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An exploration of etiological correlates of vocal disorders in women

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AN EXPLORATION OF ETIOLOGICAL CORRELATES OF VOCAL DISORDERS IN WOMEN

By

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ABSTRACT

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The study was designed to determine if features identified in the literature as being potentially etiological for vocal disorders, were actually present in women with vocal difficulties in Montana. Thirty women between the ages of eighteen and fifty-five with vocal difficulty and thirty women of similar ages in a control population completed questionnaires designed to collect data on sixty-five features.

Eleven of the sixty-five features significantly correlated to women with vocal difficulty. These features should be investigated when taking a case history and/or planning symptomatic voice therapy. Data from seventeen women with polyps or nodules and twelve women with acute hoarseness indicated that the two disorder types may interrelate in stages of development along a continuum. In addition, sixteen areas warranting further study were identified.

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CHAPTER I

INTRODUCTION AND REVIEW OF LITERATURE

Introduction

The patient with a vocal complaint often presents the otolaryngologist and/or speech clinician with a history that may indicate a variety of probable etiological features. Occasionally a single etiological feature (paralysis of a vocal fold secondary to a thyriodectomy, direct injury to the laryngeal area through blows or wounds, burning or scalding, intubation, or inhalation and lodgement of foreign bodies) can be isolated (Cooper, 1973; DeWeese and Saunders, 1968; Ranger, 1965; Simpson et al., 1967; Moore, 1957; Jackson and Jackson, 1942; Ellis, 1965a; Moncur and Brackett, 1974; Boone, 1971; Brodnitz, 1971). Historically, these have been recognized as organic vocal disorders arising from a specific traumatic event (Brodnitz, 1971; Moore, 1957; Ranger, 1965). Other organic vocal disorders are reported to be caused by inappropriate use of the vocal mechanism (Boone, 1971; Brodnitz, 1971). These have traditionally been classified as hypo and hyperfunctional uses of the vocal mechanism resulting in organic disorders (nodules, polyps, polypoid thickening, etc.). Frequently the origins of these disorders

are questionable or unknown (Brodnitz, 1971). The diverse reports appearing in the literature appear to indicate a careful exploration of the etiologies of these vocal disorders is warranted. The need for an initial exploration of these etiologies has prompted the incentive and design of this study.

Exploration of etiologies was not limited to any particular types of vocal disorder or categorical grouping (organic/functional) or vocal disorders. The organic/functional dichotomy and definition of each term has been a subject of controversy in the literature (Boone, 1971; Brodnitz, 1971). Interrelationships between disorder types is also suggested. MacComb and Fletcher (1967) suggest that leukoplakia may be a precursor to carcinoma of the larynx. Cooper (1973) and Boone (1971) indicate that hoarseness due to colds or infections may precede pathology, especially if compensatory behaviors for the hoarseness are attempted. Cooper further postulates a potential sequential interrelationship of disorders along a continuum. This sequence begins with acute hoarseness and inflammation and ends with malignancy. Repeated edemas, benign lesions, and premalignant lesions are intermediate steps. Possible etiological components suggested by the review of the literature will be investigated with hopes of identifying those most relevant to vocal disorders in general.

The author, through clinical work, has become particularly

interested in the etiologies of vocal disorders in women and decided to limit this study to that population. The limitation of the study to adult females permitted exploration of such factors as menstrual cycle changes, use of contraceptives, and other potential etiological features for that segment of the population.

With these inclusions and exclusions defined above, this study was designed to explore potential etiological correlates of vocal disorders in the adult female population.

Review of the Literature

Most research related to the etiologies of vocal disorders in women has been empirical, based on clinical observations. Cooper (1973), Brodnitz (1963, 1971), Harma et al. (1975), and Hiroto et al. (1973) have studied their own caseloads in attempts to list possible etiological features or possible patterns of features that may be related to the presence of selected vocal disorders. Caseloads were analysed to determine the prevalence and significant occurrence of selected etiological features by Damste (1967) (for effects of virilizing agents), Aronson et al. (1964, 1966) and Heaver (1958) (for psychological factors), Bicknell (1973) (for effects of hypothyroidism), Robe et al. (1960) (for neurological bases), Frable (1962) (for effects of menstrual cycle changes), and Wilson (1974) (for effects of contraceptives). The case histories of professional singers were analyzed by Baker (1962),

Brodnitz (1974), and Flach et al. (1969) in an attempt to identify common etiological features in vocal disorders of the professional singer.

The frequency to which the above features are present in a population without vocal disorders has been little studied. Diehl (1960) (for psychological factors), Linke (1973) (for effects of pitch change), and Dordain (1973) and Wendler (1972) (for effects of menstrual cycle changes and oral contraceptives) ran controlled studies on normal populations to establish changes in the presence of other variables.

A further review of this literature indicated that a variety of etiological features have been reported and studied. Features tend to group themselves into three general categories: (1) abuses and misuses of the laryngeal mechanisms, (2) emotional or psychogenic bases, and (3) medical/physical conditions precipitating changes in the vocal mechanism. It would appear then that specific discussion of each of these groupings is warranted.

Abuses and Misuses of the Vocal Mechanism

Cooper (1973) defined vocal abuse as the mistreatment of the vocal folds, as well as laryngeal and pharyngeal musculature. One of the features that could result in mistreatment of the vocal folds is the use of abusive behaviors including shouting, screaming, talking in competitive noise,

continued talking, excessive laughing and crying, overstraining the voice, or using excessive force to speak (Simpson et al., 1967; Ellis, 1965b; Aronson et al., 1964; Cooper, 1973; Moncur and Brackett, 1974; Murphy, 1964; Brodnitz, 1971; Boone, 1971; and Jackson and Jackson, 1942). Use of these types of vocal behavior reduces the efficiency of the laryngeal mechanism and brings about mechanical stress on the vocal mechanism which may produce such problems as edema, vascular engorgement, or thickened folds (Jackson and Jackson, 1942; Boone, 1971). Although these conditions are usually temporary, continued use of the abusive behaviors while these conditions exist, can result in a vocal image pattern that may persist beyond the reduction of the edemateous state (Cooper, 1973). Attempts to compensate for the aberrant vocal patterns by adjusting the intrinsic and extrinsic muscles may further compound the hyperfunctional phonatory behavior and the problem will continue (Boome, 1971). Extended use of these behaviors can eventually result in vocal fold pathology such as nodules or polyps (Boone, 1971; Cooper, 1973; Riroto, 1973).

Nonverbal behaviors such as excessive coughing and throat clearing may also have adverse effects on the larynx (Jackson and Jackson, 1942; Bremer, 1975).

Most vocal patients are constant talkers or use their voices professionally, or both (Jackson and Jackson, 1942; Cooper, 1973). Such occupations as teaching, politics, sales

work, and acting are verbal in nature and require extensive and highly qualified use of the voice (Arnold, 1959; Brodnitz, 1959, 1963, 1971; DeWeese and Saunders, 1968; Harma et al., 1975; Cooper, 1973; Ellis, 1965b; Simpson et al., 1967). In addition these occupations are most frequently practiced in a competitive atmosphere (Brodnitz, 1963, 1971). Extended use of the voice in these situations may fatigue the vocal musculature creating eventual edema and thickening of the folds (Brodnitz, 1971; DeWeese and Saunders, 1968; Jackson and Jackson, 1942). Polyps or nodules can result if the extended use of the voice is compounded with abusive behaviors (Harma et al., 1973; Ellis, 1965b; Simpson et al., 1967; Brodnitz, 1971). Harma et al. (1975) found that 12 of 34 patients with polyps or nodules had histories of extended use of abusive behaviors in their occupations. Individuals in these occupations are also more sensitive to small vocal changes and often refer themselves to a physician or attempt compensatory behaviors (Brodnitz, 1963; Cooper, 1973). Environmental factors--dust, noise or extreme climatic exposure--in an occupation may contribute to vocal misuse (Ellis, 1965b; Cooper, 1973). Improper use of the voice over the telephone has also been listed as a source of abusive behavior (Jackson and Jackson, 1942). Hyperactive and socially ambitious housewives with tense personalities were reported to be the largest group of females in Brodnitz' (1973) caseload. Talking too loudly or shouting at children

was listed as another form of abuse (Jackson and Jackson, 1942; Cooper 1973).

The major occupational or professional misuse of the vocal mechanism is that of singers. Overextension of the vocal range is the most commonly reported abuse (Ellis, 1965b; Brodnitz, 1958, 1971; Simpson et al., 1967; Cooper, 1973; Baker, 1962). This abuse plus others such as singing when fatigued, with the presence of an upper respiratory infection (Baker, 1962), for extended periods of time (Aronson et al., 1964), or with inadequate periods of professional abstinence (Ellis, 1965b) tend to lead to submucosal hemorrhages in the vocal folds. Continued vocal use when the folds are edemateous or thickened can result in pathology. Inadequate training for use of the vocal mechanism for singing is also listed as a related factor (Brodnitz, 1958, 1971, 1974; Ellis, 1965b). Brodnitz (1974) suggests allergies, menstrual cycle irregularities, hormonal deficiencies, use of contraceptives, and habituation to drugs by singers may be specific problems compounding any vocal abuse and result in a vocal disorder. Wilson (1974) suggests that drinking milk prior to a singing performance causes the mucous glands above the folds to secrete mucous which can weight the vocal folds and decrease their ability to vibrate. Baker (1962) warns that the person who sings for pleasure or gain never engage in smoking as smoking tends to cause thickening of the vocal folds over time.

The effect of tobacco on the vocal mechanism is local. Distillation of the burning tobacco produces empyreumatic oil which irritates the vocal mechanism (Jackson and Jackson, 1942). The injurious effect is not only confined to the smoker; but is noticeable in the larynx of anyone who remains long in a room whose atmosphere is saturated with tobacco smoke (Jackson and Jackson, 1942; Ellis 1965b). Chronic irritation of the vocal folds by smoking can be a predisposing feature for the development and maintenance of a vocal fold pathology (Hiroto et al., 1973; Harma et al., 1975; Baker, 1962; Moore, 1957; Ellis, 1965a, 1965b; Boone, 1971; Murphy, 1964; Punt, 1974; DeWeese and Saunders, 1968; Simpson et al., 1967; Ranger, 1965; Brodnitz, 1971; Cooper, 1973; Brewer, 1975).

Alcohol is a potential cause of laryngeal disease because of its prolonged peripheral vasodilator effect resulting in engorgement of the vocal folds (Jackson and Jackson, 1942; Ellis, 1965b). A person who drinks usually also ends up abusing his voice (DeWeese and Saunders, 1968). Alcohol is listed as a possible source of vocal abuse by Murphy (1964), Simpson et al. (1967), Boone (1971), Brodnitz (1971), Ellis (1965b), Moore (1957), and Hiroto et al. (1973).

Other sources of irritation to the vocal cords are the inhalation of dust (Moore, 1957; Murphy, 1964; Ranger, 1965; Boone, 1971; Jackson and Jackson, 1942; Simpson et al., 1967), smog and other fumes (Simpson et al., 1967; Boone, 1971;

Ellis, 1965a; Ranger, 1965; DeWeese and Saunders, 1968; Cooper, 1973), or the dry indoor air of northern climates (Moore, 1957; Moses, 1954; Brewer, 1975; Cooper, 1973).

Voluntary control of the respiratory mechanism for phonation, especially for extended periods of time as in singing or acting, is a function overlaid on the natural function of breath support for life (Farquharsen and Anthony, 1970; Boone, 1971). Faulty breathing patterns, whether secondary to inflammations and emotional stress, or as compensatory behavior contribute to misuse of the vocal mechanism (Moses, 1954; Brodnitz, 1958). Cooper (1973) reported 86 percent of his patients had upper chest or clavicular breathing, which he felt was detrimental to optimum speech production. Mouth breathing, another form of faulty respiration, deprives the larynx of most of its normal protection of warming, cleansing, and moistening air before it reaches the larynx. Ellis (1965b) and Jackson and Jackson (1942) both postulate that chronic irritation by the dry uncleansed air can have deleterious effects.

Cough in nature is a protective device; although in laryngeal disease it may lose its importance as a protective device and become an aggravating feature (DeWeese and Saunders, 1968). Coughing results in a sudden or violent approximation of the vocal cords which in turn can produce submucosal hemorrhages on the vocal cords (Simpson et al., 1967). The trauma of coughing on the vocal cords is viewed deleteriously

by Simpson et al. (1967, Ellis (1965b), Cooper (1973), DeWeese and Saunders (1968), Boone (1971), and Jackson and Jackson (1942).

Aronson et al. (1964) reported a large number of their patients experienced feelings of physical fatigue prior to the onset of their vocal difficulties. While they report this feature is relatively undocumented, Moses (1954), Cooper (1973), and Boone (1971) also list it as a possible etiological feature.

Occasionally the vocal mechanism can be abused during single traumatic events such as intubation, burning or scalding, or direct injury to the laryngeal area through blows or wounds. Cooper (1973), DeWeese and Saunders (1968), Ranger (1965), Simpson et al. (1967), Moore (1957), Jackson and Jackson (1942), Ellis (1965a), Moncur and Brackett (1974), Boone (1971), and Brodnitz (1971) describe mechanism changes (edema, granulations) and vocal qualities resulting from traumatic changes.

Abusive vocal behaviors, inappropriate occupational and professional use of the voice, irritation from tobacco, alcohol and other sources, faulty respiratory patterns, persistent cough and trauma to the laryngeal area are types of abuses and misuses reported by the majority of the authors. Most authors also concur that prolonged or compounded abuse and misuse can result in physical changes in the vocal mechanism. Most literature concerned with this area is based on

empirical observation of clinical populations. Little appears in the literature that is based on controlled research.

Emotional and Psychogenic Bases

Cooper (1973) views vocal image as one of the most controlling factors in the onset, development and resolution of voice disorders. He defines vocal image as the pitch, quality, volume, tone focus, breathing, or rate images an individual identifies with and uses. The desire of an individual to use a particular quality, pitch, tone focus, or breathing image may not be the one that is optimum for his vocal physiology. This improper use of the mechanism creates mechanical changes within it. Cooper reported 77 percent of his caseload indicated they had a vocal image that influenced the vocal pattern they were using. Of preference were low pitched, throaty voices. Moses (1954) and Brodnitz (1971) reported the preference of females to imitate low pitched, breathy voices of popular entertainers.

The gutteral, throaty voice is obtained by emphasizing laryngepharyngeal resonance. This in turn results in pharyngeal and laryngeal tension (Cooper, 1973). Boone (1971) related that hyperfunctional carriage of the tongue and mandibular restriction may create these acoustic variations; however, the increased tension created by these position results in symptoms of vocal fatigue, pain or fullness in the hyoid area after prolonged speaking or singing.

Cooper reported 71 percent of his patients experienced a basal or near basal pitch upon rising in the morning. Although there was fluctuation throughout the day, most of his patients continued to use a habitual pitch that was too low. Boone (1971) reports use of a pitch that is too low or high may be a primary etiological feature in some patients, while others have faulty pitch levels secondary to growths. Moncur and Brackett (1974) list the use of wrong pitch as one of the bases for vocal strain. Linke (1973) found that women may be tending to use median pitch levels which are lower than would seem advisable for the most effective employment of their vocal mechanism for speech. Murphy (1964) disputes the importance of voice images and types; however, he does not offer evidence to support this position.

Brodnitz (1958) and Cooper (1973) report that the psychologic, emotional and competitive stress of everyday life all combine to produce hyperfunctional voice patterns which are abusive to the vocal cords. Murphy (1964) reports nodules and polyps as being the result of faulty vocal functioning, usually having a psychological base.

Relationships between psychogenic conditions and the vocal disorders, spastic dysphonia and functional aphonia, have been established. Aronson et al. (1964, 1966) and Beaver (1958) found their spastic dysphonic patients to have hysterical, hostile, and aggressive tendencies, histories of emotional stress and able to obtain primary or

secondary gain with the presence of the vocal disorder. Diehl (1960) found seminary students with hoarse/breathy voices to be more anxious than seminary students with normal voices.

The onset of spastic dysphonia or aphonia is relatively abrupt and frequently follows an unpleasant, traumatic event (Brodnitz, 1971; Arnold, 1959; Aronson et al., 1966; Boone, 1971; Ranger, 1965). Aronson et al. (1964, 1966) found half of their patients with functional dysphonia to report a sudden onset of the problem. However, in the Aronson et al. (1966) study none of the patients had experienced emotional or physically traumatic events prior to onset.

Moses (1954, 1960), Moncur and Brackett (1974), DeWeese and Saunders (1968), Barton (1960), and Aronson et al. (1966) report vocal disorders, primarily spastic dysphonia and functional aphonia, are a physical manifestation by which an inner conflict is rendered harmless (Freud's conversion reaction) or repression of some upsetting experience. Moses (1954) reports these findings are found in cases that do not have medical or abusive histories. The above authors advocate treatment of the psychosis, as symptomatic voice therapy will probably only result in the occurrence of another physical symptom of the psychosis. Boone (1971) reports this not to be the case. Cooper (1973) and Murphy (1964) report that while patients may have emotional and psychological problems which affect the speaking voice, most are not severely disturbed person-

alities. They summarize that little is known about personality as an etiological, consequential or therapeutic feature in the disorders of voice.

Most authors concur that emotional or psychogenic problems may be related to spastic dysphonia and functional aphonia. Reports of these bases for other vocal disorders are scanty. Viewpoints conflict as to dysphonia or aphonia being symptoms of a physical manifestation of inner conflict. The majority of authors conclude that the psychosocial desire of the female for a particular vocal image, one that is low pitched and throaty or breathy can be a factor in vocal disorders.

Medical/Physical Conditions Precipitating Vocal Fold Changes

Acute infections of the upper respiratory tract, tonsils, adenoids, or teeth may serve as a precipitating factor in creating a vocal disorder (Cooper, 1973; Robe, et al., 1960; Aronson et al., 1964; Ellis, 1965a; Moore, 1957; Hiroto et al., 1973; Brewer, 1975; Murphy, 1964; Simpson et al., 1967; Ellis, 1965b; DeWeese and Saunders, 1968). Aronson et al. (1964) reported that nine of their twenty voice patients had experienced colds or the flu prior to the onset of their functional aphonia or dysphonia. Upper respiratory infections, flu, or laryngitis preceded the onset of vocal difficulties in 50 percent of the patients studied by Robe et al. (1960). Cooper (1973) indicated a lower percentage (17 to 20 percent)

of his patients had experienced these infections prior to onset.

These infections often establish a focus and extend to the larynx (Jackson and Jackson, 1942) where changes in the mucosal membrane result in thickened, roughened, edemateous vocal cords (DeWeese and Saunders, 1968; Cooper, 1973; Ellis, 1965a). These conditions, while they may affect the voice, may not result in a chronic vocal disorder unless the voice is already being misused. The individual who is attempting to pamper or protect his voice by using compensatory behaviors, or if the infection is severe or prolonged may well be adding to his potential for vocal disorder (Cooper, 1973; Boone 1971).

Allergic reactions to pollens, dust, or other agents may directly irritate the vocal folds, inflame the sinuses and result in a mucosal discharge, or increase the secretion of the laryngeal mucoses. These reactions may result in vocal cord changes similar to those described as being secondary to infections (Cooper, 1973; Brewer, 1975). Brodnitz (1971, 1974), DeWeese and Saunders (1968), Jackson and Jackson (1942), Boone (1971), Simpson et al. (1967), Murphy (1964), and Moore (1957) also advocate that a relationship between allergies and vocal disorders may exist.

Post nasal drip, whether secondary to an allergy, or as part of an infectious disease, may also create changes in the vocal folds and mucous membrances which could then affect the quality of the voice (Cooper, 1973; Ellis, 1965b).

Systemic and specific infections such as tuberculosis, mycoses, syphilis or diphtheria may destroy the tissue of the laryngeal area with lesions or granulations. The incidence of most of these diseases has decreased significantly and vocal disorders resulting from these infections are currently rare (Simpson et al., 1967; DeWeese and Saunders, 1968; Moore, 1957; Jackson and Jackson, 1942; Ellis, 1965a, 1965b).

Reactions to medications such as aspirin (Brodnitz, 1971; Moore, 1957; Ellis, 1965a), iodides (Moore, 1957; Ellis 1965a; Jackson and Jackson, 1942), antidepressants and antihistamines (Punt, 1974; Wilson, 1974), which cause vascular coagulation or decreased mucal secretion effects, may affect the vocal cords as well as other areas of the body. Continued applications of silver nitrate may irritate the vocal folds (Jackson and Jackson, 1942; Moore, 1957).

Hormonal imbalances may have a twofold effect on the voice. The hormonal imbalance has a direct effect on the body, including the larynx. Indirectly the voice may be affected by the emotions which may have been affected by the hormones (Cooper, 1973). Investigation of hormonal imbalance in voice patients has been advocated by Brodnitz (1958, 1974) and DeWeese and Saunders (1968).

Hypothyroidism results in edema in the vocal folds and enlargement of the larynx (Bicknell, 1973; Burke, 1968; Brewer, 1975; Moore, 1957; Moncur and Brackett (1974) and a probable change in the quality of the voice (Burke, 1968).

Boone (1971) reported that these cases are relatively rare, although Brodnitz (1963) observed that 8 of 229 voice patients had disorders related to hypothyroidism. Bicknell (1973) reported vocal complaints by 27 patients with mild hypothyroidism. Sex was a factor in this study as 25 of the 27 patients were female.

Virilization, including a lowered pitch, may occur in women receiving testosterone therapy (Burke, 1968; Damste, 1967; Cooper, 1973; Boone, 1971; Lucente, 1973). Damste (1967) reported that 40 of 400 voice patients at a clinic in Utrecht had vocal disorders resulting from virilizing agents. He also reported that the virilizing agents tended to affect women who used their voice professionally. Ovulation inhibitors containing testosterone may also produce virilizing effects, particularly in women whose careers demand high vocal efficiency (Wendler, 1972). The testosterone tended to increase vocal cord size and mass (Boone, 1971; Cooper, 1973; Damste, 1967).

Hormonal effect upon the voice is reported by Cooper (1973) to be minimal in patients taking medications containing estrogen. Dordain (1973) found some change in vocal quality in patients using hormonal contraceptives after a year's time. However, the author concluded that the design of the study did not make it possible to prove or exclude any influence of hormonal products on the voice. Wilson (1974) and Brodnitz (1974) postulate that use of contraceptives

may create specific problems for women who use their voices professionally. Wilson noted that 6 of 18 young females in his caseload were taking oral contraceptives and were in successful jobs that required prolonged use of the voice.

Transitory vocal changes, particularly a decrease in basal pitch, during the menstrual cycle were noted by Cooper (1973), Frable (1962), Flach et al. (1969), Brodnitz (1963, 1974), Moses (1954), and Wendler (1972). Frable (1962) and Flach et al. (1969) noted prevalence in women who were professional users of their voices. Flach et al. (1969) found 67 percent of 136 professional singers experienced vocal changes during pregnancy. These changes persisted in 25 percent of these cases after delivery. Cooper (1973) reported that patients whose vocal problems were associated with the onset of pregnancy also misused their voices prior to the pregnancy. The hormonal changes during menopause may be related to the large number of women who have polypoid thickening on the vocal cords at ages 45 to 50 (Brodnitz, 1971). Cooper (1973) related that menopause does not have a serious effect on the well-used voice.

Infrequent vocal disorders were reported in patients with diabetes (Lucente, 1973), pituitary gland imbalance (Lucente, 1973; Boone, 1971), autonomic nervous system imbalances (Brodnitz, 1958), or hypometabolic states (Brodnitz, 1958; DeWeese and Saunders, 1968).

MacComb and Fletcher (1967) accept leukoplakia as a

precursor to carcinoma of the true vocal folds. They list the cause of leukoplakia as unknown, but suggest that dietary deficiencies can be contributory. Tobacco, syphilis, alcohol, voice strain and ingestion of hot or highly spiced foods are suggested as being related to carcinoma. Cooper (1973) indicates leukoplakia, and possibly other benign tumors (polyps, nodules), are possible precursors to carcinoma to the vocal folds. Although acknowledging the etiology of cancer is unknown, he lists vocal abuse and misuse, voice strain, smoking, and other chronic irritants as possible contributatory factors.

Changes in the vocal mechanism function and vocal quality in the presence of neurologic disorders is reported by Brodnitz (1971) and Moncur and Brackett (1974). Sporadic changes in laryngeal valving are related by Moncur and Brackett to be the result of neurological abnormalities affecting the larynx. Brodnitz further advises that the possibility of neurologic problems be investigated in all vocal disorders with organic involvement.

A study by Robe et al. (1960) found ten patients with spastic dysphonia also had neurological signs (abnormal EEG, neurological history) and postulated that this phonatory disturbance is a symptom of neurological disease. Research to specifically support this hypothesis does not appear in the literature.

Jackson (1949) in Aronson et al. (1960) postulated that

aphonia may be due to sudden cerebral anemia not severe enough to cause a paresis. Aronson et al. (1964) and Barton (1960) found little to support this.

Medical conditions precipitating vocal fold change and change in vocal quality include infections, allergies, use of specific medications or hormonal imbalances. Most research is empirical except for some controlled studies of menstrual cycle changes or use of contraceptives. Most evidence in these areas appears to indicate that effects of contraceptives, menstrual cycle and pregnancy hormonal changes are most predominant in women who use their voices professionally. Evidence of voice change during menopause is inconclusive. Neurological and cerebral anemia theories are postulated as etiologies for aphonia. These theories have little support.

Summary of Literature Review

A review of the literature indicates that authors list a variety of features that may be potentially related to the onset of vocal disorders in the adult female population. These features were reviewed by three general categories: abuses and misuses, psychogenic bases, and precipitating medical conditions. Some authors do discuss interrelationships between features or potential relationships between disorder types. Most literature reviewed appeared to be empirically based. With this review of the literature as background, a preliminary study was designed.

Preliminary Study

A pilot study was designed by the author to determine: (1) the feasibility of studying etiological features through use of a questionnaire, and (2) whether certain features would be prevalent enough to prompt further study. The questionnaires were distributed to eight females whose vocal disorders required therapy. Five of these females completed the questionnaires.

After each informant completed the questionnaire, a personal interview was scheduled. During this interview the informants responded to the questionnaire and its purpose. All five informants observed that:

1) this study would be worthwhile, especially if the information gained could be applied to therapy;
2) the questionnaire (10 pages, 75 questions) would be most effective if shortened;
3) confidentiality should continue to be emphasized;
4) they were able to complete the questionnaire without major difficulty;
5) the wording of specific questions be changed; and
6) other aspects, which they judged to be etiologic or nonetiologic, be included or excluded.

The last two observations varied as to aspect or questions with each informant.

At least three of the five informants responded positively to questions about these aspects:

1) dissatisfaction with present voice;
2) changes in family routine or unusual stress prior to onset;
3) age at onset (within ten years);
4) presence of deviant voice characteristics (high/low pitch, breathiness) prior to onset;
5) professional use of the voice in demanding occupations;
6) importance of having jobs and careers;
7) use of voice for singing, professionally or non-professionally;
8) physical and emotional premenstrual changes;
9) history of thyroid difficulties;
10) regular use of aspirin;
11) history of bronchitis or other respiratory difficulties;
12) history of smoking or working in smoke-filled rooms;
13) use of alcohol;
14) consumption of one to two cups or more of dairy products daily;
15) frequent throat clearings; and
16) known or suspected allergies.

All informants responded negatively to:

1) voice change during pregnancy;
2) persistent ear infections; and

3) history of emphysema.

An otolaryngologist was consulted about the study, the questionnaire, and the feasibility of using patients in an otolaryngological office for data collection. Results of the consultation indicated that the study appeared worthwhile and the distribution of a questionnaire to patients in the office a feasible procedure. The otolaryngological consultation and pilot study resulted in some modification of the questionnaire.

The results of the pilot study and consultation with the otolaryngologist indicated that an expanded study would be of merit and that use of a questionnaire would be a feasible means by which to study etiological features of vocal disorders in women.

Statement of Purpose

The purpose of the study was to determine whether features listed in the literature as potentially etiological for vocal disorders, actually did relate to women with vocal difficulties. The hypothesis that these etiological features were significantly present in women with vocal disorders was postulated. This would indicate that the etiologies for vocal disorders suggested by most authors are, in fact, correlated with the occurrence of a vocal disorder. Rejection of this hypothesis would indicate that either the etiological features may not be related to the occurrence of vocal disorders, thus requiring investigation of other aspects, or that a different method of study may be required. Exploration of all parameters of

relatively broad features, such as oral contraceptives, would require a highly involved procedure. The present study was further designed to, hopefully, isolate some general areas which might require indepth examination in subsequent studies.

CHAPTER II

PROCEDURES

Subjects

Subjects for this study were sixty females between the ages of eighteen and fifty-five who were patients of cooperating otolaryngologists in Missoula, Helena and Great Falls, Montana. Thirty of these subjects, hereafter referred to as the vocally disordered group, were seen by the physician primarily because of difficulty with the voice. The remaining thirty subjects, hereafter referred to as the control group, were seen by the physician concerning a primary complaint other than the voice. The lower age limit, eighteen, was established to eliminate any experimental subjects whose vocal difficulties may have involved the hormonal changes during puberty. The upper age limit of fifty-five was established to include any patients whose vocal difficulties were related to menopause, a relationship suggested by Brodnitz (1963, 1971) and yet exclude those whose vocal difficulties could be related to geriatric change.

To insure equal age distribution of vocally disordered and control subjects, questionnaires from controls were matched to questionnaires from the vocally disordered for ± 5 years of age as they were received.

Initially, geographic matching of questionnaires from control and vocally disordered subjects was planned. However, in a state such as Montana where long distance travel to see a physician is not uncommon, it was discovered that subjects residing in one city where data collection was taking place might travel to see a physician in another city. This reduced possible control of variables related to geographic area, other than to the state of Montana itself. Watching of subjects by geographic area was then essentially eliminated.

Method

A questionnaire (appendix A) was devised to collect data. Questions were designed to elicit information on etiological features suggested by the literature review. Questions 4 to 32 were designed to explore etiologies related to abuses and misuses of the vocal mechanism. Questions 33 to 38 were designed to explore psychogenic and emotionally related etiologies. Questions 39 to 60 were designed to explore etiologies related to precipitating medical conditions. Questions 61 and 62 were designed to explore traumatic, neurogenic or carcinogenic relationships. Questions 1, 2, 3, and 63 were included to obtain necessary background on each subject. Many questions included in the questionnaire dealt with some relatively broad areas, such as oral contraceptives. This was done to enable preliminary examination of a broad

scope and potentially isolate areas for more in-depth studies in the future. It was also an attempt to limit the questionnaire to a reasonable length and thus, hopefully, obtain careful and accurate completion by respondents.

Otolaryngologists were contacted and the study explained. After each physician consented to participate, office personnel were provided with a packet containing questionnaires, cover letters (appendix B), envelopes, and an instruction sheet (appendix F). The author spent a half day in each office developing, along with office personnel, a distribution process that best fit the organization of that particular office. The instruction sheet was used as a guide to insure uniformity of data collection in all physicians' offices. During this half day the author also answered questions about the questionnaire and its distribution. Distribution processes were established with Missoula otolaryngologists on a trial basis for two days. The process was then reviewed by the author and office personnel. After a working process was established, distribution procedures were established in Great Falls and Helena.

In addition to obtaining experimental subjects in physician offices, each cooperating physician provided the author with names of patients having vocal complaints who had visited the office in the past six months. These patients were contacted by telephone and questionnaires mailed to those who agreed to complete them. The data collection process then

included patients seen in the physicians' offices over slightly more than a year's period, thus reducing the potential for seasonal variables having an effect on this study.

Questionnaire Review

All returned questionnaires were reviewed using the following criteria:

1) Questionnaires had been completed by subjects within the 18 to 55 age range. Questionnaires not meeting criteria were eliminated from the study.
2) Non-scorable responses to be eliminated from further analysis. These were defined as:
   a) questions receiving two responses where one was requested;
   b) questions where written comments confused checked responses; or
   c) questions where responses had to be interpreted (i.e., a check mark between lines).
3) Non-applicable responses to be eliminated from further analysis. Occasionally subjects completed questions they had been instructed to skip (i.e., skip questions 13 to 19 if you do not sing). These responses were labeled not applicable and eliminated from further analysis.
4) Questions 6, 16, 26, 28, 31, 40, 54, 59, 61, and 62

required responses only if factors were applicable. When these questions received no response, they were interpreted as not applicable to the subject and scored as "none" for further analysis. This criteria did not result in the elimination of any questions. Reduction in the number responding to each question is available in appendix D.

Responses to completed questionnaires were tallied and statistically treated with percentages, medians, the X^2 statistic or the Fisher Exact Probability Test. The confidence level was set at .05. For more discussion of statistical treatment, see Statistical Treatment, chapter 3.

CHAPTER III

RESULTS

This study was designed to examine relationships between features identified in the literature as etiological for vocal disorders in women and those actually demonstrating vocal difficulties. It was hypothesized that occurrence of the identified features would correlate with women experiencing vocal difficulties. A questionnaire was devised to collect data to test this hypothesis.

Questionnaires were distributed to forty women between the ages of 18 and 55 who presented their otolaryngologist with a primary complaint of vocal difficulty. Questionnaires were completed by 35 (98 percent) of these women. Eighteen of the 35 (51 percent) questionnaires returned were from women contacted through Missoula otolaryngological offices. Nine (26 percent) were from Helena and eight (23 percent) were from Great Falls.

The majority of returned questionnaires represented two types of vocal disorders. Seventeen of the 35 respondents (49 percent) were diagnosed by physicians as having vocal difficulties related to polyps, polypoid thickening or nodules. Twelve (34 percent) were diagnosed by physicians as having acute hoarseness or laryngitis primarily secondary

to colds or infections. The remaining six questionnaires (17 percent) were from women whose vocal difficulties varied (i.e., functional, vocal cord paralysis, leukoplakia). This spontaneous grouping of most questionnaires into two categories prompted exploration of a second question--Do factors identified by the literature as etiological for vocal disorders correlate with one disorder grouping (polyps, nodules) when compared to another type of vocal difficulty (acute hoarseness)?

Ages of vocally disordered respondents ranged from 18 to 55 with the mean age being 35.66. The mean age of respondents with polyps, nodules (PN) was 37.12. The mean age for respondents with acute hoarseness (AH) was 30.92 and for respondents with other vocal difficulties (O) was 41.00. (See table 1). The approximate mean age of all vocally disordered respondents at the time of onset was 33.77. (See appendix C.)

TABLE 1

MEAN AGE OF RESPONDENTS (VOCAL DISORDERED)

Classification	Range	N	Mean
AH	18-47	12	30.92
PN	21-55	17	37.12
(polyps, po. thck.)	36-55	6	48.33
(nodules)	21-47	11	31.00
O	20-54	6	41.00
Overall	18-55	35	35.66

Questionnaires from thirty controls were obtained from otolaryngologists' offices and matched to the questionnaires from the vocally disordered population with ±5 years of age. These sixty questionnaires (30 vocally disordered and 30 control) formed the corpus for analysis of the hypothetical question, "Do the features identified as etiological for vocal disorders correlate with women actually having vocal difficulties?" After matching had been completed, five additional questionnaires from women with vocal difficulties were received. These questionnaires were included in intro-vocally disordered analysis only to provide additional data, and a larger sample size.

Statistical Treatment

Questions 5, 7 to 11, 13, 17, 20 to 24, 36, 37, 55, and 57 were composed of rating scales and were analyzed to obtain medians. Scores exceeding the median were considered positive and those at or below the median were considered negative. The scores were then tallied for further statistical analysis. The chi square (X^2) statistic corrected for continuity (Siegel, 1956) was applied to all data where expected frequency counts in individual cells were greater than five. Questions 4, 8 to 12, 20, 21, 23, 25, 26, 28, 30 to 39, 42, 47, 49 to 51, 53 to 55, and 57 to 61 were treated with this statistic. The confidence level was set at .05 with all significant scores measured for strength of association with the Contingency

Coefficient (C). In cases where expected frequency counts were less than five, the Fisher Exact Probability Test or Table of Critical Values for the Fisher Test (Siegel, 1956) were applied. The confidence level continued to be set at .05. Questions 5, 6, 12 to 15, 18, 19, 21, 24, 29, 43, 44, 48, 52, and 53 were treated with this statistic.

Percentages were determined for responses to each question. When other statistical treatments were applied, it became apparent that between group percentage differences less than 18 percent would not yield statistical significance. Further statistical application was thus eliminated in these cases. Questions 7, 11, 17, 22, 40, 41, 45, 46, 56, and 62 were treated in this manner. Questions 1, 2, 3, 16, 25, and 63 were informational in nature and were analyzed with frequency counts and/or percentages.

Statistical treatment for intra-group comparisons varied slightly. No data met the assumptions of the X^2 statistic and it was not used. Questions 5, 6, 11 to 15, 17 to 19, 21 to 24, 28, 29, 34, 37, 38, 40, 42 to 44, 48, 52, 53, 57, and 58 were treated with the Fisher test. The confidence level continued to be set at .05. In cases where percentage differences were less than 30 percent, no further statistic was applied. Questions 4, 7 to 12, 20, 21, 26, 27, 30 to 33, 35, 36, 39, 41, 45, 46, 49 to 51, 53 to 56, and 59 to 62 were treated in this manner.

Comparison of Women With and Without Vocal Difficulty

Of the 65 features treated statistically, twelve (18 percent) correlated significantly with women having vocal difficulties. These twelve features were ranked by between group percentage differences since treatment with different statistics yielded different types of scores. These features were determined by X^2 and Fisher statistics to be significant at the .05 level or greater. Strength of association of the X^2 scores, as measured by the C Coefficient, ranged from .436 to .298. The features and statistical data are summarized in table 2.

The remaining 53 features (82 percent) did not correlate significantly to women with vocal difficulties. However, thirteen of the features, while not correlated significantly, did have large (18 percent or greater) between group percentage differences. These features and statistical treatment are available in table 3.

All other features not significantly correlated to women with vocal difficulties are listed in table 4. They are listed by questionnaire question number and are not ranked. Complete statistical treatment of all features is available in appendix D.

TABLE 2

FEATURES CORRELATED TO WOMEN HAVING VOCAL DIFFICULTIES

(Ranked by between group percentage differences)

Feature	Question No.	% Diff.	% C	% V	Stat. Used	Score	C Coef.
1. Change in singing voice	(18)	64	30	94	Fisher	.001*	
2. Compensate for change in singing voice	(19)	61	33	94	Fisher	.05*	
3. Run out of breath	(30)	51	15	66	X^2	12.83*	.432
4. Cold, hoarse at onset	(60)	50	27	79	X^2	13.62*	.436
5. Sing 5+ hours/week	(13)	41	0	41	Fisher	.02*	
6. Clear throat 10+ times daily	(9)	40	21	62	X^2	7.38*	.341
7. History of resp. diff.	(28)	38	21	59	X^2	6.82*	.325
8. History of cough	(31)	36	17	53	X^2	6.88*	.323
9. Having a job	(4)	36	41	77	X^2	6.22*	.308
10. Fatigue at onset	(32)	34	38	72	X^2	5.66*	.298
11. Dissatis. with voice	(35)	34	4	38	X^2	8.16*	.354
12. Working condition precip. vocal abuse	(6)	33	58	91	Fisher	.03*	

*All scores significant at .05 or greater.
C = Control population
V = Vocally Disordered Population

TABLE 3

FEATURES NOT SIGNIFICANTLY CORRELATED BUT REPRESENTING POTENTIAL TRENDS IN WOMEN WITH VOCAL DIFFICULTIES

(Listed by percentage difference)

Feature	Question No.	% Diff.	% C	% V	Stat. Used	Score*
1. Taking medication for menopause	(44)	38	0	38	X^2	2.78
2. Persistent sinus or pnd.	(52)	37	100	63	Fisher	.10
3. Singing	(12)	27	40	67	X^2	2.72
4. Attempt to change voice	(34)	25	13	38	X^2	2.78
5. Taking hormones for menopause	(43)	25	25	50	Fisher	.35
6. Participate in clubs, etc.	(11)	22	31	53	X^2	2.16
7. Smoking	(21)	21	38	59	X^2	1.73
8. History of thyroid difficulty	(47)	20	13	33	X^2	2.33
9. Compensate for laryngitis	(59)	20	62	82	X^2	1.94
10. 4+ drinks/each occasion	(24)	19	0	19	Fisher	.10
11. Sing pro or semi-pro	(12)	19	20	39	Fisher	.21
12. Singing training	(14)	18	10	28	Fisher	.23
13. Sop./Mezzo Sop. voice range	(15)	18	11	29	Fisher	.24

*No scores significant at .05 level
C = Control Population
V = Vocally Disordered Population

TABLE 4

FEATURES NOT SIGNIFICANTLY CORRELATED WITH WOMEN HAVING VOCAL DIFFICULTIES
(Listed by questionnaire question number)

Question Number and Feature	% C	% V	Diff.
5. Job required constant talking	17	30	13
7. Quite a bit or constant talking at home	10	10	0
8. Shout more than 5 times/day	41	45	4
10. Cheer, yell 2+ times/monthly	21	31	10
11. Quite a bit, constant talking at clubs, church, etc.	22	31	9
17. Sang too high or low more than 1/4 of time	10	22	12
20. 2+ cups dairy products daily	25	20	5
21. Non-smokers 5+ hours/day in smoke	14	20	6
22. Smokers--more than 1 pack/day	30	39	9
23. Drink more than 2 times/week	25	21	4
26. In places smoggy, dusty, dry	70	67	3
27. Mouth breather	23	31	8
29. Cough with respiratory diseases	50	65	15
33. Describe voice as having deviant qualities prior to onset	69	83	14
36. More stress in everyday life	28	34	6
37. Life more or very stressful/onset	37	46	9
38. Change in family routine/onset	32	39	7
39. Menstruate regularly	64	59	5
40. Changes related to menstruation	75	89	14
41. Taking oral contraceptives	21	13	7
42. Begun menopause	14	28	14
45. Pregnant at onset	3	0	3
48. Taking medications for thyroid diff.	75	60	15
49. Known or suspected allergies	37	27	10
50. Seasonal difficulties	27	18	9
51. Chronic sinus or post nasal drip	28	30	2
53. Tonsils and adenoids intact	46	55	9
53. Infected T&A at onset	43	40	3
53. Persistent infected T&A	33	18	15
54. Taking antidepressants, antihistamines or tranquilizers	23	20	3
55. Taking aspirin	48	48	0
56. Taking medications affecting voice	0	3	3
57. More than 2 colds/year	24	40	16
58. Tend to get hoarse with cold	48	62	14
61. Surgery, illness, injury/onset	33	37	4
62. History of neuro. diseases	3	0	3
62. History of cancer	0	10	10

Intra-Group Comparisons

The data from the PN and AH groups was treated statistically to determine if features correlated with either group. Two features -- (1) stress at the time of onset; and (2) more than two colds each year -- were determined by the Fisher statistic to be significantly present at the .05 level to the AH population. (See table 5.) No features were significantly present in the PN population.

TABLE 5

FEATURES CORRELATED TO WOMEN HAVING ACUTE HOARSENESS WHEN COMPARED WITH WOMEN HAVING POLYPS OR NODULES

(Ranked by between group percentage difference)

Feature	Question No.	% Diff.	% AH	% PN	Fisher Score
1. More than 2 colds/year	(57)	45	64	19	.02*
2. Life very or more stressful at onset	(37)	42	75	33	.03*

*Significant at .05 level or greater.

Eight of the remaining 63 features (13 percent), while not significantly present in either AH or PN populations, did demonstrate large (30 percent or greater) between group percentage differences. This might, again, indicate potential trends for further study. Five of the features demonstrated potential trends in the PN population. Three features demon-

strating potential trends for each group are summarized in tables 6 and 7. The remaining features not significantly present in either AH or PN populations are listed by questionnaire question number in table 8. Complete statistical treatment of all features is available in appendix E.

TABLE 6

FEATURES NOT SIGNIFICANTLY CORRELATED BUT DEMONSTRATING POTENTIAL TRENDS IN WOMEN HAVING POLYPS OR NODULES

(Ranked by between groups percentage difference)

Feature	Question No.	% PN	% AH	% Diff.
1. Taking hormones for menopause	(43)	50	0	50
2. Taking meds. for thyroid difficulty	(48)	57	25	42
3. Pro or Semi-pro singing	(12)	64	29	35
4. Taking other meds. for menopause	(44)	33	0	33
5. Begun menopause	(42)	38	8	30

TABLE 7

FEATURES NOT SIGNIFICANTLY CORRELATED BUT DEMONSTRATING POTENTIAL TRENDS IN WOMEN HAVING ACUTE HOARSENESS

(Ranked by between groups percentage difference)

Feature	Question No.	% All	% PN	% Diff.
1. Persistent chronic sinus and post nasal drip	(52)	67	25	42
2. Infected Tonsils & Adenoids	(53)	60	20	40
3. Change in family routine at onset	(38)	55	25	30

TABLE 8

FEATURES NOT SIGNIFICANTLY CORRELATED TO WOMEN HAVING ACUTE HOARSENESS OR POLYPS/NODULES

(Listed by Questionnaire question number)

Question Number and Feature	% All	% PN	% Diff.
4. Having a job	83	82	1
5. Job required constant talking	11	38	27
6. Working conditions possibly precipitating vocal abuse	100	86	14
7. Quite a bit, constant talk/home	0	7	7
8. Shout 5+ times/day	33	50	17
9. Clear throat 10+ times daily	67	75	8
10. Cheer, yell 2+ times/monthly	17	44	27
11. Participate in clubs, church, etc.	58	53	5
11. Quite a bit, constant talking at clubs, church, etc.	29	22	7

TABLE 8 - cont'd.

12. Sing	58	69	11
13. Sing more than 5 hours/week	29	55	26
14. Singing training	29	36	7
15. Soprano or m. sop. voice range	29	40	11
17. Sang too high or low more than ¼time	86	64	22
18. Change in singing voice	71	100	29
19. Compensate for change in singing voice	80	100	20
20. 2+ cups dairy products daily	25	24	1
21. Smoking	50	63	13
21. Nonsmokers 5+ hours/day in smoke	0	20	20
22. Smokers--more than 1 pack/day	33	27	6
23. Drink more than 2 times/week	42	13	29
24. 4+ drinks/each drinking occasion	11	25	13
26. In places smoggy, dusty, dry	67	65	2
27. Mouth breather	33	35	2
28. History of respiratory diseases	42	56	14
29. Cough with respiratory diseases	80	56	24
30. Run out of breath	64	56	8
31. History of cough	67	53	14
32. Fatigue at onset	67	63	4
33. Describe voice as having deviant qualities prior to onset	75	82	7
34. Attempts to change vocal quality	30	50	20
35. Dissatisfaction with present voice	33	37	4
36. Everyday life more stressful	42	38	4
39. Menstruate regularly	75	56	19
40. Changes related to menstruation	80	89	9
41. Taking oral contraceptives	17	9	8
45. Pregnant at onset	0	0	0
47. History of thyroid difficulty	36	18	18
49. Suspected or known allergies	33	18	15
50. Seasonal difficulties	17	20	3
51. Chronic sinus or post nasal drip	50	29	21
53. Tonsils and adenoids intact	73	65	8
53. Persistently infected T & A	25	17	8
54. Taking antidepressants, anti-histamines or tranquilizers	8	24	16
55. Taking aspirin	45	56	11
56. Taking meds. affecting voice	0	6	6
58. Tend to get hoarse with cold	73	57	16
59. Compensate for laryngitis	83	80	3
60. Cold, hoarse at onset	64	63	1
61. Surgery, illness, injury/onset	42	24	18
62. History of neuro. diseases	0	0	0
62. History of cancer	8	6	2

In summary, twelve of the features identified as possibly etiological for vocal disorders appear to distinguish women with vocal difficulties from women without vocal difficulties. The level of confidence was set at .05. Thirteen additional features demonstrated potential trends. All other features appeared nondiscriminate.

Intra-group comparisons were made between the experimental populations labeled AH and PN. Two features appeared to distinguish the AH from the PN population. Five additional features demonstrated potential trends in the PN population and three features demonstrated potential trends in the AH population. All other features appeared to be nondiscriminate.

CHAPTER IV

DISCUSSION

The present study was designed to examine relationships between potential etiological features for vocal disorders identified in the literature with women who actually had vocal difficulties. It was the contention of this study that etiological features would correlate with women having vocal difficulties. A questionnaire was designed to collect data on sixty-five possible features. Women presenting otolaryngologists with complaints of vocal difficulties and women of similar ages who presented otolaryngologists with complaints other than their voice completed the questionnaire. Data from the questionnaires was then analyzed. Intra-group comparisons between women with polyps or nodules (PN) and women with acute hoarseness (AH) were also studied.

Statistical treatment supported the hypothetical statement for 12 of the 65 features. In addition, thirteen features, while not significant, demonstrated potential trends for relationships. All other features were not significant. Intra-group comparisons revealed two features were significantly present in the AH population; while none were significantly present in the PN population. Eight additional features,

while not significant, demonstrated potential trends between AH or PN populations. All other features appeared nondiscriminate.

Features Significantly Correlated to Women With Vocal Difficulties

Job and Working Conditions

Relationships between women experiencing vocal difficulties and/or working in conditions precipitous to vocal abuse are demonstrated by the present study. Jobs may require extensive vocal use. Work conditions, such as the presence of noisy equipment or other conditions producing high ambient noise levels, may require an individual to talk loudly to be heard. This can result in misuse of the vocal mechanism. A demanding job may create tension in all muscles, including the laryngeal musculature. The present study supports theories about relationships of jobs and vocal difficulties posited by Brodnitz (1959, 1963, 1971), DeWeese and Saunders (1968), Jackson and Jackson (1942), Ellis (1965b), Cooper (1973), Arnold (1959), Simpson et al. (1967), and Harma et al. (1975). Relationships between kinds of jobs and vocal difficulties might be established with a larger sample size. Careful exploration of other working conditions and potential relationships to vocal difficulties is another area warranting further study.

Aspects of Singing

Singing itself was not a significant feature in the present study. However, differences among vocally disordered and control subjects who sang were significant. Singing more than five hours a week, experiencing change in singing voice, and compensation for changes in singing voice were related to women who sang and had vocal difficulties. Singing requires fine coordination of laryngeal musculature and extended use of a singing voice may result in change of the vocal mechanism. While Aronson et al. (1964) did not define excessive use of the singing voice, the present study indicated that singing five or more hours a week may be significant. Since professional singers can sing more than five hours weekly and not develop vocal pathology, singing more than five hours weekly may be related to nontrained singers. Therefore, relationships of vocal difficulty to singing training, singing professionally, and singing more than five hours weekly should be investigated. Trends regarding this area of vocal use are discussed below. It also would not be unexpected to assume that a change in speaking voice (thus vocal quality) would also result in a change in singing voice. Compensation may be attempted to return the singing voice to its previous quality. This compensation may result in hyperfunctional laryngeal conditions. Boone (1971) does address the issue of compensatory vocal behaviors in the speaking voice and it may be that the same principles apply to compensatory

behaviors in the singing voice. It should be noted that 27 percent more women with vocal difficulties sang than women without vocal difficulty. While not significant in the present study, the high percentage differences for singing, singing training, voice range, and professional or semi-professional singing do indicate the whole relationship of vocal difficulties and all aspects of singing should be further explored.

Cold, Hoarseness at Onset

The present study significantly correlated women with vocal difficulties and Question 60: (Did you have a cold, hoarse voice or laryngitis at the time checked in Question 2 [onset date]?) The purpose of the question had been to determine if the presence of a cold and the onset of vocal difficulties were related. The inclusion of the words "hoarse voice or laryngitis" permitted a subject to respond positively if she judged her vocal quality to be hoarse regardless if she had a cold. As a result no conclusion can be made concerning the relationship of the presence of a cold and onset of vocal difficulties in this study. It thus becomes an area for further study.

Shortness of Breath and Respiratory Difficulties

Running out of breath and having a history of emphysema, chronic bronchitis or other respiratory problems correlated significantly with women having vocal difficulty in the present

study. Both factors may alter or be indicative of faulty respiratory patterns. This would support relationships between faulty respiratory patterns and vocal difficulty suggested by Moses (1954), Brodnitz (1958) and Cooper (1973).

Dissatisfaction with Vocal Quality

Dissatisfaction with present vocal quality and the presence of vocal difficulty were significantly correlated in the present study. Dissatisfaction with vocal quality and concern prompting a woman to seek medical intervention are theories posited by Brodnitz (1963) and Cooper (1973). Since the experimental population consisted of women who were concerned about their vocal difficulties, it was expected this significant correlation would exist. The dissatisfaction, however, did not appear to result in compensatory behavior as attempts to change vocal quality did not significantly correlate with vocal difficulties in the present study. It did, however, indicate potential trend for a relationship. Further study might clarify this relationship.

Frequent Throat Clearing

The present study significantly correlated frequent throat clearing (more than ten times daily) and vocal difficulty. This supported Jackson and Jackson's (1942), and Brewer's (1975) views of throat clearing as an abusive behavior precipitous to vocal difficulty. It may also be

postulated that women who are concerned about vocal quality have already focused attention on laryngeal behaviors and may be more aware of throat clearing than a control population. Further exploration might clarify the issue.

History of Cough

A history of cough (nervous, persistent, and/or smokers) significantly correlated to vocal difficulty in the present study. This supported premises of Jackson and Jackson (1942), Simpson et al. (1967), Ellis (1965b), Cooper (1973), DeWeese and Saunders (1968), and Boone (1971) that excessive coughing may be deleterious to the vocal folds.

Fatigue at Onset

The present study established a significant correlation between fatigue at onset and vocal difficulty. Fatigue may result in inefficient use of the vocal mechanism. Its significance in the present study supports the suspected, but relatively undocumented theories postulated by Moses (1954), Cooper (1973), Boone (1971), and Aronson et al. (1964).

The eleven features discussed above correlated with women experiencing vocal difficulty and support theories of etiological features postulated by other authors. These eleven features appeared to distinguish between women with vocal difficulty and women without vocal difficulty in this study. These features should be carefully explored in taking case histories

of women with vocal difficulty. This becomes especially pertinent if symptomatic voice therapy (Boone, 1971) is planned. Symptomatic voice therapy emphasizes the reduction or removal of etiological conditions as a therapeutic goal. Thus the presence of any of the significant features during a case history can have implications of therapeutic value.

Factors Demonstrating Potential Trends to Women with Vocal Difficulty

Thirteen additional features--(1) taking hormones for menopause; (2) taking other medications for menopause; (3) singing; (4) persistent chronic sinus or post nasal drip; (5) attempts to change vocal quality; (6) participation in clubs, church, etc.; (7) history of thyroid difficulty; (8) compensation for laryngitis; (9) smoking; (10) consuming more than four drinks on each drinking occasion; (11) singing training; (12) singing professionally or semi-professionally; and (13) soprano or mezzo soprano voice range--demonstrated insignificant, but high between group percentage differences in the present study. Specific exploration of these features with a larger sample size may establish additional relationships undetected by the present study. The potential trend demonstrated by the thirteen features in the present study indicates that exploration of these features when taking a case history of women with vocal difficulty is warranted. It should be noted that persistent chronic sinus and post nasal

drip had a larger percentage of occurrence in the control group. The control group consisted of women whose complaints primarily concerned ears, nose and sinus difficulties. Since, by definition, these women had sinus difficulties, the potential relationship of persistent chronic sinus or post nasal drip to the control population was not unexpected. Comparison of women with vocal difficulties to a non-pathological population might clarify any potential relationship between vocal difficulty and persistent chronic sinus and post nasal drip.

The comparison of the vocally disordered population to a control population who also sought the services of an otolaryngologist, but primarily for ear, nose and sinus difficulties, warrants further discussion. Since ear, nose, sinus, and vocal difficulties often require the services of the same type of physician, it is possible that relationships exist between the difficulties. It is also possible that etiological features potentially related to vocal difficulties may also be potentially related to ear, nose and sinus difficulties. This being true, a study comparing women with vocal difficulty to a non-pathological population might potentially increase the strength of the prsesent correlations attained for women with vocal difficulties. This type of study might also produce correlations of features demonstrating trends in the present study. Thus exploration of relationships between women with vocal difficulties and a different control population or a three-way analysis (between vocal difficulties, ear, nose and

sinus difficulties, and the general population) appears warranted.

The present study did not support relationships between vocal difficulty and other features indicated as potentially etiological in the literature. These features may be related in individual cases, but did not appear to represent the vocally disordered population included in this study.

The present study did support aspects of the preliminary study. A questionnaire did appear to be an appropriate means to collect data; although in future studies, rewording of Question 60 should be considered. Several of the features deemed potentially related to vocal difficulties by the preliminary study (dissatisfaction with present vocal quality, jobs, history of respiratory difficulties, and frequent throat clearing) were supported by the present study.

As the study progressed, it became apparent that busy routines of average physician offices appeared to counter-indicate the use of office personnel for effective distribution of questionnaires. At that point, physicians provided the author with lists of patients with vocal difficulty who had been in the office in the previous six months. These women were contacted by telephone and questionnaires sent to those who agreed to complete them. This proved to be an effective procedure by which to distribute questionnaires and

collect data for the present study. Questionnaires from control subjects continued to be collected in physicians' offices. Unless a more effective means can be implemented to incorporate the use of office personnel in physicians' offices, it is recommended that subsequent studies utilize procedures other than use of office personnel to distribute questionnaires.

Intra-Group Comparison

Correlated Factors

Intra-group comparison revealed that only two features (stress at time of onset and more than two colds each year) of the 65 factors studied significantly correlated with the AH population. None significantly correlated with the PN population. If Cooper's (1973) theory of interrelationship of vocal disorders along a continuum is accepted, no or few significant correlations would be expected. It appears then that this study supports Cooper's theory. It may be that stress at onset and more than two colds each year distinguish acute hoarseness and its potential stage of development on the continuum from polyp or nodular disorders. Women with acute hoarseness also had a lower mean age in the present study. This might further support the interrelationship theory in that women with acute hoarseness might later be susceptible to the development of polyps or nodules. It must be pointed out, however, that Cooper does not advocate that all persons with acute hoarseness will develop nodules

or polyps. The theory instead posits susceptibility for potential development of other disorders along a continuum. Further substantiation of interrelationships between disorder types and potential for specific order of succession appears warranted. A longitudinal study of women with repeated episodes of acute hoarseness would seem to be a logical method and population to use to develop a better understanding of relationships between disorders.

Literature (Brodnitz, 1958; Cooper, 1973) specifically reviewed for the present study discussed stress at onset as related to spastic dysphonia and aphonia and not acute hoarseness. This did not lead the author to expect or assume that stress at onset would significantly correlate with the AH population when compared to another vocally disordered population. However, it is a generally accepted theory that mental stress may affect the body and reduce its immunity to colds or infections (Cooper, 1973; Jackson and Jackson, 1942). Since women with acute hoarseness had, by definition, vocal difficulties primarily secondary to colds or infections, this relationship may be explained. However, further substantiation is warranted.

Factors Demonstrating Potential Trends

Trends for potential relationships to the AH group were demonstrated by three features (persistent chronic sinus and post nasal drip, infected tonsils and adenoids, and change in

routine at onset) in the present study. In addition, five features (menopause, hormone medications for menopause, other medications for menopause, history of thyroid difficulty, and singing professionally or semi-professionally) demonstrated potential trends for the PN population. Investigation of these features in each population might indicate that stress, colds, and infections distinguish acute hoarseness disorders at their stage of development on the continuum (Cooper, 1973) and that hormonal conditions and singing may distinguish vocal difficulties related to polyps or nodules, at yet another stage along this continuum.

Ages of AH and PN responses in this study were similar to Brodnitz (1971) caseload findings. Polyps and polypoid thickening occurred primarily in women of menopause age in both studies. It is entirely likely that in studies of larger sample size or with different age criteria, that menopause may be related to polyps and/or polypoid thickening.

Further consideration might be given to study of relationships of etiological features in males, in other vocal disorders, to women in other geographic areas, and to establish if significant etiological features tend to covary with each other. Two of the respondents indicated a family history of vocal difficulty. This aspect was not investigated

in the present study and may warrant inclusion in subsequent investigations.

CHAPTER V

SUMMARY AND CONCLUSIONS

The present study was designed to examine postulated relationships between potential etiological features for vocal difficulties identified in the literature with women who actually experience vocal difficulty. It was the contention of this study that etiological features would correlate with women having vocal difficulties. Features and relationships requiring further investigation would also be identified.

A questionnaire was designed to collect data on 65 potential features. Women presenting otolaryngologists with complaints of vocal difficulty and women of similar ages who presented otolaryngologists with complaints other than vocal difficulties completed the questionnaire. Intragroup comparison between women with polyps or nodules (PN) and women with acute hoarseness (AH) was also studied.

Statistical treatment with percentages, the chi square (X^2) statistic corrected for continuity and the Fisher Exact Probability Test (or Table of Critical Values) supported the hypothetical statement for twelve of the 65 features: (1) cold or hoarseness at onset; (2) running out

of breath; (3) change in singing voice; (4) dissatisfaction with present vocal quality; (5) frequent throat clearing; (6) history of cough; (7) history of respiratory diseases; (8) having a job; (9) fatigue at onset; (10) singing more than five hours weekly; (11) working conditions possibly precipitous to vocal abuse; and (12) compensation for change in singing voice. One feature cold or hoarseness at onset had to be eliminated because it did not discriminate hoarseness from the presence of a cold. The remaining eleven features strongly distinguished women with vocal difficulty from women without vocal difficulty and clearly indicate investigation of these parameters during case history taking. This becomes pertinent if symptomatic voice therapy, based on identification and reduction of etiologies, is planned.

In addition, twelve features, while not significant, demonstrated potential trends for relationships to vocal disorders and should be included in case histories of women with vocal difficulties. The twelve features were: (1) taking medications other than hormones for menopause; (2) singing; (3) attempts to change vocal quality; (4) taking hormones for menopause; (5) participation in clubs, church, etc.; (6) history of thyroid difficulties; (7) compensation for laryngitis; (8) smoking; (9) consuming more than four drinks on each drinking occasion; (10) singing training; singing professionally or semi-professionally; and (12) soprano or mezzo soprano singing voice. The presence of persistent sinus and post nasal drip

demonstrated a potential relationship with the control group. All other features were nondiscriminate for the vocal disordered population studied, but may be pertinent in individual cases.

Intra-group comparisons revealed that two features (stress at time of onset and more than two colds a year) were significantly present in the AH population, while none significantly correlated with the PN group. This supported theories (Cooper, 1973) that the two vocal disorder types may interrelate in stages of development along a continuum. Trends for relationship between colds, stress, and infections to women with acute hoarseness were indicated. Relationship trends for hormonal conditions and singing to women with polyps and nodules were also indicated. These potential trend features may, on further investigation, distinguish each disorder at its particular stage on the continuum.

Several areas for further investigation, with a larger sample size, were identified. Included were exploration of relationships between:

1) job type, work conditions and vocal difficulty;
2) all aspects of singing and vocal difficulty;
3) colds and onset of vocal difficulty;
4) compensatory behavior attempted when dissatisfied with speaking and singing voices;
5) reported awareness of throat clearing and actual occurrence of the behavior;

6) the twelve features identified as demonstrating potential trends and women with vocal difficulty;
7) the presence of potential etiological features in women with vocal difficulty when compared to a different control population, or a three-way analysis of potential etiological features in women (1) with vocal difficulty, (2) with ear, nose, and sinus difficulties, and the general population;
8) experiencing acute hoarseness and eventual development of polyps or nodules (possibly use a longitudinal study);
9) stress, colds, and infections to women with acute hoarseness;
10) hormonal conditions and singing to women with polyps and nodules;
11) menopause and polyps and/or polypoid thickening;
12) potential etiological features to males experiencing vocal difficulty;
13) significant etiological features established to women with vocal disorders in Montana and women in other geographic areas;
14) potential etiological features and vocal disorders other than polyps, nodules or acute hoarseness;
15) covariance between potential etiological features;

16) and familial trends for vocal difficulties,

It then appears that the present study has served three purposes. It supported, for eleven features, contentions that feature identified in the literature as potentially etiological for women with vocal disorders do actually relate to women experiencing vocal difficulty. It supported theories that the vocal disorder groups AH and PN may be interrelated, possibly on a continuum. It lastly identified several areas, pertinent to the understanding of vocal disorders, that require further investigation. Of primary interest for further investigation may be a three- or four-way analysis of women with vocal disorders (AH, PN), women with ear, nose, sinus difficulties and the general population.

A P P E N D I X E S

APPENDIX A

THE QUESTIONNAIRE

QUESTIONNAIRE

DATE_____ DATE OF BIRTH_____

1. What is your main reason for coming to see your physician? Please check only one.
   a. _____ ear difficulties
   b. _____ voice difficulties
   c. _____ nose difficulties
   d. _____ sinus difficulties
   e. _____ other. Please explain _____

2. When did your difficulties begin? (Please check only one).
   a. _____ within the past month
   b. _____ 1-6 months ago
   c. _____ 7-12 months ago
   d. _____ 1-2 years ago
   e. _____ over 2 years ago. Please explain when._____
   _____

3. Have you ever had speech therapy?
   a. _____ Yes For what type of problem?_____
   When?_____
   b. _____ No

4. At the time checked in Question 2, did you have a job?
   a. _____ Yes What was it?_____
   b. _____ No (If no, please skip to Question 7.)

5. How much talking or vocal use did that job require? Please check one.
   a. _____ very little
   b. _____ some, but not a lot
   c. _____ an average amount
   d. _____ quite a bit
   e. _____ almost constant

   If quite a bit or almost constant were checked, please explain. _____
   _____
   _____

6. Please check any that applied to the job you had around the time checked in Question 2.
   a. _____ You had to work near equipment that required you to use increased loudness to communicate.
   b. _____ The job was quite demanding.
   c. _____ The place where you worked was hot and dry.
   d. _____ The place where you worked was dusty.
   e. _____ The job required you to go inside and outside a great deal.
   f. _____ You had to talk loudly to be heard.

7. When you are at home do you usually find yourself talking (please check one).
   a. _____ very little
   b. _____ some, but not a lot
   c. _____ an average amount
   d. _____ quite a bit
   e. _____ almost constantly

   If quite a bit or almost constantly were checked, please explain._____
   _____
   _____

8. About the time checked in Question 2, how often (on the average each day) would you shout or raise your voice at children, pets, etc:?
   a. _____ less than 5 times per day
   b. _____ 5-10 times per day
   c. _____ over 10 times per day

9. About the time checked in Question 2, how often did you clear your throat or voice each day (on the average)?
   a. _____ less than 10 times
   b. _____ 10-20 times per day
   c. _____ 20-40 times per day
   d. _____ 40-60 times per day
   e. _____ more than 60 times per day

10. About the time checked in Question 2, how often were you attending sporting events or participating in activities where you cheered, shouted or used your voice a lot (on the average for a month)?
   a. _____ never
   b. _____ one or two times
   c. _____ 2-10 times
   d. _____ over 10 times

11. About the time checked in Question 2, were you actively participating in any clubs, social work, or church type activities?
   a. _____ Yes How much talking/vocal use did you do at these activities?
      1. _____ very little
      2. _____ some, but not a lot
      3. _____ an average amount
      4. _____ quite a bit
      5. _____ almost constant
   b. _____ No

12. Around the time checked in Question 2, were you singing? (Please check any that apply).
   a. _____ professionally (for money) Where?_____
   b. _____ nonprofessionally (such as in choirs) Where?_____
   c. _____ just for fun Where?_____
   d. _____ don't sing (If you don't sing, please go to Question 20).

13. At that time approximately how much were you singing (on the average each week)? Please check only one.
    a. _____ less than 5 hours per week
    b. _____ 5-10 hours per week
    c. _____ 10-30 hours per week
    d. _____ over 30 hours per week

14. Have you had any formal singing training?
    a. _____ Yes When?_____
    For how long?_____
    b. _____ No

15. What range of voice do you have? Please check one.
    a. _____ soprano
    b. _____ mezzo (second) soprano
    c. _____ alto
    d. _____ don't know

16. What kind of music were you singing? Please check any that apply.
    a. _____ classical
    b. _____ folk
    c. _____ rock
    d. _____ blues
    e. _____ jazz
    f. _____ country-western
    g. _____ bluegrass
    h. _____ all kinds

17. About the time checked in Question 2, how often were you singing songs that were just a little too high or low for you? Please check one.
    a. _____ never
    b. _____ less than 1/4 of the time
    c. _____ 1/4 to 1/2 of the time
    d. _____ more than 1/2 of the time

18. Did your singing voice change when your difficulties began?
    a. _____ Yes
    b. _____ No If no, please skip to Question 20.

19. Did you do anything to compensate for those changes?
    a. _____ Yes Please check any of the following that apply.
    1. _____ attempted to sing higher
    2. _____ attempted to sing lower
    3. _____ attempted to sing louder
    4. _____ attempted to sing softer
    5. _____ other. Please explain._____
    _____
    b. _____ No

20. About the time checked in Question 2, how much milk or dairy products were you consuming daily? Please check one.
a. _____ less than 1 cup
b. _____ 1-2 cups
c. _____ 2-4 cups
d. _____ 4 or more cups

21. About the time checked in Question 2, were you smoking?
a. _____ Yes How long have you been smoking?_____
_____
b. _____ No If you were not smoking, how much were you in smoke-filled rooms, both at work and at home? After you answer this question, please skip to Question 23.
1. _____ seldom (1-2 hours per day)
2. _____ occasionally (3-5 hours per day)
3. _____ often (5-10 hours per day)
4. _____ almost constantly (over 10 hours per day).

22. How many cigarettes per day (on the average) were you smoking at the time checked in Question 2?
a. _____ less than half a pack
b. _____ 1/2 to 1 pack
c. _____ 1-2 packs
d. _____ 2-3 packs
e. _____ more than 3 packs

23. About the time checked in Question 2, was having a cocktail, a glass of wine, or beer part of your routine?
a. _____ never If never, please skip to Question 26.
b. _____ less than 2 times per week
c. _____ 2-3 times per week
d. _____ 4-5 times per week
e. _____ daily
What do you usually drink?_____

24. Each time you would drink, did you usually have
a. _____ one drink
b. _____ 2-4 drinks
c. _____ 4-6 drinks
d. _____ more than 6 drinks

25. Although you may have a drink when you are in all of the following places, where are you primarily when you have a drink? Please check only one.
a. _____ at home
b. _____ visiting friends
c. _____ in bars or lounges
d. _____ at parties
e. _____ other Please explain._____

26. About the time checked in Question 2, did you often find yourself in places that were (please check any that apply)
    a. _____ dusty
    b. _____ smoggy
    c. _____ dry

27. Do you usually breathe through your nose or mouth? Please check only one.
    a. _____ mouth
    b. _____ nose

28. At any time before the time checked in Question 2, did you have (please check any that apply)
    a. _____ emphysema When?_____
    b. _____ chronic bronchitis When?_____
    c. _____ other respiratory difficulties or trouble breathing? When?_____

29. Did any of the above include a persistent cough?
    a. _____ Yes
    b. _____ No

30. About the time checked in Question 2, did you find yourself frequently running out of breath?
    a. _____ Yes
    b. _____ No

31. About the time checked in Question 2, would you have said you had a (please check any that apply).
    a. _____ persistent cough
    b. _____ nervous cough
    c. _____ smoker's cough

32. Did you feel physically fatigued around the time checked in Question 2?
    a. _____ Yes
    b. _____ No

33. Before the time checked in Question 2, would you have described your voice as: (Please check any that apply)
    a. _____ breathy
    b. _____ low-pitched
    c. _____ high-pitched
    d. _____ throaty
    e. _____ containing many pitch breaks
    f. _____ weak

34. At that time did you attempt to change your voice?
a. _____ Yes Please check any of the following that may apply.
1. _____ attempted to talk higher
2. _____ attemtped to talk lower
3. _____ attempted to sound breathier
4. _____ attempted to sound less breathy
5. _____ attempted to sound more throaty
6. _____ attempted to sound less throaty
7. _____ other. Please explain._____
_____
b. _____ No

35. Are you satisfied with your present speaking quality (as compared to other women you know)?
a. _____ Yes
b. _____ No Please explain._____
_____

36. Compared to your friends and neighbors, is your life usually: (Please check one.)
a. _____ more stressful or tense
b. _____ about as stressful or tense as theirs
c. _____ less stressful or tense

37. About the time checked in Question 2, would you have described everyday life as:
a. _____ very stressful, hard to cope with
b. _____ somewhat more stressful than usual
c. _____ about average in stress
d. _____ less stressful than usual

38. Were there any changes in family routine (deaths, change in jobs, etc:) or unusual stress around the time checked in Question 2?
a. _____ Yes Would you please explain._____
_____
b. _____ No

39. Around the time checked in Question 2, were you menstruating regularly?
a. _____ Yes
b. _____ No

40. Just prior to or during menstruation do you (please check any that apply)
a. _____ have a tendency to retain fluids
b. _____ take diuretics for the retention of fluids
c. _____ become depressed, anxious or tense
d. _____ experience change in your voice

41. Were you taking birth control pills prior to the time checked in Question 2?
a. _____ Yes When did you begin?_____
b. _____ No

42. Had you begun menopause prior to the time checked in Question 2?
a. _____ Yes When did it begin?_____
b. _____ No If no, please skip to Question 45.

43. About the time checked in Question 2, were you taking any hormone medications for menopausal symptoms?
a. _____ Yes
b. _____ No

44. Were you taking other medications related to menopause at that time?
a. _____ Yes
b. _____ No

45. Were you pregnant just before or during the time checked in Question 2?
a. _____ Yes
b. _____ No If no, please skip to Question 47.

46. Did your voice change during or after this pregnancy?
a. _____ Yes
b. _____ No

47. At any time prior to the time checked in Question 2, have you had thyroid difficulties?
a. _____ Yes When?_____
b. _____ No

48. Around the time checked in Question 2, were you taking medications for thyroid difficulty?
a. _____ Yes
b. _____ No

49. Around the time checked in Question 2, did you suspect or know you had allergies?
a. _____ Yes
b. _____ No

0. Does your difficulty seem to be seasonal?
a. _____ Yes Which seasons?_____
b. _____ No

1. Around the time checked in Question 2, did you have a chronic sinus infection or post nasal drip?
a. _____ Yes
b. _____ No

2. Does this infection or post nasal drip seem to be persistent?
a. _____ Yes
b. _____ No

53. Were your tonsils and/or adenoids removed at any time before the time checked in Question 2?
a. _____ Yes When?_____
b. _____ No If no, were your tonsils/adenoids infected around the time checked in Question 2?
1. _____ Yes
2. _____ No
Are infected tonsils/adenoids a persistent problem?
3. _____ Yes
4. _____ No

54. Around the time checked in Question 2, were you taking (please check any that apply)
a. _____ antidepressants
b. _____ antihistamines
c. _____ tranquillizers

55. Around the time checked in Question 2, approximately how many aspirin were you taking weekly? Please check one.
a. _____ none
b. _____ less than 10
c. _____ 10-25
d. _____ over 25

56. Around the time checked in Question 2, were you taking any medications that appeared to affect your voice?
a. _____ Yes Which medications?_____
b. _____ No

57. How often do you have colds each year?
a. _____ never If never, please skip to Question 59.
b. _____ once or twice
c. _____ 2-5 times per year
d. _____ over five times per year

58. Do you tend to get hoarse or have laryngitis when you have a cold?
a. _____ Yes
b. _____ No

59. When you get laryngitis do you (please check any that may apply)
a. _____ usually try to talk less
b. _____ talk about the same amount
c. _____ try to talk softer
d. _____ try to talk higher or lower

60. Did you have a cold, hoarse voice or laryngitis at the time checked in Question 2?
a. _____ Yes
b. _____ No

61. Around the time checked in Question 2, did you (please check any that apply.)
a. _____ have surgery. What kind of surgery?_____
b. _____ receive an injury to your throat or neck? How did this happen?_____
c. _____ have a serious illness? Would you please explain what it was?_____

62. Have you ever had (Please check any that apply.)
a. _____ Parkinson's Disease. When was it diagnosed?_____
b. _____ Multiple Sclerosis. When was it diagnosed?_____
c. _____ other neurological difficulties (such as epilepsy, muscular dystrophy, etc:). When was it diagnosed?
d. _____ cancer. To what part of your body?_____
When was it diagnosed?_____

63. Are there any other comments or things you can tell me that will help me understand you and your difficulties better?_____

FOR PHYSICIAN'S USE ONLY

This patient was primarily concerned about difficulties related to her:
a. _____ ears
b. _____ voice
c. _____ sinuses
d. _____ nose
e. _____ other

This patient was diagnosed as having:
a. _____ vocal nodules
b. _____ laryngeal polyps
c. _____ polypoid thickening
d. _____ functional voice difficulties
e. _____ vocal difficulties related colds, infections
f. _____ paralyzed vocal fold secondary to _____.
g. _____ other nonfunctional vocal difficulties. Please explain if appropriate._____
h. _____ no laryngeal difficulties

APPENDIX B

COVER LETTER

Dear Madam:

Attached is a questionnaire which is part of a research study designed to study some of the factors which may be related to voice problems in women. Some of those who are requested to fill out this questionnaire may not have voice problems. If this is your case, your responses to the questions are very important to help establish a basis for comparison. Please note that your name is not requested and that you may be assured of total confidentiality.

Please follow these instructions:

1) Answer each question as best you can.
2) Have your physician complete the last two questions.
3) Place the completed questionnaire in the attached envelope and seal it.
4) Return the envelope to the receptionist.

Please do NOT fill out a questionnaire if you have completed one before or are younger than eighteen or older than 55.

If you would like a summary of the results of this study, please put your name and address on this sheet of paper and put it in the envelope.

Thank you very much for your time and cooperation.

Sincerely,

Dee Kotaska

APPENDIX C

AGE, ONSET AGE, TYPE OF PROBLEM, AND CITY OF PHYSICIAN FOR RESPONDENTS WITH VOCAL DIFFICULTIES

AGE, ONSET AGE, TYPE OF PROBLEM, AND CITY OF PHYSICIAN FOR RESPONDENTS WITH VOCAL DIFFICULTIES

Respondent Number	Age	Onset Age	Problem/ type	Physician Location
1.	21	19	PN-Nodules	Missoula
2.	24	23	PN-Nodules	Missoula
3.	37	36	O-Leukoplakia	Helena
4.	55	48	PN-P.Thick.	Missoula
5.	23	23	PN-Nodules	Helena
6.	35	35	PN-Nodules	Helena
7.	23	23	AH	Missoula
8.	49	48	PN-Polyps	Missoula
9.	28	28	AH	Missoula
10.	20	19	AH	Missoula
11.	32	31	PN-Nodules	Missoula
12.	22	22	AH	Missoula
13.	18	17	AH	Helena
14.	30	30	O-Functional	Helena
15.	52	51	O-Functional	Great Falls
16.	41	40	PN-Polyps	Great Falls
17.	36	36	PN-P.Thick.	Missoula
18.	32	28	PN-Nodules	Missoula
19.	37	36	PN-Nodules	Great Falls
20.	40	38	AH	Great Falls
21.	25	22	PN-Nodules	Missoula
22.	54	47	O-Undiagnosed	Helena
23.	20	18	O-Functional	Great Falls
24.	30	29	AH	Helena
25.	24	24	AH	Missoula
26.	53	46	O-P.fold	Great Falls
27.	38	34	AH	Great Falls
28.	54	49	PN-Polyps	Missoula
29.	55	50	PN-Polyps	Missoula
30.	43	42	PN-Nodules	Great Falls
31.	43	42	AH	Missoula
32.	47	45	AH	Helena
33.	38	38	AH	Missoula
34.	22	20	PN-Nodules	Missoula
35.	47	45	PN-Nodules	Helena

Respondents 1-30 were included in the analysis of women with Vocal Difficulties and a control population. Respondents 31-35 were included in the PN/AH analysis. Onset ages are approximate. Wording of question 2 did not allow for exact fixing of onset age.

APPENDIX D

QUESTION RESPONSES BY EXPERIMENTAL AND CONTROL GROUPS

QUESTION RESPONSES BY EXPERIMENTAL AND CONTROL GROUPS

Question No. and Feature	Raw Data C	Raw Data V	% C	% V	% Diff.	x^2	C Coef.	Fisher	Sig. Level
1. Voice Complaint	0/30	30/30	0	100	100				
2. Time of Onset	No analysis. See Appendix C for exp. onset ages								
3. Speech Therapy	1/30	4/30	3	13	10				
4. Having a job	12/29	23/30	41	77	36	6.22	.308		.02*
5. Constant talk/job	2/12	7/23	17	30	13			.23	
6. Job/Vocal Abuse	7/12	21/23	58	91	33			.03	.03*
7. Quite/con. talk at home	3/30	3/30	10	10	0				
8. 5+ daily shouting	12/29	13/29	41	45	4	.00			
9. 10+ daily clear throat	6/28	17/28	21	61	40	7.38	.341		.01*
10. 2+ monthly cheering	6/28	9/29	21	31	10	.27			
11. Clubs, church etc:	9/29	16/30	31	53	22	2.16			.20
Quite/con. talking	2/29	5/16	22	31	9				
12. Sing	10/25	18/27	40	67	27	2.72			.10
Pro or semi pro	2/10	7/18	20	39	19			.21	
13. 5+ hrs./week singing	0/10	7/17	0	41	41			.02	.02*
14. Singing training	1/10	5/18	10	28	18			.23	
15. Sop/M. Sop. Voice	1/29	5/17	11	29	18			.24	
16. Kind of Music	No kind prevalent.								
17. 1/4 sing too high or low	1/10	4/18	10	22	12				
18. Sing voice changed	3/10	16/17	30	94	64			.001	.001*
19. Compensate for change	1/ 3	15/16	33	94	61			.05	.05*
20. 2c.+ daily dairy prod.	7/28	6/30	25	20	5	.02			
21. Smoking	11/29	17/29	38	59	21	1.73			.20
5+ hrs/day in smoke (non)	2/14	2/10	14=	20	6			not**	
22. 1 pack + per day	3/10	7/18	30	39	9				
23. 2+ weekly drinking	7/28	6/29	25	21	4	.01			

*Considered significant at .05 level
**From Table of Critical Values for Fisher Test (Siegl, 1956)
C = Control Subjects
V = Vocally Disordered Subjects

QUESTION RESPONSES BY EXPERIMENTAL AND CONTROL GROUPS (Cont.)

Question No. and Feature	Raw Data C	Raw Data V	% C	% V	% Diff.	x^2	C Coef.	Fisher	Sig. Level
24. 4+ drinks	0/15	4/21	0	19	19			.10	.10
25. Where drink	No place prevalent.								
26. In dusty etc. places	21/30	20/30	70	67	3	.00			
27. Mouth breather	7/30	9/29	23	31	8	.14			
28. Resp. disease history	6/28	17/29	21	59	38	6.72	.325		.01*
29. Cough with Resp. dis.	3/ 6	11/17	50	65	15			not**	
30. Run out of breath	4/27	19/29	15	66	51	12.83	.432		.001*
31. Cough history	5/29	16/30	17	53	36	6.88	.323		.01*
32. Fatigue	11/29	21/29	38	72	34	5.65	.298		.02*
33. Prior vocal quality	20/29	25/30	69	83	14	.98			
34. Change vocal quality	3/24	9/24	13	38	25	2.78			.10
35. Dissat. with voice	1/28	11/29	4	38	34	8.16	.354		.01*
36. Life has more stress	8/29	10/29	28	34	6	.08			
37. more/very stress onset	11/30	13/28	37	46	9	.24			
38. Change in routine	9/28	11/28	32	39	7	.08			
39. Menstruate regularly	18/28	17/29	64	59	5	.03			
40. Menstrual changes	18/24	17/19	75	89	14				
41. Oral Contraceptives	6/28	3/23	21	13	7				
42. Begun menopause	4/28	8/29	14	28	14	.82			
43. Hormones for menopause	1/ 4	4/ 8	25	50	25			.35	
44. Other meds. for meno.	0/ 4	3/ 8	0	38	38			.25	
45. Pregnant	1/29	0/30	3	0	3				
46. Voice change in preg.	0/ 1	0/ 0	0	0	0				
47. Thyroid history	4/30	10/30	13	33	20	2.33			.20
48. Meds. for thyroid	3/ 4	6/10	75	60	15			.42	
49. Allergies	11/30	8/30	37	27	10	.31			
50. Seasonal differences	8/30	5/28	27	18	9	.24			

*Considered significant at .05 level

**From Table of Critical Values for Fisher Test (Siegl, 1956)

C = Control Subjects

V = Vocally Disordered Subjects

QUESTION RESPONSES BY EXPERIMENTAL AND CONTROL GROUPS (Cont.)

Question No. and Feature	Raw Data C	Raw Data V	% C	% V	% Diff.	x^2	C Coef.	Fisher	Sig. Level
51. Chronic sinus or PND	8/29	9/30	28	30	2	.01			
52. Persistent sinus/PND	8/ 8	5/ 8	100	63	37			.10	.10
53. Tonsil/Adenoid intact	13/28	16/29	46	55	9	.16			
Infected T&A	3/ 7	4/10	43	40	3			not**	
Persistently infected	3/ 9	2/11	33	18	15			.30	
54. Meds. history	7/30	6/30	23	20	3	.00			
55. Take aspirin	14/29	14/29	48	48	0	.07			
56. Meds. affecting voice	0/30	1/30	0	3	3				
57. 2+ colds/year	7/29	12/30	24	40	16	1.05			
58. Hoarse with cold	14/29	16/26	48	62	14	.51			
59. Compensate for hoarse	18/29	23/28	62	82	20	1.94			
60. Cold/hoarse at onset	8/30	22/28	27	79	50	13.62	.436		.001*
61. Illness, surgery	10/30	11/30	33	37	4	.00			
62. Neuro history	1/29	0/30	3	0	3				
Cancer history	0/29	3/30	0	10	10				

*Considered significant at .05 level
**From Table of Critical Values for Fisher Test (Siegl, 1956)
C = Control Subjects
V = Vocally Disordered Subjects

APPENDIX E

QUESTION RESPONSES BY VOCALLY DISORDERED SUBGROUPS (AH, PN)

QUESTION RESPONSES BY VOCALLY DISORDERED SUBGROUPS (AH, PN)

Question No. and Feature	Raw Data AH	Raw Data PN	% AH	% PN	% Diff.	Fisher Score	Sig. Level
1. Voice Complaint	12/12	17/17	100	100	0		
2. Time of Onset	No analysis. See Appendix C for onset ages.						
3. Speech Therapy	0/12	4/17	0	24	24		
4. Having a job	10/12	14/17	83	82	1		
5. Constant talk/job	1/ 9	5/13	11	38	27	not**	
6. Job/vocal abuse	10/10	13/17	100	86	14	not**	
7. Quite/con. talk at home	0/12	2/17	0	7	7		
8. 5+ daily shouting	4/12	8/16	33	50	17		
9. 10+ daily clear throat	8/12	12/16	67	75	8		
10. 2+ monthly cheering	2/12	7/16	17	44	27		
11. Clubs, church etc:	7/12	9/17	58	53	5		
Quite/con. talking	2/ 7	2/ 9	29	22	7	not**	
12. Sing	7/12	11/16	58	69	11		
Pro or semi pro	2/ 7	7/11	29	64	35	.14	.14
13. 5+ hrs./week singing	2/ 7	6/11	29	55	26	not**	
14. Singing/training	2/ 7	4/11	29	36	7	not**	
15. Sop./M.Sop. voice	2/ 7	4/10	29	40	11	not**	
16. Kind of music	No kind prevalent.						
17. 1/4+ sing too high or low	6/ 7	7/11	86	64	22	not**	
18. Sing voice changed	5/ 7	10/10	71	100	29	not**	
19. Compensate for change	4/ 5	10/10	80	100	20	not**	
20. 2c.+ daily dairy prod.	3/12	4/17	25	24	1		
21. Smoking	6/12	10/16	50	63	13		
5+ hrs./day in smoke (non)	0/ 5	1/ 5	0	20	20		
22. 1 pack+ per day	2/ 6	3/11	33	27	6		
23. 2+ weekly drinking	5/12	2/16	42	13	29	.08	.08

*Significant .05 level
**From Table of Critical Values for Fisher Test (Siegel, 1956)
AH - Subjects diagnosed as having acute hoarseness
PN - Subjects diagnosed as having polyps or nodules

QUESTION RESPONSES BY VOCALLY DISORDERED SUBGROUPS (AH, PN) Cont.

Question No. and Feature	Raw Data AH	Raw Data PN	% AH	% PN	% Diff.	Fisher Score	Sig. Level
24. 4+ drinks	1/ 9	2/ 8	11	25	13	not**	
25. Where drink	No place prevalent.						
26. In dusty etc: places	9/12	11/17	67	65	2		
27. Mouth breather	3/12	6/17	33	35	2		
28. Resp. disease hist.	5/12	9/16	42	56	14	not**	
29. Cough with resp. dis.	4/ 5	5/ 9	80	56	24	not**	
30. Run out of breath	7/11	9/16	64	56	8		
31. Cough history	8/12	9/17	67	53	14		
32. Fatigue	8/12	10/16	67	63	4		
33. Prior vocal quality	9/12	14/17	75	82	7		
34. Change vocal quality	3/10	7/14	30	50	20	not**	
35. Dissat. with voice	4/12	6/16	33	37	4		
36. Life has more stress	5/12	6/16	42	38	4		
37. More/very stress onset	9/12	5/15	75	33	42	.03	.03*
38. Change in routine	6/11	4/16	55	25	30	.10	.10
39. Menstruate regularly	9/12	9/16	75	56	19		
40. Menstrual change	8/10	8/ 9	80	89	9	not**	
41. Oral contraceptives	2/12	1/11	17	9	8		
42. Begun menopause	1/12	6/16	8	38	30	.08	.08
43. Hormones for menopause	0/ 1	3/ 6	0	50	50	.57	.57
44. Other meds. for meno.	0/ 1	2/ 6	0	33	33	.71	.71
45. Pregnant	0/12	0/17	0	0	0		
46. Voice change in preg.	No analysis. No respondents pregnant.						
47. Thyroid history	4/11	3/17	36	18	18		
48. Meds. for thryoid	1/ 4	2/ 3	25	67	42	.34	.34
49. Allergies	4/12	3/17	33	18	15		
50. Seasonal Differences	2/12	3/15	17	20	3		

*Significant .05 level
**From Table of Critical Values for Fisher Test (Siegel, 1956)
AH - Subjects diagnosed as having acute hoarseness
PN - Subjects diagnosed as having polyps or nodules

QUESTION RESPONSES BY VOCALLY DISORDERED SUBGROUPS (AH, PN) Cont.

Question No. and Feature	Raw Data AH	Raw Data PN	% AH	% PN	% Diff.	Fisher Score	Sig. Level
51. Chronic sinus or PND	6/12	5/17	50	29	21		
52. Persistent sinus/PND	4/ 6	1/ 4	67	25	42	.24	.24
53. Tonsils/Adenoids intact	8/11	11/17	73	65	8		
Infected T&A	3/ 5	1/ 5	60	20	40	.24	.24
Persistently infected	1/ 4	1/ 6	25	17	8	not**	
54. Meds. history	1/12	4/17	8	24	16		
55. Take aspirin	5/11	9/16	45	56	11		
56. Meds. affecting voice	0/12	1/17	0	6	6		
57. 2+ colds/year	7/11	3/16	64	19	45	.02	.02*
58. Hoarse with cold	8/11	8/14	73	57	16	not**	
59. Compensate for hoarse	10/12	12/15	83	80	3		
60. Cold/hoarse at onset	7/11	10/16	64	63	1		
61. Illness/surgery	5/12	4/17	42	24	18		
62. Neuro. history	0/12	0/17	0	0	0		
Cancer history	1/12	1/17	8	6	2		

*Significant .05 level
**From Table of Critical Values for Fisher Test (Siegel, 1956)
AH - Subjects diagnosed as having acute hoarseness
PN - Subjects diagnosed as having polyps or nodules

APPENDIX F

INSTRUCTIONS

INSTRUCTIONS

1. As each female patient enters the office, use the usual procedure to inquire why she has come to the physician. If her response is ambiguous (i.e. throat), ask her, "Are you primarily here to see the physician about your voice?"
2. Determine the patient's age from her file or by asking.
3. If the response to the above questions indicates that vocal problems are the primary complaint and the patient is between the ages of 18-55, give her a copy of the questionnaire (unless she has already filled one out) and a cover letter and instruct her to:
   a. Complete the questionnaire while waiting for the physician.
   b. Have the physician complete the last two questions.
   c. Put the completed questionnaire in the attached white envelope.
   d. Return the white envelope to the receptionist's desk.
4. Record the patient's age in the appropriate place on the checksheet.
5. Give the questionnaire to the next two patients who enter the office:
   a. who are within 5 years of age of the first patient,
   b. and whose primary complaint is not her voice.

   Instruct her to complete the questionnaire as directed in Instruction 3. If the next patient is a female who also has a complaint about her voice, give her a questionnaire with the same instructions and give questionnaires to the next six patients whose primary complaints are not their voice and are within five years of age of the first two patients.
6. Record the patients' ages in the appropriate place on the checksheet.

7. Return completed questionnaires in the white envelopes to the Speech and Hearing Clinic in the addressed, stamped envelopes which will be provided to the physician every two weeks.

B I B L I O G R A P H Y

BIBLIOGRAPHY

Arnold, Godfrey E. "Spastic Dysphonia." Logos II (1959).

Aronson, Arnold E.; Herbert W. Peterson, Jr.; and Edward M. Litin. "Voice Symptomatology in Functional Dysphonia and Aphonia." Journal of Speech and Hearing Disorders XXIX (1964).

_____. "Psychiatric symptomatology in Functional Dysphonia." Journal of Speech and Hearing Disorders XXXI (1966).

Baker, Daniel C. "Laryngeal Problems in Singers." Laryngoscope LXXII (1962).

Barton, Richard. "The Whispering Syndrome of Hysterical Dysphonia." Annals of Otology, Rhinology, and Laryngology LXIV (1960).

Bicknell, P. G. "Mild Hypothyroidism and Its Effect on the Larnyx." Journal of Laryngology and Otology LXXXVII (1973).

Boone, Daniel R. The Voice and Voice Therapy. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1971.

Brewer, David W., Sr. "Early Diagnostic Signs and Symptoms of Laryngeal Disease." Laryngoscope LXXXV (1975).

Brodnitz, Friedrich S. "Vocal Rehabilitation in Benign Lesions of the Vocal Cords." Journal of Speech and Hearing Disorders XXIII (1958).

_____. "Goals, Results and Limitations of Vocal Rehabilitation." Archives of Otolaryngology LXXVII (1963).

_____. Vocal Rehabilitation. Rochester, Minnesota: American Academy of Opthalmology and Otolaryngology, 1971.

_____. "Diagnostic Techniques for Evaluating Voice of Singer and Actor: Part I--Patient's History." ORL Digest, June 1975.

Burke, Herbert A. "Endocrine Aspects of Otolaryngology." Laryngoscope LXXVIII (1968).

Cooper, Morton. Modern Techniques of Vocal Rehabilitation. Springfield, Ill.: Charles C. Thomas, Publishers, 1973.

Damste, P. H. "Voice Change in Adult Women Caused by Virilizing Agents." Journal of Speech and Hearing Disorders XXXII (1967).

DeWeese, David, and William Saunders. Textbook of Otolaryngology. 3d ed. St. Louis, Mo.: Mosely Company, 1968.

Diehl, Charles F. "Voice and Personality," in Psychological and Psychiatric Aspects of Speech and Hearing. Dominic Barbara, Editor. Springfield, Ill.: C. T. Thomas, Publisher, 1960.

Dordain, M. "Statistical Study of Influences of Contraceptive Drugs on the Voice." Folia Phoniatrica XXIV (1973). Abstract in ORL Digest, August 1973.

Ellis, Maxwell. "Acute Diseases of Larynx," in Diseases of the Ear, Nose and Throat. 2d ed. W. G. Scott-Brown, John Ballantyne, and John Groves, Editors. London: Butterworths, 1965a.

_____. "Chronic Diseases of Larynx," in Diseases of the Ear, Nose and Throat. 2d ed. W. G. Scott-Brown, John Ballantyne, and John Groves, Editors. London: Butterworths, 1965b.

Farquharsen, I. Malcolm, and J. K. F. Anthony. "Research Techniques in Voice Pathology." Journal of Laryngology and Otology LXXXIV, 1970.

Flach, M.; H. Schwickardi; and R. Simon. "The Influence of Menstruation and Pregnancy on the Singing Voice." Folia Phoniatrica XXI (1969).

Frable, Mary Ann. "Hoarseness, a Symptom of Premenstrual Tension." Archives of Otolaryngology LXXV (1962).

Froeschels, Emil. "Remarks on Some Pathologic and Physiologic Conditions of the Human Voice." Archives of Otolaryngology LXXI (1960).

Harma, R.; A. Sonninen; E. Vartainen; P. Haveri; and A. Vaisanen. "Vocal Polyps and Nodules." Folia Phoniatrica XXVII (1975).

Heaver, Lynwood. "Psychiatric Observations on the Personality Structure of Patients with Habitual Dysphonia." Logos I (1958).

Hiroto, I.; T. Shin; Y. Koike; and S. Hirose. "Etiology of Laryngeal Polyps." ORL Digest, 1973.

Jackson, C.; and C. L. Jackson. Diseases and Injuries of the Larynx. New York: MacMillan, 1942.

Linke, C. E. "Characteristics of Female Voices and Their Relationship to Vocal Effectiveness." Folia Phoniatrica XXV (1973).

Lucente, Frank E. "Endocrine Problems in Otolaryngology." Annals of Otology, Rhinology and Laryngology LXXXII (1973).

MacComb, William S.; and Gilbert H. Fletcher. Cancer of the Head and Neck. Baltimore, Md.: Williams and Wilkins Company, 1967.

Moncur, John P., and Isaac P. Brackett. Modifying Vocal Behavior. New York: Harper and Row, 1974.

Moore, Paul. "Organic Voice Disorders," in Handbook of Speech Pathology. Lee Travis, Editor. New York: Appleton-Century-Crofts, 1957.

Moses, P. J. The Voice of Neuroses. New York: Greene and Stratton, 1954.

_____. "Emotional Causes of Vocal Pathology," in Psychologi logical and Psychiatric Aspects of Speech and Hearing. Dominic Barbara, Editor. Springfield, Ill.: C. T. Thomas Publishers, 1960.

Murphy, Albert T. Functional Voice Disorders. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1964.

Punt, Norman. "Lubrication of the Vocal Mechanism." Folia Phoniatrica XXVI (1974).

Ranger, Douglas. "Trauma and Stenosis of the Larynx," in Diseases of the Ear, Nose and Throat. 2d ed. W. G. Scott-Brown, John Ballantyne, and John Groves, Editors. London: Butterworths, 1965.

Robe, Evelyn; Joel Brumlik; and Paul Moore. "A Study of Spastic Dysphonia." Laryngoscope LXX (1960).

Siegel, Sidney. Nonparametric Statistics for the Behavioral Sciences. New York: McGraw Hill Book Co. Inc., 1956.

Simpson, John F.; John C. Ballantyne; and John Groves. A Synopsis of Otolaryngology. Bristol, England: John Wright and Sons, Ltd., 1967.

Wendler, J. "Cycle-Related Variations of Vocal Efficienty and Influence of Ovulation Inhibitors." Folia Phoniatrica XXIV (1972). Abstract in ORL Digest, August 1973.

Wilson, Frank. "Workshop on Vocal Disorders." Held in St. Paul, Minnesota, May 3-5, 1974.