

Children's Bureau Publication No. 334

**services for the
child who is
hard of hearing**

a guide for the development of programs

Collection
Number 426

SOCIAL SECURITY ADMINISTRATION • CHILDREN'S BUREAU

Ch. B.

**SERVICES FOR THE
CHILD WHO IS
HARD OF HEARING**
**a guide for the devel-
opment of programs**

by
Arthur J. Lesser, M.D.

FEDERAL SECURITY AGENCY
Social Security Administration
Children's Bureau

Each year the Congress appropriates to the Children's Bureau for grants in aid to State health departments \$18,500,000 for maternal and child health and crippled children's services. In most States small amounts of these funds are being used for development of programs for children who are hard of hearing. With a few exceptions, these programs are still in early stages of development.

With the increasing interest in these programs, a need arose to bring together information regarding recent developments in audiology. Hence, a guide was drafted for members of the Children's Bureau staff to be used in consulting with States that were developing these programs. At that time, only a limited number of copies were issued. However, knowledge of its existence has spread and the Bureau has received many requests for it. This revised edition is issued to meet these requirements.

It is not intended that this publication represent the final word on the subject. It contains suggested principles which have been selected from many sources, and has had the benefit of extensive review by specialists in the field of audiology as well as those in allied fields. Appreciation is expressed to all whose contributions have aided in the preparation of the materials which made this document possible.

CONTENTS

Part I. Facts about audiology

The child who is hard of hearing.....	1
Meaning of terms "hard of hearing" and "deaf".....	2
Statistics on hearing loss.....	2
Types of hearing loss.....	3
Conductive hearing impairment.....	3
Perceptive hearing impairment.....	4
Central hearing impairment.....	4
Psychogenic hearing impairment.....	4
Methods of testing hearing.....	4
Screening tests.....	5
Group test with phonograph audiometer.....	5
Sweep frequency test.....	5
Massachusetts group pure tone test.....	5
Diagnostic audiometer tests.....	5
Pure tone audiometer test.....	5
Speech reception test.....	6
The audiogram.....	6
New tests of interest.....	6
Skin resistance test.....	7
Doerfler-Stewart test.....	7
Evaluation of hearing loss.....	7
Treatment of hearing loss.....	8
Preventive.....	8
Medical and surgical.....	8
Adjustment to handicap.....	9
Hearing aids.....	10
Basic requirements.....	10
Ear mold.....	10
Testing suitability of hearing aid.....	10
Binaural hearing.....	11
Effectiveness of hearing aid.....	11
Summary of services.....	12
Auditory training.....	14
Speech reading.....	14
Speech training.....	15
Social services.....	15

CONTENTS

Part II. Administration of programs

Organization of services.....	17
Flow chart of hearing and related services.....	18
Case finding.....	20
Schools.....	20
Physicians	21
Reports of communicable diseases.....	21
Public health nurses	21
Parents.....	22
Other agencies	22
Clinical services	22
Personnel.....	22
Audiologist.....	23
Conservation of hearing specialist.....	23
Audiometer technician.....	24
Otologist.....	24
Notes	25
References.....	26



THE CHILD WHO IS HARD OF HEARING

The child who is hard of hearing lives in a world which is difficult for normally hearing people to comprehend fully. It is a world in which most of the sounds normally taken for granted are blotted out, and occasional loud sounds are heard. The visual sense plays an important part in this world, for much or all of a conversation is lost if the back is turned.

The child who does not hear does not develop speech and in turn is unable to communicate. The child who hears some sounds but not others, develops a garbled speech which may be partly understood only by his mother. Children with impairment for high tones have great difficulty in hearing the consonant sounds while their ability to hear vowel sounds may be unimpaired. When a child's ability to communicate is impaired, the expected learning processes are distorted or delayed. As a result some hard of hearing preschool children are often thought to be feeble-minded and their hearing loss goes undiscovered. This mistake is less apt to be made if the child has so little hearing that he does not learn to speak at all.

It is obvious that impairment of hearing in a child sets up a chain of disturbances in his development which affects seriously his mental and emotional and social development. Management of the physical factors immediately responsible for the hearing loss will not of itself bring order out of the distorted development which has taken place. The hard of hearing child must be considered as a whole and should be under medical supervision, preferably by a physician who has had special training in the care of children.

MEANING OF TERMS "HARD OF HEARING" AND "DEAF"

The word "deaf" became fixed in our language before the audiometer was invented, and, therefore, before there was any method of determining with any accuracy degrees of hearing loss. With the measurement of gradations of hearing loss has come the recognition that many children who would traditionally be considered deaf do have sufficient residuum of hearing, so that if they are fitted with hearing aids and are provided auditory training, speech reading and speech training, they are able to hear and so become regarded as being hard of hearing rather than deaf.

Because of the inadequacy of the terms "hard of hearing" and "deaf," there is increasing reason for classifying hearing loss into these categories:

Mild to moderate (a threshold of 30-40 decibels by speech audiometry).

Moderate to severe (a threshold of 40-70 decibels by speech audiometry).

Profound (more than 70 decibels by speech audiometry).

The term applied to the modern treatment of communicative disorders caused by hearing loss is clinical audiology.

STATISTICS ON HEARING LOSS

Statistics on this subject are plentiful, but not accurate. Variability factors are method of testing (whether group phono-

graph, or pure tone audiometer), frequency of calibration of the instruments, criteria for screening (9, 12, and 15 decibels loss are used in various studies), acoustic conditions in the room in which testing is done, presence of acute ear disease or blockage in the auditory canal, and the factors inherent in any subjective test. For this reason the available crude statistics on hearing loss are usually reported on the basis of children whose hearing appears sufficiently impaired to warrant further study. Typical of such statistics are those reported in 1945 by the Committee on Hard of Hearing Children of the American Hearing Society, according to which 4-1/2 percent of about 2,500,000 school children had a loss of 9 or more decibels in one or both ears. A round number which is pretty safe is 5 percent.

It is difficult to ascertain from existing studies how many children are actually handicapped by loss of hearing. To get this figure would require better standardization of testing on a larger scale than has yet been done. The estimates of children with handicapping hearing loss are in the neighborhood of 0.5 percent to 1 percent of the total child population.

TYPES OF HEARING LOSS

A. Conductive Hearing Impairment

This type results from obstruction of the passage of sound to the inner ear. It may be caused by:

1. Otitis media,
2. Otitis externa,
3. Wax impactions (temporary hearing loss),
4. Congenital malformations,
5. Otosclerosis (a progressive familial soft bone invasion of the bony capsule surrounding the internal ear, which may result in fixation of the stapes in the oval window and a conduction deafness; less commonly, the cochlea is involved with nerve deafness; hearing loss usually appears in adolescence or the early twenties).

B. Perceptive Hearing Impairment

This type results from degeneration of the sensory cells of the internal ear. It is usually the perception of high tones that is mostly affected, but the impairment may be pervasive as with the severely or profoundly affected child. Medical treatment can do little or nothing for perceptive hearing impairment. It may result from:

1. Infections which may affect the auditory nerve, such as meningitis, scarlet fever, mumps, measles.
2. Familial degeneration of the auditory nerve or the organ of Corti. Such hereditary hearing loss is almost certain to be transmitted if it occurs in both parents.
3. Maternal infection in the first trimester of pregnancy, such as German measles.

C. Central Hearing Impairment

This is a nerve type of hearing loss which has its origin in the central nervous system and may be due to tumors of the eighth nerve, or degeneration of the cerebral blood vessels.

D. Psychogenic Hearing Impairment

True hysteria is unusual in children, but transitory psychogenic involvement is more common than is realized.

METHODS OF TESTING HEARING

Preschool children usually cannot be tested accurately without preparation. Some indication of hearing can be obtained by noting reactions to sounds produced by various sound making toys. If parents receive adequate instruction from the hearing center, children can be conditioned at home gradually to the

varying volume of sounds produced by a radio, with some method of indicating when they hear the sounds. This procedure will aid in preparing them for a pure tone test, for which a half dozen visits to the testing center may be needed.

A. Screening Tests

1. Group Test with Phonograph Audiometer

This is commonly used to test up to 40 school children simultaneously by playing a phonograph record and receiving the words (usually numbers) into sets of headphones. Retests are usually done with children who suggest a 9 to 15 decibel loss (the criterion varies). Children showing such a loss on the retest need to be studied individually.

2. Sweep Frequency Test

This is an individual screening test, using a pure tone rather than words. The level of sound is placed arbitrarily at, for example, 15 decibels above the threshold of normal hearing and the tester "sweeps" through the frequencies. Children who miss at two or more frequencies need to be studied further. This test is gaining widespread use because it gives more accurate results than the group phonograph audiometer test.

3. Massachusetts Group Pure Tone Test

This test employs the pure tone audiometer for group screening. Signals at four frequencies are delivered to groups of up to 40 children who indicate whether they hear the signal by underlining "yes" or "no" on the test sheet. Children who get more than two wrong answers receive an individual test. This is a relatively new test and information regarding its comparative values in relation to the sweep frequency test is not yet available.

B. Diagnostic Audiometer Tests

1. Pure Tone Audiometer Test

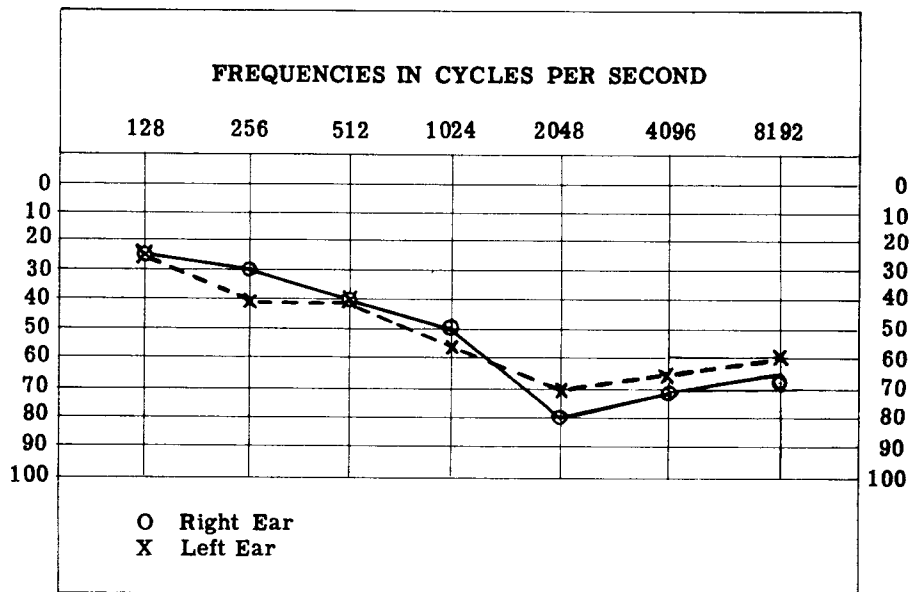
This test makes use of the same audiometer that is used for the sweep frequency screen. For an accurate diagnosis, it is necessary to test the individual's hearing levels at all the frequencies in a sound processed room.

2. Speech Reception Test

In about 25 percent of the people tested, there is unsatisfactory correlation between pure tone and speech reception levels. For this reason there is increasing use of the speech reception test by the speech audiometer in addition to the pure tone test in diagnosing hearing loss. The individual's reception of electrically measured voice volumes, with and without concomitant static noise, is recorded. The voice sounds are produced either by the tester or a phonograph record, utilizing a microphone, with the patient in a separate sound treated room. Speech audiometry has its major use in fitting hearing aids but it belongs in all thorough testing. The threshold for speech is defined as the level at which 50 percent of the test words can be repeated successfully by the patient.

C. The Audiogram

This is the audiometric record of hearing, showing graphically the level of hearing at each frequency.



D. New Tests of Interest

Brief mention is made of these. They are new but both are beyond the experimental stage.

1. Skin Resistance Test

This is an objective test of hearing, not requiring the cooperation of the subject and may be used with infants. Only a preliminary report on this test is thus far available.

2. Doerfler-Stewart Test

The purpose of this test is to aid in the differential diagnosis of psychogenic and organic loss of hearing. It utilizes speech audiometry during which there is simultaneously delivered speech and static noise. Usually, persons with normal hearing will continue to perceive speech until the level of the noise is 10-15 decibels greater than the speech. In psychogenic hearing loss, speech perception is usually lost before the static noise reaches the intensity of speech.

EVALUATION OF HEARING LOSS

In evaluating a loss of hearing for the purposes of medical and social treatment, consideration must be given to the following:

History,

Complete medical examination (including tuning fork tests),

Accurate measurement of hearing levels by air conduction with pure tone audiometer, and preferably, speech audiometer as well,

Speech and voice tests,

Type of hearing loss,

Age of child,

Current pattern of communication, if any,

Personality and social adequacy of child.

While the need for evaluation of hearing loss may seem self evident, emphasis needs to be given to it because it is not uncommon to attach major or entire significance to only one or two factors. For example, in a school system suburban to one

large metropolitan area children are reported to be assigned to a lip reading class following audiometry without an adequate opportunity for expert medical diagnosis and treatment. The continued enrollment in some schools for the deaf of children who do not belong there is perhaps the most obvious example of misinterpretation of the meaning of a loss of hearing in a child.

TREATMENT OF HEARING LOSS

A. Preventive

The widespread use of the sulfonamides and antibiotics has altered the pattern of the effects on hearing of the bacterial infections. Both acute and chronic ear disease are now much more readily controlled. The reduction in mortality from generalized and cerebro-spinal bacterial infections have, on the other hand, resulted in the survival with profound hearing loss of children who, a decade ago, would have died. The early recognition and effective treatment of acute otitis media constitute the best opportunities of preventing loss of hearing. The possibility that some congenital deafness may result from virus infection in the mother early in pregnancy seems to have been verified.

B. Medical and Surgical

1. Antibiotics and chemotherapy for acute and chronic ear infections.
2. Tonsillectomy, adenoidectomy, mastoidectomy, if indicated.
3. Irradiation of nasopharynx. The value of radium derivatives is being studied. Its chief indication is claimed by some clinics to be in high tone hearing loss where adenoid tissue is blocking the opening of the Eustachian tube.
4. Treatment for allergies which may be causing edema of the Eustachian tube and high tone hearing loss.

5. Fenestration operation for otosclerosis.
6. Psychotherapy as indicated.

ADJUSTMENT TO HANDICAP

When moderate to profound hearing loss cannot be improved by treatment, and the existence of a permanent handicap is established, it is essential to help the patient to adjust himself to this situation and to develop a satisfactory means of communication in keeping with modern concepts of audiology. To aid him in the maintenance or development of social adequacy, use is made of the skills and knowledges which are included in the following:

Selection of hearing aid,

Auditory training,

Speech (lip) reading,

Speech training,

Social services,

Psychiatric consultation and treatment as needed,

Special education as needed,

Vocational guidance as needed.

In the following discussion of the first 5 of these items, it is understood that the indications for these services are considered in relation to the patient as a growing child, for whom a careful diagnosis and evaluation of status has been made. The minimal level of hearing loss which may indicate the need for aural rehabilitation is usually given as 30 to 35 decibels in the speech range (300 to 4,000 cycles per second) in the better ear. This should not be rigidly adhered to since there are some children with a hearing loss less than 30 decibels for whom speech reading or speech training or both may be indicated.

A. Hearing Aids

A hearing aid is of course fundamentally an appliance, like a brace or a pair of glasses. It differs from the latter example in that training in its use is required for most people. It is estimated that about one half of the aids which have been sold are not being used, chiefly because of the unavailability of such training, or failure to understand the importance of it. It is, moreover, necessary to prepare the patient for the hearing aid by an explanation of what is to be expected of it and how to obtain maximum efficiency from it. It is also necessary to recognize with the child and his family that it will be difficult for him to have to accept the fact that he should wear a hearing appliance. An intellectual explanation alone cannot always be expected to achieve this acceptance.

1. Basic Requirements (Office of Scientific Research and Development)

- a. Power.
- b. Tolerability.
- c. Fidelity.
- d. Wearability.
- e. Sensitivity and amplification (as related to speech). Hearing aids meeting these and other requirements are approved by the Council on Physical Medicine of the American Medical Association.

2. Ear Mold

This is prepared individually for the ear in which the aid is to be worn. It is made usually of an acrylic resin. It is essential for an air conduction hearing loss but should not be fitted in an ear having a suppurative otitis.

3. Testing Suitability of Hearing Aid

Ideally, it might be expected that the hearing aids would supply the deficiency in hearing as recorded in the audiogram. This is not practicable at the present time. The few available studies do not indicate any real advantage in selective amplification over flat amplification.

In the selection of aids, comparative tests employing speech audiometry under uniformly controlled conditions are carried out to help the patient secure the aid best suited to him. The following tests are employed in the selection of the hearing aid:

- a. **Threshold Gain Test**--To ascertain the threshold of hearing with the aid in use (as compared to the threshold without an aid).
- b. **Signal to Noise Ratio**--To test the hearing with three levels of ambient noise of 50-70 decibels.
- c. **Tolerance Threshold**--To ascertain the level at which sound becomes uncomfortable.
- d. **Speech Discrimination**--To ascertain how well the patient is able to discriminate speech with amplification. Selected test words are used with sound volume of 30 decibels or more above the aided ear's threshold.

The hearing aid giving the best results on these tests is usually the one prescribed.

In testing older patients' hearing with various aids, it has been found desirable to conceal the name of the aid so that extensive advertising and knowledge of cost will not influence the patient.

4. Binaural Hearing Aids

These have a definite place, particularly for young school children in the classroom. These aids, which make use of headphones, are placed on the child's desk. Their use eliminates the possible risk of damage to an expensive aid which is always present where large groups of children are together. They are commonly used in special classes for hard of hearing children. They are also used in the testing of preschool children and in their speech training.

5. Effectiveness of Hearing Aids

Under conditions previously outlined, the hearing aid is an effective appliance. Children as young as 3 years have been satisfactorily fitted. In a study done in the United States Navy of 2,216 patients who had been fitted with aids only 6 had such a profound loss that they received no benefit from the aid and the associated training.

**SUMMARY OF SERVICES ACCORDING
Hearing Loss in Decibels as Measured by**

Group in decibels	15 to A	25 to B	35 to C
Extent of disability	Submarginal	Marginal	Modere
Medico-audiologic clinical services indicated	Yes	Yes	Ye
Prognosis from medical treatment (exclusive of nature of and extent of nerve-involvement)	Excellent; normalcy	Excellent: normalcy	Good; moderate
Rehabilitation indicated: Type and nature of procedures	Usually no problem for children over age 9, nor for adults		Hearing aid f
	Pre-primary school group--special attention to language development	Mastery of speech reading	Speech readi
	Primary school group special seating; special language training	Auditory training of residual hearing indicated	Auditory trai residual hear hearing aid
		Speech training	Speech traini indicated
			Regular scho
	Public Health Nursing	Public Health Nursing	Public Healt
			Medical Soci
			Psychothera] indicated
Prognosis from hearing rehabilitation	Elimination of disability	Reduction of disability to negligible state	Reduction o to marginal aided heari or low norm
Follow-up indicated	Yes	Yes	Y
Vocational rehabilitation Indicated	No	No	Depends on aptitudes ar

¹This summary prepared by William G. Hardy, Ph.D., Director, Hearing and Speech Center, Th

3 TO DEGREE OF HEARING LOSS¹

Speech Reception Intelligibility-Threshold

	50	70	85 - plus
	D	E	F
Rate	Severe	Profound	Profound
Res	Yes	Yes	Yes
Rate hearing	Probably improvement; control of progressive	Perhaps slight improvement in threshold; almost certain arresting of progressive symptoms	Preservation of residual hearing
itted	Hearing aid fitted	Hearing aid fitted	Hearing aid fitted if possible
ng	Speech reading	Speech reading	Mastery of speech reading
ning of ing with	Auditory training of residual hearing with hearing aid	Auditory training of residual hearing with hearing aid	Intensive work in acoustic conditioning
ng as	Speech training as indicated	Speech training as indicated	Speech training
ol			
Nursing	Public Health Nursing	Public Health Nursing	Public Health Nursing
al Service	Medical Social Service	Medical Social Service	Medical Social Service
y as	Psychotherapy as indicated	Psychotherapy as indicated	Psychotherapy as indicated
	Special acoustic training for primary and pre-primary school groups	Special acoustic training for primary and pre-primary school groups	
	Regular schools unless contraindicated	Special education	Special education
			No dependence on manual signs
			Failure in use of hearing aid must not be assumed until all efforts to establish some useful sound-patterns have been exhausted
disability rate; in normal l range	Aided hearing within marginal range; good psycho-social adjustment	Aided hearing within moderate-loss range; psycho-social adjustment depends upon mastery of communicative skills	Handicapped individual; nature and extent of handicap depends upon time of onset and duration of loss of behavioral pattern; and success of re-educative measures
s	Yes	Yes	Yes
ocational choice	Yes	Yes	Yes

Johns Hopkins Hospital, Baltimore, Maryland, and modified slightly for use in this publication.

B. Auditory Training

The purpose of auditory training is to enable a person to get the maximum use of the little hearing he has. There is individual variation in adjustment to the hearing aid, the number of hours during the day it is used, and the rate of increased use of the aid. Initially, the young child may wear the aid for about 15 minutes a day to become acquainted with ordinary sounds. The story period before bedtime is a good occasion for the aid regardless of how adequately the young child understands the words. Listening to children's phonograph records for short periods is another good introduction. This is part of the gradual process of becoming acquainted (or re-acquainted) with common sounds and words which normally hearing people take for granted.

Such informal auditory training is usually insufficient for children and a more definitive training program is necessary. Group and individual instruction in the use of the aid relies chiefly on phonograph records, sound discrimination drills and other auditory experiences which gradually become more complicated as group conversations and similar situations are introduced. Adaptation to crowds, such as at movies and schools, is not always easy. The binaural aid may be preferable in school at this introductory period since it is used only in the relative quiet of the classroom. The rate of acceptance of increasingly complicated sound experiences and proficiency in speech discrimination is variable and in all instances is a graduated learning process. To attain maximum progress in communication, the patient is introduced to the elements of speech (lip) reading during the period of auditory training. This dual development of auditory and speech reading skills is by all means the most effective way to develop communicative skills.

C. Speech Reading

This is a more literal term than lip reading since not only the lips but the whole facial expression is read. Most people who need hearing aids also need to be expert speech readers as hearing is both auditory and visual. The hearing aid and speech reading therefore supplement one another. Many hard of hearing people who need hearing aids try to get by with speech reading without hearing aids. It cannot be a substitute, however, since only about one third of the speech sounds are visible.

Children usually learn speech reading rapidly and with much greater facility than adults. Children who receive instruction in speech reading and auditory training at the same time progress

more rapidly than when such training is given separately. The mastery of speech reading may take more than one year and, therefore, proficiency cannot be acquired during the relatively short period when it is taught together with auditory training. For this reason, only a beginning in speech reading can be made in the clinical setting and it must be continued in the child's school curriculum by a speech reading teacher. Also, recognition must be given to the needs of preschool children which can be met through the organization of nursery school classes.

D. Speech Training

Children who have never learned speech or who speak very poorly need training in speech. Usually this is a prolonged and painstaking task, requiring the services of teachers trained in working with this group of children.

Older children who have developed hearing impairment following the development of acceptable speech may find their speech gradually deteriorating. Speech training is therefore necessary for this group also, both for prevention of faulty speech habits as well as for treatment.

The correction of faulty speech patterns is much more readily accomplished than teaching children to speak who have never learned to talk. As in the case of the child who has not learned speech, use is made of what residual hearing there is, as well as the visual and tactile senses. The use of records and "play-back" technique has greatly aided speech training. The "play-back" not only records the current speech habits of the patient, but enables him to compare his own speech with the normal, and to recognize the progress being made. Such equipment is requisite in hearing programs.

E. Social Services

Attention to the child's adjustment to moderate or profound hearing loss involves attention to his social situation, to his place as a member of his family and of his community. Problems of inadequate home conditions, economic pressure, strained family relationships and tensions affect the child with a communicative disorder as they do other children and need to be met in order to hasten and improve his adjustment. The child's ability to make an effective adjustment to his handicap is frequently dependent upon his personality, his environment, and the attitude of his parents. Both the child and his family must be enabled

to express their feelings so that misunderstandings, fears, and anxiety may be dealt with whenever possible so as not to retard the adjustment to the handicap.

All professional personnel concerned with the care of the child should be aware of these social and emotional problems and helpful in so far as possible in meeting them. Of particular significance is the availability of social casework services directed toward understanding and treating such problems of the child and his family as well as any resistance to carrying out medical recommendations. Since the child with this kind of handicap is often isolated from other people, special consideration must be given to help him in his relationship with them, particularly in his adjustment to other children.

Both social casework and social group work services offered by various community agencies can be drawn upon for this purpose. Of particular importance is the help that needs to be given to the family in their understanding and emotional acceptance of the child and in their ability to assist him in achieving maximum satisfaction as a person and as a member of society.



Part 2

Administration of Program

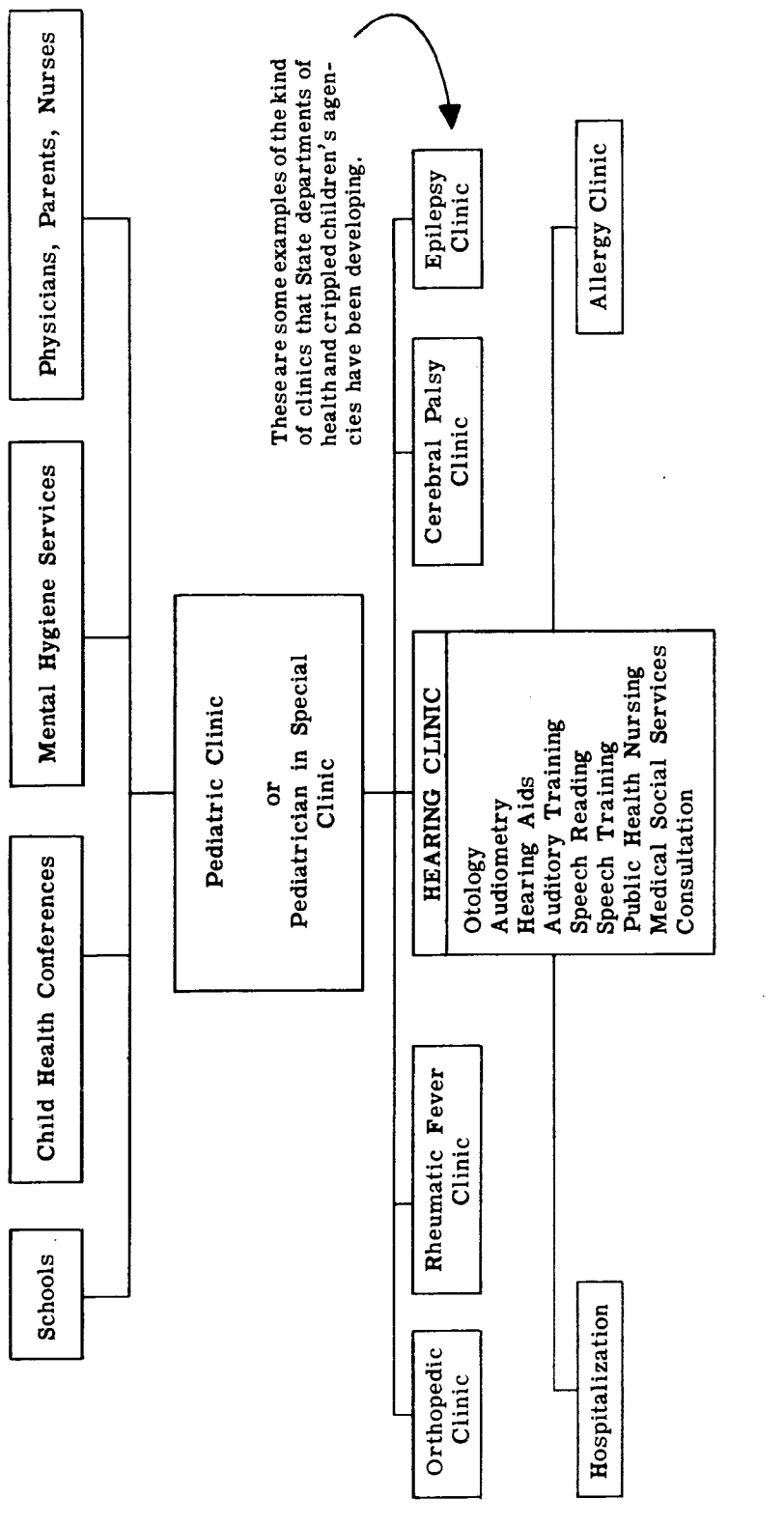
ORGANIZATION OF SERVICES

Pediatric supervision is essential in any special program of services for children. The multiplication of special clinics in an increasing number of State crippled children's and maternal and child health programs makes it necessary to reconsider the organization of clinical services so that such supervision can be provided. A large number of children are referred to the hearing conservation program from the schools where they may have had only a medical screening examination or none at all. The flow chart, on page 16, indicates a satisfactory method for referral of patients to various services.

The best device for appraising the child as a whole rather than his several component parts only, is through the establishment of the pediatric clinic. As in most teaching hospital out-patient departments, children should be first referred to the pediatric clinic and from there referral can be made to any of the special clinics. This also affords opportunity for referral back to the pediatric clinic as occasion may require. Such pediatric clinics are now in operation in several States and the experiences with them have been very good. Where there are no pediatric clinics, pediatric supervision can be provided by having a pediatrician in the special clinic.

Because of the specialized technical skills required, it is desirable that a hearing conservation center be established in association with a teaching hospital with subsidiary clinics located in various parts of the State. It is dubious that such a

FLOW CHART OF HEARING AND RELATED SERVICES



center should be established only for children. However, the special problems that hard of hearing children present make it essential that the staff have a definite interest and experience in working with children.

The technical nature of this program places an important responsibility on the health department to insure good teamwork. Much of this responsibility falls upon the audiologist or conservation of hearing specialist for developing the technical aspects of the program in association with the pediatrician, otologist, and maternal and child health or crippled children's director, for providing consultation services to staff members and school personnel, and for providing direct services.

The knowledge the health department staff has of the health and social needs of the family will contribute to planning for the specific needs of the hard of hearing child. This planning can be made effective to the degree to which it is related to the needs and plans for other family members. The public health nurse is in a strategic position to participate in this through her recognition of these factors and her assistance in interpreting recommendations for the child to parents, teachers, and others.

The medical social consultant may provide consultation services to staff members of the health department in meeting the social needs of children. For some children direct casework services may be needed and can be offered by the medical social consultant or provided by a community agency.

The American Academy of Ophthalmology and Otolaryngology¹ recommends that school health programs make provision for the services of an otologist to examine the children who fail to pass the hearing test. Such examination should be made in the presence of a parent of the child.

Speech reading is included in the conservation of hearing service, although primarily it is an educational function. Clinically, the child should be introduced to speech reading during the period of auditory training. In many counties the departments of education make no provision for speech reading teachers and the most important group, the preschool children, usually are not admitted to the services of the education department. In such instances, the health agency should provide speech reading services directly, pending the provision of the services by the education department as part of the child's school curriculum.

Since at least 5 percent of children coming to a hearing clinic have allergies which may be a contributing factor, an allergy service is indicated. In the flow chart, the allergy service is shown as part of the hearing program which might be developed

¹ Syllabus of Audiometric Procedures in the Administration of a Program for the Conservation of Hearing of School Children. American Academy of Ophthalmology and Otolaryngology, 100 First Ave., Bldg., Rochester, Minn. 1945. 28 pp.

as a major special clinic comparable to rheumatic fever, or might be carried in the pediatric clinic or, in urban centers, might be provided through an existing facility.

CASE FINDING

A. Schools

1. Periodic Screening Tests²

Audiometer testing is most effective when done by audiometer technicians. Their work is more effective in screening children than when done by teachers or nurses who have other responsibilities. Moreover it is a waste of nursing time for nurses to do the test since this job could not be regarded as being nursing.

The most effective case finding method currently in use is the periodic screening of children in the schools. The frequency of such testing considered minimal is every third year, i.e., first, third, fifth grades are tested annually.

An alternative minimal frequency is testing the whole school every third year. This may save time as it concentrates the work in one third of the schools each year, but its important disadvantage is that one third of the entering pupils would not be tested until their second year and one third not until their third year.

It will often be found that the best timing of screening is that which makes the fullest and best use of facilities available locally--administrative and technical.

Up to 40 children can be tested in 30 minutes under good conditions with the group phonograph audiometer and about the same number with the sweep frequency test. Including time for setting up the service, retesting, and discussion, about 100 to 150 children can be tested daily in a school.

2. Criteria for Further Study

a. Group Phonograph Test--Children who have a loss of 9 or more decibels in one ear by two tests should have a complete pure tone test.

b. Sweep Frequency Test--Children who have a loss of 15 decibels for two or more tones should have a complete pure tone test.

²The Syllabus of the American Academy of Ophthalmology and Otolaryngology was used as source of Periodic Screening Test and Criteria for Further Study.

c. **Pure Tone Test**--Children who have a loss in the better ear of 20 decibels or more for two or more tones should be referred to the otologist.

3. **Teacher - Nurse Referral**

Children should be tested at any time if a hearing loss is suspected. Indications may include behavior problems, inability to keep up with the work, speech defects, cerebral palsy, apparent inattentiveness, or obvious indication of hearing impairment. For children in this group it is usually neither practical nor desirable to wait for the periodic visit of the audiometer technician, but rather a direct referral to the hearing center for a pure tone test should be made.

Teacher observation alone has been shown to be considerably less satisfactory than audiometer screening and, therefore, should not be considered a substitute for periodic testing.

B. Physicians

Referrals by physicians constitute a large source of case finding. In rural areas many children so referred may have potential rather than actual hearing impairment since all types of nose and throat pathology are found among the reasons for the referral to the hearing center according to current experiences. A major function of centers now in operation is the provision of consultation services to practicing physicians.

C. Reports of Communicable Diseases

Some programs offer audiometric tests routinely to children who have recently had measles, scarlet fever, meningitis, mumps, or diphtheria.

D. Public Health Nurses

In addition to opportunities for case finding in the previously named sources in which public health nurses may participate, nurses are a major source of referral of preschool children and others encountered in their regular nursing duties.

E. Parents

Referral directly by parents is common, particularly for preschool children who show delayed speech development.

F. Other Agencies

Welfare departments, nursery schools, schools for the deaf, other medical programs, etc.

CLINICAL SERVICES

These are discussed in Part I under Evaluation of Hearing Loss, Treatment of Hearing Loss, and Adjustment to Handicap.

PERSONNEL

Pediatrician,

Otologist,

Conservation of hearing specialist,

Audiometer technician,

Public health nurse,

Pediatric nursing consultant,

Medical social consultant,

Consultants - psychiatry, vocational guidance, etc.

Qualifications--Inasmuch as audiology is a new field, qualification standards cannot be expected to be as definite as in the other professions. The situation is somewhat complicated by the fact that audiometry technicians and speech teachers have

been employed for years, chiefly in educational settings where treatment has not occupied the prominent role now possible in clinical audiology. The principal current resource material is from the United States Civil Service Commission, and the American Speech and Hearing Association.

A. Audiologist

This term is used for the well trained and experienced specialist who is qualified to head up the non-medical technical components of the hearing program. (It is not expected that many physicians will become audiologists, although there are a few.) His duties include consultation, teaching, and direct services (depending on the development of the program and number of technicians).

Qualifications--These include completion of requirements for a doctorate in audiology and 2 years experience in an organized audiology program.

B. Conservation of Hearing Specialist

Obviously, it would be impossible to require the qualifications of the audiologist for all States. The courses currently available in the universities are designed principally to meet the requirements for clinical membership in the American Speech and Hearing Association.

Qualifications (Two grades):

A bachelor's degree in speech and hearing including 200 clock hours of clinical training and a year's experience.

A master's degree in speech and hearing including 200 clock hours of clinical training and a year's experience.

The requirements for clinical membership in the American Speech and Hearing Association are:

A total of 18 semester hour credits distributed among phonetics, anatomy, physiology and physics of voice, speech pathology, correction, therapy, clinical and laboratory methods, research.

A total of 12 semester hour credits distributed in various allied fields exclusive of the speech arts.

A total of 200 clock hours of basic clinical training.

One year of internship or employment experience.

Bachelor's degree.

C. Audiometer Technician

For group or individual audiometer testing, many clinics train their own technicians, or technicians may take a short course in testing at a university. A bachelor's degree is considered desirable, although this is not universal. The extent to which audiometrists are licensed is not known. In California, audiometrists are licensed by the State Board of Health upon the completion of an acceptable course. This, however, is probably unique.

D. Otologist

The otologist should meet the requirements for certification by his specialty board and preferably be interested in problems of hearing

NOTES

In the determination of a State-wide county program of medico-audiologic treatment and training, it would be helpful to think in terms of specific categories that relate to the individual's behavior: (1) the congenitally affected child; (2) the child whose hearing loss develops prior to the establishment of a normal language pattern; (3) the child whose hearing loss develops after the establishment of a normal language pattern; (4) the adult who is congenitally deaf; (5) the hard of hearing adult whose hearing loss is relatively recent; (6) the adult whose hearing loss is basically an old-age development.

The primary requisite for the hard of hearing or deaf child is the development of a sound-pattern to whatever extent is possible. In these terms, the use of amplification for auditory conditioning is never contraindicated, except insofar as extensive diagnostic testing can demonstrate no useful hearing residuum. A hearing residuum is useful if any significant auditory response can be demonstrated, even though it be only a sense of linguistic rhythm.

A hearing aid must not be purchased like a household gadget; it should be fitted to the needs of the individual, and the aid of choice should be determined by exhaustive objective tests of the aided speech-hearing function.

Status and progress in hearing rehabilitation is largely determined by the intelligence of the individual, and, so far as the adult is concerned, by his motivation. Hearing rehabilitation is fundamentally concerned with teaching the individual the use of communicative skills necessary for him to compensate for his communicative disorder. Because of the nature of the hearing function and its relation to the language function, hearing rehabilitation is also concerned with the psycho-social adjustment of the individual.

REFERENCES

Hearing and Deafness.

Hallowell Davis. Murray Hill Books, Inc. New York. 1947.
471 pp.

**Fundamentals in the Treatment of Communicative Disorders
Caused by Hearing Disability, Parts I and II.**

Miriam Pauls and William G. Hardy. Journal of Speech and
Hearing Disorders, 12:35-43; 97-105. March 1948 and June
1948.

Hearing Handicaps in Children of Today.

Ruth Guildler. New England Journal of Medicine. 227:619-624.
Oct. 1942.

What Can One Do For the Hard of Hearing.

JAMA 137:1121-1127. July 24, 1948.

Rehabilitating the Hard of Hearing Child.

Dorothy Sutherland and Maxine Miller. The Child, 9:51-56.
Oct. 1944.

**The Relations Between Impaired Hearing and Pseudo-Feeble-
mindedness.**

William G. Hardy, The Nervous Child, 7:432-445. Oct. 1948.

Instructions for Conducting Audiometer Tests.

Warren H. Gardner. American Society for the Hard of Hearing.
Wash., D. C. 1940. 22 pp.

The Massachusetts Hearing Test.

P. W. Johnston. Journal of the Acoustical Society of America.
20:697-703. Sept. 1948.

Deafness and the Deaf in the United States.

H. Best. The Macmillan Company. 1943. 675 pp.

The Hard of Hearing and the Deaf, A Digest of State Laws.

U. S Government Printing Office. 1943. 119 pp.

Learning to Use Hearing Aids, A Study of Factors Influencing
the Decision of Children to Wear Hearing Aids.

Arthur I. Gates and Rose E. Kushner. Bureau of Publications,
Teachers College, Columbia University, New York. 1946.
62 pp.

Principal journals in this field are:

Journal of Speech and Hearing Disorders

Hearing News

Journal of Exceptional Children