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IMPORTANCE OF COGNITIVE RECOGNITION OF HEARING LOSS IN
THE NURSING CARE OF INSTITUTIONALIZED AGED PERSONS

by

Theodore H. Koff

A Dissertation Submitted to the Faculty of the
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GRADUATE COLLEGE

I hereby recommend that this dissertation prepared under my direction by Theodore H. Koff entitled Importance of Cognitive Recognition of Hearing Loss in the Nursing Care of Institutionalized Aged Persons be accepted as fulfilling the dissertation requirement of the degree of Doctor of Education

D. W. Smith

Dissertation Director

4/5/71

Date

After inspection of the final copy of the dissertation, the following members of the Final Examination Committee concur in its approval and recommend its acceptance:*

<u>DW Smith</u>	<u>4/5/71</u>
<u>Donald R. Ross</u>	<u>4/5/71</u>
<u>Thomas J. Fisher</u>	<u>4-5-71</u>
<u>Doris E. Stealy</u>	<u>4-5-71</u>
<u>Jane Morrison</u>	<u>4-5-71</u>

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Theodor H Koff

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ABSTRACT

As a result of the prolongation of life and the increasing number of older people in our society larger numbers of older people enter nursing homes for care. The older person becomes dependent upon nursing personnel to provide daily care and assumes that the nurses understand and are prepared to deal with his health problems. Specifically it is assumed by the older person that nursing personnel are aware of the ubiquity of failing hearing in older people, that the nurses have the capacity to understand this loss, and are able to overcome the communication difficulty imposed by it.

The general hypotheses advanced in this study indicate that there are communication difficulties between nurses and residents which are attributable to inadequate appreciation, evaluation, and compensation for the hearing problems of aged persons in nursing homes.

A multi-phasic audiometric analysis, including a hearing handicap scale, pure-tone, air-conduction, threshold, and speech discrimination tests was administered to twenty-eight randomly chosen individuals from three nursing homes located in Tucson, Arizona.

The residents' actual hearing loss, their awareness of this loss, the nursing staffs' perception of

residents' hearing loss, and the factors facilitating or impeding accurate communications were the focal concerns of this study.

In the interest of establishing guidelines for maximizing communication, hypotheses were tested comparing actual states of hearing ability to subjective evaluations of hearing ability by both nursing home residents and nurses.

The findings of the study indicated accurate measurement of resident hearing loss on the part of both residents and nurses. However, the tendency for more accurate evaluation of hearing capacity on the part of residents in comparison to nurses was established, with nurses' evaluations lower than residents'.

The general lower level of awareness of remedial hearing practices by nurses employed in a nursing home in comparison with professionals working with a population having impaired hearing was disclosed. It was also shown that the use of the intercommunication system, between the nurse and older person, significantly impairs and severely distorts communication.

Recommendations were made for a hearing testing program for all residents in nursing homes. In-service education for nurses related to hearing loss and communication problems of older people were also suggested as well

as limitation in the use of the nurse-patient inter-communication system. Suggestions for further research were included.

CHAPTER I

INTRODUCTION TO THE PROBLEM

The industrial and medical revolutions of this century have provided opportunities for the prolongation and purposeful use of life for a large segment of our society. Accompanying these developments has been the societal necessity of providing care for the increasing aged segment of our population who are unable to continue to care for themselves.

Brotman (1968) stated that at the turn of the century every twenty-fifth American was at least 65 years of age. By 1990, every tenth American will be over age 65.

By 1990 there will be 27 million over age 65 and 40%, or more than ten million, will be more than age 75.

By 1990 the 65 to 74 age group will be seven and a half times as large as in 1900, but the 75 plus age group will be eleven and a half times as large.

Currently, the aged population (over 75) increases annually by 225,000--almost a quarter of a million persons (p. 6).

Brotman (1968) also wrote that seven per cent of the age group over age 75 live in institutions such as nursing homes and homes for the aged. There are more than 25,000 nursing homes with 450,000 beds and 1,500 homes for the aged with 100,000 beds. It has been projected that by 1990

over 700,000 aged persons will reside in institutional settings in the United States.

This large group of older persons requires institutionalization because of failing health and the inability to receive increasing care in their own residences. The older person anticipates that the nursing home will have the staff both in quantity and quality capable of recognizing problems of and providing the services needed by older persons in failing health. Nursing care, the primary service offered in the nursing home, is designed to assist the older person with activities of daily living and medical care. The relationship developed between the older person and the nursing personnel is important in determining the benefits an older person derives from a nursing home. This relationship ideally should enable a nurse to understand the needs of an older person and permit the communication of needs, treatment goals, and expectations between the nurse and the older person. Obstacles interposed on this relationship can impair the effectiveness of communication and thereby the effectiveness of treatment administered to an older person.

There has been research related to the communication problems of older persons in nursing homes (Walle, 1962; Hudson, 1960; Grossman, 1955). However, there is an absence of research related to the possible communication barriers between a nurse and an older person in a nursing home.

Statement of the Problem

Larger numbers of older persons enter nursing homes for care now more than ever before. The older person becomes dependent upon nursing personnel to provide daily care and assumes that the nurses understand and are prepared to deal with the health problems of older people. Specifically, it is assumed by the older person that nursing personnel will be aware of the ubiquity of failing hearing in older people and that the nurses will have the capacity to understand this loss and be able to overcome the limits to communication imposed by it.

The problems that exist then, are: (1) does the resident have a hearing loss, (2) to what extent is the nursing staff and/or the older person aware of it, (3) what happens if one or both are unaware of the loss, (4) what are the possible effects of the concomitant reduction in understanding or effectiveness of communications produced from such a loss, and finally (5) what relevance do these contingencies have to patient satisfaction and nursing services in a home for the aged? Qualitative evaluation of problems (4) and (5) will be supplemented by an exploration of the literature on the social-psychological ramifications of hearing loss.

Importance of the Problem

The older person is much more prone to develop hearing loss of the presbycusis type (Gaitz and Warshaw, 1964) than is the younger adult.

Presbycusis is the term used to describe the irreversible physiological changes occurring in the human auditory mechanism with increasing age (Barr, 1970). The problems of old age hearing loss also are varied in terms of auditory behavior. These variations in auditory behavior include the following: common high frequency loss resulting in deterioration of consonant intelligibility, diminished ability to compensate for discrimination loss, decrease in cerebral processing of speech and other acoustic patterns, decrease in pitch and volume discrimination, as well as speech discrimination ability in noisy situations.

The importance of the problems of communication and hearing loss in older people can be viewed from an economic perspective. Larger numbers of older persons are now being cared for in nursing homes and larger sums of money are now being spent by individuals, as well as the state and federal government, to obtain this care. The large amount of money spent would justify the highest level of care and therefore the importance of assuring fully effective communication between the nurse and the older person.

Sataloff and Vassallo (1966) stated that:

No physical illness, be it arthritic, impaired vision, or crippling illness can have such an adverse effect upon an individual's personality as hearing loss, and it does not always take a marked degree of hearing loss to create a psychological disturbance of sizable proportion. The major reason for the elderly person's self-banishment to a corner often lies in the strange type of deafness associated with aging (p. 182).

Bloomer (1960) suggested that no program of rehabilitation of elderly patients can be successful without attention being given to the problem of communication. Verbal communication is important in informing a nurse, physician, or other persons involved in the delivery of health care, how we feel. "We use verbal communication to indicate our desires and to persuade other people to modify their activities or behavior to accord with ours" (p. 292). Consequently, it is essential to use hearing successfully in responding to speech or to the sounds from the environment. Sataloff and Vassallo (1966) stated:

The adverse effects produced upon the senior citizen's personality by impaired communication . . . are serious and often misunderstood and present a major challenge to medicine and society. We may be helping people to live longer, but we are certainly not enabling them to enjoy it. All one has to do is to visit an old folks' home to realize the magnitude of this problem and the challenge it poses to medicine (p. 184).

The consequences of hearing loss to an older person in an institutional setting can best be illustrated by examining the circumstances of one person confronted with a communication problem.

The old lady in Room #12 had not been feeling well for the past hour. She rested in bed, pondering the nature of her discomfort and whether she would feel better after a rest. But the discomfort increased and since she now resided in a nursing home she chose to call the nurse. She moved to The Home because she feared the long, lonely hours at her apartment. She knew that a tug on the white cord at her pillow would bring a response from the nice lady at the desk and she would have someone to share her anxiety. "Perhaps she'll call the doctor, or bring a pill, or just sit with me until I feel better," the patient thought. And sooner than she anticipated, she heard the voice of the nurse through the intercom. In her slow, soft voice the patient in #12 told the nurse of her discomfort. But what was it the nurse said? Did she say she was coming? Was she too busy to visit now? Perhaps she didn't make herself understood the patient thought. Should she call the nurse again? The time passed slowly now. The patient became more fearful and agitated. When the nurse finally arrived, she was surprised to find an agitated lady who accused her of unnecessary delay.

Where had the communication broken down? If the nurse had been aware of the hearing loss of the lady in #12, could she have modified her response? What about the patients who do not socialize because the others talk too softly? What about the patients who think that the "whispering" they hear is other persons talking about them?

How often do older people in nursing homes miss the announcements, the good morning salutation, or the words of support because of hearing loss? How often does the nurse fail to communicate with the patient because she is unaware of the patient's hearing loss and consequently does not

modify and individualize her communication technique to fit the needs of the patient?

This study examines the relationship between the nurses' awareness of the older person's hearing loss, the measured hearing loss of the older person, and his awareness of his own hearing loss and the effects of these, alone or in combination, on the effectiveness of communication in relationship to nursing practice. This study can lead to recommendations for nursing staff education that can improve communication between nurses and older people and thereby improve the care provided in nursing homes.

Theoretical Framework

Given that this thesis deals with a problem in which physiological, psychological, sociological, and cultural factors converge, the development of a theoretical framework must precede any literature review or statement of hypotheses. Such a theoretical frame of reference will focus the study and give insight into the ceteris paribus conditions of this work.

A theoretical framework is developed that deals first with the significance of the relationship between a nurse and an older person. Thereafter, communication theory is discussed and related to the importance of hearing in the nurse-older person relationship. Finally, the nature of hearing loss for the older person is

discussed as it contributes to the cognitive problems of self-awareness of hearing by the older person and its impact on communication.

Relationship Between Nurse and Patient

What can nursing offer the resident of a nursing home? The nurse's function is to promote health and well-being of individuals. This includes helping a patient meet certain kinds of needs that he cannot meet for himself (Henderson, 1964; Wooldrige, Skipper, and Leonard, 1968). A need defined in this context is a "want" or requirement of an individual which can be met by the nurse to relieve an individual's distress or improve his well-being (Orlando, 1961).

The core concern of nursing as described by Ujhely (1968) is that of sustaining an individual or family. Sustaining means helping the patient cope with or profit from an experience in which he finds himself. To sustain an individual the nurse may need to provide information lacking in order to help the individual perceive the event realistically. Sustaining may also mean helping the individual by providing information relating to his needs and problems. The sustaining function of the nurse is realized when effective communication exists between the nurse and an individual patient.

Much of what the nurse does involves interacting with the patient. Wooldrige et al. (1968) referred to the nurse's role as reducing or preventing tension through interaction. Skipper and Leonard (1968) suggested that "interaction with a patient-centered nurse trained in effective communication often results in large reductions of stress experienced by the patient . . ." (p. 276).

Hearing Problems of the Aged

Studies of hearing of the elderly demonstrate that hearing loss is related to a variety of factors including hearing loss of high frequencies and impairment of speech discrimination (Panicucci et al., 1968). Birren and Morrison (1963) stated that "the reduction in sensory processes with aging reduces the quantity and quality of information available to the organism" (p. 15). The continuity of hearing and communication for the aged is essential for the well-being of the aged individual. "Effective communication with the elderly permits the individual to retain his sense of individuality, his self-esteem, and his feeling of being worthwhile, and also satisfies his need to pass on his knowledge, experience, and wisdom" (Panicucci et al., 1968, p. 100).

Stone (1964) points out that hearing loss does more to bring on social isolation for the elderly person than factors such as reduction of income, loss of contemporaries

and lessened energy. When the person cannot hear, he cannot communicate and tends to withdraw from social contacts. Where the older person remains barely communicative or fails to follow instructions, the nurse is inclined to judge the person as "confused," or incapable of understanding.

One of the prevailing theories of patterns of response to aging; disengagement theory (Cumming and Henry, 1961), might well be advised to consider the literature on hearing loss of the aged. The withdrawal, or disengagement, of the aged predicted in this theory as a result of social-structural and social-psychological changes might well be in large part the consequent of hearing loss.

Klotz and Robinson (1963) in an article for nurses titled "Hard-of-Hearing Patients Have Special Problems" point out that the older person with a hearing loss presents special problems for those attempting to provide health care, and especially for those people attempting to provide care for older people in nursing homes. The authors further state that nurses should be cognizant of the special problem of the older person with hearing loss and be prepared to cope with it.

Communication

The preceding discussion dealt with the importance of communication between the nurse and the older person in

the provision of nursing care and the ramifications of a hearing loss. What is communication? How can it be enhanced in the nurse-patient relationship? How is communication affected by a loss of hearing? How does awareness of hearing loss contribute to communication?

Communication is defined as all the signs and symbols by which humans try to convey meaning and value one to another (Schramm, 1963). In its simplest form, communication consists of a sender, a message, and a receiver (Schramm, 1963). That which is communicated is a symbol. Schramm (1963) states that a basic principle of general communication theory is "that signs can only have such meaning as an individual's experiences permit him to read into them" (p. 7).

The sender communicates in terms of his own frame of reference and the receiver receives the signals in terms of his own frame of reference. Messages have different meanings depending upon the emotional attachment to the message or the high degree of importance attributed to the message. Berlo (1966b) describes communication as a process between two or more persons which involves an interdependent relationship between the sender and receiver. When two people are communicating, both an emotional and a physical interdependence occurs.

Stewart (1968) states that the purpose of communication is to convey certain ideas and this is dependent

upon a physical symbol complex. However, the symbol must be understood to be utilized. The greater the communication accuracy (Stewart, 1968) of a given message, the greater will be its resultant understanding. Communication accuracy involves both psychological and physical aspects. "I hear the message, but I don't understand it," is a statement illustrative of the psychological aspect of communication accuracy. This statement describes the lack of a common frame of reference or the absence of inter-relationship between sender and receiver. The physical aspect of communication accuracy is demonstrated by the inability of the receiver to receive the signal for one of several reasons: distortion of the signal, poor hearing, etc. Human communication involves a physical component in its process, providing the physical medium through which communication of ideas can occur. Hearing and understanding becomes one of the vehicles for the physical transmission of symbols and language a physical tool. While language and hearing are not the only means for communication, they are the primary means.

"The functions of the source and receiver are physically interdependent. When two people are communicating, they rely on the physical existence of the other for the production or reception of messages" (Berlo, 1966a, p. 119). Without the completion of the communication transfer there can be no feedback of information to the

source concerning the success in accomplishing the communication objective. Feedback is an important part of communication in enabling either the source or receiver to check up on himself, to determine how well he is doing. Feedback also affects future behavior. When a source receives feedback that is rewarding, he continues to produce the same kind of message. The absence of physical transmittal of the message destroys the channel for effective communication.

Thayer (1968) suggests that "communication be conceived as one of the two basic life processes" (p. 13). He believes that the acquisition of information in the communication process is the way in which the organism establishes and maintains itself functionally in its environment: It is comparable to the organism's physical metabolism, the process by which it established and maintains itself organically.

The manner in which people communicate, or the tone and warmth of their message, is an important aspect of communication (Barnlund, 1968). Matter and manner interact to produce meaning. Garbled messages, or weakness in the physical transfer of sounds create confusion in the symbols, create apprehension, increase defenses and sensitivity. To reduce defenses, threat must be reduced and clarity restored to impaired communication. Human understanding is facilitated where there is the willingness

and capacity to become involved with the other person. Communication between two individuals also suggests mutual responsibilities. To be communicatively accessible, one must listen as well as speak (Barnlund, 1968).

Awareness of Hearing Loss

How does the awareness of hearing loss contribute to the communication between nurse and older person?

The communication between nurse and older patient in the nursing home is complicated by the tendency on the part of the older person to deny a hearing loss (Eisdorfer, 1960a). Auditory loss on the part of the older person can be an insidious and gradual process. The older person generally is not confronted by an accident or pain but a gradual loss of response to auditory stimuli. There is no outward sign of being hard of hearing. There is neither the crutch, the empty place where formerly a limb had been, nor the obvious inability to see what had previously been clearly viewed. Often the older person himself cannot be sure whether he is experiencing true hearing loss or lapses in his listening and concentration--he becomes confused (Grossman, 1955; Eisdorfer, 1960a). Reactions to hearing loss differ where the onset of the disability has been an abrupt versus a gradual one. Further, the durational aspects of the impairment as well as the prognostic goals are important in the patient's acceptance of the disability

(Svinn, 1967). The older person sees the loss of hearing as part of "growing old" with little hope for recovery or termination of the disability (Sataloff and Vassallo, 1966). Very often the older person reacts to gradual hearing loss by withdrawal and by increasing rigidity of personality (Eisdorfer, 1960b). Rarely does the hearing loss inspire sympathetic understanding. Instead, the older person is apt to be accused of being inattentive because he repeatedly asks "what?" or interjects unrelated remarks into the conversation. Sometimes the older person is accused of hearing only what he wants to hear and turning off other portions of conversation. Donahue (1958) refers to this as "environmental exclusion" or the indication that the older person knows he cannot handle mentally the variety of environmental stimuli; so he forms this defense mechanism unconsciously, and devotes his psychic energy to those stimuli which are emotionally pertinent.

The loss of auditory environmental contact and communication often comes at a time when other problems of aging require personal adjustment. Now, as never before, the rapid changes of social environment and the relationship between different generations put an increasing strain on the elderly person who is trying to maintain social adjustment (Parker, 1969, p. 152).

Increased hearing loss has a strong emotional impact on the older person and often causes the person to become "tuned out."

In order to avoid this strong emotional impact the older person must admit to a hearing loss, to impaired communication with others, and to the need for assistance. Nursing staff, on the other hand, must be aware of the hearing and communication problems of the older patient, must find some sensitive way of enabling the older person to understand the hearing loss, and must be prepared to overcome the problems in nurse-patient communication.

Awareness of hearing loss is a key concept in this thesis. An unaware patient could conceivably not communicate, or could react negatively to attempts by the staff at effecting special measures to insure communication. The staff, if they proceed in their usual fashion, could not communicate or possibly could insult the patient by implementation of special measures. Consequently, this thesis will focus on awareness of patient, staff, professionals, and all combinations of awareness by those concerned. The significance of awareness or unawareness by those concerned will be explored by means of existing literature.

Hypotheses to be Tested

The general hypothesis of this study is that nurses and patients have deficient communication which is attributable to poor understanding of hearing loss in the aged.

The following null hypotheses will be tested:

1. There is no significant relationship between the nursing staff's awareness of patient hearing loss as measured by the Hearing Handicap Scale and the patient's hearing loss measured by an audiological assessment.
2. There is no significant relationship between the patient's awareness of his own hearing loss as measured by the Hearing Handicap Scale and his hearing loss as measured by an audiological assessment.
3. There is no significant relationship between the patient's awareness of hearing loss and nursing staff awareness of patient hearing loss as measured by the Hearing Handicap Scale.
4. There is no significant difference between resident's self-evaluation as measured by the Hearing Handicap Scale and nursing staff evaluation of resident hearing loss as measured by the Hearing Handicap Scale.
5. There is no significant difference between awareness of remedial hearing practice of the staff and the awareness of remedial hearing practices of other professionals working with a population having impaired hearing.

6. There is no significant difference between patient measured hearing ability and the measured ability to hear instructions given through the nurse-patient intercommunication system.

The .05 level of significance is used for rejection of the hypotheses.

Assumptions Underlying This Study

1. There has not been any formal program sensitizing nursing staff to hearing problems of nursing home patients.
2. The general knowledge of hearing by the nurses selected is similar to that of other nurses in nursing homes without specialized hearing programs.
3. The aged in the homes studied are similar to the aged in other nursing homes.
4. Nurses and patients responding to the Hearing Handicap Scale questionnaire will respond honestly.
5. The intercommunication systems used in each of the nursing homes tested are comparable in terms of quality of sound reproduction.
6. There will be no significant change in the subject's hearing between the one week period of pre-test and posttest.

Limitations of the Study

1. Participant patients will be sufficiently oriented to understand instructions of the hearing examination and be capable of responding to a self-assessment of hearing loss.
2. Only those patients able to speak, write, and understand English will be included among the participants.

Definition of Terms

1. Aged: Older person, elderly man or woman 65 years or older.
2. Patient: Aged person residing in an institution.
3. Institution: Facility providing health care for men and women on a 24-hour schedule, primarily serving the aged with multiple, chronic illnesses. Institution is used interchangeably with nursing home and home for the aged.
4. Nursing Home: See Institution.
5. Home for the Aged: See Institution.
6. Nurse: Either a registered nurse or a practical nurse licensed to provide nursing care. Staff refers specifically to nursing staff, the registered or licensed practical nurse.
7. Nursing is the giving of direct and continuing assistance to the ill individual because of his

specific needs for care, to promote, maintain, or restore health. It includes ministering to personal needs; assisting the patient and his family to understand the recommendations of the physician and other members of the health care team; enabling him to cope with psychosocio-biological stress or impending death; fostering self-help to facilitate maintenance or return to self-care; and teaching health practice to achieve, maintain, or promote a desirable state of health (Chioni and Panicucci, 1970).

8. Nurse-call intercom: An amplified electronic communication system enabling an institutionalized patient in his bedroom to communicate with the nurse at her work area.
9. Rehabilitation for the Aged: Return to activity and social participation normal for his age and the attainment of some higher level of independence (Harris, 1968).
10. Hearing handicap refers to any disadvantage in the activities of daily living which derives from hearing impairment (High, Fairbanks, and Glorig, 1964).
11. Hearing impairment is used to describe a decrement in hearing capacity which affects an individual's

personal efficiency in the activities of everyday living (High et al., 1964).

12. Auditory handicap: An audiometric examination indicating a hearing loss greater than 30 decibels in the speech frequencies (Gaitz and Warshaw, 1964).
13. Hearing loss is defined as a degree of hearing disability sufficient to make communication by unamplified speech more or less difficult. On audiometric examination, in this study, people with a hearing loss greater than 30 decibels in the speech frequencies are considered to have an auditory handicap (Gaitz and Warshaw, 1964).
14. Hearing Handicap Scale refers to the scale developed by High et al. (1964) for a self-evaluation of hearing serviceability.
15. Presbycusis is defined by Fowler (1959) as a diminished hearing acuity incident to advancing years, due to a progressive loss of function, mainly in the neural apparatus of hearing (peripheral, central, cortical, singly or combined, continuing or intermittent).
16. Pure tone threshold audiometry is a test to measure the intensities of pure tones of various frequencies a listener is just able to detect in an otherwise quiet environment (Naunton, 1968).

17. Speech Audiometry: Two basic measures are made in speech audiometry: The first closely parallels the measurements of thresholds for pure tones and is described as the Speech Reception Threshold (SRT). The second is a measurement of the listener's maximum ability to hear and understand or to discriminate speech (Naunton, 1968).
18. Aural Rehabilitation: Improvement in the capacity of an adult with hearing impairment to cope with his environment (Anderman et al., 1959).
19. Communication is defined as all the signs and symbols by which humans try to convey meaning and value one to another (Schramm, 1963).

CHAPTER II

REVIEW OF THE LITERATURE

This chapter presents the review of the literature. Sections within the chapter include: the role of nurses with the aged, hearing loss among the aged, presbycusis hearing loss, and self-awareness of hearing loss.

The Role of Nurses With the Aged

There has been a consistent interest shown in the literature regarding the plight of older persons. From the biblical injunction to "Honor your mother and father" and the prophetic command, "O cast us not off in old age, forget us not when our own strength faileth" to the current conventional writings, "grow old along with me, the best is yet to be," society has been concerned with the appropriate role and response to the older person.

Nurse practitioners caring for older people frequently have general misconceptions and negative attitudes toward the aged and view most older people as being sick, friendless, without resources, handicapped by chronic disease, having little contact with family, and unable to make decisions (Working with Older People, Vol. II, 1970). The practitioner's recognition of his own bias is important in order to establish a healthy working relationship with

the older person. Because of their negative attitudes, many nurses serve to reenforce the diminishing self-image of some older people. Coe (1967) in a review of professional attitudes toward the older person concluded that "aging as a process is viewed by all professional groups as a deteriorative change . . ." (p. 116). He found that nurses indicated a belief that "aged patients were slow, and that it was sometimes hard to deal and to communicate with them" (p. 116). Thus, for nurses, there is apparently a generally negative attitude toward providing care for the aged patient as well as a perception of small reward.

Hulicka (1967) found that the majority of staff members in an institution providing care for the aged believed that young patients should be given priority over old patients. She also found that staff members contributed to the emotional discomfort of elderly patients by unconsciously withholding information from the patient and by denying the patient his right to make decisions.

DeLora and Moses (1969), in a study related to work preferences of nursing students, found geriatric nursing at the lowest level of the interest scale. The most desired patients were children and young adults, with those over 60 least desired. In a companion study, Moses and Lake (1968) made inquiries of schools (N = 136) regarding specialty courses offered in geriatrics as part of the nursing curriculum. Sixteen schools (12%) replied affirmatively,

an additional two schools gave a qualified yes, and 118 schools (86%) replied that such courses were not offered.

In answer to the question: "Is the teaching of geriatric nursing included specifically in any specialty area?" one hundred schools (72%) indicated geriatric content was integrated into other specialty areas and thirty-three schools (24%) indicated it was not. Furthermore, seventy schools (51%) reported they used a geriatric clinical facility while sixty-five schools (47%) said that they did not use such facilities for their students. A major deterrent in presenting geriatric nursing to young students is the attitude of faculty members themselves which too often reflects that of the general public--geriatric nursing is depressing and lacking in reward (Moses and Lake, 1968).

Brown (1957) stressed the importance of the nurse's attitude in attaining emotional security for the older person, and Elmore (1964) suggested that attitudes of nurses toward aging and the aged person are prominent among the common problems affecting the quantity and quality of nursing care given geriatric patients. Stotsky and Rhetts (1967) found that nurses in successful homes for the aged were more benevolent, less restricted, less authoritarian, and more positively oriented to the mental health needs of the older person than in unsuccessful ones.

In a study of resident evaluation of staff attitudes in a nursing home (Larson, Knapp, and Zuckerman, 1969), the authors found that positive staff evaluations are associated with staff attitudes which reject the notion that nursing home patients are different than others. They also found that favorable staff evaluations were related to staff attitudes which were supportive of close personal relationships with patients.

The registered nurse, whose training emphasized short-term care in the general hospital, is more often than not ill-equipped to cope with the demands of long term care (Working with Older People, Vol. III, 1970). Brody (1970), found that negative social and cultural attitudes deprive the aged person of psychological support; she stressed the importance of viewing aging as a normal phase of development which is a natural process, rather than a disease process or abnormal phase.

The National Citizens Advisory Committee on Vocational Rehabilitation (1968) reported that "basic to all rehabilitation is the assumption that the handicapped person has within himself the potential for his own self-improvement and that, given the appropriate incentives and circumstances, he will be motivated to accentuate the constructive life-embracing aspects of his own personality" (p. 7).

Gaitz (1968) discovered that provisions of comprehensive care are possible only when the needs of the person who has been designated the patient are understood. He stated that we tend to expect a decline in function with aging and this belief is inconsistent with goals in rehabilitation as stated in Chapter I.

An expectation of a decline in function in the absence of a real decline could lead to stereotyping by the nurse, and concomitant difficulties in communication in terms of both process and context.

Hulicka (1964) found that nurses are frequently the most significant persons in the lives of lonely, elderly patients, who know they must live out their last days in an institution. Stone (1969) reported that older people have special needs due to the process of aging, and some of these needs call for a nursing approach that differs from the approach needed for other age groups. Among them is the need for a different "pacing" of nursing care. Pacing refers to a slowing down, since this is what is happening to older people. The nurse will need to modify her pace if the older person's needs are to be met in a way that is satisfying to the patient.

Summary

Preconceived generalizations about older persons reflecting negative aspects of aging influence the

attitudes of nursing staff working with the aged. Nurses play an important role with older persons in institutions and can assist in their rehabilitation by viewing aging as a normal process in life and the aging person as an individual with potential for improvement.

Nurses with negative attitudes toward elderly patients contribute to their discomfort. On the other hand, nurses who understand and accept the role of the elderly patients contribute significantly to their emotional security as well as their cognitive awareness of disabilities and changed circumstances for living.

Hearing Loss Among the Aged

In the United States, the extent and nature of human hearing loss has been well documented. Data from the National Center for Health Statistics (1965) revealed that 22.3 persons per 1,000 population have some degree of hearing loss. This is further broken down by age as follows: 3.5 persons per 1,000 under age 17, 8.4 persons through age 44, 29.4 persons between the ages of 45 and 64, and 132 persons per 1,000 population over 65 years of age. Presbycusis was the most frequently mentioned cause of hearing loss in the group over 65 years of age. In another report (Working with Older People, Vol. II, 1970), the rate of hearing impairment rises from approximately 10 to 75 per 1,000 population in persons aged 20 to 60. Between the

ages of 60 and 80, the incidence of hearing loss increases to 250 per 1,000 persons. Thus, 1 out of 4 aged persons (60-80 years) has a significant hearing impairment. Walle (1962) showed that the incidence of hearing handicaps doubles from age 40 to 50 and that 75 to 85 per cent of all deaf and hard of hearing persons in the United States are 50 years of age or older. The author also reported presbycusis as the most frequent cause of hearing difficulty.

Alpiner (1963) found the incidence of hearing impairment to be 129 per 1,000 population in the 65 to 74 age group, and 256 in the age group over 75. In addition, presbycusis is reported as the major cause of hearing loss among the older population. Progressive high frequency loss of sensitivity and decreased ability to discriminate speech are cited as characteristics of the presbycusic hearing loss (Alpiner, 1963).

Changes in auditory responses as a function of aging have been reported by many investigators (Bunch, 1929; Fowler, 1944; Gaeth, 1948; Hinchcliffe, 1959; Leisti, 1949; Montgomery, 1940). They found a progressive decrement in hearing acuity for pure tones with each succeeding decade, with a greater pure-tone loss in the higher frequencies than in the lower frequencies. They indicated that men had a greater overall hearing loss than women.

Grossman (1955) studied hearing loss among 181 persons residing in a home for the aged and found that 159 persons failed to meet the hearing standard which was set at an average loss of 40 db or more in the speech range. The author concluded that loss of hearing was the most prevalent communication problem of the aged. Heffler (1960) examined 97 persons in a home for the aged and found that 33 per cent had normal hearing, 41 per cent had mild hearing loss, 18 per cent moderate hearing loss, 7 per cent severe loss, and 4 per cent questionable. This population included 33 men with an average age of 75 and 64 women with an average age of 78 years. In a companion study, Heffler (1960) examined 142 residents, including 52 men and 95 women with an average age of 77 years. The author reported 32 per cent of his population had normal hearing, 35 per cent mild hearing loss, 26 per cent moderate hearing loss, and 5 per cent questionable. A scale for the criteria of hearing loss was developed by Heffler (1960) with a speech range loss of not more than 15 db in the better ear considered normal, mild loss was 30 db, moderate loss was 50 db, severe loss was in excess of 50 db, and a questionable category used when no reliable threshold measurement was possible. The author concluded that hearing loss in an aged institutionalized population was a major problem.

Walle (1962) in a study of 236 persons in a home for the aged with an average age of 70 for men and 68 for

women found 63 per cent had mild hearing impairment, 25 per cent moderate impairment, and 6 per cent severe impairment. Chafee (1967) studied 223 patients in nursing homes where the average age was 77 years, and found that nearly 90 per cent showed significant hearing loss. Miller and Ort (1965) found that the overall degree of hearing loss became greater as a function of age and that the presbycusis hearing loss affected both ears equally. Results of a study by Sataloff and Menduke (1957) indicated that little variation in hearing loss could be accounted for by age differences after age 75, suggesting that little additional hearing loss takes place after age 65. Women over 76 seemed to have had the same hearing loss as men, while women under the age of 76 years seemed to have less hearing loss than men of similar age.

Bloomer (1960) found in a study of 62 patients in a county hospital that 51 per cent had some difficulty in using their hearing successfully in responding to speech or to the sounds from their environment. He concluded that hearing loss can be a severe handicap to hospitalized patients because patients utilize communication in order to become oriented in a new environment. Successful orientation tends to reduce fear of the unknown.

Alpiner (1963) studied hearing loss of persons in two homes for the aged and one Golden Age Club. In the first home 79 residents with an average age of 80 years

were tested, and 47 per cent showed hearing loss. The second home had 152 residents with an average age of 78 and 69 per cent were found with hearing loss. In a Golden Age Club 63 persons with an average age of 74 years had hearing loss in 63 per cent of the cases. The author's results were in agreement with Heffler (1960) in that approximately 60 per cent of his population of older persons had some degree of hearing impairment.

In other studies, hearing loss of institutionalized persons in state hospitals was surveyed. Sprinkle et al. (1965) examined the incidence of hearing loss in consecutive admissions to a state mental hospital and concluded that hearing disorders were not a significant problem in a mental hospital population. Lamb and Graham (1963) found the hospitalized psychiatric population exhibited extensive hearing problems. Of 4,800 patients tested by McCoy and Plotkin (1967) at a state hospital, only 27 per cent passed the hearing test. Magaro et al. (1968) studied 46 patients in a state hospital and observed that 22 demonstrated a hearing loss. These authors concluded that the incidence of hearing loss in a state mental hospital population appears to be higher than that found in the general population. They suggested that chronic patients in a state mental hospital have other problems, one of which may be a hearing loss, that complicate or block the treatment process.

Summary

Documentation of hearing loss among the elderly population was reported for the general population, residents of homes for the aged, and patients of mental hospitals in the United States. Increased hearing loss is characteristic of the population over age 60 and evidence indicates its highest incidence among residents of homes for the aged. Presbycusis is identified as the typical hearing problem of the elderly population, having its impact on high frequency sensitivity and speech discrimination. It is suggested that presbycusic hearing loss creates problems in communication, especially for residents of institutions for the aged.

Presbycusic Hearing Loss

Presbycusis has been identified as the term associated with the effects of age on hearing (Glorig and Nixon, 1962; Glorig and Davis, 1961; Barr, 1970; Jones, 1967; Sataloff and Vassallo, 1966; Myers and Carmel, 1967; Griffing and Hallberg, 1962; Miller, 1967, McCabe, 1963; Hinchcliffe, 1959). The term presbycusis was first proposed by Zwaardemaker in 1894 (Myers and Carmel, 1967). Four distinct varieties of presbycusis have been identified (Myers and Carmel, 1967). They include: (1) sensory type with an abrupt high tone hearing loss which spared the speech frequencies and good speech discrimination; (2)

neural type with more severe high tone sensori-neural hearing loss and a marked inability to hear and understand words; for example, there can be a rather severe speech discrimination loss with only a mild high-tone hearing loss for pure tones--a condition which has been called "phonemic regression"; (3) metabolic presbycusis which is characterized by a flat audiometric curve; and (4) mechanical presbycusis showing high tone hearing loss sensori-neural deafness with a conductive element.

The human ear is most sensitive to frequencies of 500 to 4,000 cps, the speech range. For a person to be able to understand conversational speech, he must be able to hear these frequencies at an intensity level of 30 db or better on the ASA scale (Griffing and Hallberg, 1962). The degree of presbycusic loss is closely related to the age of the patient. The earliest signs of presbycusis are generally a slight high-tone sensori-neural hearing loss, first seen after the fifth decade of life (Myers and Carmel, 1967). While some studies report the onset of presbycusis as early as age 30 (Corso, 1963; Working with Older People, Vol. I, 1969), it appears that presbycusis usually reaches the state of handicap between the ages of 60 and 70 (Rosenberg, 1963). By the time age 80 is reached, a large number of persons will show an average pure tone loss for the speech frequencies of 30 db or more (Miller, 1967). Initially, the person is not aware of any loss in

hearing acuity. He may often complain that people do not speak as clearly as they once did. The presbycusis patient is apt to ask that a statement be repeated. When you raise your voice in reply, he may exclaim. "Don't shout, I am not deaf." Indeed, his greatest difficulty is one of auditory discrimination and not a simple loss in hearing acuity. The loss of the high frequency consonant sounds makes speech sound hollow and unclear. Speech loses its customary sharpness and therefore the patient begins to have difficulty in understanding the words even though he can hear them with adequate loudness. Presbycusis is progressive, but rarely results in total deafness (Rosenberg, 1963).

Much of the impairment of hearing in elderly people has been due to changes in the central nervous system, and often has seemed associated with a dulling of other sensory faculties (Glorig and Davis, 1961). The most striking single fact about the changes in the architecture of the central nervous system from early infancy to old age has been the gradual loss of cells. Paralleling the decrease in neurons, the weight of the brain is found to fall consistently with increasing age--from nearly 1400 grams in the human male at age 20, to some 1200 grams at age 80. Other changes include shrinkage and increased pigmentation of cells. Arteriosclerotic changes result in reduced cerebral blood flow and diminished oxygen uptake in the

brain (Birren and Szafran, 1968). Griffing and Hallberg (1962) reported that in all cases of sensori-neural hearing loss there is an expected proportionate loss in ability to comprehend speech referred to as phonemic regression.

Because presbycusis hearing loss is related to the central nervous system where neural interactions and integrations take place, where perception occurs, and where response is determined, the prospect for improvement of speech intelligibility is slight (Davis, 1962; Griffing and Hallberg, 1962; Glorig and Nixon, 1962). Davis (1948) stressed the importance of the difference between hearing loss and discrimination loss, or ability to understand speech. Discrimination loss cannot be offset by mere increase in volume but requires other factors such as auditory training. Klotz and Robinson (1963) did not discount the value of amplification, but stressed its importance only when used with auditory training. Jones (1967) and Myers and Carmel (1967) stressed the involvement of family or those in close contact with the older person in understanding the hearing problem and techniques useful in communicating with older persons. Slowing the pace of speech is one technique shown to be more important than increasing the volume of speech. Miller (1967) stated that "no valid generalization could be made about the ability of the presbycusis patient to benefit from amplification" (p. 210), and felt that what was needed was an appliance

that made speech slower, not louder. The older person needs more time to respond to stimuli, more time to receive the same amount of stimuli from the environment, more information and more understanding from the person involved in the communication (Working with Older People, Vol. II, 1970; Stone, 1969; Klotz and Robinson, 1963). Hearing loss can be a barrier to good social adjustment for the long-term patient, particularly in a nursing home. Those who work with or live with a hard-of-hearing patient need to be aware of the handicap and be given instruction in the best ways of communicating with the person having a presbycusis hearing loss.

Davis and Silverman (1947) presented thirteen guidelines for auditory training with hard-of-hearing adults. They point out that effective communication is possible with a person experiencing a hearing and understanding loss when persons attempting to communicate use a variety of resources based upon special training. Some of these resources are speech reading, use of hearing aid, understanding the importance of the combination of hearing and seeing, and focusing on the content of the discussion. Of great importance to the older person is the nurse's awareness of the presbycusis hearing loss and her use of all available techniques in improving communication with her patient. Beyond the problems in in-person conversation between the nurse and presbycusis patient, the

nurse and patient communication may have been complicated by the use of the intercommunication system. Klotz and Robinson (1963) urged caution in the use of this mechanical means of communication which can produce distortion and static. The intercom, though only annoying to the person with normal hearing, frequently produces difficulty in understanding messages for the patient with presbycusis. The authors suggested that it would be time saving to place patients with presbycusis in rooms close to the nurse's station, encouraging the nurse to visit the patient's room in person in order to avoid use of the intercommunication system.

Stone (1969) also discussed the problem of the intercommunication system causing distorted sounds for the older patients. She suggested that the nurse test the system with the older person when first admitted to the nursing home to determine if the person could hear and discriminate speech coming to him in this way. No research could be found examining the problems of communication between nurse and older person created by the use of the intercommunication system.

Summary

The nature of presbycusic hearing loss was described as a sensori-neural hearing loss progressively increasing until reaching a state of handicap in the sixth

and seventh decade. The greatest difficulty experienced by those with presbycusis is lack of auditory discrimination or stated simply, the characteristic of being able to hear the speech but not understand it. Slowing the pace of speech to make it more understandable, as well as other suggestions for auditory training, were mentioned. Finally, the communication problem presented by the use of the intercommunication system between the nurse and older person was reviewed.

Self-Awareness of Hearing Loss

There is difficulty discerning the presbycusis hearing loss as a recognizable handicap due to the insidious onset and its imperceptible progression in the aging individual. The assessment of hearing handicap is not in terms of obvious sensory deficiency or pain, but in relationship to the effectiveness of communication with the older person's environment. Cawthorne (1952) pointed out that it was the intelligibility of speech that was most affected by advancing years and the progressive loss of speech intelligibility is more significant to the older person than the pure tone hearing loss.

Grossman (1955) described the loss of hearing among the aged as an insidious event, a gradual process where the older person himself cannot be sure whether he is experiencing true hearing loss or lapses in his listening and

concentration. Findings of the National Health Survey (1960) indicated that very few older persons with hearing loss voluntarily sought medical care. This possible denial of hearing loss may be part of the same dynamic whereby individuals attempt to keep their hearing loss a secret from others as well as themselves. They may try to convince themselves that others are unaware of their loss and that in reality they have no loss. This denial is handled through the use of some of the following techniques described by Conkey and Buchan (1965): monopolizing conversation, talking about self, talking too softly or too loudly, and withdrawing from social opportunities.

In their study of 40 residents in a home for the aged, Gaitz and Warshaw (1964) found that the nursing staff suspected that 17 of the 36 residents referred for treatment had an impairment of hearing. Actually only 14 were found to have serious hearing impairment, while the other 22 had minimal or no loss. The nurses had no tool to evaluate the residents' hearing loss but reacted on the basis of their own observations in contact with these persons. Gaitz and Warshaw (1964) concluded that the resident must be strongly motivated to overcome the problems of hearing loss before he will participate in a rehabilitative program. The individual in order to be benefited by a rehabilitative program must admit to a

hearing loss, to impaired communication with others, and to a need for assistance.

Klotz and Kilbane (1962) demonstrated that there was no correlation between hearing loss of older people and the occurrence of dizzy spells or headaches, employment in a noisy place, exposure to acoustic trauma, head injury, serious disease, other ear, nose, and throat symptoms, changes in sense of taste or smell, or family history of high blood pressure or deafness. In their sample of 100 women and 70 men between the ages of 51 and 92 with a mean age of 73, 39 women and 31 men admitted some difficulty with hearing. This group demonstrated poorer hearing than those denying a hearing loss. The authors found that no participant denied a hearing loss if his pure tone or speech-reception threshold was greater than 30 db or his discrimination of phonetically balanced words was less than 61 per cent. There was a much greater tendency to complain of a hearing loss when none could be demonstrated than to deny one that clearly existed.

Lefevre (1957) identified three situations that typified the responses of older people toward their hearing loss. The responses were as follows:

1. Individual is unaware of loss, or accepts it as an inevitable concomitant of advancing years, when actually he could derive great benefit from rehabilitation.

2. Person denies a loss, but needs assistance if he is to return to even partially normal function.
3. Person claims a hearing loss, which is not a loss of acuity.

This author stressed the importance of the awareness of a loss and an estimate of its severity in preparation for treatment and recommended a routine audiometric screening as a worthwhile procedure for the older patient.

Eisdorfer (1960b) conducted an investigation of the relationships between visual and hearing decrement and Rorschach indices of rigidity in an aged population. He found there were no differences in subjects with normal and impaired vision but that there were differences between subjects with normal and impaired hearing. Those with impaired hearing tended to be more rigid or authoritarian. He found that subjects with both vision and hearing impairments were not significantly different from subjects showing hearing decrement alone. In his conclusion, he discussed his choice of hearing as a variable because it:

Occurs so frequently with increasing age and because of the insidious role defective hearing plays in the impairment of human communication. While the victim of visual loss is usually able to recognize his own condition, personal knowledge of hearing decrement, at least in its early phases, is often received from others. This information is usually associated with frustration and hostility generated by the failure of others to communicate with the hard-of-hearing individual. This study would appear to suggest that the aged individual reacts to hearing loss

by withdrawal and by increasing rigidity of personality (p. 190).

A report of the subcommittee on Hearing Problems in Adults (Anderman et al., 1959) outlined areas of needed research. They raised questions about the relationship between self-evaluation of a hearing problem and society's evaluation of the same problem as well as the relationship between measures of hearing function and the degree of handicap an individual experiences.

High et al. (1964) raised similar questions about the assessment of hearing handicap and its relationship to hearing impairment:

Systematic investigation of hearing handicap has lagged far behind the development of techniques for the measurement of hearing impairment. While it is now possible to quantify many types of hearing disorders with a high degree of accuracy, the consequence of these hearing deficiencies in the every day activities of patients is known largely through anecdotal reports. So long as our knowledge of hearing handicap derives primarily from anecdotal material, both the need for, and the result of therapy directed at the correction of hearing impairment can be assessed only with uncertainty (p. 215).

The authors felt that direct measurement of hearing handicap more closely approximated an ultimate test of hearing serviceability for an individual than did measurement of impairment. They proceeded to develop a scale for the self-assessment of hearing handicap and then to examine the relationship between self-assessment of hearing handicap by the use of this scale and a battery of audiological

tests. The Hearing Handicap Scale consisted of two 20-item parallel forms.

The items pertain to ordinary hearing experiences likely to have been encountered by most persons living in an urban environment. The majority of items describe experiences involving speech communication; the remainder deal with audition of background noises and warning signals. Respondents are required on each item to indicate on a scale of relative frequency how often difficulty has been experienced with the auditory event specified in the item. Internal consistency reliability for the 20-item forms was .96 (p. 229).

Significant correlation coefficients (about .70) were obtained between The Hearing Handicap Scale scores and all measures of auditory sensitivity for the subjects' better ears. The Handicap Scale did not correlate significantly with either better or poorer ear speech discrimination measures.

Summary

The importance of awareness of hearing loss was presented as a prerequisite for the engagement in rehabilitative practices to overcome hearing loss. The development of the Hearing Handicap Scale as a self-assessment measure for determining hearing impairment was described.

Summary

This chapter reviewed the literature related to the problem of this study. Included were sections on the role of nurses with the aged, hearing loss among the aged,

presbycusis hearing loss, and self-awareness of hearing loss.

The nature of presbycusis hearing loss among the aged with its characteristic loss of discrimination was presented, as well as the difficulty in determining its onset and progression. Presbycusis contributes to a communication problem between the nurse and older person in a home for the aged. The nurse in her important role with the older person in a home for the aged, can improve communication with the older person through her appreciation of the needs of the person, understanding of presbycusis hearing loss, awareness of the communication deficiencies of her patients, and the problems of communicating through the use of the intercommunication system. Finally, the development of the Hearing Handicap Scale as a method for the self-assessment of hearing impairment was described.

CHAPTER III

METHODS AND PROCEDURES

The purpose of this chapter is to present the methodology and procedures used in the study. The chapter is divided into three major subsections: (1) the study population and selection of the sample, (2) general research procedures, and (3) analysis of the data.

The Study Population and Selection of the Sample

The population for this study was selected from residents of nursing homes located in Tucson, Arizona. Three nursing homes were selected to provide a variety of settings and socioeconomic groups. One home was a non-profit, private charitable institution with religious group sponsorship serving a broad spectrum of socioeconomic levels. Another home was a proprietary nursing home offering a variety of facilities for those in the high socioeconomic level. The third home also was a proprietary nursing home somewhat less well equipped and appointed than the other serving a middle socioeconomic level. The universe of patients in these three homes was 305 (including only those in nursing home section of the total facilities).

Several criteria were established for selection of subjects.

Criterion 1

Because the hearing tests were administered outside of the nursing home to provide the resources of optimum testing apparatus, participants were selected who were able to be transported in automobiles. This did not exclude residents who could be helped into a vehicle or who ambulated by use of a wheelchair. It did exclude those residents who could not be transported to the testing site. The physical condition of forty people was such that they could not be transported and they were omitted from those eligible to be included in the sample.

Criterion 2

Each participant was examined by the use of a special questionnaire (see Appendix B) to determine level of mental functioning (Kahn et al., 1960). The special questionnaire was a series of ten questions similar to the usual psychiatric examination of sensorium. The ten questions selected by the authors from a larger list were used for a quantitative determination of mental status. The response to each of the questions was scored as right or wrong. Those persons making 0 to 2 errors were considered as having none or minimal chronic brain syndrome. Those making 3-8 errors were considered moderate and over 8

errors were considered severe brain syndrome. Those scoring over two errors, thereby demonstrating moderate to severe brain syndrome on this examination, were presumed to be incapable of participating in a self-analysis of hearing handicap and were excluded from the sample (Kahn et al., 1960). Nineteen potential eligibles were eliminated by this criterion.

Criterion 3

Only those persons who had resided in a home for a period in excess of two months were included in the sample. This cut-off time was selected in order to provide nursing staff with a variety of experiences with the resident, thus enabling the nursing staff to form an impression of the resident's hearing. There were four people whose time in residence was less than the two-month minimum standard used.

Application of these three criteria eliminated a total of sixty-three people from the universe. Each of the remaining residents in the three homes was assigned a number. The sample of twenty-eight was selected by use of table of random numbers. Twenty-eight respondents were selected to allow for possible mortality and still permit a ten per cent sample. No attempts were made to draw a purposive sample of proportionate numbers of males and females, nor of age categories. Sataloff and Menduke

(1957) point out that there appears to be little difference in hearing between men and women after age 76.

General Research Procedures

Nursing Home Participation

1. The administrator of each of the homes used in this research was interviewed to invite his participation in the research, and to obtain his permission to involve his nursing staff and residents in the home (Appendix A).
2. Each administrator was questioned to determine whether: (a) there was any audiological screening of residents on admission to the home (there was none at any home), (b) there was any specific in-service training program for nursing staff dealing with hearing problems of the older person (there was none at any home), and (c) there were any techniques used in communication by nursing staff with hard-of-hearing residents (there were none routinely used at any home).

Resident Participation Part A

1. Each participant was interviewed by the researcher to invite his participation in the research, explain the procedures to be followed, answer any

questions, and to obtain his written consent (see Appendix C).

2. Information including name, age, and length of time in nursing home was obtained.
3. The screening test to determine degree of brain damage (Kahn et al., 1960) (see Appendix B) was administered by the researcher.
4. The Hearing Handicap Scale (High et al., 1964) (see Appendix D) was administered to each participant by the researcher. This enabled each subject to participate in a self-assessment of his hearing.

The Hearing Handicap Scale consisted of twenty questions. Each question dealt with the subject's own appraisal of his own hearing handicap in every day experiences. The following is a sample of the questions used:

- (1) Can you carry on a conversation if you are seated across the room from someone who speaks in a normal tone of voice?

1. almost always
2. usually
3. sometimes
4. rarely
5. almost never

Each reply had a numerical value from 20 at almost always to 100 at almost never.

The same list of questions was used by the nurses in their evaluation of the residents' hearing handicap.

5. Audiological measurements were taken on each subject following administration of the Hearing Handicap Scale. The auditory tests included pure-tone, air conduction, threshold tests, and a speech-discrimination test. This portion of the research was administered by a clinical audiologist.

Test Locale, Equipment, and Procedure

All testing was administered at the Rehabilitation Center, College of Education, The University of Arizona, in Tucson, Arizona. The testing was conducted in an IAC (Industrial Acoustics Company) double sound suite which was specifically designed to reduce ambient noise to a level that does not affect the ability of the patient to perform accurately during hearing testing. A calibrated clinical audiometer (Maico MA-8) was used to measure the air conduction thresholds. This audiometer is calibrated to ISO 1964 standards as specified by the American Speech and Hearing Association. The earphones used were of the TDH-39 variety with MX-41/AR cushions.

Each subject's hearing was measured for both the left ear and right ear by air conduction. Air conduction testing was utilized in order to not only determine the overall hearing ability of the patient, but to give information concerning the shape of the hearing loss. For example, was there a greater loss in the higher frequencies than in

the lower frequencies? Those frequencies tested were 250 Hertz, 500 Hertz, 1000 Hertz, 2000 Hertz, 4000 Hertz, and 8000 Hertz. These frequencies were selected on the basis that the sounds of everyday speech, which contribute to speech intelligibility, lie between 250 Hertz and 8000 Hertz.

In order to test each patient's speech understanding ability, under ideal conditions, phonetically balanced word lists were used. Testing speech discrimination ability under ideal conditions refers to conducting the test under earphones in a soundproof room in which no other factor other than the patient's ability can influence the test results. The word lists used were all phonetically balanced to give sound representation as it occurs in everyday speech. The word lists were presented at a sufficient loudness level so that inadequate patient performance could only have been the result of some inability of the patient to hear and not the result of insufficient loudness of the stimulus. The word lists were presented by monitored live voice, in lieu of taped or recorded speech. Monitored live voice is easier to control in the testing situation, especially in working with patients who might have an insufficient attention span to consistently attend to an ever present stimulus over a lengthy period of time (Newby, 1964).

All testing was conducted by a Clinical Audiologist holding the Certificate of Clinical Competence awarded by the American Speech and Hearing Association.

Resident Participation Part B

Seventeen residents were selected to participate in a test of the intercommunication system. Given the possible disruption of some patients, eleven respondents were not included in this test.

1. Each individual participant listened to the reading of a list of phonetically balanced words and was asked to repeat each word to the tester. A score was obtained based on the number of errors in repeating. The resident was seated in a bedroom approximately six feet in front of and facing the person administering the test. The words used were adopted by the Central Institute for the Deaf from the phonetically balanced word lists of the Psycho-acoustic Laboratory, Harvard University (Newby, 1964, p. 115).
2. One week after the initial administration of the phonetically balanced word list, a different but equivalent set of words was presented to the subject. In this testing situation the person administering the test sat opposite the subject,

the same distance as the first test, but with her back facing the subject.

3. One week after the second administration of the word list, a comparable form of phonetically balanced words were presented to the subjects by the same tester, using the inter-communication system (see Appendix E for word list).

Four different lists of phonetically balanced words were used in this part of the study. One list was used for explanation of the procedures to the subjects. Three other equal but different word lists were used for the other parts of the procedure. The word lists were chosen in order that each list contained samples of speech sounds in the same proportion in which they occur in English speech.

The week interval between tests was chosen to avoid any specific recall from one test situation to another.

Nurse Participation

Three nurses at each location were selected to assess the hearing of each participant in the study. Each nurse had direct contact in providing care for the subject and had worked with each subject for a period of two months or longer. Only those nurses with a sufficient level of familiarity with the subjects were utilized in this study.

Part A.

1. Each nurse was interviewed to invite her participation in the research, to explain the procedures to be followed, to answer any questions, and to obtain written consent (see Appendix C).
2. Each nurse completed the Hearing Handicap Scale (High et al., 1964) (Appendix D) for each of the residents. An average nurse evaluation for each resident was obtained from the three nurses assessing each resident.

Part B.

1. Each nurse was asked to list all the techniques with which she was familiar to assist in communicating with the hard-of-hearing older person.
2. A group of nine experienced people trained to work with the hard-of-hearing were asked to list all of the aids with which they were familiar to assist in communicating with older persons with impaired hearing.

Analysis of the Data

The general hypothesis of this study is that nurses and patients have deficient communication that is attributable to poor understanding of hearing loss in the aged. Six hypotheses were tested in this study. The Pearson Product Moment Correlation was used to test those

hypotheses dealing with the significant relationship between two variables (Hypotheses 1, 2, and 3). These correlations were checked for significance by Table 6 in the Appendix of Downie and Heath (1965, p. 306). The t-test was used to test the significance of difference between the means of the two groups in Hypothesis 4. A non-parametric test of significance, the Mann-Whitney U, was used to test Hypothesis 5. A post hoc procedure using the Newman-Kuels method was used to test the differences between pairs of means in the repeated measures taken in Hypothesis 6.

CHAPTER IV

RESULTS OF THE STUDY

Introduction

This chapter presents the statistical analyses and research findings of the study. The chapter is divided into two sections. Descriptive data regarding the study population are presented first, followed by a discussion of the data pertinent to tests of the individual hypotheses.

Descriptive Data on Studied Population

The sample for this study consisted of twenty-eight individuals chosen randomly from three nursing homes in Tucson, Arizona. The sex composition of the sample was as follows: 25 females and 3 males.

The population studied had a higher proportion of females compared to males than would be expected from a population of this age group. Riley and Foner (1968) reported 72.9 males for every 100 females in the age group over 75. In the three homes studied, there was a ratio of 53.1 males for 100 females (see Table I).

Table II presents the age distribution of the subjects.

The age of the average respondent in the study was lower than the average age of the total population of the

Table I. Comparison of Sex Ratios: U. S. Population Over 75, Study Population, and Study Sample

Population Over 75	Population in Three Homes Tested	Population of Sample
100 females	100.0	100.0
72.9 males	53.1	12.0

Table II. Age Distribution: Subjects and Total Population

Age	Range	N	\bar{X}	SD
Subjects	61-85	28	74.5	6.1
Total Population	18-97	242	75	10.5

Homes used for the study because the study design precluded the use of subjects unable to: (1) travel to the testing site, and (2) pass the screening examination for brain damage. It appeared that increased age was accompanied by infirmity and deterioration.

The respondents in the sample resided in their nursing home for an average of 38.2 months prior to the study, or considerably longer than the two months required for inclusion in the sample. The average stay in the nursing home of the sample population compared favorably with the national average residence of three years reported by Riley and Foner (1968) (see Table III).

Table III. Comparison of Length of Residence in Nursing Homes: National Average and Study Subjects

National Average	Average of Sample Tested
36 months	38.2 months

The nurses participating in this study were each employed in their respective institutions for more than the required two months. The average duration of their employment preceding the study was 33 months. Thus, there was sufficient opportunity for them to assess the auditory condition of the residents.

Table IV presents the subjects' average response to air conduction, pure-tone, hearing tests (ISO Scale).

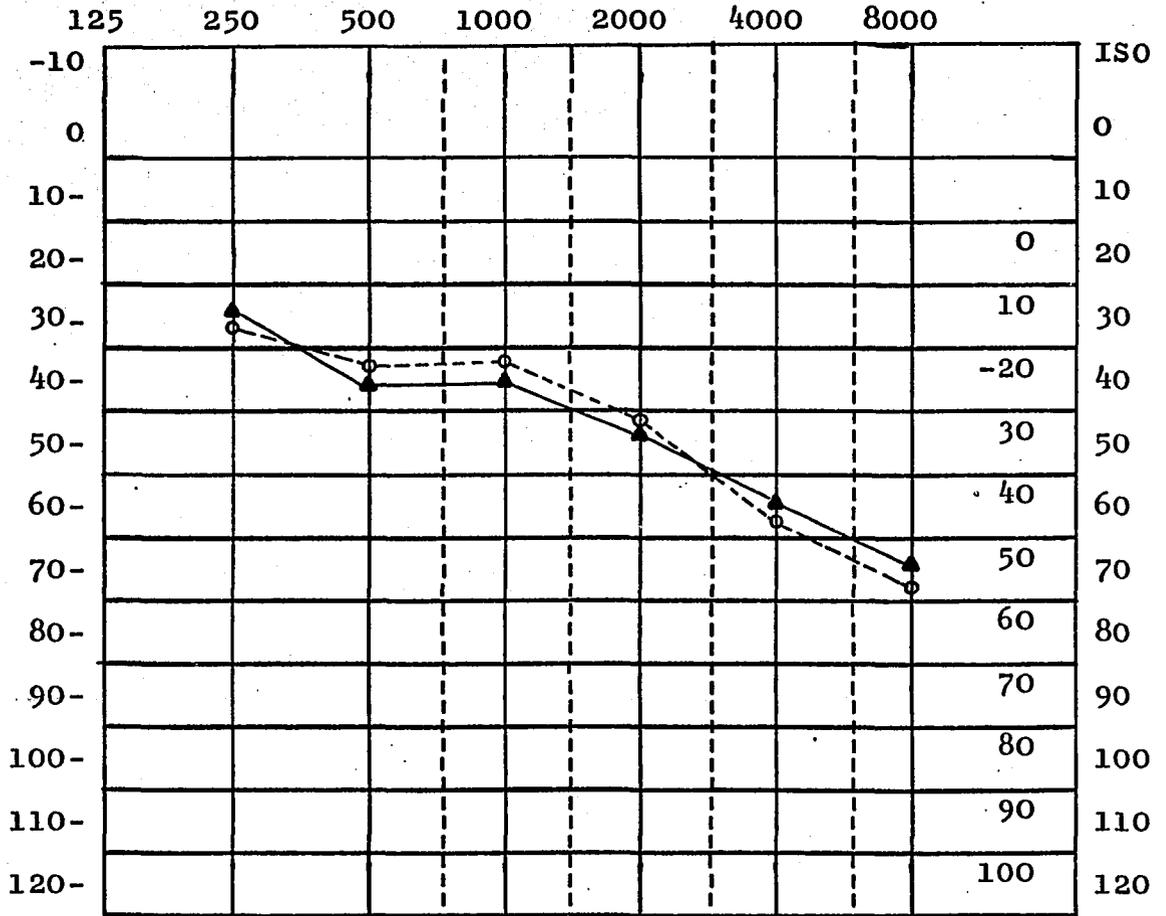
Table IV. Average Air Conduction for 28 Subjects

CPS	Average Loss	
	Right Ear db Loss	Left Ear db Loss
250	28.75	28.0
500	31.78	32.5
1000	31.96	20.9
2000	40.54	40.54
4000	55.71	54.6
8000	68.57	66.4

The same data are presented on an audiogram in Figure 1.

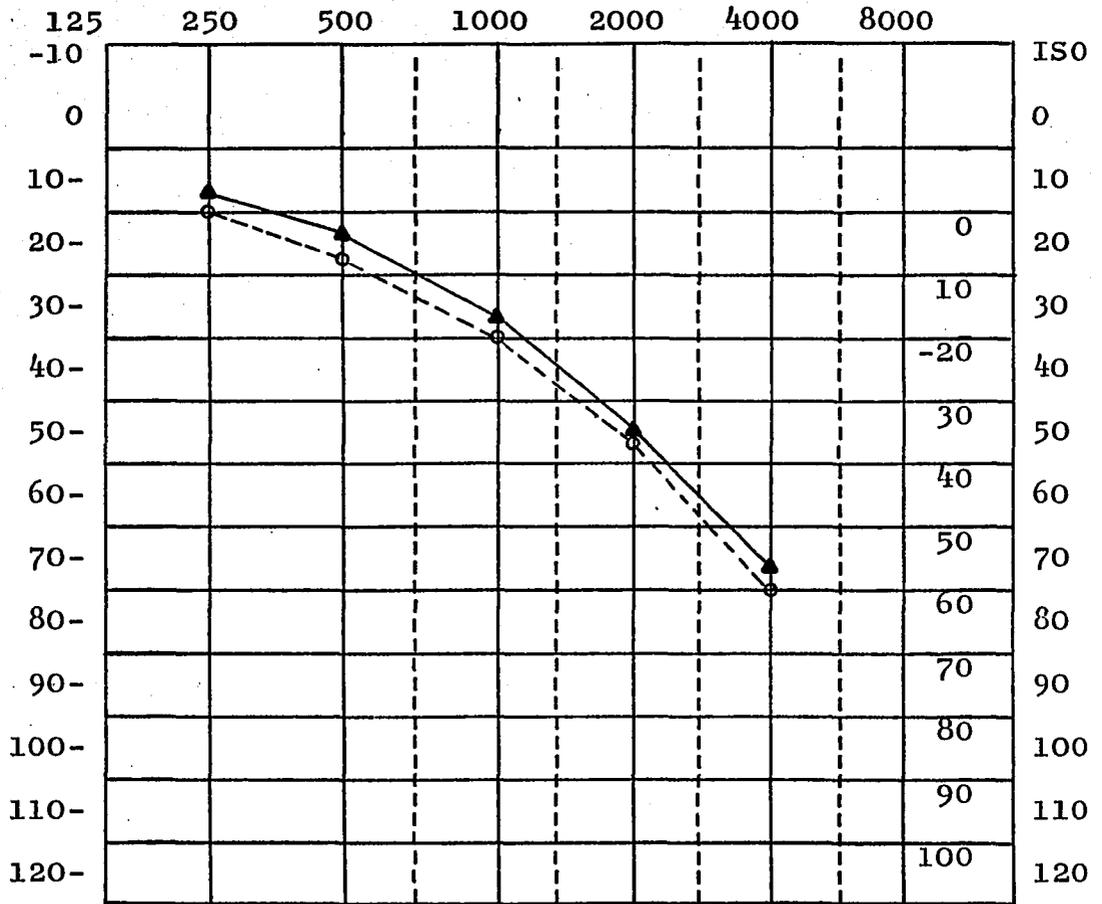
When presented in graphic form the slope of the audiogram is typical of the hearing loss of a presbycusis subject. Sensori-neural impairments are characterized usually, but not always, by greater losses at the higher frequencies on the audiogram (Newby, 1964).

Figure 2 is a representation of a typical sensori-neural impairment from Newby (1964, p. 6) shown on the American ISO Scale. It is presented for comparison with



PURE TONE AUDIOGRAM
ISO 1964

Figure 1. Results of Testing -- Hearing levels in db loss ISO standard average of 28 subjects. o = right ear; ▲ = left ear.



PURE TONE AUDIOGRAM
ASA 1951

Figure 2. Typical Sensori-Neural Impairment -- Hearing level in db American standard, from Newby (1964, p. 96). o = right ear; ▲ = left ear.

Figure 1, the average air conduction loss on the ISO scale of the twenty-eight subjects. The similarity of the two figures is striking.

Table V presents a summary of the speech discrimination scores for the twenty-eight subjects.

Table V. Speech Discrimination Scores: 28 Subjects

	Right Ear	Left Ear
% Accuracy on Speech Discrimination Test for a Typical Respondent	79.6%	83.9%

Speech discrimination testing was used to determine impairment in understanding what was heard. Each of the fifty words presented to the subject under the ideal situation of the sound suite was articulated with sufficient volume so that each subject, except one with hearing impairment, could hear the word. Under these ideal conditions, every word not only should be heard, it should also be understood. The score shown represented a percentage of fifty words answered correctly. The discrimination loss was typical of the presbycusis hearing loss described by Rosenberg (1963).

Summary

The twenty-eight subjects studied were representative of older persons in homes for the aged in terms of age, length of stay in the home, and audiogram representing sensori-neural impairment as well as speech discrimination loss. The sample was unlike the larger group of older people in homes for the aged in sex ratios with the sample having a predominance of females. Sataloff and Menduke (1957) pointed out that there appeared to be little difference in hearing between men and women after age 76.

Hypotheses

The general hypothesis of this study was: nurses and elderly patients have communication difficulties attributable to poor understanding of hearing impairment on the part of one or both members of the dyad. The first four hypotheses were designed to determine the significance of both the nurse and patient's accurate awareness of patient hearing loss. Hypothesis Number 5 was directed to the nursing staff's awareness of techniques available to assist in improving communication with residents who have impaired hearing and understanding. In comparing the responses of nurses in nursing homes with other staff trained to work with the hard-of-hearing, Hypothesis Number 5 was designed to determine if additional training would prove helpful to nurses in nursing homes. Hypothesis

Number 6 was designed to determine the effect of the inter-communication system on communication between the nurses and residents.

The Hearing Handicap Scale (High et al., 1964) was used to determine both residents' and staff assessment of residents' hearing loss. Hearing tests were reported on both the ISO pure tone examination as well as discrimination scores.

Hypothesis 1

Hypothesis Number 1 stated that: there is no significant relationship between the staff's awareness of patient hearing loss as measured by the Hearing Handicap Scale (High et al., 1964) and the patient hearing loss measured by audiological assessment.

The correlation between these variables is shown in Table VI.

The correlations were computed by using the Pearson Product-Moment Formula (Popham, 1967, p. 89), with 26 degrees of freedom ($df = \text{number of pairs} - 2$) a correlation of .374 is needed for significance at the .05 level. As indicated in Table VI, the value of r for Pearson correlations between nurse evaluations of patient hearing loss and patient audiological assessment was in excess of .374. Therefore, this null hypothesis was rejected. The findings indicated a significant relationship

Table VI. Correlation of Nurses' Evaluation of Patient Hearing Loss with Audiological Assessment of Hearing Loss

Variable		
1	Nurse evaluation of patient hearing loss	--
2	ISO better ear	.58*
3	ISO worse ear	.41*
4	Discrimination score better ear	-.61*
5	Discrimination score worse ear	-.42*

*Significant at .05 level.

between the staff awareness of patient hearing loss and the patient's actual hearing loss.

Negative values were obtained for some correlations because the discrimination score has a reverse value when compared to the Hearing Handicap Scale and ISO Scale. In both the Hearing Handicap and ISO Scales the larger value represented poorer hearing or understanding. In the discrimination scale the larger value represented better understanding.

Hypothesis 2

Hypothesis Number 2 stated that: there is no significant relationship between the patient's awareness of his own hearing loss as measured by Hearing Handicap Scale

(High et al., 1964), and his hearing loss measured by an audiological assessment. Table VII contains the correlation coefficients obtained between the variables of self-awareness of hearing loss and the measured hearing loss for both the better and worse ear.

Table VII. Patient Self-Evaluation of Hearing Loss Correlated with Audiological Measures of Hearing Loss

Variable		
1	Self-evaluation of hearing loss	--
2	ISO better ear	.66*
3	ISO worse ear	.62*
4	Discrimination score better ear	-.57*
5	Discrimination score worse ear	-.29

*Significant at .05 level.

As indicated in Table VII there was a significant correlation between the resident's self-evaluation of hearing loss and the ISO score for better and worse ear as well as discrimination score for the better ear. In these three situations the null hypothesis was rejected. There was a significant relationship between the resident's self-evaluation of hearing loss and those appropriate audiological measures. However, when the discrimination score

for the worse ear was correlated with the self-evaluation, the correlation was not significant. Since discrimination scores are represented by maximum understanding, or the score of the best ear, this correlation had no special significance in testing this hypothesis.

Hypothesis 3

Hypothesis Number 3 stated that: there is no significant relationship between the patient's awareness of hearing loss and the nursing staff's awareness of patient hearing loss as measured by the Hearing Handicap Scale (High et al., 1964). The correlation between these two variables is shown in Table VIII.

Table VIII. Patient's Awareness of Own Hearing Loss Compared with the Nurses' Awareness of the Loss

Variable	(Correlation Coefficient)
Patient's awareness of hearing loss compared with staff awareness of patient hearing loss	.43*

*Significant at the .05 level.

As indicated in Table VIII the correlation of .43 is significant at the .05 level; thus the null hypothesis was rejected. There was a significant relationship between

patient's self-evaluation of hearing loss and the staff's evaluation of the patient's hearing loss.

By rejecting the null hypotheses stated in Hypotheses 1, 2, and 3, the study demonstrated that both nurses and residents were aware of resident hearing loss and that there was a relationship between both residents' and nurses' awareness of resident hearing loss.

Hypothesis 4

Hypothesis Number 4 stated that: there is no significant difference between the mean score of the resident's self-evaluation of hearing loss as measured by the Hearing Handicap Scale (High et al., 1964) and the mean score of the nursing staff evaluation of resident hearing loss as measured by the Hearing Handicap Scale (High et al., 1964). Table IX lists relevant data for a t-test of the significance of difference between these two means.

The t value was computed by using the t model for correlated observations (Popham, 1967, p. 152) and the degrees of freedom equaled the number of pairs minus one.

As indicated in Table IX, the obtained t value of 3.6 was significant at the .05 level. Therefore, the null hypothesis was rejected. There was a significant difference in the residents' own evaluation of hearing loss and the nurses' evaluation of the residents' hearing loss.

Table IX. t Value for the Comparison of Residents' Self-Evaluation and Nursing Staff Evaluation of Residents

Group	N	Mean	Stand- ard Devia- tion	Degrees of Freedom	t Needed at .05 Level	Obtained t
Residents' self- evaluation	28	719.28	337.87	27	2.052	3.6*
Nurse evaluation of resi- dents	28	1126.04	301.07	27		

*Significant at .05 level.

The lower mean score of the residents represented an assessment of lower hearing loss or conversely higher hearing ability. The residents assessed their hearing ability somewhat more favorably than the nurses.

This significant difference in the mean evaluation of hearing between nurses and elderly residents should not be interpreted as contradictory with the results of the test of Hypothesis 3. It was quite possible for there to be significant differences in means of variables whose distributions were linearly related. This, then, meant that either the nurse or residents were consistently over- or under-estimating hearing deficiencies.

Discussion of the Hearing Assessment
Hypotheses (1 through 4)

The data using ISO standards did not disclose the prevalence of severe hearing problems that might be expected among the aged in nursing homes. The distribution of the ISO scores for both ears and the norms used to interpret hearing loss in terms of ISO scores are shown in Table X.

Table X. Distribution of ISO Scores: Right and Left Ear

		Right Ear	Left Ear	Total
Normal	0-26	9	11	20
Mild	27-40	11	10	21
Moderate	41-55	3	3	6
Moderately Severe	56-70	5	2	7
Severe	71-90		2	2
Profound	91+			—
				56

This distribution of scores disclosed that while only a very small number fall in the range considered normal, the majority of the people fall within the range considered borderline hearing problems. The mean ISO hearing loss audiograms demonstrated the presbycusis character of these hearing problems with the concomitant

gradual onset of hearing loss, loss of discrimination, and loss of higher frequency sounds. Furthermore, the data used in testing Hypotheses 3 and 4 helped define the character of the relationship between the residents' and the nurses' awareness of this hearing loss. In failing to reject Hypothesis 3, the findings showed that there was a relationship between the resident self-evaluation and the nurses' evaluation of resident hearing loss. However, in rejecting Hypothesis 4 it was shown that there was a significant difference between the residents' and nurses' evaluation of the severity of this loss.

While there was a significant correlation between resident and staff assessment of resident hearing loss, the differences in the mean evaluations were so great that these two groups were considered to be distinct.

The use of the mean self-evaluation hearing handicap score and the mean hearing handicap score of the nurses in comparison to the norms generally accepted for ISO tests (Newby, 1964) permitted the determination of the relative accuracy of hearing assessment by nurses and residents. The scores were dichotomized at the mean for both the residents' and the nurses' hearing handicap scores. Higher scores represented a lower estimate of hearing capacity.

It can be seen from Tables XI and XII that the residents tended to make more accurate assessment of their

Table XI. Resident Self-Evaluation with ISO Scores for Right Ear

	Self-Evaluation		Nurse Evaluation	
	Normal to Border-line	Moderate to Severe Problem	Normal to Border-line	Moderate to Severe Problem
Higher Hearing Capacity	16	3	13	3
Lower Hearing Capacity	4	5	7	5

Table XII. Comparison of Resident Self-Evaluation with ISO Scores for Left Ear

	Self-Evaluation		Nurse Evaluation	
	Normal to Border-line	Moderate to Severe Problem	Normal to Border-line	Moderate to Severe Problem
Higher Hearing Capacity	18	1	15	1
Lower Hearing Capacity	3	6	6	6

hearing capacity than did the nurses. Further, it was evident that the nurses tended to exaggerate the extent of the problem while the residents, contrary to the expectation held in the theoretical framework, did not tend to overestimate their hearing ability using these standards.

When a direct comparison of nurses' and residents' self-evaluation was made,¹ the potentials for communication difficulties were clearly demonstrated.

Table XIII discloses that thirty-two per cent of the time there was disagreement between the residents' and the nurses' evaluations on the hearing handicap scale. The disagreements took the form, predominantly, of nurses having lower evaluations than residents, but in approximately ten per cent of the cases they had higher ones than the resident. The fact that nurses overestimated hearing ability of these residents, while the residents themselves perceived that they had a problem, was likely to produce severe obstacles to communication. The fact that nurses often underestimated hearing ability of some residents who did not agree with this estimate was likely to produce strained relationships between the nurse and the resident.

Given the fact that two different mean scores were used in dichotomizing the evaluations of hearing loss, it should be pointed out that the residents on the whole

1. Using dichotomized hearing handicap scale scores.

Table XIII. Comparison of Residents' Self-Evaluation with Nurses' Evaluation

	Nurse Evaluations	
	Higher Hearing Capacity	Lower Hearing Capacity
Higher Hearing Capacity	13	6
Lower Hearing Capacity	3	6

tended to make a much more favorable assessment of their hearing capacity than did the nurses. However, given the fact that their assessment using ISO standards was somewhat more accurate than that of the nurses, the situations for possible insults to the patient by the nurse were increased.

The nurses' severe appraisal of resident hearing capacity supported the theory of low expectation of resident performance. Such expectations may lead the nurse to omit significant communication with the resident, if she had labeled the resident as being incapable of participating in communication with her. From the analysis of these data there is evidence that the differences between residents' and nurses' evaluation noted in Hypothesis Number 4 contributed to a communication problem.

Since the nurses perceived resident hearing loss differently and exaggerated the severity of this loss they

may have avoided opportunities for communication with residents. The residents may not have been aware of the nurses' underestimation of their hearing and not appreciated the reason for the nurses' avoidance of opportunities for communication. This would support the finding that nursing staffs underestimate the capacity of older people earlier reported by Barnlund (1968), Coe (1967), Hulicka (1967), and Gaitz and Warshaw (1964).

Similarly, if the residents minimized their estimate of hearing handicap they would not be prepared to accept assistance from others to overcome this handicap (Grossman, 1955; Gaitz and Warshaw, 1964).

It is not enough to know only the actual hearing condition of the residents, their evaluation of their hearing, or the nurses' evaluation of resident hearing capacity. These data suggested that the agreement between the resident and nursing home staff on hearing capacity is problematical.

Hypothesis 5

Hypothesis Number 5 stated that: there is no significant difference between awareness of remedial hearing practice of the staff and the awareness of remedial hearing practices of other professionals working with a population having impaired hearing.

The Mann-Whitney Test was selected to determine whether there was a significant difference between the two groups. This non-parametric test was used because of a small N and inability to make the assumptions of normality of distribution and randomness of sample. The results are shown in Table XIV.

Table XIV. Significance of Difference Between Staff Awareness of Remedial Hearing Practices and a Select Group of Professionals Working with Hard-of-Hearing Population

Group	N	U need at .05 Level	Obtained U
Nursing Staff	9	17	14.5*
Other Professionals	9		

*Significant at .05 level.

Note: In Mann-Whitney U Test the smaller the statistic U, the more significant (Popham, 1967, p. 306).

As indicated in Table XIV, the obtained U value of 14.5 was significant for two groups each with an N of 9 at the .05 level. Therefore the null hypothesis was rejected. There was a significant difference between the awareness of remedial hearing practices of the nurses and other professionals working with a population having impaired hearing

with the professionals being more aware of remedial hearing practices.

Discussion of Awareness of Remedial Techniques To Be Used with the Hard-of-Hearing

As indicated in Table XIV, there was a significant difference in awareness of remedial practices between nurses and others educated to work with persons having impaired hearing. This has great significance for the rehabilitation of elderly people in nursing homes because it suggests that there is a body of knowledge currently available to individuals trained to work with persons having impaired hearing. This body of knowledge could be imparted usefully to nursing staffs in nursing homes. This has further significance when it is related to the results of a survey of in-service practices for nursing staffs of all nursing homes in Tucson, Arizona. Not one of the fifteen nursing homes surveyed assisted the nursing staff through in-service training to improve their skills in helping the elderly residents improve their communication skills.

The results of this study, along with others reported in the review of the literature, demonstrated that the older persons residing in nursing homes had hearing loss and understanding impairment. They, therefore, would derive benefit from receiving the same attention given to other groups of hard-of-hearing persons.

Perhaps, the expectations that hearing loss is a concomitant to the aging process, along with the professionals' rejection of the aging person (DeLora and Moses, 1969; Hulicka, 1967) lead to the rejection by educational institutions of the significance of preparing the nurse who works with older persons to be qualified in working with the hard-of-hearing.

The inaccuracy of assessment of hearing capacity by nurses, the disagreement between nurses' and residents' self-evaluations on the Hearing Handicap Scale, and the importance of fully effective communication between nurses and patients imply that this common omission should be corrected.

Hypothesis 6

A general statement of Hypothesis 6 was: there is no significant difference between patient's measured hearing ability and the measured ability to hear instructions given through the nurse-patient intercommunication system.

Given the fact that measurements of hearing ability were undertaken in three different ways, three sub-hypotheses were tested:

- (a) First, hearing discrimination scores were calculated under the standard laboratory condition.

Therefore, this sub-hypothesis was tested: there

is no significant difference between the discrimination score under standard laboratory conditions and a discrimination score calculated through the use of the intercommunication system.

- (b) Second, hearing discrimination scores were calculated in the home by having the tester face the respondent when repeating the word list. Therefore, this sub-hypothesis was tested: there is no significant difference between the discrimination score calculated in the patient's room with the tester facing the patient and the discrimination score derived when the intercommunication system was used to repeat the word list.
- (c) Third, hearing discrimination scores were calculated in the home by having the tester speak to the subject with his back turned. Therefore, this sub-hypothesis was tested: there is no significant difference between the discrimination score calculated in the patient's room with the tester's back turned to the subject and the discrimination score derived when the intercommunication system was used to repeat the word list.

Given the three separate conditions under which discrimination scale scores were calculated to be compared to the score obtained by use of the intercommunication

system, three auxiliary hypotheses can be generated. The comparison of these discrimination scale scores of the tester-facing-respondent situation versus the tester-back-turned situation, tester-facing-respondent situation versus the laboratory situation, and the tester-back-turned versus the laboratory situation produced additional data which provided relevant insight valuable to this thesis.

- (d) (b vs c) There is no significant difference between the discrimination score calculated with the tester facing the subject and the discrimination score obtained when the tester's back was turned to the subject while presenting the word list.
- (e) (a vs b) There is no significant difference between the discrimination score calculated with the tester facing the subject and the discrimination score obtained in the sound suite.
- (f) (a vs c) There is no significant difference between the discrimination score obtained when the word list was presented when the tester's back was turned to the subject and the discrimination score obtained in the sound suite.

The post hoc procedure using the Newman-Keuls (Winer, 1962) method was used to test the difference between pairs of means in the repeated measures.

Table XV shows the results of the test of differences.

As indicated in Table XV, all of the q values reported were significant at the .05 level. Therefore, all of the null hypotheses stated under the general Hypothesis 6 were rejected. Specifically, each of these sub-hypotheses were individually examined.

Table XV. Test of Differences for Repeated Measures of Discrimination Scores Based on Total Errors

		2	1	3	4
Treatments	Totals	84	105	245	468
Direct facing	2 84	--	21*	161*	384*
Lab. testing	1 105	--	--	140*	363*
Back to subject	3 245	--	--	--	223*
Intercom	4 468	--	--	--	--

*Significant at .05 level.

Note: q value of 3.75 was required for significance.

Sub-hypothesis (a). There was a significant difference between the discrimination score obtained under standard laboratory conditions and the discrimination score calculated through the use of the intercommunication system. The score of 105 errors recorded for the subjects

in the sound suite was increased to 468 errors when the list of words was presented through the intercommunication system. This supported the thesis that the use of the intercommunication system significantly impaired communication between a nurse and a resident.

Sub-hypothesis (b). There was a significant difference between the discrimination score obtained when the tester faced the subject and the discrimination score derived when the intercommunication system was used to repeat the word list. The total number of errors on the discrimination scale score, which was obtained in the tester-facing-respondent condition, was 84; whereas, in the condition where the intercommunication system was used, the total number of errors was 468. The presentation of words in the room facing the subject obtained the lowest number of errors and therefore demonstrated the most successful method of enhancing communication between nurse and resident. Here, again, it was concluded that the use of the intercommunication system impaired communication.

Sub-hypothesis (c). There was a significant difference between the discrimination score obtained when the tester spoke to the subject with his back turned and the discrimination score derived when the intercommunication system was used. The total number of errors for the respondents on the discrimination scale score when the

tester had his back turned to the respondent was 245 in comparison to 468 when the test was administered over the intercommunication system. Of the three sub-hypotheses tested, this situation produced the greatest number of errors, or showed the greatest similarity to the use of the intercommunication system. When the tester turned his back to the subject while reading the word list, communication was impaired and was less successful than when the subject was able to see the tester. Apparently the ability to view the person while speaking provided many of the visual cues essential in overcoming impairment in hearing and understanding.

Finally, the three auxiliary null hypotheses were tested and each one was rejected (see Table XV).

Auxiliary hypothesis (d). There was a significant difference between the discrimination score of 84 obtained when the tester faced the respondent and the discrimination score of 245 obtained when the tester's back was turned to the subject while presenting the word list.

Auxiliary hypothesis (e). There was a significant difference between the discrimination score of 84 obtained when the tester faced the subject and the discrimination score of 105 obtained in the sound suite.

Auxiliary hypothesis (f). There was a significant difference between the discrimination score of 245 obtained when the word list was presented when the tester's back was turned to the subject and the discrimination score of 105 obtained in the sound suite.

Based upon these findings, a hierarchy of conditions for maximum effective communications was established in the following descending order:

1. Direct contact and facing the subject.
2. The ideal system of a sound suite and controlled speech volume.
3. Back turned to the subject while talking.
4. Talking through the intercommunication system.

Discussion of Hypotheses Relating to Understanding of Speech

The test of Hypothesis 6 disclosed significant differences in the discrimination scores when those obtained in the sound suite situation were compared to those calculated by use of the intercommunication system.

As noted above the best condition for understanding speech was the one in which the person administering the test faced the respondent when reading the word list. The next most effective condition was that in which the word list was administered in a sound suite. The percentage of accuracy in the former condition was 90.12 per cent, while in the latter it was 83.94 per cent. In the sound suite

the loudness of the stimuli was carefully controlled. In all cases the audiologist in the sound suite condition established a threshold of hearing to insure that the respondent at least heard the stimulus. Given the fact that no such efforts were made to control the volume of speech when the word list was read to the respondent in the home, one would expect a lower level of discrimination accuracy in those tests administered outside of the sound suite. One can conclude that the greater discrimination accuracy in the tester-facing-respondent situation is in part attributable to the non-verbal component of hearing because in the sound suite the possibility of lip reading was not present.

The level of accuracy of discrimination when the person administering the word list to the respondent had his back turned is somewhat poorer than that found in the sound suite. In the back-turned condition the level of accuracy was 61.30 per cent as compared to 83.92 per cent in the sound suite. This is further evidence that the tester-facing-respondent situation provided valuable non-verbal aids to hearing. It was also noted that the discrimination scale score was lowest when the inter-communication system was used (44.94 per cent accurate).

These observations might clarify in part the nurses' lower estimates of hearing capacity. It is unlikely that the nurse always will be able to take the

time to address the patient while directly facing him. She is likely to enter the room, busy herself with her chores, and talk to the patient while doing so. Other attempts to communicate with the patient are likely to be those in which the intercommunication system is utilized by the nurse. If the nurse does not conduct most of her conversation with the patient while directly facing him, the lower estimate of hearing capacity is made somewhat more understandable by these data.

The nurses employed in a home for the aged should be advised of the importance of facing the patient directly, speaking slowly, and avoiding the use of an intercommunication system when it is possible to do so. The test of Hypothesis 5 indicated that she is likely to be unaware of these remedial practices.

If the nurse conducts a large part of her communication with a patient while not directly facing him, the possibility of increasing his anxiety is presented. If the patient is discriminating no more than 45-60 per cent of the words used in these communications, the value of nursing care is not only vitiated but could in some cases diminish the security of the patient.

The assumption was made that a nursing home patient will expect a high level of expertise from those who work in a nursing home. He would expect the nurse to be knowledgeable about the special techniques required in

delivering health services to the aged. He would expect the facilities of the home to be of a nature to accommodate the problems of an aged person. If a nurse communicates to a patient largely through the intercommunication system or with her back partially or totally turned, the patient might then be led to misinterpret his own condition or exaggerate the severity of it. The very fact that nursing homes take pride in having an intercommunication system and rely on it often could also lead to patient problems.

Summary

The results of the study were presented in this chapter. The first section included data descriptive of the sample studied. The next section presented each of the six hypotheses with the statistical findings, and a discussion.

The test of Hypothesis 1 demonstrated that there was a significant relationship between the staff awareness of patient hearing loss and the patient's actual hearing loss.

The tests of Hypothesis 2 demonstrated that there was a significant relationship between the resident's awareness of his own hearing loss and the results of the conduction tests for either ear and the discrimination score for the better ear. There was no significant

relationship between the self-evaluation and the discrimination score for the worse ear.

The test of Hypothesis 3 demonstrated that there was a significant relationship between the patient's self-evaluation of hearing loss and the staff's evaluation of patient hearing loss.

The test of Hypothesis 4 demonstrated that there was a significant difference in the mean scores of the residents' self-evaluation of hearing loss and the nurses' evaluation of the residents' hearing loss. It was further shown that the residents thought more highly of their hearing capacity than did the nurses. The ramifications of greater resident assessment accuracy were explored. Some of the possible problems created by nurses' inaccurate assessment of hearing ability or underestimated hearing capacity of the resident were identified.

The test of Hypothesis 5 demonstrated that there was a significant difference between the awareness of remedial hearing practices of the nurses and other professionals working with a population having impaired hearing with the hearing professionals being more aware of remedial hearing practices. Unawareness by nurses of remedial techniques to be used with the hard-of-hearing was discussed.

The test of Hypothesis 6 demonstrated that there was a significant difference between the mean scores of the

patients' measured hearing ability by use of word discrimination and the measured ability to understand words presented through the intercommunication system.

This hypothesis relating to understanding of speech was explored in some detail in the interest of developing guidelines for insuring effective nurse-patient communication.

CHAPTER V

SUMMARY, IMPLICATIONS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents a summary of the study as well as conclusions and implications derived from it. Recommendations for the improvement of nursing care in homes for the aged, and suggestions for further investigations are included.

General Summary

The general hypothesis of this study was that nurses and patients have deficient communication attributable in part to poor understanding of hearing loss in the aged. Several questions were raised in the study related to this problem. They were: (1) did the resident have a hearing loss, (2) was the nursing staff and/or resident aware of it, (3) what resulted when one or both were unaware of it, (4) what were the possible effects of the concomitant reduction in understanding or effectiveness of communication produced from such a loss, and (5) what relevance did these contingencies have to patient satisfaction and nursing services in a home for the aged?

Design

A multi-phasic audiometric analysis, including a hearing handicap scale (High et al., 1964), pure-tone, air-conduction, threshold and speech discrimination tests, was administered to twenty-eight randomly chosen individuals from three nursing homes located in Tucson, Arizona.

The residents' actual hearing loss, their awareness of this loss, the nursing staffs' perception of residents' hearing loss and the factors facilitating or impeding accurate communications were the focal concerns of this study.

In the interest of establishing guidelines for maximizing communications, hypotheses were tested comparing actual states of hearing ability to subjective evaluations of hearing ability by both nursing home residents and nurses.

Conclusions and Implications

1. The findings of the study indicated accurate assessment of hearing loss on the part of both residents and nurses. However, the tendency for more accurate evaluation of hearing capacity on the part of residents in comparison to nurses was established. The fact that nurses tended to have lower evaluation than residents was the general trend.

Implication: (a) The negative appraisal of resident hearing capacity by the nurse could likely have a series of deleterious effects on the communication process. The likelihood of the nurse having lower expectations of resident performance is made more probable. Should such a contingency develop, the probability is increased for greater reluctance on the part of the nurse to communicate with the resident. (b) If the residents tend to minimize their loss of hearing capacity, their willingness to accept assistance from others in overcoming this handicap is reduced. (c) Given the general tendency for the nurses to exaggerate the severity of resident hearing loss and consequently the tendency to underestimate the capacity of older people is evidence that the labeling of aged residents with negative stereotypes of a general nature occurs in nursing homes. The possible consequences of this stereotyping are numerous, among them is a self-fulfilling prophecy.

2. The general lower level of awareness of remedial hearing practices by nurses employed in a nursing home in comparison with professionals working with a population having impaired hearing was disclosed in Hypothesis 5.

Implications: (a) Accepting the above conclusion, and recognizing the common omission of specific geriatric

studies in the curricula of nursing schools (Moses and Lake, 1968) suggests that remedial practices of a wide variety are needed to upgrade the skills of the typical nursing staff of homes for the aged. Specifically, evidence exists for the immediate need for remedial education in delivering service to those with impaired hearing. (b) This finding is an indirect explanation for the less accurate assessment of resident hearing capacity by the nurses in comparison to the residents themselves. In this area of consideration it becomes problematical for the resident, the family of the resident, and the administrator of the nursing home who assume that nurses properly understand and compensate for lowered levels of performance in the aged.

3. The use of the intercommunication system significantly impairs communication between a nurse and the resident.

Implication: (a) The greater reliance on electronically amplified sound systems in health care facilities presents the potential for a variety of communication difficulties unless these systems incorporate a visual component. Given the facts: (1) that the most accurate discrimination of sound occurred under the condition when the tester was directly facing the respondent and (2) that hearing problems are ubiquitous among the aging, then any intercommunication system in a home for the aged other than

an audio-visual one is likely to be the source of more problems than benefits. (b) Nurses in homes for the aged should be encouraged to speak to the patients by facing them directly and avoid the use of the intercommunication system. (c) If the majority of the communications directed to the patient comes to him without face-to-face contact with the communicator or by means of an intercommunication system the likelihood of a patient exaggerating the severity of his hearing problem is greatly increased.

Recommendations

1. The administrator should insure that (a) every resident have his hearing tested on admission to a home (Hearing Handicap Scale plus audiological testing) and (b) the test results be disclosed to both the nursing staff and the resident.
2. The administrator should require each nurse to assess the hearing of the residents in her care, and to then compare her findings with the resident's self-evaluation for better appreciation of potential barriers to communication.
3. The administrator should promote in-service programs for the nursing staff which relate to (a) reduced hearing and understanding ability, (b) the importance of the resident's own awareness of his hearing loss, (c) remedial practices to be used in working

with the hard-of-hearing, and (d) the conditions which facilitate maximum communication and understanding.

4. Gerontologists should attempt to insure that the educational experience of nursing students will include information about: the ubiquity of hearing problems in the aged, the significance of hearing loss, and the significance of self-awareness of this loss.
5. Nursing home administrators should be informed of the limits of the nurse-patient intercommunication system. They should recommend that the nurse avoid use of the "intercom" and talk directly to the patient whenever possible.
6. The administrators of new nursing home installations should specify that the intercom system should never rely entirely on voice transmission. If a full audio-visual system is not economically feasible, the use of a system in which a bell is sounded to summon the nurse is recommended.
7. The ramifications of this study include aspects pertinent to other health care facilities, for all age groups, and should be generally disseminated.
8. Administrators of nursing homes might well utilize the Hearing Handicap Scale for assessment of resident hearing loss, recognizing the accuracy of this

test as compared to ISO standards. It would be further recommended that nursing staffs and residents both assess the extent of resident hearing capacity. When lack of agreement between resident and nurse assessment is found this should be communicated to both parties and to the administrator, who should then supplement the Hearing Handicap Scale with other hearing tests.

Recommendations for Further Research

1. Because of a serious lack of research relating to the self-awareness of hearing loss among the aged, this portion of the study should be replicated in other settings.
2. The behavioral correlates to communicating accurate hearing assessments to elderly people should be explored in further studies.
3. Given the tendency for nurses to stereotype elderly patients, a comparative study of the following four groups of patients should be undertaken: one group whose hearing is normal, but perceived as deficient by nurses; one group whose hearing is normal and perceived as normal by nurses; one group whose hearing is deficient and perceived by nurses as deficient; and one group whose hearing is deficient but perceived as normal by nurses. The differences

in the behavior of both the patients and the nurses in relationship to each other would be the focus of this study. This study would be an attempt to reveal the significance of accurate assessment of patient condition by health personnel.

4. A study is needed to investigate the extent to which behavior modification techniques can be used to enhance hearing ability and/or lead to changed self-awareness of hearing ability. A comparative study of at least two groups is needed. One group would have hearing and every evidence of hearing rewarded. Another group would be positively reinforced for evidence of hearing loss and decrements. Pre- and posttests would be taken of self-analysis of hearing ability and actual hearing ability. The hypotheses to be investigated would be: (a) hearing ability of group one would improve and self-evaluation of hearing capacity would be overestimated; (b) hearing ability of group two would decline and self-evaluation of hearing capacity would be underestimated.

APPENDIX A

HOME CONSENT FORM

FOR THE PARTICIPATION OF RESIDENTS AND STAFF OF
_____ (NURSING HOME) IN AN INVESTIGA-
TION OF HEARING.

I give my permission for Theodore H. Koff,
Graduate student at The University of Arizona, College of
Education, to include residents and staff of _____
_____ (Nursing Home) in his study of hearing.

I understand that the confidentiality of each of
the participants will be protected and will only be
referred to by a number.

Each of the residents and staff of _____
(Nursing Home) invited to participate in this study will be
asked to sign a consent form prior to their participation.
_____ (Nursing Home), or any of its
residents or staff involved in the study, may elect at any
time to withdraw from the study.

Signature _____

Position _____

Date _____

APPENDIX B

QUESTIONNAIRE TO DETERMINE MENTAL STATUS

	Answer	Right	Wrong
1. What is the name of this place?	_____		
2. Where is it?	_____		
3. What is today's date?	_____		
4. Month?	_____		
5. Year?	_____		
6. How old are you?	_____		
7. When were you born? Month?	_____		
8. When were you born? (Year)	_____		
9. Who is the President of the United States?	_____		
10. Who was the President before him?	_____		

Total wrong _____

Right or wrong response _____

0-2 errors--none or minimal

3-8 errors--moderate

9-10 errors--severe

degree of severity of chronic brain syndrome

Source: Kahn et al. (1960).

APPENDIX C

INFORMATION AND CONSENT FORM FOR PARTICIPATION IN AN
INVESTIGATION OF HEARING AND AWARENESS OF HEARING
LOSS BY RESIDENTS OF A NURSING HOME

Mr. Theodore H. Koff, a graduate student at The University of Arizona, College of Education, is conducting a study of hearing and awareness of hearing loss of a group of residents and staff in nursing homes. The purpose of this study is to understand how residents of nursing homes with hearing loss can be helped to overcome their hearing loss.

Your nursing home has agreed to participate in this study and has given us permission to contact you. Your participation will include a test of your hearing, performed at the Rehabilitation Center of The University of Arizona. You will also be asked to complete a questionnaire regarding your hearing.

If you are willing to participate, please sign your name in the space provided below.

PERMISSION

I give my permission to be included in the study described above. I understand that if I choose to withdraw from the study at any time I will be able to do so.

Signature

Date _____

Relative Approval

Signature

Date _____

APPENDIX D

SCALE FOR SELF-ASSESSMENT OF HEARING HANDICAP

Name: _____

- | | |
|--|--|
| 1. When you are listening to the radio or watching television, can you hear adequately when the volume is comfortable for most other people? | _____ 1. Practically always
_____ 2. Frequently
_____ 3. As often as not
_____ 4. Occasionally
_____ 5. Almost never |
| 2. Can you carry on a conversation with one other person when you are riding in an automobile with the windows closed? | _____ 1. Practically always
_____ 2. Frequently
_____ 3. As often as not
_____ 4. Occasionally
_____ 5. Almost never |
| 3. Can you carry on a conversation with one other person when you are riding in an automobile with the windows open? | _____ 1. Practically always
_____ 2. Frequently
_____ 3. As often as not
_____ 4. Occasionally
_____ 5. Almost never |
| 4. Can you carry on a conversation with one other person if there is a radio or television in the same room playing at normal loudness? | _____ 1. Practically always
_____ 2. Frequently
_____ 3. As often as not
_____ 4. Occasionally
_____ 5. Almost never |
| 5. Can you hear when someone calls you from another room? | _____ 1. Practically always
_____ 2. Frequently
_____ 3. As often as not
_____ 4. Occasionally
_____ 5. Almost never |
| 6. Can you understand when someone speaks to you from another room? | _____ 1. Practically always
_____ 2. Frequently
_____ 3. As often as not
_____ 4. Occasionally
_____ 5. Almost never |

7. When you buy something in a store, do you easily understand the clerk? _____
- _____ 1. Practically always
 _____ 2. Frequently
 _____ 3. As often as not
 _____ 4. Occasionally
 _____ 5. Almost never
8. Can you carry on a conversation with someone who does not speak as loudly as most people? _____
- _____ 1. Practically always
 _____ 2. Frequently
 _____ 3. As often as not
 _____ 4. Occasionally
 _____ 5. Almost never
9. Can you tell if a person is talking when you are seated beside him and cannot see his face? _____
- _____ 1. Practically always
 _____ 2. Frequently
 _____ 3. As often as not
 _____ 4. Occasionally
 _____ 5. Almost never
10. When you ask someone for directions, do you understand what he says? _____
- _____ 1. Practically always
 _____ 2. Frequently
 _____ 3. As often as not
 _____ 4. Occasionally
 _____ 5. Almost never
11. If you are within three or four feet of a person who speaks in a normal tone of voice (assume you are facing one another), can you hear everything he says? _____
- _____ 1. Practically always
 _____ 2. Frequently
 _____ 3. As often as not
 _____ 4. Occasionally
 _____ 5. Almost never
12. Do you recognize the voices of speakers when you don't see them? _____
- _____ 1. Practically always
 _____ 2. Frequently
 _____ 3. As often as not
 _____ 4. Occasionally
 _____ 5. Almost never
13. When you are introduced to someone, can you understand the name the first time it is spoken? _____
- _____ 1. Practically always
 _____ 2. Frequently
 _____ 3. As often as not
 _____ 4. Occasionally
 _____ 5. Almost never
14. Can you hear adequately when you are conversing with more than one person? _____
- _____ 1. Practically always
 _____ 2. Frequently
 _____ 3. As often as not
 _____ 4. Occasionally
 _____ 5. Almost never

15. If you are in an audience, such as in a church or theater and you are seated near the front, can you understand most of what is said?
- _____ 1. Practically always
 _____ 2. Frequently
 _____ 3. As often as not
 _____ 4. Occasionally
 _____ 5. Almost never
16. Can you carry on everyday conversation with members of your family without difficulty?
- _____ 1. Practically always
 _____ 2. Frequently
 _____ 3. As often as not
 _____ 4. Occasionally
 _____ 5. Almost never
17. If you are in an audience, such as in a church or theater and you are seated near the rear, can you understand most of what is said?
- _____ 1. Practically always
 _____ 2. Frequently
 _____ 3. As often as not
 _____ 4. Occasionally
 _____ 5. Almost never
18. When you are in a large formal gathering (a church, lodge lecture hall, etc.) can you hear what is said when the speaker does use a microphone?
- _____ 1. Practically always
 _____ 2. Frequently
 _____ 3. As often as not
 _____ 4. Occasionally
 _____ 5. Almost never
19. Can you hear the telephone ring when you are in the next room?
- _____ 1. Practically always
 _____ 2. Frequently
 _____ 3. As often as not
 _____ 4. Occasionally
 _____ 5. Almost never
20. Can you hear night sounds, such as distant trains, bells, dogs barking, trucks passing, and so forth?
- _____ 1. Practically always
 _____ 2. Frequently
 _____ 3. As often as not
 _____ 4. Occasionally
 _____ 5. Almost never

Source: High et al. (1964).

APPENDIX E

PHONETICALLY BALANCED WORD LIST

Central Institute for the Deaf Auditory Test W-22

List 3A

bill
add(ad)
west
cute
start
ears
tan
nest
say
is
out
lie(lye)
three
oil
king
pie
he
smooth
farm
this
done
use
camp
wool
are

Unaided _____
Aided _____
Live Voice _____
Recorded _____
Spkr _____
Phones _____
RE _____ LE _____
at _____ db
Noise _____
Quiet _____

aim
when
book
tie
do
hand
end
shove
have
owes
jar
no(know)
may
knit
on
if
daw
glove
ten
dull
though
chair
we
ate(eight)
year

List 1D

owl
 wire
 isle(aisle)
 give
 up
 she
 wet
 ace
 skin
 day
 east
 law
 thing
 carve
 mew
 earn
 chew
 or(oar)
 hunt
 an
 true
 none(nun)
 poor
 what
 felt

Unaided _____
 Aided _____
 Live Voice _____
 Recorded _____
 Spkr _____
 Phones _____
 RE _____ LE _____
 at _____ db _____
 Noise _____
 Quiet _____

toe
 jam
 low
 bathe
 dad
 stove
 ache
 us
 see(sea)
 as
 high
 knees
 yard
 ran
 there(their)
 you(ewe)
 deaf
 him
 not(knot)
 me
 it
 twins
 bells
 could
 them

List 4B

chin
 all(awl)
 who
 few
 stiff
 my
 nuts
 save
 his
 tin
 aid
 yet
 art
 so(sew)
 why
 darn
 tea
 men
 of
 pale(pail)

Unaided _____
 Aided _____
 Live Voice _____
 Recorded _____
 Spkr _____
 Phones _____
 RE _____ LE _____
 at _____ db _____
 Noise _____
 Quiet _____

wood
 bee
 they
 dust
 ought(aught)
 jump
 leave
 in(inn)
 ear
 than
 bread(bred)
 will
 eyes(eyes)
 arm
 toy
 cook
 shoe
 hang
 near
 go

our(hour)
 through(thru)
 dolls
 yes
 at

can
 net
 clothes
 where
 am

List 1E

them
 give
 it
 ace
 deaf
 law
 yard
 earn
 see(sea)
 an
 dad
 what
 toe
 jam
 none(nun)
 ache
 or(oar)
 high
 carve
 there(their)
 day
 not(knot)
 she
 bells
 wire

Unaided _____
 Aided _____
 Live Voice _____
 Recorded _____
 Spkr _____
 Phones _____
 RE _____ LE _____
 at _____ db _____
 Noise _____
 Quiet _____

owl
 up
 twins
 poor
 him
 thing
 ran
 chew
 as
 true
 stove
 felt
 low
 bathe
 skin
 us
 hunt
 knees
 mew
 you(ewe)
 east
 me
 wet
 could
 isle(aisle)

Source: Newby (1964).

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