cord thickening. The other subject developed a polyp which required surgery and voice therapy 8 months later. In comparison, all five Ss with chronic histories in

Group 3 (voice therapy) were reduced or cleared of their vocal fold pathologies in 2 to 6 months. The implication is that the physician's verbal advice alone was not as effective in the reduction and elimination of vocal fold pathologies with chronic histories as the physician's advice and voice therapy combined.

Surgical Group 4 (physician's advice only) had one recurrence of vocal fold pathology 4 months after surgery; however it was not determined whether the history of the pathology was acute or chronic. Sixteen Ss in Group 6 (voice therapy) were diagnosed with chronic histories. Four of these Ss had experienced a recurrence of previous vocal fold pathology. The length of vocal problems ranged from 1 to 20 years for these Ss, with a mean of 7 years.

A debriefing interview followed the study, and the physicians indicated they had specifically referred Ss for voice therapy based on severity of the vocal fold pathology and duration of the vocal problem. This is important information for the vocal rehabilitationist. The typical vocal fold pathology patient who receives the physician's advice only (Groups 1 and 4) would have cord thickening or soft nodules or polyps and a recent history of vocal problems (less than 1 year). The vocal fold pathology patient referred to voice

therapy (Groups 3 and 6) would tend to have bilateral soft nodules or polyps (and on occasion, hard nodules) and a chronic history of vocal problems averaging 7 years. The patient referred for voice therapy would be more likely to have a history of previous vocal fold pathology. He would also tend to use his voice professionally (e.g., teacher, singer) (Arnold, 1962; Ballantyne & Groves, 1971; Greene, 1972).

Although Ss in non-surgical Groups 1 and 3 experienced approximately equal rates of reduction and elimination of their vocal fold pathologies, the Ss in Group 3 (voice therapy) started with more severe vocal fold pathologies and chronic histories of vocal abuse. The implications are that voice therapy is a viable, effective alternative for those Ss with severe vocal fold pathologies and chronic histories of vocal abuse.

Voice therapy. The mean number of sessions for non-surgical Group 3 was 6.4, with a range from 1 to 19 sessions. The mean length of therapy was 3 months, with a maximum length of 9 months. A comparison was made to the results of the seven vocal rehabilitation studies reviewed in chapter 1 (Andrews, 1973; Baynes, 1967; Deal et al., 1976; Drudge & Philips, 1976; Holbrook et al., 1974; Shearer, 1972; Toohill, 1975). The number of sessions for the seven studies ranged

from 3 to 77 sessions, with an approximate mean of 15 sessions. The length of voice therapy in the seven studies ranged from 5 weeks to 7 months, with a mean of 3 months.

Those Ss who had voice therapy prior to surgery (10 Ss) were no different than those Ss who had voice therapy following surgery. The purpose of beginning voice therapy prior to surgery was not an attempt to reduce and eliminate the vocal fold pathology. It was an attempt to identify, reduce, and eliminate the vocal abuse prior to surgery so the subject would not continue the vocal abuse and possible risk a recurrence. In this study, there were no recurrences of vocal fold pathology in any of the 22 Ss who received voice therapy. Thus, comparison of the benefits of receiving voice therapy prior to or following surgery cannot be made. In this study, Ss apparently benefited from both modes of treatment; one was not shown to be more beneficial than the other.

Internal and External Validity Considerations

Several validity problems that are inherent in any field research were encountered in this study. As previously discussed, there was a differential selection of Ss for placement in each of Groups 1, 3, 4, and 6.

This same selection bias allowed the physicians to choose not to distribute the voice pamphlet. Ss within offices 1 and 2 who received the voice pamphlet also received voice therapy. In offices 3, 4, and 5, there were were only two Ss in non-surgical Group 2 and no Ss in surgical Group 5. One physician reported he did not advocate some of the written advice concerning complete voice rest and did not give out the voice pamphlet. No explanation was given by the other three physicians.

Subject mortality was a problem in all groups. The greatest percentage of subject drop-out occurred in Group 1 (physician's advice only). Nine persons out of 16 did not return for further rechecks in Group 1. This was perhaps an indication of a lack of communication to the patient that he needed to return and have his vocal folds checked. An analysis of the demographic data for these patients did not show them to be different in age, sex, or diagnoses from the non-surgical Ss who did return for examination. A possible explanation is (1) their diagnoses were related to beginning pathologies and the physician's advice "sufficed" and they had no more problems; (2) their diagnoses were less advanced than those in the surgical groups and were perhaps caused by an isolated incident

(e.g., yelling at a football game or coughing during a cold) and the vocal fold pathology dissipated on its own; or (3) the patients were not satisfied with the advice of the physician and went elsewhere for treatment.

Brodnitz (1963) touched on the problem of follow-up visits for patients with vocal fold pathologies:

> One of the problems of phoniatric practice is the follow-up of successfully treated patients. It is very difficult to persuade voice patients to return for regular check-ups after termination of the period of intensive voice training. This makes it hard to judge the permanent success of vocal rehabilitation. Patients who are listed as having successful treatments may develop recurrences of a nodule, a polyp, a contact ulcer, and turn to another laryngologist or phoniatrist (p. 154).

The fact that all 31 Ss in the surgical group returned for periodic rechecks following surgery indicates the concern on their part to take care of their vocal folds. They were apparently convinced of the seriousness of their vocal fold pathology and the need to have the folds checked for healing.

There was no control for intrasession history. Offices 1 and 2 contributed 43 Ss to the study and offices 3, 4, and 5 examined only three Ss. Since the speech pathologist was already involved in offices 1 and 2, the level of cooperation was expectedly higher. The physicians in offices 1 and 2 were more familiar

with the voice therapy procedures and this may have biased their advice to the patients. Physicians treated each patient individually, and may have taken more time to explain the pathology or suspected vocal abuse to one patient than to another. Differences in the physicians' personalities and the numerous, separate presentations of the examinations probably had an effect on the patients' perceptions of their vocal problems.

Implications for Future Research

Further research is needed in several areas. First, this study should be replicated to achieve randomization of Ss within the surgical and non-surgical groups. The selection of Ss for the study should be based on certain criteria. For example, one set of criteria could be: All Ss must have severe vocal fold pathologies with chronic histories, be 21 years or older and female, and have surgical intervention.

Secondly, the voice pamphlet should be revised to encompass the consensus of the physicians' opinions concerning vocal abuse and voice rest. A study to test the validity of the voice pamphlet should then be done with numerous vocal fold pathology patients in both surgical and non-surgical conditions.

The relative success in vocal fold pathology reduction for the three Ss with bilateral hard nodules in non-surgical Group 3 gives implications for another study. A group of Ss with unilateral and bilateral hard nodules should receive voice therapy prior to possible surgical intervention. Using Rubin and Lehrhoff's (1962) surgical decision criteria, a 6 months' trial of voice therapy should then be performed. At the end of 6 months, the incidence of reduction and elimination of the vocal fold pathology should be measured. (A control group with similar pathology would not receive voice therapy and be re-examined at the end of the 6 month period.)

Finally, this study needs to be replicated with several speech pathologists instituting the same voice therapy to generalize the communication technique across therapists. At the same time, a large number of physicians should be asked to participate in the study to generalize the advice communication across physicians.

Conclusions

There are acknowledged procedural problems within this study that prevent clear cut answers to the question: Is voice therapy a more effective communi-

cation technique than the physician's verbal advice or the written voice pamphlet? Despite the preliminary nature of these clinical results, it appears that voice therapy can be a viable treatment alternative for patients who have severe vocal fold pathologies of a chronic nature. It is important for those professionals interested in vocal rehabilitation to realize that a patient with a chronic history of vocal abuse has built up habit strength over time. First, the vocal abuse must be identified. Then an intensive kind of communication must deal with the dissonance aroused and help shape the challenged beliefs and attitudes into successful reduction and elimination of the vocal abuse.

These preliminary findings have important implications for physicians who favor prompt surgical removal of fibrous vocal nodules. A trial period of voice therapy for patients with severe vocal fold pathology is reasonable, if not obligatory, to identify, reduce, and eliminate the vocal abuse and prevent recurrence.

Finally, it is important that these findings not be interpreted to suggest that the reduction and elimination of vocal fold pathology is the sole criteria for successful vocal rehabilitation. Other considerations such as vocal quality and the patient's feeling

of improvement are also viable considerations (Boone, 1974).

SUMMARY

Vocal rehabilitation can be no more successful than the quality of the communication that takes place between the rehabilitation professional and the vocal fold pathology patient (Barnlund, 1968). In this study, the effects of three specific communication techniques were compared: (1) the physician's verbal advice; (2) the physician's verbal advice and the written voice pamphlet; and (3) the physician's verbal advice, the voice pamphlet, and voice therapy.

Forty-six Ss with vocal fold pathologies due to vocal abuse were identified, of which 31 Ss received surgery. The physicians determined the communication technique(s) for each subject based on differences in (1) the subject's age, (2) the etiology and severity of the diagnosis, (3) the size rating of the pathology, and (4) the duration of the problem.

Results indicated the two hypotheses under investigation were not supported. Statistical analysis did not support the hypothesis that (1) non-surgical Ss who received all three communication techniques would experience the greatest resolution of vocal fold

pathology over those Ss who only received the physician's advice and/or the voice pamphlet. It was not shown that (2) surgical Ss who received all three communication techniques would have less incidence of vocal fold pathology recurrence than those Ss who received only the physician's advice and/or the voice pamphlet.

A subject selection bias was in operation and may be a possible explanation for the non-significant findings. There was a trend for physicians to refer Ss with severe vocal fold pathologies and chronic vocal histories to voice therapy. Ss in both non-surgical groups experienced equal reduction and elimination of their vocal fold pathologies; however, Ss in Group 3 (voice therapy) had more severe vocal fold pathologies and longer duration of vocal abuse than Ss in Group 1 (physician's advice only). The implications of this study are that voice therapy is a viable treatment alternative for the patient with severe vocal fold pathology and a chronic history of vocal abuse.

APPENDIX A

HELPING YOUR VOICE TO GET BETTER

by

David B. Ingram, Ph.D.

Speech Pathologist

INTRODUCTION

Your doctor has diagnosed you as having a voice problem. There are many causes of voice problems, but several changes in your talking habits may improve your voice. Perhaps your physician will decide that a voice therapist may help you, or you require surgery, or voice rest, or that you have a voicing habit that needs to be changed. You may need 'some' or 'all' of the above.

What's important FIRST is that you need some information about your voice because YOU will be helping to make it better. We would like to put you to work right away as a member of your own rehabilitation team.

There are several things that you can do to help your voice. If you will do them, you can save yourself both time and money. In fact, it would be difficult to improve your voice without your help.

Your voice belongs to you, and you will be in charge of most of the changes; however, you will need some information or training first. That's what this pamphlet is all about.

There are three parts to the pamphlet.

(1) How normal voices are made,

(2) How people hurt or 'abuse' their voices,

(3) Getting your voice back to normal.

HOW NORMAL VOICES ARE MADE

At least part of your voice problem is caused by vocal abuse. This means that you have been 'misusing' your voice. The first step in learning to use your voice without hurting it is to learn how normal voicing is done.

Before you make a voice, you must take air in, then as it comes out, it will pass over the vocal cords or folds and vibrate them. Now you are making a voice. This basic sound may be changed into different vowels in your mouth and nasal cavities. Now let's look more carefully at these steps.

Taking Air In - "Inhalation"

When you make sounds for talking like "aah" or "ooo", you begin by taking air in:

(1) Through your nose

(2) and mouth

(3) then the air goes down through the top part of your air tube (voice box)

(4) down through the lower part of the air tube (trachea)

(5) and finally to your lungs.

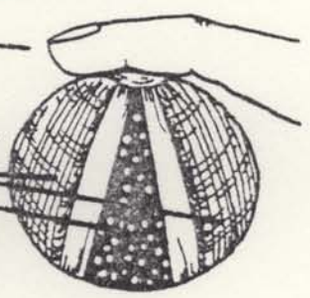
Getting The Air Out - "Exhalation"

If you look at the drawing on the previous page, you will see that the air in the lungs may go back up and out through the same tubes and areas it came in through. As the air leaves the lungs it is under pressure and flows up the air tube (4) through the larynx, (3) and out through your mouth, (2) or nose, (1) (see picture).

Making A Voice - "Phonation"

The air goes in - the air goes out. That's breathing or respiration. Your VOICE happens when the air comes up through the larynx and vibrates the vocal folds.

Now here's the important part. Put your finger on the small bump at the top of your larynx (sometimes called the adam's apple). Your finger is near the top of the air tube and the vocal folds.



If we could look down the throat to see the top of the tube behind your finger, we would see two small pieces of skin stretched across the tube. Air may pass through the opening. Remember, we're looking down the air tube.

The vocal folds move back and forth - they open and close. When they move together, the air tube is closed.

When the folds move apart, they open wide and lots of air may go in or out.

The folds open and close rapidly many times while you say "aaaaaaaaaaah".

-4-

Making Pitch Changes - The vocal folds may stretch out from front to back so they become long and thin. (Which makes the pitch of your voice rise.

When muscles in the vocal folds relax, the folds get loose and thicker, and when they vibrate this makes the pitch lower.

There is a BEST pitch range for everyone. It is determined mostly by the size of your vocal folds.

Your vocal folds make many complicated changes as you talk; (a) the pitch goes up and down and the vocal folds 'stretch out' or 'relax', (b) the folds vibrate and, (c) the folds open and close.

HOW PEOPLE HURT OR 'ABUSE' THEIR VOICES

It is hoped you have enough ideas now so you may begin to understand what may have caused your voice problem. Any time there is too much or too little tension in the muscles in the breathing or phonation areas we have talked about, there may be vocal abuse. The vocal folds and the muscles which control them may also tighten and the vocal folds may become reddened, swollen or develop callous-like bumps.

When the vocal folds come together and close, they actually touch all along the middle edges. If you are making a voice normally, the vocal folds come together gently. If you are 'hurting' the vocal folds, you are probably making your voice so the vocal folds go together too hard. And this is what vocal abuse is all about; voicing habits that hurt the vocal folds.

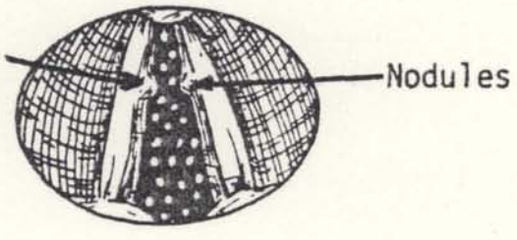
Consider this example. Imagine you did not rake leaves very often. Suddenly you found that you had to rake leaves for an entire day. At the end of the day you would probably have sore hands with redness, swelling and blisters. This would happen because the skin was abused; it was rubbed and scraped. If you kept on raking for a few days, hard callouses would develop as protection against the rubbing.

The skin on your vocal folds is the same as the skin on your hands. If vocal fold skin is rubbed, bumped or abused, it will redden, thicken and "blisters" will form. The "blister" will be soft at first and then get hard if the abuse of the vocal folds continues. So your job is to find out how you have been hurting your voice and then eliminate the abuse. Then the problem won't happen again. Here are some examples of some types of problems and their causes.

(1) Thickening and Reddening of the Vocal Folds and Vocal Nodules

If you (a) yell, (b) talk often in a loud voice, (c) cough or clear your throat often and hard, (d) use 'unusual' or tense voices during play or anger, or (e) use a pitch that is too high or too low, you are hurting your vocal folds. Also, if you are a very tense, nervous person under pressure, the tension may focus in the neck, shoulder or laryngeal area. In most of these situations the vocal folds slam together during voicing.

These problems begin with one of the above vocal abuses and result in thickening and redness. If the vocal abuse continues, the thickening near the middle of the fold may develop into a blister or nodule. In severe conditions a nodule may be present on both folds.



(2) Contact Ulcers

Contact ulcers are similar to vocal nodules in that they are both "between the vocal folds". Contact ulcers, however, are small growths at the back of the vocal folds. There may be only one or one on each vocal fold.

The causes are also different; (a) this problem is connected with loud or hard voicing when the voicing starts, (b) frequent lifting or straining during voicing, (c) 'authoritative voicing'. Occasionally, medical problems cause contact ulcers.

(3) Laryngitis

Laryngitis may result from infection from a cold or flu, vocal abuse such as yelling at a football game, or both. The vocal folds become thickened and red. As the laryngitis gets worse, it becomes harder and harder to voice. If you insist on 'speaking over' the laryngitis and not resting your voice, it will get worse. You should also consider coughing and throat clearing as vocal abuse.

If appropriate, your physician or speech pathologist will discuss other pathologies with you. However, at this point it is important for you to understand that many types of vocally abusive behavior can cause vocal fold problems. If you are really going to solve the problem, you will want to eliminate these causes. Your physician and speech pathologist will help.

GETTING YOUR VOICE BACK TO NORMAL

What will you need to do to get the vocal folds back to normal?

(1) If you have not seriously damaged your vocal folds, your physician or speech pathologist may help you eliminate the vocal abuse. Treatment usually consists of finding out what vocally abusive behavior you may be using, and then helping you to replace this behavior with normal voicing.

(2) If the condition is slightly more serious, you may be advised to have a week or two of complete voice rest. This means NO voicing at all, limit any coughing, throat clearing, and no whispering. If your doctor recommends complete voice rest, plan ahead for that week so you are not in situations which 'demand' speech. You may have to change your lifestyle somewhat for a week, so prepare yourself.

Complete voice rest is inconvenient, but it is prescribed for a good reason.

You will recall that during voicing, your vocal folds come together and touch many, many times. The skin on the area that touches is injured and needs to heal. If you had a cut on the palm of your hand, you would probably not 'rake' for a week, but instead would let the skin heal. Your vocal folds are the same. They need rest and no rubbing so they can heal.

Good voice rest for two days followed by five minutes of voicing won't work. You are making an investment in something very important--your voice. Go 'first class'.

(3) In more serious cases the physician may choose surgery followed by voice rest. The surgery consists of gently scraping the added tissue or thickening from the fold or removing the nodule or growth from the vocal fold.

Many surgeons prefer to have their patients follow surgery with a week or two of complete voice rest. If your doctor tells you to follow this procedure, he wants to make sure the folds heal properly; so follow the previous directions for complete voice rest.

(4) Occasionally, a week of 'modified voice rest' is suggested. This plan allows for a minimum of talking and reduced or eliminated coughing or throat clearing. Talk only when absolutely necessary and only for short periods such as 30 - 60 seconds.

This technique is used when the condition of the vocal folds is fairly good at the beginning of treatment, or the folds may have improved as a result of complete voice rest.

Your doctor will choose the right treatment sequence for you. You may need only modified voice rest for a week or combinations of the other treatment techniques.

APPENDIX B

SUMMARY OF RECENT STUDIES IN VOCAL FOLD PATHOLOGIES AND VOCAL REHABILITATION

Authors/ Researchers	Location of Study	Duration of Study	Number of Ss	Age Range	Vocal Pathologies
Baynes (1967)	Not known	3 mos.	14	Pre-adol.	Vocal nodules Cord thickening
Shearer (1972)	University clinic & public school	24 mos.	80	Pre-adol.	Vocal nodules - 57%
Andrews (1973)	Indiana University Speech and Hearing Center	7.5 mos.	4	4.10-5.11 years	Vocal nodules: 1 Hoarseness: 3
Holbrook, Rolnick, & Bailey (1974)	William Beaumont Hospital	3 mos.	32	Child and adult	Vocal nodules, polyps and contact ulcers
Toohill (1975)	School, clinic, & home environments	3 mos.	77	Pre-adol.	Bilateral vocal nodules - 76/77
Deal, McClain, & Sudderth (1976)	Public school	6 mos.	77	5.6-13.7 years	Normal: 25 Ss Edema: 7 Ss Allergy: 7 Ss Vocal nodules: 34 Ss
Drudge & Phillips (1976)	Kent State University Clinic	2 mos.	3	Adult	Vocal nodules

Authors/ Researchers	Indirect Laryngo-scopy	Rating System	Recheck Interval	Surgical Intervention	Length of Voice Therapy	Number of Sessions
Baynes (1967)	Yes	Not given	3 mos.	No	8 weeks	8 (2 hrs. per week)
Shearer (1972)	Yes for 93%	Not given	Approx. 3 mos.	Not given	Not given	Not given
Andrews (1973)	Yes	Not given	End of 7.5 mos.	No	2 semesters (30 weeks)	Approx. 90
Holbrook, Rolnick, & Bailey (1974)	Yes	Not given	3 mos.	Yes (3 Ss)	2 to 12 wks. $\bar{x}$ = 5.3 wks.	3 to 14 (range)
Toohill (1975)	Yes	Class I, II, III[a]	End of 3 mos.	Yes (2 Ss)	3 mos.	Not given
Deal, McClain, & Sudderth (1976)	Yes	1-clear 2-tiny 3-small 4-moder. 5-large	2 mos.	No	2 to 6 mos. (2 to 3x per week)	17 to 77
Drudge & Philips (1976)	Yes	Not given	End of 2 mos.	No	8 weeks	16 ($\frac{1}{2}$ hr.)

[a]Class I = cured; Class II = improved; Class III = unimproved.

Authors/ Researchers	Goals of Therapy	Results of Study
Baynes (1967)	1) control of vocal abuse 2) develop less aggressive vocal pattern 3) group therapy	7 Ss = normal vocal folds 4 Ss = decrease in thickening 3 Ss = did not continue program As voice quality improved--pathology diminished.
Shearer (1972)	1) reduction of vocal tension 2) new pitch levels 3) reduce hard glottal attack 4) vocal abuse awareness	Not given
Andrews (1973)	1) vocal awareness 2) discrimination training 3) volume control 4) vocal abuse awareness	1 S = reduction of pathology 4 Ss = hoarseness eliminated
Holbrook, Rolnick, & Bailey (1974)	1) test feedback device "vocal intensity controller"	11 Ss = complete reduction 8 Ss = some reduction 3 Ss = no improvement 5 Ss = discontinued treatment 5 Ss = no lesions (hyperfunction)
Toohill (1975)	1) to determine differential effectiveness among school vs clinic vs parental vs no speech therapy	58.5% = cured or improved (I or II) 33.0% = unimproved (III) 9.0% = unavailable for follow-up
Drudge & Phillips (1976)	1) elimination of vocal abuse 2) easy & clear phonation	2 Ss = Normal vocal folds 1 Ss = Decrease in pathology

Date_____

Dear Dr. _____,

Enclosed is a supply of the Information Sheets necessary to record the vocal fold pathology and treatment(s) for each patient.

(1) If your nurse or receptionist will fill in the date, patient's name (or number), age, and sex and then attach the sheet to the front of the patient's chart, this will present the sheet to you for easy fill-in.

(2) After the patient has been dismissed for the visit, the Information Sheets may be kept in one place for my collection at a later date.

(3) Each time the patient returns for a visit, a new Information Sheet should be used.

(4) In the interest of professional ethics, all patient information will be regarded as privileged, and will be kept strictly confidential.

Your cooperation in helping with this research is greatly appreciated. The results of this experimental study will be made available in the near future.

Sincerely,

Minnie Graham

(Mrs.) Minnie Graham

If you have any questions or need to contact me:
my home phone number is 862-8784,
or Dr. Ingram's office phone number is 275-2681.

APPENDIX D

VOICE DISORDER EVALUATION SHEET

Patient Name (or Number)____

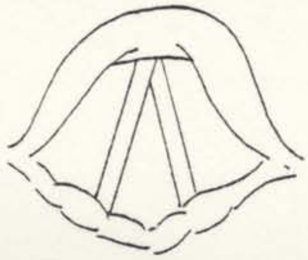
- -

Age_____ Sex_____ DATE_____________

1) DIAGNOSIS:

____	Cord thickening
____	Unilateral soft nodule/polyp
____	Bilateral soft nodules/polyps
____	Unilateral hard nodule
____	Bilateral hard nodules
____	Normal vocal folds
____	Other (specify:_______________)

DIAGRAM OF VOCAL FOLD PATHOLOGY

R  L

2) SIZE RATING FOR VOCAL NODULES/POLYPS

____	Tiny (less than 1 mm.)
____	Small (approx. 1 mm.)
____	Moderate (approx. 2 mm.)
____	Large (3 mm. or larger)

____

____

____

____

3) TREATMENT RECOMMENDED:

____	Stop vocal abuse
____	Voice rest
____	Stop smoking
____	Voice therapy
____	Surgery
____	Other (specify:______________________________)

____	Voice pamphlet

APPENDIX E

Table A

Clinical Observation of the Condition of the Vocal Folds for Non-surgical Groups at the Final Indirect Laryngoscopy

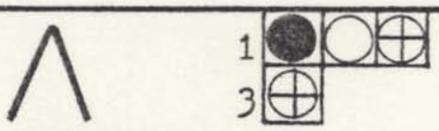
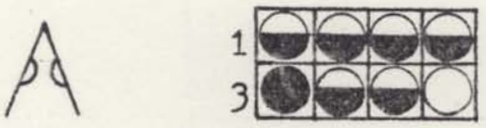
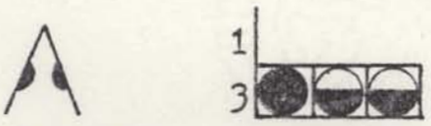
Condition of vocal folds	Group 1	Time Passed[a]	Group 3	Time Passed[a]
Cleared	1	11 mos.	2	4 mos.
Reduced	4	2-4 mos.	4	2-4 mos.
Unchanged	1	2 mos.	1	2 mos.
Increased	1	8 mos.	1	6 mos.
(n =)	(7)		(8)	

[a]Time passed indicates the period between the initial indirect laryngoscopy and the last recheck.

APPENDIX E

Table B

Observational Data for the Condition of the Vocal Folds Following Treatment for Non-surgical Groups 1 & 3

Vocal fold pathology	Condition of vocal folds following treatment
Cord thickening	
Soft Nodules/Polyps	
Hard Nodules	

 = cleared

 = reduced

 = unchanged

 = increased

Table C

Observational Data for 46 Ss in Non-surgical and Surgical Groups

Patient number	Initial diagnosis[a]	Etiology	Duration of problem	Treatment recommended	Results
Non-surgical Group 1 (Physician's advice only)					
NS-1	CT	1) smoking 2) unknown vocal abuse	4 years	1) stop smoking 2) stop v. abuse	Surgery & voice therapy 8 mos. later
NS-2	CT	1) smoking	Chronic	1) stop smoking	Clear: 11 mos.
NS-3	BSN	1) unknown vocal abuse	unknown	1) voice rest 2) stop v. abuse	Reduced to CT in 4 mos.
NS-4	USN	1) excessive talking 2) loud talking 3) forcing 4) emot. stress	4 mos.	1) voice therapy	1) Reduced to CT: 4 mos. 2) No surgery 3) Voice ther. after 4 mos.
NS-5	USP	1) smoking	Several mos.	1) stop smoking	Reduced to CT: 2 mos.

Table C (continued)

Patient number	Initial diagnosis[a]	Etiology	Duration of problem	Treatment Recommended	Results
NS-6	CT	1) excessive talking (teacher)	2 mos.	1) voice therapy	1) Unchanged: 2 mos. 2) No v. ther.
NS-7	USP	1) cold/coughing	Acute	1) stop coughing 2) voice rest	1) Reduced: 2 mos.
Non-surgical Group 3 (advice, voice pamphlet, voice therapy)					
NS-8	BHN	1) loud talking 2) forcing	unknown	1) voice therapy 2) surgery	Clear: 4 mos. w/o surgery
NS-9	CT	1) screaming/yelling 2) throat clearing 3) coughing	1 yr.+	1) stop vocal ab. 2) voice therapy	CT to UHN: 6 mos.; surgery done
NS-10	BSN	1) screaming/yelling 2) chronic laryng.	5 yrs.	1) voice therapy	Clear: 4 mos.
NS-11	BSN	1) low pitch 2) throat clearing 3) chronic laryng. (professional singer)	2 mos.	1) voice rest 2) voice therapy	Reduced to CT: 2 mos.

Table C (continued)

Patient number	Initial diagnosis[a]	Etiology	Duration of problem	Treatment recommended	Results
NS-12	BHN	1) coughing 2) smoking 3) loud talking (professional singer)	4 years (recurrence: had nodule 4 years ago)	1) stop v. abuse 2) stop smoking 3) voice therapy	Reduced to CT: 2 mos.
NS-13	USN	1) screaming/yell 2) crying 3) emot. stress	Chronic: recurrence had polyps 10 yrs. ago	1) stop v. abuse 2) voice therapy 3) surgery	Reduced to CT: 4 mos. - Surgery not required.
NS-14	BHN	1) yelling 2) loud talking 3) play sounds	1 year+	1) stop v. abuse 2) voice therapy 3) surgery after voice therapy	Reduced: 2 mos Surgery done to remove last traces of fibrous nodule
NS-15	BSN	1) screaming 2) crying 3) emot. stress	1½ mos.	1) stop v. abuse 2) voice therapy 3) poss. surgery	Unchanged: 2 mos.; did not return.

Table C (continued)

Surgical Group 4 (physician's advice only)

Patient number	Initial diagnosis[a]	Etiology	Duration of problem	Treatment recommended	Recurrence; Results
S-16	USP	1) unknown	unknown	1) voice rest 2) surgery	Clear: 1 mo.
S-17	USP	1) unknown	unknown	1) voice rest 2) surgery	Clear: 3 yrs.
S-18	BSP	1) smoking	unknown	1) voice rest 2) stop smoking 3) surgery	Clear: 4 yrs.
S-19	BSN	1) unknown	unknown	1) voice rest 2) surgery 3) v. therapy	Clear: 2 mos. Did not have voice therapy
S-20	USP	1) unknown	2 years	1) voice rest 2) surgery	Clear: 4 years
S-21	USP	1) smoking	Chronic	1) stop smoking 2) surgery 3) steroids	Clear: $3\frac{1}{2}$ yrs.

Table C (continued)

Patient number	Initial diagnosis[a]	Etiology	Duration of problem	Treatment recommended	Recurrence; Results
S-22	USP	1) smoking	2 mos.	1) stop smoking 2) voice rest 3) surgery	Clear: 6 mos.
S-23	BSP	1) unknown	unknown	1) stop v. abuse 2) voice rest 3) surgery 4) v. therapy	Recurrence: 4 mos.; did not have voice therapy
S-24	BSN	1) unknown	unknown	1) voice rest 2) surgery	Clear: 1 mo.
	Surgical Group 6 (advice, voice pamphlet, voice therapy)				
S-25	USP	1) chronic laryng. 2) throat clearing 3) coughing	4 yrs.	1) voice therapy 2) surgery	Clear: 1 mo.
S-26	BSP	1) yelling/scream 2) throat clearing 3) loud talking 4) smoking	20 yrs. (Recurrence; polyps-10 yrs. ago)	1) voice rest 2) stop smoking 3) voice therapy 4) surgery	Clear: 1 yr.

Table C (continued)

Patient number	Initial diagnosis[a]	Etiology	Duration of problem	Treatment recommended	Recurrence; Results
S-27	USN	1) loud talking 2) yelling 3) coughing 4) smoking 5) emot. stress 6) false folds	Chronic	1) voice therapy 2) stop smoking 3) surgery	Clear: 2 mos.
S-28	UHN	1) coughing 2) throat clearing 3) smoking	Chronic	1) voice therapy 2) surgery 3) stop smoking	Clear: 5 mos.
S-29	USP	1) yell/screaming	2 years; recurrence had nodules 2 yrs. ago	1) voice therapy 2) voice rest 3) surgery	Clear: 5 mos.
S-30	BSP	1) forcing 2) crying 3) emot. stress	unknown	1) voice therapy 2) voice rest 3) surgery	Clear: 3 mos.
S-31	BSN	1) throat clearing 2) loud talking 3) excessive talk. 4) forcing	unknown	1) voice therapy 2) voice rest 3) surgery	Clear: 1 mo.

Table C (continued)

Patient number	Initial diagnosis[a]	Etiology	Duration of problem	Treatment recommended	Recurrence; results
S-32	UHN	1) coughing 2) low pitch 3) throat clearing	unknown	1) voice therapy 2) voice rest 3) surgery	Clear: 3 mos.
S-33	BSN	1) yelling 2) coughing 3) loud talking 4) excess talking	7 years	1) voice therapy 2) voice rest 3) surgery	Clear: 4 mos.
S-34	BSN	1) yell/scream 2) gagging	Several yrs.	1) stop v. abuse 2) voice therapy 3) voice rest 4) surgery	Clear: 1 week
S-35	USP	1) coughing 2) forcing	8 years	1) stop v. abuse 2) voice therapy 3) voice rest 4) surgery	Clear: 3 mos.
S-36	BSP	1) throat clear. 2) excess talk 3) hard glottal attacks	2 mos.	1) voice rest 2) surgery 3) voice therapy	Clear: 1 mo.

Table C (continued)

Patient number	Initial diagnosis[a]	Etiology	Duration of problem	Treatment recommended	Recurrence; results
S-37	UHN	1) loud talking 2) throat clear. 3) smoking	20 years	1) stop smoking 2) voice therapy 3) surgery	Clear: 1 mo.
S-38	BHN	1) throat clear. 2) forcing	Chronic	1) voice therapy 2) surgery	Clear: 4 mos.
S-39	BSN	1) emot. stress	unknown	1) stop v. abuse 2) voice rest 3) voice therapy 4) surgery	Clear: 2 mos.
S-40	CT	1) chronic laryng. 2) excess talk. 3) forcing 4) emot. stress 5) smoking	7 years	1) stop smoking 2) voice therapy 3) surgery 4) cough syrup	Clear: 1 mo.
S-41	USN	1) excess talk. 2) forcing 3) low pitch	5 mos.	1) stop v. abuse 2) voice therapy 3) surgery	Clear: 1 mo.

Table C (continued)

Patient number	Initial diagnosis[a]	Etiology	Duration of problem	Treatment recommended	Recurrence; Results
S-42	BSN	1) yelling 2) high pitch 3) hard glottal attacks 4) false folds	1½ years	1) voice rest 2) voice therapy 3) surgery	Clear: 7 mos.
S-43	USP	1) coughing 2) throat clear. 3) smoking 4) glottal fry	3 years (recurrence; had polyps 3 yrs. ago)	1) voice rest 2) stop smoking 3) voice therapy 4) surgery	Clear: 1 wk.
S-44	BSN	1) yelling 2) loud talking 3) play sounds	2 years	1) stop v. abuse 2) voice therapy 3) voice rest 4) surgery	Clear: 1 wk.
S-45	BSP	1) throat clear. 2) high pitch 3) smoking	unknown	1) voice rest 2) stop smoking 3) voice therapy 4) surgery	Clear: 5 mos.
S-46	BSP	1) smoking 2) emot. stress	Chronic (recurrence of polyps)	1) voice rest 2) stop smoking 3) voice therapy 4) surgery	Clear: 1 mo.

Table C (continued)

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[a]CT = cord thickening; U/BSN = unilateral or bilateral soft nodules; U/BSP = unilateral or bilateral soft polyps; U/BHN = unilateral or bilateral hard nodules.

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