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THE STATUS OF OBJECTIVE EVALUATION OF THE VELOPHARYNGEAL
MECHANISM IN MONTANA

By

Mary Pat Schilly

B.S., Southeast Missouri State University, 1976

Presented in partial fulfillment of the requirements


for the degree of

Master of Arts

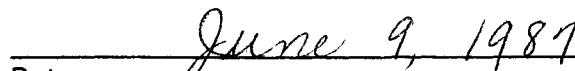
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Communication Sciences
and Disorders

The Status of Objective Evaluation of the Velopharyngeal
Mechanism in Montana (79 pp.)

Director: Mary A. Hardin, Ph.D. *MAH*

The purpose of this study was to examine, in part, the efficiency of the evaluation process for cleft palate children with velopharyngeal insufficiency who have been seen by cleft palate teams in the state of Montana. Specifically, the intent of the study was to 1) determine whether or not children who evidence nasalization of speech receive a recommendation for an objective assessment of the velopharyngeal mechanism prior to behavioral or surgical treatment of the problem, 2) identify the time interval involved with such a recommendation, and 3) specify the criteria employed to determine the need for an objective assessment.

Information was retrieved from the Handicapped Childrens Services (HCS) files for 80 subjects diagnosed as having repaired cleft palate, submucous cleft, or congenital palatal incompetence, who were at least age 5 at the onset of the study. All subjects had a history of speech nasalization as determined since the onset of speech production and/or as first noted through evaluation by cleft palate team specialists. In addition, a questionnaire designed to survey methods of diagnosis and management of velopharyngeal insufficiency associated with cleft palate was completed via telephone interviews with 8 speech pathologists serving on the cleft palate teams throughout the state of Montana.

Results of this investigation indicated that 14 of the 80 subjects received a recommendation for an objective evaluation of the velopharyngeal mechanism following diagnosis of nasalization. In addition, the data indicated that of the 14 who received a recommendation for an objective evaluation, only 8 of the subjects received an evaluation immediately following the diagnosis of nasalization. According to the results obtained from the telephone survey of speech pathologists on the cleft palate teams, only 4 of the 8 respondents reported that an objective evaluation was necessary at the initial diagnosis of nasalization.

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Chapter 1

INTRODUCTION

It is estimated that one in every 750 live births result in cleft lip and/or palate (McWilliams, Morris, and Shelton, 1984). Depending on the type and severity of the cleft, this condition frequently has a significant effect on the individual, as well as the family, in a variety of ways. Habilitation of cleft palate is a complex, multivariable issue involving consideration of anatomic, physiologic, social and communicative aspects of development. Consequently, extensive and multidimensional management is required. Specialists from a broad range of disciplines oftentimes combine their expertise in one setting to provide the necessary care to the cleft palate individual and are usually referred to as the cleft palate team. Multidisciplinary management begins at birth, and due to the complex nature of the disorder, often continues into late adolescence and early adulthood.

1.1. Speech Characteristics of Individuals with Cleft Lip and Palate

It has been well established, in the literature to date (McWilliams et al. 1984; Morris, 1975; Van Demark, Morris, and Vandehaar, 1979), that one of the most critical and major potential handicapping areas of concern to the cleft palate child, the parents, as well as to each of the professional members involved, is defective speech. Despite improvements in surgical technique, orthodontic management, and speech guidance, the proportion of speech-impaired children has remained

high (Morris, 1981; Spriestersbach and Sherman, 1968). McWilliams et al. (1984) reported that, on the average, these children exhibit poorer speech proficiency than noncleft children of the same age and sex. Like their noncleft peers, these children are at risk for articulation errors related to maturation and dental anomalies. Since speech is a process that is learned through development and maturation, the patient with cleft palate is subject to the usual kinds of influences (e.g. hearing, intelligence, dentition) that interfere with that learning process in the noncleft individual with no physiological deficits. According to Van Demark et al. (1979), these children may exhibit articulation deficits that are apparently strongly influenced by maturation because of an inability to match the normal articulation models or because the verbal output, thus verbal practice, is sufficiently limited. In addition, children with cleft palate frequently demonstrate dental-occlusal problems including crossbite and mesiocclusion. If a cleft of the lip and alveolus is present, malposed teeth and instability of dental arches may be present. As indicated by Morris (1975), the roles of other defects of the oral mechanism (e.g. size of oral cavity, configuration of palatal vault, size of tongue), although taken singly may not adversely affect speech production, may in combination severely restrict the acquisition and maintenance of normal articulatory patterns in the cleft palate patient.

In addition to articulation errors related to maturational/developmental delays and dentition, children with cleft palate are at risk for articulation and resonance problems associated with velopharyngeal valving deficits. During oral speech production for a child born with a normal palate, the velum serves as an efficient

valve used to divert the airstream into the oral cavity for all sounds of the English language except the nasal consonants /m/, /n/, and /ŋ/. As these latter three sounds are spoken, the soft palate is momentarily lowered and nasal resonance is added to the speech characteristics (Fletcher, 1978). Closure of the port enables a speaker to develop sufficient oral air pressure and air flow for production of various consonant sounds, namely the pressure consonants consisting of plosives, fricatives and affricates.

Prior to closure of the palatal cleft, the oral and nasal cavities are coupled. As a result, the infant is unable to impound intraoral air pressure and regulate the direction of the airstream. Perceptually, the consequences of oral-nasal coupling include audible nasal emission of air during production of pressure consonants and hypernasality during vocalic consonants and vowel production.

The primary purpose of cleft palate repair then, is to provide an intact mechanism for normal speech production (Dorf and Curtin, 1982). The major reason for performing surgery to close a cleft palate is to create a velopharyngeal valving mechanism that is capable of separating the oral and nasal cavities during speech. An attempt is made to provide a soft palate of sufficient bulk, length, and mobility to establish velopharyngeal competence that is adequate for normal speech. Surgical closure of the primary cleft may also facilitate feeding, psychosocial, cosmetic, and/or middle ear problems.

Even following surgical repair of the palatal cleft, however, an estimated 25% of children with cleft palate continue to exhibit velopharyngeal incompetence (McWilliams et al., 1984; Morris, 1975). Persistence of velopharyngeal

incompetence may be related to any one of a number of problems, including: 1) inadequate length or functioning of the repaired structures, 2) scar tissue which restricts the mobility of the soft palate and prevents it from making the numerous, rapid adjustments needed in ongoing speech, or 3) the occurrence of a growth spurt, such as during adolescence, in which the lower third of the face grows down and away from the base of the skull creating a reoccurrence of velopharyngeal insufficiency (Ross and Johnston, 1972). Although infrequently observed, nasalization of speech may also persist following primary palatoplasty as a learned behavior. Typically, when nasalization occurs as a result of learned behavior, it is found to be phoneme-specific (McWilliams et al., 1984; Trost, 1980).

Atypical patterns of articulation are also noted in some children when there is abnormal coupling of the oral and nasal cavities (Dorf and Curtin, 1982; Trost, 1981). The two most common compensatory articulation patterns include the glottal stop and the pharyngeal fricative. Glottal stops are plosive consonants resembling a "cough-like" sound resulting in interruption (vocal fold valving) of the airstream at the glottis. Pharyngeal fricatives are produced with the source of friction in the pharyngeal area (Bernthal and Bankson, 1981). During production of plosive and fricative sounds, children attempt to imitate the characteristics of these sounds. For example, children with adequate velopharyngeal mechanisms, who are too young to produce fricatives, will generally substitute a plosive for the fricative sound. When children with velopharyngeal incompetence attempt the same production, an appropriate plosive substitution can not be made and so they may compensate by using a glottal or pharyngeal fricative. Bzoch (1971) has

included the velar fricative as a third type of compensatory articulation pattern, described as a linguavelar articulation made in the appropriate place of /k/ and /g/.

More recently, Trost (1981) described three additional types of compensatory articulation patterns. These atypical gestures include a pharyngeal stop for /k/ and /g/; a mid-dorsum palatal stop which is similar in vocal tract location to /j/, substituted for /t,d,k,g/; and a linguavelar nasal fricative which is sometimes referred to as a nasal snort. According to Trost, these patterns of articulation represent errors in place of production. Manner of production is generally preserved.

Morris (1979) hypothesized that the child with velopharyngeal incompetence develops these atypical patterns of articulation to avoid the perceptual consequences of nasal emission of air. By valving the airstream at a point inferior to the velopharyngeal port in the vocal tract, the plosive or fricative character of the target sound is maintained. According to Morris, the resultant production is perceived by the child to be a closer approximation of the target sound. This hypothesis was indirectly tested by Paynter and Kinard (1979). Noncleft children, cleft palate children with velopharyngeal incompetence but without compensatory articulation, and cleft palate children with both velopharyngeal incompetence and compensatory articulation, were asked to indicate preference for test words produced with nasal emission or with compensatory articulation. The noncleft children and the cleft palate children without compensatory articulation preferred the test words produced with compensatory articulation, but the cleft palate children with compensatory articulation did not evidence a clear pattern of

preference for either error type.

The results of the study above, by Paynter and Kinard (1979), do not support the hypothesis that children with cleft palate who produce compensatory articulation patterns do so because they consider these productions to be perceptually better than those produced with nasal distortion. Because the children with normal speech and those exhibiting audible nasal emission responded more favorably to compensatory articulation patterns than to nasalization, it might be speculated that children with cleft palate who develop these atypical articulation patterns do so in response to the listener's preference; that is, the listener responds more favorably to compensatory articulation patterns and rewards those productions.

While these compensatory patterns are frequently evident in patients with incompetent velopharyngeal mechanisms, they also persist in some individuals whose velopharyngeal mechanisms have been adequately reconstructed. It has been speculated that the persistence of compensatory articulation patterns following restoration of the mechanism occur because the abnormal speech production motor patterns have become well established prior to reconstruction (Dorf and Curtin, 1982).

Historically, the surgical literature has indicated that the palate should be repaired between 18 and 24 months of age (McWilliams et al., 1984). Since current developmental research has shown that speech develops prior to and during this period, it is not surprising that many of the atypical articulation patterns observed in children and adults with repaired clefts can be traced to the chronology of cleft

palate treatment. These problems develop prior to surgical reconstruction and persist postoperatively (Dorf and Curtin, 1982). Dorf and Curtin examined the relationship between speech proficiency and age of primary palatal surgery in 80 children with cleft palate. Their findings indicated that children who received surgical repair of the palatal cleft prior to 12 months of age demonstrated better speech production than children who received surgical management between 12 and 27 months of age. Eighty-six percent of the children in the late surgery group exhibited compensatory articulation patterns. Only 10% of the children in the early surgery group demonstrated these atypical patterns. The implications of these data are clear. When the palate can be closed prior to the onset of speech development, it may be possible to minimize abnormal speech patterns. Speech patterns that have originated prior to reconstructive management, on the other hand, are difficult to eradicate and may continue into adolescence and adulthood in spite of speech therapy attempts to correct them. At that point, treatment of the defect in the mechanism may not be sufficient to correct the speech disorder. The patient must also learn new articulatory gestures and must incorporate those gestures into his/her phonological system.

1.2. Self-Perceptions and Listener Reactions to the Speech of Individuals with Cleft Palate

In considering the importance of early evaluation of the velopharyngeal mechanism in the cleft palate child's development, it is also important to consider the psychosocial impact of an incompetent mechanism. The perceptual

consequences of velopharyngeal incompetence may not only affect the child's developing phonology, but may well result in negative listener reactions with further consequence in negative self-perceptions as a communicator.

There are some indications in the literature that support the notion that noncleft children respond differentially to cleft palate children with varying degrees of nasality. In a study conducted by Blood and Hyman (1977), the reaction of 120 noncleft children, kindergarten through second grade, to recordings of children with cleft palate in varying degrees of severity, were examined. The children were required to indicate, after listening to each recording, if they liked the person, liked the way the person talked, and would like to talk to the person. The children's responses became increasingly more negative as the severity of hypernasality increased. These listener reactions may have a significant impact on a child's social/communicative interactions and effectiveness with others, as well as his/her own perceptions of the problem.

Few studies have examined the relationship between speech proficiency and social adjustment of individuals with cleft lip and palate. Van Demark and Van Demark (1970) examined the speech proficiency of 39 adults, ages 18 and 19, with cleft lip and palate. According to the authors, the majority of the subjects exhibited articulation and/or resonance problems. Although the subjects frequently reported satisfaction with their speech, 10 felt they might be refused dates because of their speech and 25 indicated that they did not participate in activities that required speaking in front of groups. In considering the social activity of these individuals, results of this study appeared to suggest that they are observers

rather than active participants. When social participation was required, for example in dating, these individuals were less active and appeared less certain of themselves and their abilities to function in a social situation than one would expect of noncleft subjects.

1.3. Methods of Evaluation of Velopharyngeal Function

Evaluating the competence of the velopharyngeal mechanism is one of the most important tasks of the speech pathologist following primary management of the palatal cleft. Typically, both subjective and objective measures are employed. If the subjective data derived indicate that the mechanism is adequate (i.e. no excessive nasalization of speech), then there is no reason to perform an objective evaluation. If, on the other hand, data derived from the subjective assessment suggests questionable competency of the mechanism, objective data are needed to determine the nature of the incompetency. The speech pathologist needs to know not only when the speech mechanism is inadequate following management but also in what ways it is inadequate. As Skolnick, McCall, and Barnes (1973) point out, it is necessary to know the precise defect in a patient's velopharyngeal closure mechanism prior to initiating procedures to correct the abnormalities producing the deviant speech. Presumably, knowledge of the physiological capability of the mechanism would save valuable therapy time and aid in the predictability of surgical and/or behavioral treatment outcome. This would eliminate demands on the patient for closure performance that the mechanism is not physiologically capable of achieving. Therefore, objective data to assess the

physiological integrity of closure are critical in evaluating velopharyngeal competency and as an important variable in the prediction of eventual speech proficiency.

1.3.1. Subjective Evaluations

Subjective evaluations, or evaluations based on listener judgments, are generally considered the most appropriate standard against which to test the diagnostic adequacy of any objective instrument (McWilliams, Glaser, Philips, Lawrence, Lavarato, Beery, and Skolnick, 1981). Although these evaluations appear intuitively to be a true indicator of the communicative significance of impaired velopharyngeal function (Dalston and Warren, 1986), they are not used exclusively by most evaluation teams (Schneider and Shprintzen, 1980) because of their poor reliability (Counihan and Cullinan, 1970; Fletcher, 1976). In addition, aside from the problems of reliability, information obtained from a subjective assessment does not enable one to specify the type or degree of velopharyngeal insufficiency (Dalston, 1982), nor does such information allow one to specify the etiology of the problem (i.e. learned versus structural/physiologic deficits). For these reasons, subjective information is usually considered in conjunction with information derived from an objective evaluation in arriving at a diagnosis.

1.3.2. Objective Evaluations

Objective evaluations, on the other hand, are techniques that have been proposed as quantitative methods of assessing velopharyngeal functioning during speech. Development of these instrumental techniques have been motivated primarily by the need for "objective" measures of hypernasality in speech for diagnostic and therapeutic purposes.

1.3.2.1. Indirect Techniques

'Indirect' techniques of assessment of velopharyngeal function provide information that imply status of the mechanism. Speech pathologists have long used simple devices such as nasal mirrors to obtain a gross estimate of velopharyngeal function. Condensation on a cold mirror held under the nose will show nasal emission not easily detected by listening. Unfortunately, such a device does not allow quantification of air pressure or air flow, and it is sometimes difficult to differentiate between abnormal air leakage and normal nasal exhalation. Other devices with similar purposes and similar limitations are the listening tube and plastic "scopes" that resemble water manometers (McWilliams et al., 1984). The listening tube is a catheter with a nasal olive in each end, one for the patient's nose and one for the examiner's ear. The scopes consist of glass or plastic tubing containing a float or piston that is displaced by nasal emission of air. While these devices supplement the clinician's ear in the evaluation of velopharyngeal function, they do not provide information about the size of the orifice responsible for the nasal emission or the utterance segment associated with the nasal air leakage (McWilliams et al., 1984).

The Hunter oral manometer is another device used to quantify air pressure as the patient blows into the manometer with the nares open and again with them closed. If the oral pressure measured with the nares closed is greater than that obtained with them open, presumably the velopharyngeal mechanism was not closed during the blowing act. Water manometers coupled to the nares by means of nasal olives have also been used to measure nasal air pressure during speech. As noted above, these devices do not provide information about the area of the velopharyngeal opening or the precise context in which leakage occurs.

Aerodynamic measurement of velopharyngeal function, originally described by Warren and Dubois (1964), is an indirect measurement technique that does not involve exposure to radiation (Schneider and Shprintzen, 1980). Specifically, this pressure-flow technique monitors aerodynamic phenomena occurring in the oral and nasal cavities during speech in order to provide quantitative information concerning total velopharyngeal port area. This technique is based on the premise that if you know the amount of air passing through the nose and the difference in pressure above and below the velopharyngeal port, the area of the orifice can be calculated by use of an hydraulic equation.

Another indirect method of assessing the velopharyngeal mechanism is photo detection. A photo detector utilizes a flexible transparent plastic tube that is inserted into the patient's nose and nasopharynx. A light sensor is attached anterior to the light in the nose and detects changes in the light as the velopharyngeal port opens and closes. Variations in the velopharyngeal port yield variations in voltage present at the photodetector output.

1.3.2.2. Direct Techniques

Methods for assessment of velopharyngeal function that were designed to be more quantitative, and thus more objective in nature than the measures described above, include the 'direct' techniques of radiography and endoscopy. 'Direct' techniques are those that permit direct observation of the velopharyngeal mechanism.

Radiography and endoscopy are relatively direct in that they provide a means for visual inspection of the mechanism at rest and during activities such as speech. Radiography may provide moving images of internal body parts through a variety of x-ray methods. Lateral radiographic procedures (still or cine) were the first techniques to be developed that provide for direct structural assessment. The lateral view is limited because it represents only two dimensions of a three-dimensional process-- the sphincteric mechanism of velopharyngeal closure. It provides little insight into the location, configuration, or movement of structures off the midsagittal plane. In particular, it offers no information about movements of the lateral pharyngeal walls. Two types of radiographic techniques that are more commonly employed today are cineradiography and videofluoroscopy. While cineradiography makes use of x-rays recorded on motion picture film, videofluoroscopy utilizes x-rays recorded on videotape and involves lower radiation dosage than does cineradiography (McWilliams et al., 1984). Accurate assessment of velopharyngeal function can be obtained by videofluorographic techniques that simultaneously record sound and movement of speech in sequential, multiple projections. With multiview videofluoroscopy, a technique that

adds a base view to the traditional lateral and frontal projections, objective data are available to make accurate judgments of velopharyngeal competence (McWilliams et al., 1981; Skolnick et al., 1973). This series of three views provides a more complete picture of the velopharyngeal valve, as they complement each other and are interpreted together. The objective diagnostic data provided by the videofluorographic procedures can have a critical impact on the recommendations for surgical or therapeutic management.

Endoscopy is a fiberoptic device that consists of a bundle of flexible glass fibers that can be passed through the nasal or oral cavity and transmits light to illuminate internal organs that cannot otherwise be visualized. As with fluoroscopy, it permits observation of the velum and pharyngeal walls as they move in relation to one another, allowing the examiner to visualize, photograph, or videorecord structures in the field of view.

1.3.3. Utility of Instrumental Techniques

The clinical utility of these instrumental techniques depends upon the degree to which they provide information that relates significantly to velopharyngeal function and impairment. To the extent that such a relationship exists, information from listener judgments and instrumental analysis should be highly correlated with one another. In a study completed by McWilliams et al. (1981), 48 subjects with repaired palatal clefts were divided into three major groups on the basis of speech symptoms and were examined for velopharyngeal valving integrity by means of a nasal manometer, an oral manometer, pressure-flow techniques, and videofluoroscopy. Comparison among techniques indicated that videofluoroscopic

findings were less variable and reflected what was heard in the speech pattern more often than did any of the other measures. In addition, videofluoroscopy provided a visual image of the mechanism that was not available from the other devices. It also permitted assessment of such features of closure as movement, timing, and size and shape of the orifice. The authors suggested that these appear to be desirable capabilities, especially when surgery is contemplated.

1.3.4. Management Decisions

If it is determined that the status of the velopharyngeal mechanism is not physiologically adequate for normal oral speech production, secondary management then needs to be considered. McWilliams et al. (1984) provide four major management decisions that can be made, based on diagnostic information: 1) velopharyngeal closure is being achieved and any existing speech deficits are the result of some other problem; 2) accept the status quo and wait and watch; 3) pursue speech therapy on a trial basis to determine whether behavioral treatment will result in more normal oral speech and/or improved velopharyngeal function; or 4) correct the velopharyngeal incompetence through surgical methods, assuming that maturational or behavioral management is not feasible for acquisition of normal speech.

To ensure that appropriate management decisions are made, it is essential that the team members: 1) understand the physiological mechanism of velopharyngeal function; 2) demonstrate knowledge of the assessment tools employed to evaluate the physiologic potential of the mechanism; and 3) are skilled in the interpretation of data derived from the assessment. In spite of the

frequent assumption that such expertise is held by members of the cleft palate team, findings from recent investigations suggest that many professionals are inadequately trained in the assessment of velopharyngeal function (Pannbacker, Lass, Middleton, Crutchfield, Trapp, and Scherbick, 1984; Pannbacker, Landis, Lass, and Middleton, 1987; Schneider and Shprintzen, 1980). In addition, although it may seem intuitively correct to obtain definitive evidence of clinical judgments before determining management recommendations, instrumental techniques have not been universally adopted for use by all cleft palate teams (Pannbacker et al., 1984; Schneider and Shprintzen, 1980).

1.4. Current Clinical Practices in Assessment of Velopharyngeal Function

In a survey of speech pathologists, Schneider and Shprintzen (1980) reported that 90% of responding cleft palate team members primarily rely on listener judgment, oral examination, and articulation testing in the diagnosis of velopharyngeal insufficiency, and for the recommendation of pharyngoplasty (even though these methods are not sufficient in and of themselves to dictate whether or not surgery is warranted). According to Pannbacker (1985), a common misconception is that adequacy of velopharyngeal closure can be assessed by clinical examination of the oral speech mechanism when, in fact, it is impossible to determine because the area of contact between the palate and pharyngeal wall is superior to the view obtained on oral examination. Only 11% of the professionals responding to Schneider and Shprintzen's survey indicated that their team had a radiologist. In addition, in many cases pharyngeal flap surgery and other types of

surgical intervention were being recommended in the absence of any type of motion picture X-ray. More than half of those responding said that they would prefer palatal repair to be completed after the age of two, even though speech development occurs before this time and deviant speech patterns may appear if the palatal repair is not initiated early on. Sixty percent of those responding regarded velopharyngeal incompetency as a voice disorder; yet 84% treated the symptoms of velopharyngeal incompetence with articulation therapy rather than voice therapy. The prevailing practice of employing articulation therapy to improve velopharyngeal function for the majority of the respondents was interesting in light of Shelton's (1969) findings that improvement in articulation does not subsequently improve velopharyngeal closure.

In a similar investigation conducted by Pannbacker et al. (1984), a questionnaire designed to survey methods of assessing velopharyngeal closure and the extent of training and experience in velopharyngeal assessment was distributed to 256 randomly selected American Cleft Palate Association members, 94% of whom were associated with cleft palate teams. Forty-five percent of the respondents indicated that they were inadequately trained in the assessment of velopharyngeal function. The most commonly reported procedures used in assessing velopharyngeal closure were listener judgments of spontaneous speech samples, phonological analysis, and lateral cine/videofluoroscopy. The findings suggest that the state of the art in assessment of velopharyngeal function is not consistent with idealized clinical practice since these measures, taken singly or coupled, are not sufficient in describing the function of the mechanism. As Folkins

(1985) stated, because there are many-to-one relationships between physiological parameters and any type of perceptual goal, it is not possible to listen to speech and unambiguously infer what is happening at the physiological levels of the speech system. Listener judgments through spontaneous speech samples and phonological analysis then, measure perceptual categories and provide no information as to the precise defects in the mechanism that are producing the incompetence. In the above survey, lateral view radiography was used by respondents more frequently than was multiview radiography in spite of the fact that limitations of lateral still x-rays as a valid predictor of velopharyngeal function during connected speech have been well documented (Williams and Eisenbach, 1981; Glaser, Skolnick, McWilliams, and Shprintzen, 1979).

In an effort to determine the current academic and clinical training available to speech-language pathology students in the area of cleft palate, Pannbacker et al. (1987), distributed a questionnaire to 239 graduate training programs. Fifty-six percent of the questionnaires were returned and indicated that academic training in cleft palate appears to be superior to that of clinical preparation. Almost all training programs (98.5%) provided one or more courses in cleft palate of which approximately two-thirds of the total courses included information related to anatomy of the velopharyngeal mechanism. Psychological aspects and management of otologic and audiologic problems received little attention. In twelve programs (9.0%) students accumulated zero clock hours for diagnostics with patients who have cleft palate, and a similar trend was reported for therapy. The majority of respondents (81.4%) felt that academic training was adequate, yet

several stated that there was insufficient clinical experience provided with cleft palate patients. In addition, very few of the training programs provided public education programs or had faculty who participated in professional organizations concerned with cleft palate. The authors concluded that the study identified needs in the areas of: a) clinical training and experience with cleft palate patients including interdisciplinary programming, and b) programs for continuing professional education in cleft palate.

The findings obtained in the three studies described above, suggest inadequate methods are employed nationally by many cleft palate teams to assess velopharyngeal function. In addition, a significant number of individuals report feelings of inadequacy in performing such an evaluation, even though the majority of them are reportedly members of a cleft palate team and are viewed as specialists with expertise in the area of cleft palate and its associated problems. These findings would appear to have important ramifications for both academic program development and service delivery. If the speech pathologist and other members of the cleft palate team are poorly trained in the assessment of velopharyngeal function, then the quality of the evaluation may be less than adequate. Moreover, feelings of inadequacy to perform such an evaluation may lead the team members to adopt a "wait-and-see" attitude. Objective assessment of the mechanism may be enforced only as a default following lack of progress in speech therapy.

1.5. Purpose of the Present Investigation

The purpose of this study was to examine, in part, the efficiency of the evaluation process for 80 cleft palate children with velopharyngeal insufficiency who were seen by cleft palate teams in the state of Montana. Specifically, the following questions were addressed:

- 1) Was a recommendation for an objective evaluation of the velopharyngeal mechanism made prior to behavioral or surgical treatment of the problem?
- 2) What was the time interval between the onset/diagnosis of speech nasalization and recommendation of an objective assessment of the velopharyngeal mechanism?
- 3) What criteria do the cleft palate team speech pathologists employ when determining the need for an objective assessment of the velopharyngeal mechanism?

Chapter 2

METHODS

Potential subjects for this study included 350 children that had been followed by five Montana-based cleft lip and palate teams, funded through the Handicapped Childrens Services (HCS) Program of the Montana State Department of Health, from the years 1984 through 1986. Children enrolled in the HCS program are followed by a team from birth (or age at first referral) to 18 years of age. The HCS program provides financial assistance for primary lip and palate repairs. Secondary surgical management and orthodontia are also funded by HCS when funds are available. In addition, evaluation and treatment follow-up are provided by HCS for all cleft palate teams at no charge to the patient (See Table 1 for a description of the location and composition of the cleft palate teams). Longitudinal records, including team evaluation results, recommendations, and management results, are housed by HCS at the State Department of Health, Helena, Montana.

An information summary regarding the purpose of the study was presented to the HCS Program, including the specific questions to be addressed, as well as the specific data to be retrieved. Confidentiality was assured and permission obtained to retrieve information on those subjects meeting the selection criteria (refer to Appendix A for a copy of the information summary).

Table 1. Location and composition of cleft palate teams in the state of Montana

TEAM COMPOSITION	TEAM LOCATION					
	Billings	Bozeman	Butte	Great Falls	Kalispell	Missoula
Audiologist		X	X	X	X	X
Clinical Psychologist		X			X	X
Dentist		X	X	X	X	X
Nurse		X	X		X	
Nutritionist		X	X	X	X	X
Oral Surgeon	X					
Orthodontist	X	X	X	X	X	X
Otolaryngologist	X	X	X	X	X	X
Pediatrician	X	X	X	X	X	X
Plastic Surgeon	X	X	X	X	X	X
Prosthodontist	X					
Social Worker			X	X		
Speech Pathologist	X	X	X	X	X	X

2.1. Subjects

Subjects selected for this study included children diagnosed as having repaired cleft palate, submucous cleft, or congenital palatal incompetence, who were at least age 5 at the onset of the study. Information from the HCS files was used to determine each patient's appropriateness for inclusion in this study. All subjects had a history of speech nasalization as determined since the onset of speech production and/or as first noted through evaluation by cleft palate team specialists. Potential subjects with a history of neurological problems and/or symptom complexes were eliminated from this study. If the child attended regular class in either private or public school, and had no grade repetitions, resource room services, or special tutoring needs, he/she was judged to be making normal academic progress. Whether or not a child had received language therapy was not considered in making the judgment of normal academic progress. Children who repeated a grade, who had been assigned to a special class, or who had received remedial work in any subject were considered as not making normal academic progress, and thus were eliminated from the study. This criteria was employed to minimize the effect of learning deficits on speech proficiency.

Eighty subjects, 61 males and 19 females, met the selection criteria. Subjects ages ranged from 2 years, 2 months to 15 years, 1 month, with a mean age of 8 years, 7 months. Subjects consisted of 66 children diagnosed as having repaired cleft palate, 8 subjects diagnosed as having a submucous cleft, and 6 subjects with a diagnosis of congenital palatal incompetence. Fifty-seven (71%) of the subjects selected reportedly had histories of middle ear infections, with

accompanying conductive hearing losses indicated for 21 (26% of total subjects) of the 57 subjects. Sensorineural losses were reported for 4 (5% of total subjects) of the subjects. As documented in the subject files, 2 of the 4 subjects with sensorineural hearing loss were mild in nature (1 unilateral loss and 1 bilateral loss). One was reportedly a mild to moderate high frequency loss (unilateral), with phoneme-specific nasalization noted. The remaining subject reportedly exhibited a severe sensorineural loss (unilateral) that, according to the subject file data, did not appear to affect speech production. Twenty-one subjects failed to meet the selection criteria due to concerns regarding learning deficits (developmental delays and/or questionable academic progress), 13 subjects reportedly demonstrated symptom complexes, while information for 4 subjects indicated at least some degree of neurological impairment.

2.2. Procedures

The data were retrieved from the HCS files on four separate occasions by this author. In general, these records typically documented results of evaluation and recommendations from each cleft palate team member. Speech and language test results and descriptions of communication by parents, speech pathologists, and other professionals were examined. Specifically, the following data were retrieved:

- 1) Age of patient at onset of study
- 2) Age of primary palatal surgery (if any)
- 3) Diagnosis/Age of diagnosis of nasalization

- 4) Age at which recommendation for an objective evaluation was made
- 5) Age at which objective evaluation was performed
- 6) Evaluation procedures used for the determination of nasalization
- 7) Recommendations made following diagnosis of nasalization.

In addition, a questionnaire designed to survey methods of diagnosis and management of velopharyngeal insufficiency associated with cleft palate was completed via telephone interviews with eight speech pathologists serving on the cleft palate teams throughout the state of Montana (A copy of the telephone survey can be found in Appendix B). Questions were formulated in order to: 1) gather information regarding current status, incidence of cleft palate individuals seen, and academic background of the speech pathologists on the teams; 2) identify the procedures utilized in the assessment and treatment of velopharyngeal incompetence; and 3) determine the attitudes/philosophy of the speech pathologists who were actively involved in the diagnosis and management of cleft palate individuals.

In order to assure as much accuracy and objectivity as possible, the following steps were taken in completion of the telephone survey: 1) an explanation of the purpose of the study was presented initially to the respondents, 2) anonymity of the respondent and the reporting of information in the study was guaranteed, 3) a brief and specific questionnaire was utilized, and 4) each speech pathologist was informed that a summary of the results of the study would be made available to them upon request.

In addition to the data designated above, descriptive information regarding the cleft palate subjects was obtained from the available records about sex (male, female), timing of palatoplasty, occurrence of nasalization and follow-up recommendations that resulted from such a diagnosis, hearing levels (normal, hearing loss) and reports of ventilation tube placement, and current status of the speech mechanism (i.e., most recent documentation from the cleft palate team). Additional information regarding articulation skills and duration/type of speech/language therapy was also obtained from the clinical records to describe the subjects in more detail.

Because the descriptions are of previously conducted evaluations, detailed information on exact testing procedures and test results was not always available. Neither, of course, were controls of testing procedures possible except those typically available in a clinical setting.

The data obtained from the telephone survey were retrieved via telephone interviews, of approximately fifteen minutes in length, with each of the speech pathologists involved. Following a brief summary of the purpose of the survey and retrieval of verbal consent to participate, specific questions addressing information in each of the major areas of concern were addressed. The initial portion of the survey involved descriptive information regarding the role and responsibilities of the speech pathologists, number of cleft palate individuals seen and referred for objective evaluation of the velopharyngeal mechanism, and identification of several aspects of cleft palate that they felt adequate/inadequate with.

The second section of the survey was designed to determine how the

respondents assessed and managed cleft palate individuals that were referred for an objective evaluation, as well as those cleft palate individuals who were not referred. In addition, information regarding recommendations for speech therapy was addressed.

In the third section of the questionnaire, the speech pathologists were requested to identify reasons or offer comments relative to their attitude concerning problems they were aware of or concerned with in referring individuals for an objective evaluation of the velopharyngeal mechanism. They were asked to give their opinions of the availability of speech and hearing services in their communities. They were also asked for their judgments of the adequacy of cleft palate services in the state.

The questions were designed to allow the respondents the convenience of identifying one or more of a series of specific reasons presented by the interviewer, or of offering their own comments. Finally, the respondents were given the opportunity to comment, express opinions, or make suggestions about any issues raised in the questionnaire.

2.3. Data Analysis

Descriptive statistics were employed in treating the data. A percentage of subjects who received an objective evaluation prior to surgical or behavioral treatment were identified. The time interval in months and years between the onset of nasalization, and/or initial diagnosis of nasalization, and objective assessment of velopharyngeal competence was calculated.

The responses to the telephone survey were analyzed in two stages. First, percentages of the responses to various options for each question were computed. The second stage of analysis attempted to determine descriptively whether selected characteristics about the respondents' experience, academic background, and practices were related to their philosophy/attitudes about referring cleft palate individuals for objective evaluations of the velopharyngeal mechanism.

2.4. Reliability

Inter-examiner reliability was established between two independent speech pathologists for 14 targeted areas of responses retrieved from each of 10 randomly selected subject files. Prior to conducting reliability measures, the investigator met with the second speech pathologist to establish agreement regarding the purpose of the present study, the descriptive measures to be obtained, the reliability measures employed, and to present the procedure for retrieving the information from the files.

Intra-examiner reliability was established by the investigator repeating the retrieval procedure for 10 of the 80 subjects. A criterion of at least 80% agreement in both inter- and intra-examiner reliability was designated.

Chapter 3

RESULTS

The general purpose of this investigation was to examine, in part, the efficiency of the evaluation process for cleft palate children with velopharyngeal insufficiency who have been seen by cleft palate teams in the state of Montana. Specifically, the intent of the study was to 1) determine whether or not children with velopharyngeal insufficiency, who evidence nasalization of speech, receive a recommendation for an objective assessment of the velopharyngeal mechanism prior to behavioral or surgical treatment of the problem, 2) identify the time interval involved with such a recommendation, and 3) specify the criteria employed to determine the need for an objective assessment.

The results section describes the reliability measures employed in the retrieval of data from the HCS files and then addresses each of the research questions posed. In addition, trends and relationships regarding objective evaluation of the velopharyngeal mechanism are examined descriptively.

3.1. Reliability of Handicapped Children's Services Data

Both inter-examiner and intra-examiner reliability were obtained by determining the percentage of point-by-point agreement, in the information retrieved from the HCS files, for 10 of the 80 individual subjects (Table 2).

Inter-examiner reliability ranged from 80% to 100% with a mean agreement

Table 2. Inter- and intra-reliability data

Item	Inter-examiner Reliability (Percentage of Agreement)	Intra-examiner Reliability (Percentage of Agreement)
Birthdate	90	100
Sex	100	100
Diagnosis	100	100
Palatal Repair (Date)	90	100
Diagnosis of Nasalization (Date)	80	80
Description of Diagnosis of Nasalization	80	80
Hearing Loss	100	100
Placement of Ventilation Tubes	90	100
Recommendations following Evaluations	80	100
Current Status (Date)	80	100
Current Status (Remarks)	90	100
Date of Recommendation for Objective Evaluation	100	100
Date of Objective Evaluation	100	100
Evaluation Procedures	100	100
	$\bar{X} = 91\%$	$\bar{X} = 97\%$

of 91% for all information retrieved. Intra-examiner reliability ranged from 80% to 100% with a mean agreement of 97% for all information retrieved.

3.2. Handicapped Children's Services Data

3.2.1. Recommendations for Objective Assessment of the Velopharyngeal

Mechanism

Of the eighty subjects that met the selection criteria for inclusion in this study, 18% (14 subjects, ranging in age from 5 years, 0 months to 11 years, 7 months) received a recommendation for an objective evaluation of the velopharyngeal mechanism following diagnosis of nasalization. For the remaining 82% (66 subjects, ranging in age from 2 years, 2 months to 15 years, 1 month) who did not receive a recommendation for an objective evaluation, alternative management recommendations were proposed. Sixteen percent (13 subjects, ranging in age from 3 years, 6 months to 14 years, 10 months) received an immediate recommendation for surgical management, 15% (12 subjects, ranging in age from 2 years, 2 months to 15 years, 1 month) were deferred with recommendations for re-evaluation at a later date (ranging from 6 months-1 year), and the remaining 51% (41 subjects, ranging in age from 2 years, 5 months to 14 years, 6 months) were referred for speech therapy services (Refer to Table 3 for a summary of the alternative management recommendations).

In general, explanations cited for referrals made without recommendation for an objective assessment centered around reports of inconsistency of nasalization, nasalization so slight that it did not warrant an objective assessment, or

Table 3. Summary of alternative management recommendations proposed for the 66 subjects who were not referred for an objective assessment of the velopharyngeal mechanism

Alternative Management Recommendations	Number of Subjects (N = 66)	
	%	(N)
Recommendations for Immediate Surgical Management	16	(13)
Recommendation Deferred for Reevaluation at a Later Date	15	(12)
Recommendation for Speech Therapy Services	51	(41)

nasalization as learned behavior in which behavioral therapy alone presumably would remediate the problem. A summary of the management recommendations for those 66 subjects (82%) who were not referred for objective evaluations is provided below. In addition, results of management for these subjects is also reported.

3.2.1.1. Recommendation for Immediate Surgical Management

Thirteen subjects received immediate recommendations for surgical management based on a diagnosis of significant nasalization (via subjective/perceptual listening tasks) as well as poor or abnormal palatal function (presumably assessed through oral peripheral examination). Five of the 13 subjects received speech therapy following surgical management. Of those 5, one continued to exhibit nasalization of speech and has attended therapy for 6 years. The other 4 exhibited velopharyngeal competence, accompanied by 'hyponasality', as indicated by speech pathology reports. These individuals received articulation therapy ranging from 4-7 years before therapy was terminated or recommendations were made for additional surgical management. Reportedly, 6 of the 13 subjects demonstrated velopharyngeal competence following surgical management. There was no follow-up documentation from recommendations made for 2 of the subjects in this group.

3.2.1.2. Recommendation Deferred for Re-evaluation at a Later Date

Of the 12 subjects for whom a speech re-evaluation at a later date was recommended, 10 were diagnosed as demonstrating slight/mild hypernasality; marginal velopharyngeal closure was noted. Presumably, these subjects were not demonstrating deviant speech patterns significant enough to warrant behavioral and/or surgical management. Each were referred for ongoing evaluations at 6 month to 2 year intervals. The remaining 2 subjects, that reportedly demonstrated significant hypernasality, were both 2 years of age. Specific management recommendations may have been deferred for further maturation.

3.2.1.3. Recommendation for Speech Therapy Services

The 41 subjects in this category reportedly demonstrated speech that was characterized by mild-severe nasalization. Ten of the 41 subjects were reported to have slight or mild nasalization, while the remaining 31 subjects exhibited more severe nasalization of speech. Duration of therapy for these individuals ranged from 1 to 6 years.

For 7 of the subjects, no significant changes in speech production were observed over a 6 month to 2 year period and surgical management was then recommended. Of the 7 subjects receiving surgical management, 3 continued to exhibit nasalization of speech and were referred for continued speech therapy services. One subject demonstrated hyponasality with a recommendation for continued therapy, and 3 subjects demonstrated adequate velopharyngeal competence.

Ten subjects, who attended speech therapy for an average of 3 years, 5

months (range: 2-6 years), reportedly evidenced no significant improvement in nasalization over time. Twenty-one of the subjects, on the other hand, reportedly demonstrated significant changes over time, resulting in a decrease or total elimination of excessive nasality during speech production. Three subjects had no record of duration or outcome following a recommendation for therapy.

3.2.2. Time Interval Between Onset/Initial Diagnosis of Nasalization and Objective Assessment of the Velopharyngeal Mechanism

Twelve of the 14 subjects who received a recommendation for an objective evaluation of the velopharyngeal mechanism actually received an evaluation. For 2 of the 14 subjects, no follow-up was made in regards to the recommendation.

The time interval between the onset/initial diagnosis of nasalization and objective assessment of velopharyngeal competence for the 12 subjects who received an objective evaluation was obtained. Eight subjects (10% of total subjects; 57% of the 14 recommended) received a recommendation immediately following diagnosis. For the remaining 4 subjects (5% of total subjects; 28% of the 14 recommended), the time interval between diagnosis and recommendation ranged from 9 months to 2 years, with a mean time interval of 18 months. All 4 of the subjects received speech therapy services during the interim. It should be noted here that, of the 4 subjects in which a time interval lapsed between diagnosis and objective evaluation of the mechanism, 2 of the subjects were less than 3 years of age at the time of the diagnosis and may have been considered too young to tolerate an objective evaluation. This hypothesis is supported by the fact that, of the 8 subjects in which an immediate recommendation was made,

each were at least 4 years of age at the time of the recommendation.

3.3. Telephone Survey

In order to examine, at least in part, why the majority of subjects in this study did not routinely receive an objective assessment of the velopharyngeal mechanism following diagnosis of nasalization, a telephone survey was conducted with the eight speech pathologists who have participated on the cleft palate teams in the state between the years 1984–1986. The purpose of this survey was to examine the criteria employed when determining the need for an objective assessment.

3.3.1. Clinical Experience and Academic Background

The initial portion of the survey involved descriptive information regarding academic and experiential background and the roles and responsibilities of the speech pathologists on the cleft palate teams. All (100%) of the individuals surveyed reported practicing as speech pathologists for 1–14 years, with the majority (75%) practicing 12–14 years. Within that time they have each served as a member of a cleft palate team for 1–12 years, with the majority (75%) within 1–4 years. The number of cleft palate individuals seen by these professionals ranged from 10–20 (2 subjects), 30–40 (2 subjects), with the remaining 4 subjects reporting more than 40 cleft palate individuals seen between the years 1984–1986.

In regard to academic background, each of the professionals reported having had at least one specific course dealing with the study of cleft lip and palate. 'Determination of physical versus behavioral management' was reportedly not

addressed in 2 of the subject's previous courses. Assessment procedures and advantages/disadvantages of various instrumentation types was not included as part of the curriculum for 1 other respondent. The remaining targeted areas (Refer to Table 4) were reportedly included in each of the courses. Respondents described their current knowledge as adequate (with additional training preferred) to excellent in each of the categories presented (Refer to Table 4 for a list of the topic areas addressed). When asked to indicate those areas in which the subjects felt a need for additional training, all subjects (100%) indicated the area of 'instrumentation used in the assessment of the velopharyngeal mechanism', with the majority (62%-87%) also expressing interest in the areas of assessment procedures, surgery options, alternatives for intervention/management, psychosocial aspects of clefting, and determination of physical versus behavioral management. Three subjects (37%) reported a need for additional training in the area of anatomy/physiology of the velopharyngeal mechanism, with 2 subjects (25%) indicating interest in the area of the purpose/function/knowledge of other professional roles of the cleft palate team(See Table 4). As an additional part of their academic background, 6 (75%) of the 8 subjects reported having had supervised clinical training with 1 to 6 cleft palate individuals. Seven (87%) of the 8 subjects also stated that they have had experience working with cleft palate individuals in conjunction with other experienced clinicians since the time of their clinical training. The number of cleft palate individuals involved ranged from 3 to 100, with the majority of speech pathologists (75%) working with less than 12 subjects.

Table 4. Respondents' academic background with perceptions of current knowledge and needs for additional training

Areas of Study	Number of Respondents Reporting Topics Covered in Cleft Palate Class		Current Knowledge				Need for Additional Training					
			Excellent	Good	Adequate	Poor						
	%	(N)	%	(N)	%	(N)	%	(N)				
Anatomy/Physiology of the VP Mechanism	100	(8)	37	(3)	50	(4)	13	(1)	0	(0)	37	(3)
Assessment Procedures used for the VP Mechanism	87	(7)	37	(3)	37	(3)	25	(2)	0	(0)	87	(3)
Instrumentation used for the VP Mechanism	87	(7)	13	(1)	50	(4)	37	(3)	0	(0)	100	(8)
Alternatives for Intervention/Management	100	(8)	25	(2)	50	(4)	25	(2)	0	(0)	62	(5)
Surgery Options	100	(8)	13	(1)	62	(5)	25	(2)	0	(0)	75	(6)
Psychosocial Aspects of Clefting	100	(8)	0	(0)	50	(4)	50	(4)	0	(0)	75	(6)
Purpose/Function/Knowledge of Cleft Palate Team Members	100	(8)	87	(7)	13	(1)	0	(0)	0	(0)	25	(2)
Determination of Physical vs. Behavioral Management	75	(6)	25	(2)	62	(5)	13	(1)	0	(0)	62	(5)

Roles and responsibilities varied among the respondents in regard to the type of setting and primary caseload involved in their present practice.

While 7 (87%) of the subjects reported working predominantly with children in a public school or clinical setting in which their primary responsibilities involved assessment and treatment, the remaining subject's present practice involves a university and hospital setting in which teaching is the main responsibility in working with both children and adults. Caseload types varied across respondents and included developmentally delayed, articulation and/or language problems, cerebral palsy, cleft palate, multi-handicapped, voice disorders and nonvocal populations. In addition, 4 (50%) of the 8 subjects reported belonging to a cleft palate organization at the state and/or national level.

3.3.2. Clinical Practices in Assessment and Treatment of Individuals with Cleft

Palate

The second section of the survey was designed to determine the criteria employed with cleft palate individuals that were referred for an objective evaluation, as well as those cleft palate individuals who were not referred. In addition, information regarding recommendations for speech therapy was examined.

When addressing how the speech pathologists judged their competency in the assessment of velopharyngeal closure, 4 (50%) of the subjects reported that they always feel competent, while 4 (50%) reported that they frequently, but not always, feel competent. Nasoendoscopy and/or videofluoroscopy were chosen as the objective measures preferred by 7 (87%) of the subjects, while 1 subject (13%)

preferred use of subjective measures (listening tasks, dry spirometer, oral exercises) as an indication of velopharyngeal competence. For 7 (87%) of the subjects, nasoendoscopy and/or videofluoroscopy were the instruments available for the objective assessment, with 1 subject (13%) reporting that no objective measures were available. In considering the tools employed by each of the professionals, subjects reported use of videofluoroscopy, nasoendoscopy, spontaneous speech and subjective listening tasks, articulation analysis, and a series of oral exercises to determine the status of the mechanism.

Three (37%) of the respondents indicated that it was the role of the plastic surgeon in conjunction with the speech pathologist to make a referral for an objective evaluation, while the remaining 5 respondents (62%) stated that any or all members of a cleft palate team may make such a referral. With the exception of 1 subject (13%), each agreed that a referral should be directed to the cleft palate team or to some member of the cleft palate team (i.e. plastic surgeon or speech pathologist). The remaining subject reported that the cleft palate individual is initially referred to the local school speech pathologist for a "second opinion", followed by a referral to the university for assessment, if indicated.

Seven (87%) of the subjects agreed that the data derived from the objective measurement should be interpreted by the speech pathologist and plastic surgeon, with 2 of the 7 including involvement from the radiologist as well. One subject (13%) reported that the speech pathologist alone should interpret the data, however, this was a respondent that relied on measures other than videofluoroscopy or nasoendoscopy.

All (100%) of the subjects agreed that behavioral therapy is not always indicated prior to objective assessment and/or surgical management, and each stated that the "preferred" treatment is dependent upon the individual problems encountered. Only 4 (50%) of the 8 respondents felt that an objective evaluation should be performed immediately following the initial diagnosis of nasalization.

When asked how long trial therapy should be employed to eliminate speech nasalization before surgical management is considered, 5 (62%) of the respondents recommended a 3 month or less time period for therapy, with 3 (37%) reporting a trial therapy period of 6 months. Factors contributing to a recommendation for therapy without an objective assessment were: phoneme-specific nasalization, inconsistent nasalization, and/or persistent nasalization following secondary physical management, for 6 (75%) of the 8 respondents. Four (50%) of the subjects considered compensatory articulation patterns to be a contributing factor. Other contributing factors were reported as parent concerns and cooperation in making the management decision. Five (62%) of the subjects felt that a child must be 2-3 years of age before he/she is capable of tolerating an objective evaluation, while 3 subjects (37%) reported a 3-4 year age level.

3.3.3. Concerns Regarding Management of Children with Cleft Palate

In the third section of the questionnaire, the speech pathologists were asked to identify any problems they were concerned with in referring individuals for an objective evaluation of the velopharyngeal mechanism. They were also asked to give opinions of the availability of speech and hearing services in their communities, as well as to offer their judgments regarding the adequacy of cleft

palate services in the state.

Three (37%) of the subjects reported that they felt most speech pathologists are adequately trained to understand the nature of the problems presented by cleft palate, 4 (50%) felt that only some are adequately trained, while 1 (13%) felt that only the exceptional speech pathologist is adequately trained (Table 5). Three (37%) reported they felt that frequently speech therapy can be effective in remediating speech deficits associated with velopharyngeal incompetence, 4 (50%) reported occasional effectiveness, while 1 (13%) felt that speech therapy is only rarely effective when the velopharyngeal mechanism is involved (Table 6). Of the training procedures believed to be effective with speech deficits associated with velopharyngeal incompetence, articulation therapy was judged effective by all (100%) of the subjects, voice therapy by 4 (50%) of the subjects, muscle exercises (eg., blowing, sucking, swallowing) by 3 (37%) of the subjects, and obturator reduction by 2 (25%) of the subjects. Other training procedures recommended included biofeedback (1 respondent) and language therapy for overall communicative ability (1 respondent).

When the subjects were requested to indicate how they felt about the coordination of services between the speech pathologists on the Montana Cleft Palate teams and the speech pathologists in the field, judgments ranged from poor to adequate, with the majority (75%) indicating that coordination was adequate. Most agreed that the contact is infrequent, but for the most part, sufficient. The professionals seemed to agree that the lines of communication are open, but that they aren't utilized as frequently as ideally possible.

Table 5. Survey respondents' perception of speech pathologist's training in regard to problems of cleft palate

	All are Adequately Trained		Most are Adequately Trained		Some are Adequately Trained		Only the Exceptional Speech/Language Pathologist is Adequately Trained		None are Adequately Trained	
	%	(N)	%	(N)	%	(N)	%	(N)	%	(N)
Percentage of Speech Pathologists Adequately Trained	0	(0)	37	(3)	50	(4)	13	(1)	0	(0)

Table 6. Survey respondents' perception of effectiveness of speech therapy services for cleft palate individuals

	Always	Frequently	Occasionally	Rarely	Never
	% (N)	% (N)	% (N)	% (N)	% (N)
Percentage of Reported Effectiveness	0 (0)	37 (3)	50 (4)	13 (1)	0 (0)

In regard to the the areas of need in the assessment of velopharyngeal closure, 4 (50%) reported a need for more objective measures, while 2 (25%) stated that it was not so much a need for 'more' objective measures as a need to understand more thoroughly how to use the objective measures currently available. Six (75%) of the 8 subjects expressed a need for increased availability of instrumentation, while all (100%) agreed that consultative services and continuing education in the area of cleft palate were the primary areas of need in the state.

Poor availability of services for young children due to the rural nature of the state and the traveling involved in receiving the necessary services were concerns expressed regarding the availability of services in the state. Limited background training in the area of cleft palate for most speech pathologists on the teams, as well as limitations of actual hands-on treatment were concerns expressed regarding the adequacy of services in the state. Positive aspects of the teams noted included: effective counseling and education regarding cleft palate that is provided to parents, the frequency with which clinics meet given the rural aspect of the state, and the strong teamwork involved in each of the clinics.

In addressing specific problems that subjects were aware of and/or concerned with in referring cleft palate individuals for speech and hearing services, concern was expressed by 2 subjects (25%) that some teams do not employ objective measures in determining velopharyngeal status and some of the professionals on the team do not see cleft palate individuals enough to establish expertise in dealing with this population. In addition, 5 subjects (62%) reported that referrals are often difficult due to the traveling involved, and there is a need for

more team visibility and public awareness so that more of the necessary referrals are possible.

3.4. Summary

In summary, then, the findings of this investigation indicated that 14 (18%) of the 80 subjects received a recommendation for an objective evaluation of the velopharyngeal mechanism following diagnosis of nasalization. The remaining 66 subjects (82%) received recommendations for management without an objective evaluation. In addition, the data indicated that of the 14 who received a recommendation for an objective evaluation, only 8 of the subjects received an evaluation immediately following the diagnosis of nasalization. Of the remaining 4 subjects, in which a time interval of 18 months had lapsed, 2 were less than 3 years of age at the time of the diagnosis and may have been considered too young to tolerate an objective assessment at that time.

According to the results obtained from the telephone survey of speech pathologists on the cleft palate teams, only 4 (50%) of the 8 respondents reported that an objective evaluation was necessary at the initial diagnosis of nasalization. The majority of respondents agreed that the factors contributing to determination of the need for an objective evaluation included the following: phoneme-specific nasalization, inconsistent nasalization, compensatory articulation patterns, and/or the persistence of nasalization following secondary surgical management. In addition to the above speech characteristics, the subjects also agreed that the age of the client is an important consideration in determining the appropriateness of an

objective assessment. However, data derived from this investigation suggested that the above criteria for objective evaluation, as designated by the speech pathologists, were not routinely employed.

Chapter 4

DISCUSSION

In 1978, seven noted speech pathologists affiliated with the American Cleft Palate Association met on three separate occasions to determine if they could agree upon a standard or uniform set of procedures to evaluate the speech of individuals with cleft palate (Van Demark, Bzoch, Daly, Fletcher, McWilliams, Pannbacker, Weinberg, 1985). The group recognized that no single observation, speech, or instrumental measurement was sufficient to evaluate velopharyngeal function. They did conclude, however, that the clinician should be in a position to make inferences about velopharyngeal function based on information obtained from subjective evaluations (e.g. oral peripheral examination, articulation tests, voice quality and resonance evaluations). If these observations suggest that velopharyngeal function is in question, the authors stated that additional information regarding the status of the mechanism is mandatory. They argued that an instrumental (objective) assessment of the velopharyngeal mechanism is necessary in order to either verify or refute the data gained from the subjective clinical evaluation. Although all instrumental procedures have limitations, the authors suggested that they are appropriate and necessary to document velopharyngeal function. The results of these conferences support the argument reported previously in this study by Skolnick, McCall, and Barnes (1973) who pointed out the necessity of knowing the precise defect in a patient's

velopharyngeal closure mechanism in order to make necessary management decisions. This information is essential for prognosis and prediction purposes. The results of the present study, however, would suggest that speech pathologists do not always agree with the necessity of an objective evaluation prior to surgical and/or behavioral management decisions. This is evidenced in the low proportion (18%) of cleft palate individuals examined in this study who received an objective evaluation of velopharyngeal function. In addition, information obtained from the telephone survey of all speech pathologists on cleft palate teams in Montana indicated that only 50% recommended objective evaluations following the onset/initial diagnosis of nasalization.

Eighty-seven percent of the survey respondents indicated that videofluoroscopy and/or nasoendoscopy were the objective measurement tools preferred in the assessment of velopharyngeal closure and also indicated that those tools were available to them upon recommendation of an objective assesment. However, at least some members of the cleft palate teams apparently feel that little useful information is derived from an objective assessment. These findings are in agreement with those obtained in a national survey performed by Pannbacker et al. (1984), presented previously in this study, and suggest that clinical practice is not consistent with the state of the art in the field of cleft palate management. The findings of the present investigation would suggest that, although the speech pathologists on the teams have access to instrumental techniques found to be reliable in the objective measurement of velopharyngeal function, a conservative approach to their use is taken.

The question arises then as to why objective evaluations are not being recommended by the speech pathologists on the Montana cleft palate teams. Is it a problem in that they don't feel competent in the assessment of velopharyngeal function and/or don't see it as their role/position as a member of the cleft palate team? When these issues were addressed as part of the telephone interview, all respondents reported that they frequently or always feel competent in the assessment of velopharyngeal closure. In addition, each felt that it was the role of the speech pathologist alone, or in conjunction with other members of the cleft palate team, to make the necessary recommendations for an objective assessment. According to the respondents, referrals for objective evaluations are directed to the cleft palate team or to some member of the cleft palate team. In addition, the interpretation of findings was felt to be the responsibility of the speech pathologist alone, in conjunction with the plastic surgeon, or in conjunction with the plastic surgeon and radiologist. These reports would suggest that the speech pathologists consider themselves in a position of responsibility for each aspect of the objective evaluation process.

In principle then, the speech pathologists are aware of the necessary instrumentation involved in the assessment of velopharyngeal function, the instrumentation is available to them, and they see it as their role to be involved in making the necessary referrals and assisting in the interpretation of the data derived from an objective evaluation. Since the majority of respondents also indicated good to excellent academic preparation in cleft lip and palate, reluctance to evaluate and manage their patients aggressively may relate to practical

inexperience in working with them and in interpreting data obtained from an objective tool.

When the area of experiential background was addressed, results indicated that the majority (75%) of speech pathologists surveyed have been practicing for 12-15 years, while most (75%) of them have been participants on a cleft palate team for only 1-4 years. Half of the respondents reported a range of 10-40 cleft palate individuals seen in the last 3 years, while the remaining subjects estimated that they had seen more than 40. Supervised clinical training was limited to no experience for some and ranged to less than 12 patients for the remaining respondents. In addition, most speech pathologists (87%) reported limited experience with cleft palate individuals in conjunction with other experienced clinicians. This information implies that most respondents had very limited experience with cleft palate individuals in a supervised and/or consultant setting prior to treating them in their present practice. The number of cleft palate individuals seen in the last 3 year period also indicates limited exposure, restricting the opportunity for developing expertise in working with this population. These findings are consistent with a recent study conducted by Pannbacker et al. (1987), in which attempts were made to determine the current academic and clinical training available to speech-language pathology students in the area of cleft palate. While the authors found that almost all training programs (98.5%) provided one or more courses in cleft palate, in some programs (9%) students accumulated zero clock hours for diagnostics with patients who have cleft palate, with a similar trend reported for therapy. The majority of respondents (81.45%) in their study felt

that training was adequate, yet several stated there was insufficient clinical experience provided with cleft palate patients. Perhaps additional "hands on" experience in the assessment and treatment of cleft palate individuals would increase the frequency with which speech pathologists would access assessment tools available to them.

In addition to determining whether or not objective evaluations of the velopharyngeal mechanism are being recommended, a second issue in this study addressed the time interval between onset/diagnosis of nasalization and recommendation for an objective assessment. For the majority of individuals who received an objective evaluation, the recommendation was made immediately following diagnosis of nasalization or, presumably due to age, the evaluation was postponed for further maturation of the cleft palate child. In the majority of instances then, when an objective evaluation was recommended, it was performed in a timely fashion.

The third issue considered in this study addressed the criteria employed in determining the need/appropriateness of an objective evaluation. If an objective evaluation is not recommended at the time of initial diagnosis of nasalization as in the majority (82%) of cases in this study, what are the guidelines used to determine the efficacy of surgical management or long-term therapy? In an attempt to determine the factors that contribute to a recommendation for surgical and/or behavioral management without first obtaining an objective evaluation, data from the HCS files were examined for an indication of the criteria by which management decisions were reached.

Thirteen subjects received an immediate recommendation for surgical management as determined by a diagnosis of significant nasalization and poor or abnormal palatal function. This latter diagnosis was presumably based on information derived from an oral peripheral inspection. As indicated previously in this study (Pannbacker, 1985), adequacy of velopharyngeal closure however, is impossible to determine by direct oral examination because the area of contact between the palate and pharyngeal wall is hidden from view. Boone (1977) stated that unless the patient has an obvious open cleft, assessment of velopharyngeal competence cannot be made from oral examination alone. Recent investigations have stressed the importance of lateral pharyngeal wall movement as a predictor of success of palatal surgery (Shprintzen, Lewin, Croft, Daniller, Aragamaso, Ship, and Straugh, 1979) and multi-view cine- or videofluoroscopy and nasoendoscopy are the only two diagnostic techniques which allow for that type of observation.

Ten subjects, for whom a speech re-evaluation was recommended at a later date, were diagnosed as demonstrating slight/mild hypernasality and marginal velopharyngeal competence was suspected. Presumably, it was determined that these subjects were not demonstrating deviant speech patterns significant enough to warrant behavioral and/or surgical management. In addition, 10% of the subjects for whom speech therapy services were recommended, were reported to have slight or mild nasalization. For these subjects, the degree of nasalization may have been considered clinically significant yet not deserving of surgical intervention. In such a case, an objective assessment might be deemed unwarranted since the management options would be restricted to either speech

therapy or no treatment. Another possibility, however, is that the "mild" degree of nasalization was interpreted by the speech pathologist to be a resonance/articulation disorder that could be easily modified in therapy. As Morris (1972) cautioned, however, children who demonstrate mild or inconsistent nasalization of speech are not always responsive to therapy. Some children evidence mild nasalization as a result of a short palate. Although the movement needed by either the palate or the posterior pharyngeal wall to achieve adequate closure is small, the mechanism may be operating maximally and further taxation of the system will likely prove difficult or ineffective. In addition there is no evidence at this time to suggest that range of movement can be modified through behavioral methods (McWilliams et al., 1984). Morris also speculated that many children who demonstrate inconsistent nasalization of speech do so as a result of mechanical or neurological constraints, which interfere with the mechanism's ability to effect appropriate rate and timing relationships with other articulators during complex speech tasks (e.g. connected speech). Unfortunately, the instances of oral production are often interpreted as evidence of physiologic potential for velopharyngeal closure. Those children are enrolled in therapy with a goal of generalizing the oral productions. As indicated by Morris, however, the generalization may never occur because the rate and timing abilities needed to manipulate the mechanism are impaired. An objective evaluation of the mechanism appears imperative, then, not only in determining the size and configuration of the mechanism in order to determine if velopharyngeal competence is possible, but also to determine if the mechanism is capable of

making the rapid adjustments of ongoing speech. The objective evaluation in this case would not only indicate the status of the mechanism, but would provide direction for necessary surgical management. When therapy proceeds over a long period of time without this information, children with physical incompetence are placed at risk for the development of vocal hyperfunction and compensatory articulation patterns (McWilliams et al., 1984)

Of the 41 subjects in this study, for whom speech therapy services were recommended, 21 (51%) reportedly demonstrated significant changes over time, resulting in a decrease or total elimination of excessive nasality during speech production. Of the remaining subjects for whom follow-up information was available, 3 (7%) demonstrated adequate velopharyngeal competence following eventual secondary palatal surgery. The remaining 14 subjects (34%) attended therapy, ranging from 1 to 6 years, with no significant changes noted. These findings were inconsistent with results obtained from the telephone survey in which the efficacy of long-term therapy was addressed. Results indicated that all speech pathologists felt that 6 months or less was sufficient for a trial period of therapy. In regard to the children that receive speech therapy services year after year, the question arises as to how long speech pathologists are willing to continue therapy with these individuals beyond the time when any type of progress is being made. McWilliams (1982) has pointed out that there is far too much speech therapy being undertaken without knowledge or concern about structure and the limitations it places upon function. This author concurs with McWilliam's notion that ill-advised therapy is expensive to administer and

emotionally costly to children, particularly when therapy is continued over long periods of time, with no progress evidenced. McWilliams contends that it is a commonly held notion that defective speech is equated with the need for speech therapy, even if the therapy is not likely to alter the speech. This philosophy can lead to a great deal of fruitless therapy that is frustrating to both the clinician and the patient. Even more serious is the loss of time in getting appropriate treatment. For children, this can mean that the optimal age for intervention may have passed before other forms of management are adequately explored.

In 1984, Riski and DeLong conducted a longitudinal study that analyzed the articulation development of 108 children with cleft lip/palate from 3 through 8 years of age. Findings indicated that cleft palate children with velopharyngeal incompetence will not make significant gains in articulation until the incompetence is managed. These data supported earlier findings by Van Demark (1974) who reported that cleft palate children with velopharyngeal insufficiency made minimal or no gain in articulation therapy while cleft palate children with velopharyngeal competence made significant gains. The implication drawn from these two studies is that early identification and management of velopharyngeal incompetence is necessary for improvement in articulation skills.

It seems imperative that , when patterns of velopharyngeal incompetence are noted (i.e. nasal emission, glottal-stops, pharyngeal substitutions, and/or reduced intraoral pressure), a definitive examination of the mechanism is needed. This would not only facilitate the determination of adequacy or inadequacy of the mechanism, but would also provide direction for those individuals for whom

behavioral therapy is indicated.

Another area of concern stemming from results of the survey of speech pathologists was that only 50% of the respondents were members of a cleft palate organization at the state and/or national level. In addition, 25% of the respondents had no current subscription with any professional journals dealing with the area of cleft palate specifically, and/or speech pathology in general. It seems imperative that if speech pathologists working in the area of cleft palate management are to avoid clinical perpetuation of outmoded approaches to management, as well as serve in an advisory position, it is a necessary prerequisite that they be involved with cleft palate organizations and in touch with the most recent literature. Such involvement may help close the gap between information that is available through current research findings and that which is put to use by speech pathologists working in the field.

4.1. Limitations of this Study

Given the retrospective nature of the initial part of this study, results were dependent upon the availability of information to be retrieved from the HCS files. As indicated previously in this study, follow-up information/documentation was not accessible for 5 of the 80 subjects that met the selection criteria. In addition to the information that was retrieved, there remains the possibility that not all of the information essential to this study was reported. Therefore, the possibility that an objective evaluation was not performed due to reasons not indicated (e.g. parental concern regarding radiation exposure) needs to be considered.

Because the retrospective aspect of the study was designed to examine data already on file, the investigator was dependent on subjective classification and descriptive characteristics based on measurements performed at a different time and by a different person. Thus the reliability and validity of the file data retrieved (e.g. procedural errors, calibration of equipment, test procedures used, etc.) may be questioned. Not certain of the conditions under which the data were collected, the examiner is forced to make assumptions based on the information that was available.

Specifically in the data derived from the HCS files, interpretation was often difficult due to the limited amount of information provided. Although the purpose of the cleft palate team is to evaluate the child, frequently the characteristics of the subject's speech were poorly described. Vague terms such as "slight nasalization" and "nasal sounding" were employed. Patterns of nasalization, information certainly important and of interest to speech pathologists working with the child, as well as in research of this type, was unclear. Nasalization was frequently noted in the cleft palate team results, but often not described in any detail. When recommendations for speech therapy services were reported, it was frequently difficult if not impossible to determine the reason for and/or type of therapy being recommended (i.e. articulation therapy versus therapy for elimination of nasalization).

In terms of the information that was available, it is important to consider that nasality is an extremely difficult vocal characteristic to judge reliably on an individual basis. This investigator was not only dependent upon the validity and

reliability of the speech pathologist's ear in the identification of nasalization, but was also limited to the description of the characteristics of the nasalization reported by the cleft palate team. Individual rater's judgments of the severity of nasalization of speech are known to be characterized by questionable reliability and unknown validity and may be biased by the presence and severity of other primary speech attributes (Counihan and Cullinan, 1970). While these factors are limitations in any type of retrospective research, they became even more evident in this study due to the scarcity of objective and descriptive information provided.

Another limitation of the HCS data retrieval in regards to subject selection should be noted. Normal academic progress was a criterion employed to minimize the effect of learning deficits on speech proficiency. For school-age children, this information was based on the child's attendance in a regular classroom, grade repetitions, resource room services and/or special tutoring needs. For those individuals of preschool age, however, the investigator relied on psychological and/or speech pathology reports regarding information of possible developmental delay. The possibility of developmental problems may have been overlooked at the time of evaluation or simply not reported in the data.

In regards to the telephone survey portion of the present study, there were no indications during data collection that the responses to interview questions were not reliable, but the possibility exists. With this type of study, there is no way of controlling or determining the accuracy of the respondent's answers. Interpretation of the responses was complicated further by providing the subjects with the opportunity to give multiple responses to a single question, as opposed

to prioritizing information within a single item. The subjective nature of such an approach leaves open the interpretation of results more so than definitive data derived from a more objective approach.

In both the retrospective (retrieval of HCS data) and survey portions of this study, caution must be taken in interpreting the data. Due to differences in the cleft palate team professionals' performance and documentation of evaluation results, it is difficult to ensure that interpretation of the data was consistent with the professionals' interpretation. In regards to the survey, differences in respondents' interpretations of questions posed should also be considered in making conclusions regarding management practices.

4.2. Implications for Training in Clinical Practice

Due to the limited number of recommendations for objective evaluations of the velopharyngeal mechanism demonstrated in the present study, along with survey respondent concerns regarding the lack of objective evaluations performed by some cleft palate teams in the state of Montana, this area needs to be addressed more thoroughly. It appears that, although the respondents' reported background in cleft palate is adequate, the practical experience associated with cleft palate management is problematic. According to data retrieved from the HCS files and through the telephone survey, the speech pathologists involved are aware of the necessary procedures, instrumentation, and consequences of making such a recommendation, but do not always take advantage of the diagnostic tools available to them. In some cases, even though the appropriate instrumentation is

available, limited training in working with the instrumentation results in problems with interpretation of the data. As a result of limited practical experience associated with their academic training programs, as well as limited contact due to the small population of cleft palate individuals throughout the state, the professionals may have limited opportunities to develop competency in the skills needed to conduct all phases of cleft palate management. Future concerns point to the need for continual training and ongoing consultation in order to provide opportunities to develop these necessary skills. A genuine concern for speech pathologists is the lack of training programs and consultation facilities within a reasonable referral distance.

A solution to these problems might be addressed through the agencies that presently fund the operation of state-wide cleft palate teams. These agencies might consider providing funds, not only for the assessment and management of these children, but expand to include training and consultative services to those professionals serving on the cleft palate teams. Through pertinent courses, seminars, and workshops, speech pathologists would be working to increase their own skills and at the same time, provide adequate treatment to patients who need it the most.

Access to consultation and supervision, as needed, could be a focus of the training program. This would not only aid the team speech pathologist in assessment procedures and management decisions, but could also be utilized in training cleft palate team members as consultants. This knowledge of cleft palate management could be carried over to the speech pathologists in the field who are

performing the actual 'hands-on' treatment for these cleft palate children. Increased correspondence through tape recordings, telephone calls, reports and visits, could all significantly upgrade the level of care for cleft palate individuals in the state.

Perhaps this type of training and consultation to speech pathologists would provide the direction necessary to realize when they have gone as far as they can go with therapy and when additional management decisions are indicated. Given this direction, the necessary trend toward more immediate and frequent objective evaluations of velopharyngeal function may help solve the problem of ongoing and unwarranted speech therapy services.

In order to supplement the training necessary for management with the cleft palate population, it seems paramount that professionals involved with cleft palate teams should become involved with cleft palate organizations and become more oriented to seeking out literature that appears in journals within and outside the field, in order to remain current with recent research findings.

Future implications for clinical practice then, point to the need to address academic program alternatives in preparing clinicians to provide more thorough and useful services to individuals with cleft palate. In addition, further considerations in determining the means by which effective continuing, professional education can be implemented, remains an important issue for cleft palate management.

4.3. Implications for Future Research

The practice of recommending surgical or behavioral management for velopharyngeal insufficiency, in the absence of objective data to support such a recommendation, was of concern in this study. Further, the philosophy of management held by the speech pathologist was frequently inconsistent with practical management of these children. Since management decisions for children with cleft lip and palate are team-based (as opposed to discipline-based), the value placed upon data derived from an objective assessment by other team members should be explored.

Group dynamics and autonomy of specified members may influence/override recommendations that arise from a speech pathology examination. If professionals from other disciplines place little value on objective data, a team recommendation for an objective assessment of the velopharyngeal mechanism may not be forthcoming. In addition, unrealistic expectations and/or lack of knowledge regarding the effectiveness of behavioral therapy in treating velopharyngeal valving disorders may lead other team members to argue against exposing a child to radiation or the discomfort associated with nasoendoscopy until a period of therapy has been initiated. Future research should be conducted to examine cleft palate team members' 1) perception of the practical utility of information derived from an objective assessment of the velopharyngeal mechanism, and 2) knowledge of research findings regarding the efficacy of behavioral treatment regimes employed to "teach" velopharyngeal closure.

As indicated earlier, the lack of referrals for objective assessment of the

velopharyngeal mechanism in this study may have been attributed to the speech pathologists' inexperience in interpreting data derived from such an assessment. Clearly, if data cannot be interpreted, its clinical utility may be questioned and thus, retrieval may be deemed unnecessary. Future research designed to assess the team speech pathologist's ability to interpret data obtained from an objective assessment of velopharyngeal function should also be explored. The correlation between information derived from an assessment and management recommendations made should be examined.

Appendix A

INFORMATION SUMMARY FOR THE HANDICAPPED CHILDREN'S
SERVICES (HCS) PROGRAM

The purpose of this study is to examine, in part, the efficiency of the evaluation process for cleft palate children with velopharyngeal insufficiency who have been seen by cleft palate teams in the state of Montana. Specifically, the following questions will be addressed:

- 1) Do children with velopharyngeal insufficiency, who evidence nasalization of speech, receive a recommendation for an objective assessment of the velopharyngeal mechanism prior to behavioral or surgical treatment of the problem?
- 2) What is the time interval between the onset/diagnosis of speech nasalization and recommendation for an objective assessment of the velopharyngeal mechanism?
- 3) What criteria do the cleft palate team speech pathologists employ when determining the need for an objective assessment of the velopharyngeal mechanism?

Questions one and two necessitate retrieval of data from the HCS cleft palate clinic files. Information from the files of patients diagnosed as cleft palate will be used to determine the child's appropriateness for inclusion in this study. Specifically, the following data, if available, will be retrieved:

- 1) Age of patient at onset of study
- 2) Diagnosis/Age of diagnosis of nasalization
- 3) Age at which recommendation for an objective evaluation

was performed

- 4) Age at which an objective evaluation was performed
- 5) Evaluation procedures used for the determination of nasalization
- 6) Recommendations made following diagnosis of nasalization
- 7) Evidence of hearing loss, developmental delays intellectually, neurological problems, and/or symptom complexes

Our intent is only to examine the extent to which objective evaluations of the velopharyngeal mechanism are being employed. Subject names and any other identifying information will not be retrieved. Information from this study will be kept strictly confidential, however, the results may be published at a later date. Information retrieved from the HCS files may help us learn more about the results of management that children with velopharyngeal insufficiency receive.

(continuation of Information Summary for the HCS program)

Mary Pat Schilly, B.S.
University of Montana

Mary A. Hardin, Ph.D., CCC-SLP
University of Montana

Date

Date

The above information has been discussed with me and I hereby give my permission for retrieval of the necessary data from the HCS files to complete the proposed study.

Sherri Pettit, R.N.
HCS Personnel

Sid Pratt, M.D.
HCS Personnel

Date

Date

Appendix B

INFORMATION SUMMARY TO TELEPHONE SURVEY PARTICIPANTS

Hello, my name is Mary Pat Schilly. I am a graduate student in the Communication Sciences and Disorders Department at the University of Montana. I am currently working on a Master's level thesis in the area of cleft palate management. I am calling to request your participation in a survey involved in this study, which includes all speech pathologists who have served on a cleft palate team in the last three years. I understand that you have been a participant on the (city) team. The survey lasts approximately 15–20 minutes. Will you agree to be interviewed? Is this a convenient time or would you prefer that we arrange another time?

The purpose of my study is to examine, in part, the efficiency of the evaluation process for cleft palate children with velopharyngeal insufficiency who have been seen by cleft palate teams in the state of Montana. If you agree to participate in this survey, your name will remain anonymous and any specific information that you report will be kept confidential. In addition, a summary of the results of this study will be made available to you upon request.

Appendix C

TELEPHONE SURVEY

I. Descriptive Information

A. Academic Background

1. What year did you complete your Master's degree or the equivalent?
2. Within your educational program, did you have a specific course on cleft palate or was information provided as part of another course?
3. Of the following different aspects of the study of cleft palate, please indicate if this topic was covered in your cleft palate class (yes/no), and in addition, describe your current knowledge in this area:
 - a) excellent
 - b) good, but refresher courses needed
 - c) adequate, but additional training preferred
 - d) poor

Topics:

- anatomy/physiology of the velopharyngeal mechanism
- assessment procedures for evaluation of the velopharyngeal mechanism
- advantages/ disadvantages of various types of instrumentation used in the assessment of the velopharyngeal mechanism/function
- alternatives for intervention/management of v.p.i. (in terms of which techniques give best results and when management should be provided)
- surgery options (type, timing, outcome)
- psychosocial aspects of clefting

- purpose/function/knowledge of other professional roles of the cleft palate team
- how to determine when physical vs. behavioral management is indicated

4. If you had the option for further training, in which of the following areas do you feel you need additional training?

- anatomy/physiology of the velopharyngeal mechanism
- assessment procedures for evaluation of the velopharyngeal mechanism
- instrumentation used in the assessment of the velopharyngeal mechanism
- alternatives for intervention/management
- surgery options (types, timing, outcome)
- psychosocial aspects of clefting
- purpose/function/knowledge of other professional roles of a cleft palate team
- determination of physical vs. behavioral management

5. In your clinical training, did you have any experience working with cleft palate children as part of a supervised clinical practicum? (yes/no)
If so, how many clients did you have?

6. In your clinical experience since that time, have you had the opportunity to see or work with any cleft palate clients in conjunction with other experienced clinicians?

If so, with how many clients?

B. Current Status

1. How long have you been practicing as a Speech Pathologist?
2. How many years have you been a member/participant with a cleft palate team?

3. Which of the following best describes your present practice?
 - a) hospital
 - b) public school
 - c) rehabilitation center
 - d) university
 - e) private practice
 - f) other;describe:

4. What are your primary responsibilities?
 - a) teaching
 - b) research
 - c) assessment
 - d) treatment
 - e) other;describe:

5. What is your primary caseload?
 - a) children
 - b) adults
 - c) both

6. Within that group, do you work primarily with:
 - a) developmentally disabled
 - b) articulation/language problems
 - c) cerebral palsy
 - d) cleft palate

7. Do you belong to a cleft palate organization at the state and/or national level? (yes/no)

8. Do you have a current subscription with any of the following professional journals?
 - a) Journal of Speech and Hearing Research
 - b) Journal of Speech and Hearing Disorders
 - c) Cleft Palate Journal
 - d) Plastic and Reconstructive Surgery
 - e) other;describe:

C. Incidence

1. How many cleft palate individuals have you worked with between the years 1984-1986?
 - a) 1-10
 - b) 10-20
 - c) 20-30
 - d) 30-40
 - e) more than 40

II. Management/ Clinical Practice

1. Do you feel competent in the assessment of velopharyngeal closure?
 - a) always
 - b) frequently, but not always
 - c) rarely
 - d) never
2. What objective measure would you prefer to use in the assessment of velopharyngeal closure?
3. What instrumentation is available to you in the assessment of the velopharyngeal mechanism?
4. What tools do you employ in the assessment of velopharyngeal closure?
5. When does an objective evaluation apply in the recommendations made?
 - a) at initial diagnosis of nasalization
 - b) following a period of trial therapy
 - c) following extensive speech therapy
 - d) following failure of secondary surgical techniques
 - e) other;describe:

6. Whose role is it, as a member of the cleft palate team, to make a referral for an objective evaluation?
 - a) plastic surgeon
 - b) otolaryngologist
 - c) speech pathologist
 - d) other;describe:

7. Where, or to whom, do you refer cleft palate individuals that you feel are in need of an objective evaluation of the velopharyngeal mechanism?

8. Who do you feel should interpret the data derived from an objective assessment?

9. Do you feel behavioral therapy is always indicated prior to objective assessment and/or surgical recommendations?

10. What would you describe as the preferred treatment for cleft palate children exhibiting nasalization following primary palatal surgery? (yes/no)
 - a) surgery
 - b) surgery followed by speech therapy
 - c) speech therapy alone
 - d) speech therapy followed by surgery
 - e) other;describe:

11. Do you directly refer children who exhibit nasalization for speech therapy without an objective assessment?
 - a) always
 - b) frequently
 - c) occasionally
 - d) rarely
 - e) never

12. For children who have not had an objective assessment of the velopharyngeal mechanism and are exhibiting nasalization of speech, do you directly advise against speech therapy?
 - a) always
 - b) frequently
 - c) occasionally
 - d) rarely
 - e) never

13. What surgical technique does the plastic surgeon on your cleft palate team employ upon recommendation for surgery?

14. If speech therapy were recommended on a trial basis, what are guidelines used to determine the efficacy of long-term therapy or the need for surgery?
 - a) progress made in 3-month period
 - b) progress made in 6-month period
 - c) progress made in 1-year period
 - d) progress made in 2-year period
 - e) other;describe:

15. When a child is seen by your team and exhibits nasalization of speech, what factors would contribute to a recommendation for speech therapy without first obtaining an objective evaluation?
 - a) phoneme-specific nasalization
 - b) inconsistent nasalization
 - c) compensatory articulation patterns
 - d) time interval post-surgery
 - e) other

16. What age do you feel a child can be before tolerating an objective evaluation?
 - a) 0-2 years
 - b) 2-3 years
 - c) 3-4 years
 - d) 4-5 years
 - e) other;describe:

III. Attitudes/Philosophy

1. Do you believe speech-language pathologists are adequately trained to understand the nature of the problem presented by cleft palate?
 - a) all are adequately trained
 - b) most are adequately trained
 - c) some are adequately trained
 - d) only the exceptional speech-language pathologist is adequately trained
 - e) none are adequately trained to understand this problem

2. Do you believe that speech therapy can be effective in remediating speech deficits associated with velopharyngeal incompetence?
 - a) always
 - b) frequently
 - c) occasionally
 - d) rarely
 - e) never

If so, which of the following training procedures do you believe to be effective?

- a) obturator reduction
 - b) muscle exercises (e.g., blowing, sucking, swallowing)
 - c) articulation therapy
 - d) voice therapy
 - e) other;describe:
-
3. How do you feel about the coordination of services between the speech pathologist on the team and the speech pathologist in the field?
 - a) excellent, work closely together
 - b) adequate, but more frequent contact desirable
 - c) poor, with infrequent contact
 - d) other;describe:

4. What do you think are areas of need in the assessment of velopharyngeal closure?
 - a) more objective measures
 - b) availability of instrumentation
 - c) consultative services regarding cleft palate
 - d) continuing education
 - e) other;describe:

5. How do you feel about the adequacy and availability of speech and hearing services offered to cleft palate individuals in this state?

6. Are there specific problems that you are aware of or concerned with in referring cleft palate individuals for speech and hearing services?

7. Are there other comments or opinions you'd like to express regarding the issues raised in this questionnaire?

References

- Bernthal, J.E., and Bankson, N.W., Articulation Disorders. Prentice-Hall, Inc., Englewood Cliffs, N.J., 1981.
- Blood, G.W., and Hyman, M., Children's perceptions of nasal resonance. Journal of Speech and Hearing Disorders, 42:446-448, 1977.
- Boone, D., The Voice and Voice Therapy. Prentice-Hall, Inc., Englewood Cliffs, N.J., 1977.
- Bzoch, K.R., Categorical aspects of cleft palate speech. In K.R. Bzoch (ed.): Communicative Disorders Related to Cleft Lip and Palate. Boston: Little, Brown, and Co., 1979.
- Counihan, D.T., and Cullinan, W.L., Reliability and dispersion of nasality ratings. Cleft Palate Journal, 7: 261-270, 1970.
- Dalston, R.M., Photodetector assessment of velopharyngeal activity. Cleft Palate Journal, 19:1-8, 1982.
- Dalston, R.M., and Warren, D.W., Comparison of Tonar II, pressure-flow, and listener judgments of hypernasality in the assessment of velopharyngeal function. Cleft Palate Journal, 23:108-115, 1986.
- Dorf, D.S., and Curtin, M.D., Early cleft palate repair and speech outcome. Plastic and Reconstructive Surgery, 70:71-79, 1982.
- Fletcher, S.G., "Nasalance" vs. listener judgments of nasality. Cleft Palate Journal, 13:31-34, 1976.
- Fletcher, S.G., (ed.) Diagnosing Speech Disorders from Cleft Palate. New York: Gruen and Stratton. 1978.
- Folkins, J.F., Speech motor control in individuals with clefting. Cleft Palate Journal, 22: 106-122, 1985.
- Glaser, E.R., Skolnick, M.L., McWilliams, B.J., and Shprintzen, R.J., The dynamics of Passavant's ridge in subjects with and without velopharyngeal insufficiency: A multiview videofluoroscopic study. Cleft Palate Journal, 16: 24-33, 1979.

- McWilliams, B.J., Glaser, E.R., Philips, B.J., Lawrence, C., Lavarato, A.S., Beery, Q.C., and Skolnick, M.L., A comparative study of four methods of evaluating velopharyngeal adequacy. Plastic and Reconstructive Surgery, 68:1-9, 1981.
- McWilliams, B.J., The trouble with speech pathology. Cleft Palate Journal, 19: 281-285, 1982.
- McWilliams, B.J., Morris, H.L., and Shelton, R.L., Cleft Palate Speech. Phil., PA.: B.C. Decker, Inc., 1984.
- Morris, H.L., Evaluation of management regimes for cleft palate. In D.B. Tower (ed.): The Nervous System: Human Communication and Its Disorders. Raven Press, N.Y., 1975.
- Morris, H.L., Evaluation of abnormal articulation patterns. In Bzoch, K.R. (ed.): Communication Disorders Related to Cleft Lip and Palate. Boston: Little, Brown and Co., 1979.
- Pannbacker, M., Lass, N.J., Middleton, G.F., Crutchfield, E., Trapp, D.S., and Scherbick, K.A., Current clinical practices in the assessment of velopharyngeal closure. Cleft Palate Journal, 21:33-37, 1984.
- Pannbacker, M., Common misconceptions about oral pharyngeal structure and function. Language, Speech, and Hearing Services in the Schools, 16:29-33, 1985.
- Pannbacker, M., Landis, P., Lass, N.J., Middleton, G.F., and Goodwin, D.S., A survey of speech-language pathology training programs: current trends in cleft palate. American Cleft Palate Association poster session presentation, San Antonio, TX, 1987.
- Paynter, E.T., and Kinard, M.W., Perceptual preferences between compensatory articulation and nasal escape of air in children with velopharyngeal incompetence. Cleft Palate Journal, 16:262-266, 1979.
- Riski, J.E., and DeLong, E., Articulation development in children with cleft lip/palate. Cleft Palate Journal, 21:57-64, 1984.
- Ross, R.B., and Johnston, M.C., Cleft Lip and Palate. Baltimore: Williams and Wilkins Co., 1972.
- Schneider, E., and Shprintzen, R.J., A survey of speech pathologists: current trends in the diagnosis and management of velopharyngeal insufficiency. Cleft Palate Journal, 17:249-253, 1980.

- Shelton, R.L., Chisum, L., Youngstrom, K.A., Arndt, W.B., and Elbert, M., Effect of articulation therapy on palatopharyngeal closure, movement of the pharyngeal wall, and tongue posture. Cleft Palate Journal, 6:440-448, 1969.
- Shprintzen, R.J., Lewin, M.L., Croft, C.B., Daniller, A.I., Argamosa, R.V., Ship, A.G., and Straugh, B., A comprehensive study of pharyngeal flap surgery: Tailor made flaps. Cleft Palate Journal. 16: 46-55, 1979.
- Skolnick, M.L., McCall, G.N., and Barnes, M., The sphincteric mechanism of velopharyngeal closure. Cleft Palate Journal, 10: 296-305, 1973.
- Spriestersbach, D.C., and Sherman, D., (eds.) Cleft Palate and Communication. New York: Academy Press, 1968.
- Trost, J.E., Understanding compensatory articulations: perceptual characteristics, articulatory gestures, radiographic description. ASHA miniseminar, Detroit, MI., 1980.
- Trost, J.E., Articulatory additions to the classical description of the speech of persons with cleft palate. Cleft Palate Journal, 18:193-203, 1981.
- Van Demark, D.R., Morris, H.L., and Vandehaar, C., Patterns of articulation abilities in speakers with cleft palate. Cleft Palate Journal, 1:230-239, 1964.
- Van Demark, D.R., and Van Demark, A.A., Speech and socio-vocational aspects of individuals with cleft palate. Cleft Palate Journal, 7:284-299, 1970.
- Van Demark, D., Bzoch, K., Daly, D., Fletcher, S., McWilliams, B.J., Pannbacker, M., Weinberg, B., Methods of assessing speech in relation to velopharyngeal function. Cleft Palate Journal, 22: 281-284, 1985.
- Warren, D.W., and Dubois, A.B., A pressure-flow technique for measuring velopharyngeal orifice area during continuous speech. Cleft Palate Journal, 1:52-71, 1964.
- Williams, W., and Eisenbach, C., Assessing velopharyngeal function: The lateral still technique vs. cineflourography. Cleft Palate Journal, 18:45-50, 1981.