Malcolm Wiener Center for Social Policy

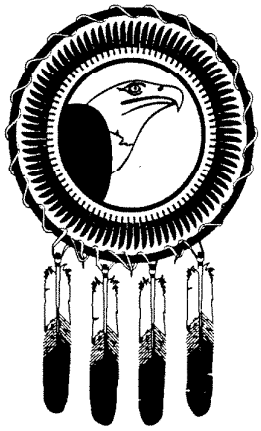
"Nodin Kaja Nodik Megasee" (Hear Like An Eagle) Hearing Health for White Earth Reservation

by

Paul Cameron

PRS 98-23

May 1998



Harvard Project on
American Indian Economic Development

John F. Kennedy School of Government
Harvard University

INDEX

My principle advisor for this project was Helen Klassen. Ken Litzau and Margaret Thunder Bird of Circle of Life and Pine Point Schools respectively, also provided significant insight as did other tribal members and service providers at White Earth.

This report could not have been written without the welcome and insight provided these committed people.

WHITE EARTH HEARING SERVICES - EXECUTIVE SUMMARY

This report addresses a number of initiatives, relating to hearing health, that the White Earth Tribal Council may wish to implement. These proposals were developed to build on the programs, skills and equipment already in place at White Earth. Rather than requiring major financial undertakings, these proposals present opportunities for White Earth Tribal Council to continue to expand the number of areas in which Ojibwe National sovereignty is being exercised.

It is also hoped that these proposals can be built into programs that will present valuable models for other Native American Nations. The programs are not intended to be merely as good as programs in surrounding towns, but rather, by being Tribally controlled and culturally sensitive, to provide higher quality, more integrated services than are available elsewhere..

The five proposals cover issues relating to the hearing health of infants, school aged children and the elders of the community, specifically:

Establishing a program of universal infant hearing screening for all new borns on the reservation.

Establishing annual hearing screening at both schools

Trialing Sound field Amplification devices to help the children with chronic middle ear problems and other learning difficulties

Reviewing the availability of hearing services for Elders on the Reservation

Developing a Hearing Awareness campaign, tailored for Native Americans

This report sets out a basis on which the Tribal Council can consider the appropriateness of each the above programs and then suggests steps that could be followed if the Council wished to implement them.

HEARING HEALTH OPTIONS AT WHITE EARTH RESERVATION

Universal Infant Screening Program

School Hearing Screening Program

Soundfield Amplification

Hearing Services for Elders

Hearing Awareness Campaign

About the Author:

I am an audiologist from Australia where I have worked for Australian Hearing Services (AHS) for the last 18 years. AHS is the Australian Government's program for providing hearing aids and audiological care to all children and pensioners. My wife, two sons and I are spending a year in the USA, while my wife does a post-doctoral fellowship and I take care of the boys. The most valuable part of my stay in the US been the time spent with the students and staff of the Native American Program at Harvard. I have learnt a lot from this community.

Part of my role at AHS has been to work with Aboriginal communities on the range of hearing problems that they confront. A number of programs have been implemented over the last 15 years. These programs have met with some success and some failure, but have left both the Aboriginal communities and AHS staff often feeling that the programs themselves were often flawed in some fundamental way. The insight from the Nation Building course at Harvard is that perhaps this flaw is that the programs, even though they may have been culturally sensitive and locally supported, were not linked to the fundamental priority of indigenous sovereignty.

In this report, I have attempted to bring together issues that are the front edge of audiological practice and link them specifically to the issue of helping build Native American sovereignty.

The title of this report relates to my experiences at the White Earth Reservation. While I was there, an Eagle flew across my path on two separate occasions. Once he was being harassed by crows, until my presence worried the crows and they left him in peace. The second time an eagle flew slowly in front of me, leading me to where he and his mate were building a nest. I hope the proposals in the report reflect his blessing.

Paul Cameron

I would like to thank **John Solan,** an audiologist from the Indian Health Service and **Grace and Stadler Instruments** in New Hampshire for the loan of their equipment. This was arranged without even face to face meetings, simply on the basis that the audiology community in the US is keen to help the Native American Nations in anyway it can.

Without the direct support of **Professor David Potter** this project would not have been possible. Thanks a lot David.

BOOK 1

Universal Infant Hearing Screening

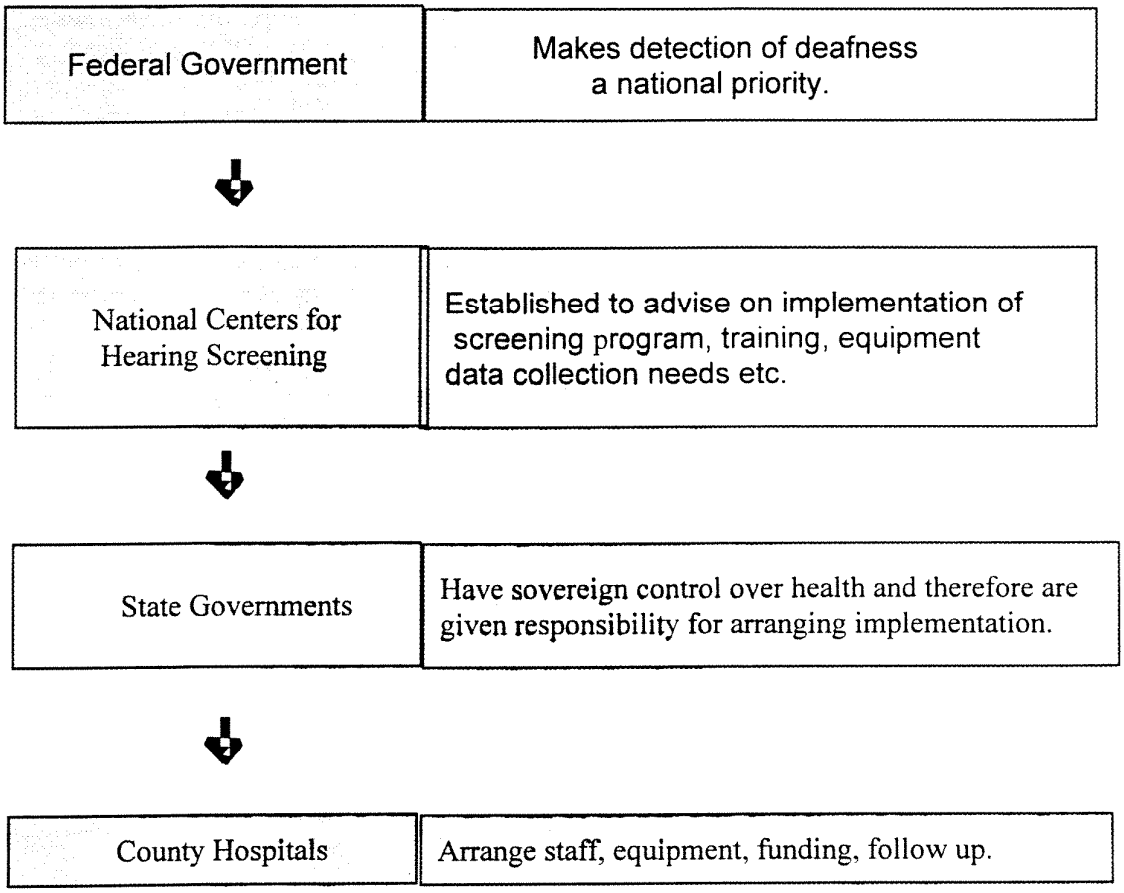
UNIVERSAL INFANT HEARING SCREENING

Across North American, about 3 infants in every 1000 are born with significant hearing loss. Unfortunately, this often goes undetected and these children can be mistakenly thought to have learning difficulties as their speech is very slow to develop. In fact the average age of detection of deafness in the US is 2 years and 3 months.

This is not a problem specific to Native American Nations, it does however effect these communities at least as much as the rest of the US population. There has been instances of this kind of delay in detection at White Earth, for example, one child with a moderate hearing loss was not diagnosed until screened by the Head Start Program at age three and a half.

The Federal government is attempting to reduce the age of detection to below 6 months. This is now possible because new technology is available to make the testing of infants simple, reliable and relatively inexpensive.

The Federal Government Universal Infant Screening Initiative works in this way:



MAKING USE OF TRIBAL SOVEREIGNTY

The outlined Federal model for implementing the infant screening program **fails to specify a role for Native American Nations.** It assumes that Native American infants will be assisted by the program when hospitals in their area become involved. These infants and their families would then be involved in a program that was designed to best meet the overall Statewide needs as defined by the State Government. It may well be that the Tribal Council would find such a program fails to meet the specific needs of the Ojibwe Nation.

Given this possibility, **the White Earth Tribal Council could choose to step into this program at effectively the same point that the States are involved**. The Tribe could take up its sovereign control over this health issue and liaise directly with the Federal Government's National Centers for Hearing Screening.

The staff at the Marion Downs Center for Infant Hearing Screening in Colorado and those at the National Center for Hearing Assessment and Management in Utah have expressed an interest in working directly with a Native American Nation on these issues. These two groups have a wealth of experience on setting up hearing screening programs and would be able to answer any of the council's enquires. The Tribal council with advice and assistance from these bodies, could design a Universal Infant Screening Program that best meets the needs of White Earth.

A Tribally controlled and designed program could differ significantly from that put in place by the State Government. The State Government programs are largely hospital based, a White Earth program could be based on testing done at home, as the equipment is highly portable. The State Government program users hospital staff or volunteers for the testing, a White Earth program could use a Tribal member who is trained as a nurse practioner. This would enable the testing to be linked to other more general support and advice to the new parents. A further problem with State Government's process is that of having hospitals volunteer to become involved. This means that it may take a number of years before the program would reached White Earth. The program set up by the Council could start almost immediately.

The White Earth Tribal Council could play the same role that the State governments are given in the Federal Government's Universal Infant Hearing Screening implementation plan.

UNIVERSAL INFANT HEARING SCREENING PROGRAM
(A nationwide program to diagnose deafness as soon as possible.)

ISSUES

Early diagnosis is the key first step in caring for children born with hearing loss,

17 States involved including Minnesota.

White Earth Tribal Council has the opportunity to exercise sovereignty and take on the role given to State Governments.

No other Native American Nation has taken on this role.

White Earth could create a program that would be far better than Minnesota will be able to design for Statewide implementation.

White Earth program would be able to be used as a model by other Native American Nations

Relationship with Minnesota's Program

In establishing an Ojibwe program for Infant screening, the White Earth Tribal Council could still make use of any support that might be available from the State Government. Minnesota is one of the 17 States that has chosen to be involved in the Universal Infant Screening program. Their approach is to slowly increase the number of hospital regions in the program, by having the hospitals volunteer to be involved and not to directly fund the program but rely instead to on third party funders. The staff from the Minnesota Department of Health involved in this process are another useful resource, if White Earth chose to take this independent path.

The staff at the Minnesota Department of Health would be able to advise on such issues as:

- Co-ordinating with the State wide program
- Gathering data on screening tests
- Ensuring adequate follow up and intervention
- Third party funding options.

The wealth of material these bodies have relating to this topic should provide a sound basis for the Tribal Council's decision on whether to set up such a program at White Earth. A key issue that these bodies will need to be addressed is funding.

The White Earth Tribal Council could liaise with :

-the Marion Downs National Centers for Infant Hearing Screening

-the National Center for Hearing Assessment and Management

-the Minnesota Department of Health

-the local Indian Health Service clinic

Obstacles:

Equipment Cost

Staff and Training Costs

Equipment Cost

The devices required for this testing cost between $8,000 and $15,000 per year. They are Automatic Auditory Brainstem Response (ABR) units or OtoAcoustic Emission (OAE) machines.

Staff and Training

These devices do not need audiologists or other professionals to do the actual testing, however the persons employed to do the testing clearly need to be funded and trained.

Solutions

The University of Minnesota is currently setting up a long-term study into chronic otitis media in children with the support of the White Earth Tribal Council. This program will train and fund a person to use an OAE machine over the next 3 years. Both the equipment and trained personnel will therefore be available at White Earth.

White Earth Council could also seek support from the IHS clinic for this program by requesting that the IHS audiologist play a support role for the program as the Council finds necessary.

There would be little cost in setting up the Universal Infant Hearing Screening at White Earth, as other programs are already providing the required:

- Equipment
- Staff
- Training

POSSIBLE MODEL FOR WHITE EARTH'S UNIVERSAL INFANT HEARING SCREENING PROGRAM

In setting up such a program the White Earth Council would be establishing a model that other Native American Nations may wish to follow. It is likely that the details of such a program would be different from those setup by the Minnesota Department of Health or other States as the model program should reflect Ojibwe needs and values. Careful consideration would be given to developing such a program in a way that reflects the Ojibwe culture, the suggestions below are only intended to show how different such a program might be from that created by the State Government.

OUTLINE OF A POSSIBLE WHITE EARTH UNIVERSAL SCREENING PROGRAM

Families are informed about the Screening program prior to the birth.
(Typically, it is simply presented, after a birth, as one of the tests hospital has to do.)

Testing is done at the family's home within 2 weeks of birth. This is possible as the equipment is easily transported.
(Typically, testing is done in hospitals)

Testing is done by a tribal member. An audiologist is not required and a member of the tribe is likely to be most sensitive to the family's needs.
(Typically, hospital nursing staff or volunteers are used)

The OtoAcoustic Emissions (OAE) test itself involves a small plug being held to the baby's ear and takes only about one minute.

Parents of children who pass (the vast majority) have an opportunity to discuss other issues with the tester, making a person with nurse practioner type skills a useful choice for the tester.
(This is lacking in the hospital based model)

Parents of children who fail can have appointments immediately arranged with the IHS audiologist.

Children who are diagnosed as having a hearing loss, then can receive the help they need with the full involvement of the family and in a manner that is co-ordinated with other assistance they may require.

This would be a better program for White Earth's families than the State Government can create.

STEPS TO CONSIDER AND IMPLEMENT SUCH AN UNIVERSAL INFANT SCREENING PROGRAM AT WHITE EARTH.

1. Contact the Marion Downs Center for Childhood Hearing .
   Person Vickie Thomson
   Number 303 402 6283
   Address 4200 E 9th Ave, Campus Box B210, Denver, CO, 82262
   Email www.colorado.edu/cdss/mdnc/staff.html

2. Contact the National Center for Hearing Assessment and Management
   Person Susan Friedman
   Number 435 797 3589
   Address Utah State University UMC 2880 , Logan UT , 84322
   Email Susanf@fs1.ed.usu.edu

The Council would be able to discuss the significance of the program, obtain materials about the options for implementation and advice about issues such as keeping track of data and Federal policies.

The background information available from this group should provide sufficient detail for the Council to be able to decide whether further action in this area is warranted.

3. Contact the Minnesota Department of Health

Person : Pat Rice
Number 507 332-5481
Address 615 Olof Hansen Dr., PO Box 308
Email pat.rice@health.state.mn.us

Pat Rice would be able to advise about support available within Minnesota, third party funding issues, the Advisory Committee that has been set up to oversee this program in Minnesota, the options that they see for Native American Nations setting up programs and ways of linking White Earth's program to any activity in other parts of Northern Minnesota.

4. Contact IHS
Person : John Solan (audiologist)
Number 218 679 3341
Address Indian Health Services Clinic, PO Box 550, Red Lake MN, 56671

John would be the person to whom infants that failed were referred and would need to be working closely with the screening program staff.

5. Contact Minnesota University

Person	Prof Kathleen Daley
Number	612 625-5491
Address	Box 396, 420 Delaware St, S.E. Minneapolis, MN 55455
Email	knoxx001@maroon.tc.umn.edu

White Earth would need to tie this program into the requirements of the Otitis Media Study to ensure the availability of the equipment and staff.

6. Form White Earth Advisory Committee for Infant Screening

Based on the outcomes of the above contacts, the Council is likely to need to co-ordinate the screening program through a committee that it could create by inviting key players such as IHS, Minnesota University and parents of hearing impaired children to suggest a representative.

BOOK 2

School Hearing Screening Programs

SCHOOL HEARING SCREENING PROGRAMS AT WHITE EARTH

Establishing Ojibwe sovereignty over the education of the Tribe's children is clearly a major concern for the White Earth Tribal Council. The two schools, *Circle of Life* and *Pine Point* which the Tribe controls, aim to demonstrate the benefits of having an education system that is :

- closely tied to the cultural roots of the Ojibwe Nation

- fully involved in community life at White Earth

- supportive of all the children's needs

- providing high quality learning outcomes

The Tribally controlled schools need to show that they are a better option for children of the Ojibwe Nation. They need to be able to be seen to be providing higher quality learning experiences they can be achieved by other schools and producing graduates who are ready to help build the Ojibwe Nation.

A number of issues make the successful development of these schools difficult:

- the long history of education being used against the interests of Native America

- the frequently negative experiences in school of the parents of the current generation of children

- the preference of some parents for the state controlled schools

- the financial constraints that all schools suffer.

A key issue in education is ensuring that all children in class are adequately prepared for learning. This leads to a broad range of activities from the provision of school lunches to screenings that ensure hearing and vision are not limiting a child's performance. As with everything else the Tribally controlled schools do, the way they ensure that hearing loss is not impairing a child's ability to learn can be done better than it is done elsewhere.

Circle of Life and Pine Point are keen to find ways of giving the families positive experiences at the schools .

HEARING PROBLEMS OR SCHOOL AGED CHILDREN

Classrooms present difficult hearing situations for children. They are amongst a group of sometimes noisy classmates and are confronting the challenge of learning to read. This requires the child to be able to make fine discriminations such as between a teacher saying "chip" and "ship", while other children maybe talking nearby.

This difficult situation means that even minor hearing problems, that had no noticeable impact on these children during their preschool years, can cause significant impact during the first years of schooling.

For this reason various bodies, including the Minnesota Education Department, recommends children have their hearing tested in grades Kinder, 1, 2, 3, 7 and 11.

The hearing problems that commonly go undetected before school include:

Unilateral hearing loss, this is where one ear is normal but the other ear has a significant loss. In classroom this presents as a problem when the teacher is speaking on the side where the child has poor hearing. Studies have found that when left undetected up to 25% of these children fail one year level.

Mild high frequency hearing loss, this is a hearing loss that only effects high pitched sounds. In quiet situations children with this type of hearing problem usually present as having no difficulty. When there is significant back ground noise however the children perform as having a significant hearing loss.

Fluctuating conductive hearing loss, this is a problem that is caused by middle ear infections that may occur 3 or 4 times a year in some children. These infections are called Chronic Suppurative Otitis Media (CSOM) and seem to be caused by a complex mix of factors. Children with this problem face great difficulty in school as sometimes their hearing is normal but at other times, following an infection, their hearing can be very poor. **Studies done across the US have found 10% to 25% of all 5 and 6 year olds suffer this problem!** These children frequently have great trouble with reading and this impacts on the rest of their schooling.

Current Screening Programs at White Earth

The school hearing screening programs have to be designed to detect any of the above range of problems. Fortunately at White Earth, a number of children with hearing problems will have already been identified by the other programs that are in place.

Current Hearing Screening Services at White Earth Reservation

- Head Start Program Screens all children as part of overall medical

- Circle of Life School Screens Elementary children each year.

Standard Screening Programs

Typically the logic behind screening programs in schools is to quickly check as many children as possible, identify those with a possible problem and then focus further support and effort on those children. These programs therefore use the simplest possible equipment and only involve the parents if there is a problem found.

School hearing screening programs typically are based on:

- children being quickly checked for hearing levels at school

- if a problem is found, the parents are informed in writing

- follow up testing or medical referral is recommended

- teachers are given information about the problem separately from the parents

Creating a Model School Screening Program for White Earth

A culturally appropriate model for hearing screening at White Earth's Tribally controlled schools should be developed locally and only after consultation with those most closely involved, the schools, parents and children. However to point to the range of issues that might be considered a possible model is described below.

The issues that would be included in developing a model screening program would include:

- culturally sensitivity

- seeking information from the parents about any history of previous middle ear or hearing problems

- assessment of middle ear function

- ensuring that actions relating to any hearing problem are linked to the child's overall educational program

- using appropriately trained clinicians
  (This would require discussions with the Speech and Language Therapists at Head Start, the audiologist at IHS and the visiting Speech and Language Therapist at the Circle of Life School)

- involving the parents and teachers as partners in dealing with any problems discovered during testing

POSSIBLE MODEL FOR SCHOOL HEARING SCREENING AT WHITE EARTH

Parents would be informed at enrolment that children will be screened for problems that may effect their school performance

Hearing screening appointments would be offered to parents so that a time can be found when parents can come to school to be present for their child's hearing test.

Hearing screening would take 15 minutes and involve:

- parents being asked about child's history of middle ear problems
- otoscopic check (looking at eardrum for evidence of past infections
- audiometry (screening to 15 dB)
- tympanometry (a check of the state of the middle ear)

Parents and teachers would then be advised about the child's hearing, so that everyone was aware of the implications of the results.

Any referrals or other inventions would be discussed with the parents prior to action being taken.

The Tribal Council should ensure that parents are aware that this is a Tribal initiative. The Screening Program could perhaps be given a name that makes clear it is being done on behalf of White earth Tribal Council, not IHS or the Minnesota Health Department.

OBSTACLES

Staffing

Parent's ability to attend

Equipment

SOLUTIONS

Staff from both the Head Start Unit, Circle of Life and IHS have the skills required to undertake this program. It is likely that all of the above could be involved at no additional cost to the Tribal council. This approach would require more time from the clinicians but that time would be used more efficiently.

Parents may need extra support to be able to attend. This may include child care for their other children and appointments outside normal school hours.

Equipment already exists at White Earth for this screening program. IHS has proved to be ready to loan their equipment for such screening programs..

REASONS TO ADOPT SCHOOL SCREENING PROGRAM

Shows Tribal intention to have the best schools

A positive interaction for parents at school.

Younger children have high rates of middle ear infection

Older children risk excessive noise exposure

LINKS TO OTHER PROGRAMS CURRENTLY ADDRESSING CHRONIC OTITIS MEDIA AT WHITE EARTH

The establishment of the School based hearing screening programs should be seen as a further development of programs already underway at White Earth. There could be useful sharing of resources and information between the various programs.

Minnesota University White Ear Little Ears Study

A study is underway in conjunction with Minnesota University to track the development of middle ear problems in infants and to pin point environmental causes of this problem. Their key finding that 48% of the preschool children they tested had frequent middle ear infections points to the scale of the problem at White Earth.

The long term hope for this study is that it would lead to a reduction in the number of children suffering chronic middle ear problems.

Head Start

The staff in the Head Start program performs annual screening on all their children for hearing problems as part of their medical examination. Information from these tests are passed onto the schools if children are found to have problems.

Circle of Life School

Annual hearing screenings on Elementary children as part of the program run by their visiting Speech Therapist.

IHS Clinic

All families can attend the IHS clinic if they are concerned about their children having hearing problems or middle ear infections. A significant number of children have their problem identified by their parents in the first instance. Unfortunately, not all children with these problems present with obvious symptoms.

INDIAN HEALTH SERVICE ROLE

The IHS has for 25 years been conducting nationwide screening programs for middle ear problems as they considered it a major health problem in Native American Nations. **Their recent published material points to the success of these Nations in reducing the rate of middle ear infection to about the rate of other North American communities.**

However, this is hardly a reason for reducing activity in this area however, as the problem in the general North American community is considered to be such a concern that significant research effort is going into the development of vaccines and the provision of Soundfield Amplification devices in classrooms to combat the effects of middle ear disease.

There is in fact a call from the American Speech and Hearing Association (ASHA) for all classrooms to have access to Sound Field Amplification equipment by the year 2005.

IHS has treated chronic middle ear disease as a priority for 20 years. While, as their data suggests the rate of this problem may well have declined across Native American Nations, the individual children who are still effected suffer considerable difficulty.

SCREENING PROGRAM RESULTS

The results below are combination of the results of screening tests carried out by Jeff Shoemaker at the Circle of Life School and myself at Pine Point.

Jeff Shoemaker's testing is done near the beginning of the school year. My testing was carried out in Early May. Middle ear problems are linked to the cold and flu cycle and so are most common during late mid and late winter. The timing of the tests done both by Jeff and myself are therefore not reflective of the rate of middle ear problems during the worst part of the year. For this reason some screening programs recommend that as well as testing children when they commence school further screening should be undertaken during the peak cold and flu season.

The screenings tests I undertook included tympnaometry, audiometry and otoscopic examination. This was an attempt to establish the clearest possible picture of the hearing health of the children at the schools.

> Tympanometry : This test is used to assess the state of middle ear and can help determine the cause of a child's hearing loss such as middle ear infection.
>
> Audiometry: Children are screened to see whether they can hear sounds at 20 decibels. Many studies have shown that if a child's hearing is worse than this, they will have difficulty hearing in class.
>
> Otoscopic Inspection: looking for scarring or other abnormalities on the eardrum. This can reflect earlier bouts of middle ear infections that are no longer effecting the child's hearing.

Overall the Screening Results:

Results were available for 131 children.

(30 from High School, 101 between Kinder and Grade 6.)

105 children passed

26 children had some problem.

DETAILS FOR CHILDREN WHO FAILED THE SCREENING

- 2 children had previously diagnosed sensorineural hearing loss.

- 3 children (10% of the students from High School) had slight hearing loss consistent with excessive noise exposure.

- 13 children (13% of Elementary students) had both some degree of hearing loss and abnormal tympanometry consistent with fluctuating middle ear problems.

- 8 children (8 % of Elementary students) had normal hearing on the screening test but scarring consistent with previous middle ear problems. (Including one child who had recently had grommet tubes inserted in her eardrums to prevent further middle ear problems)

Summary

1) These results are consistent with the IHS finding that Chronic Suppurative Otitis Media (CSOM) is present in Native American communities at rates that are similar to those of the rest of the USA.

   However, the high number of children with evidence of earlier middle problems suggests that at other times of the year the rate may be as high 21% of elementary aged children.

2) The individual children who are effected need to be given appropriate assistance. Both schools have relatively small class sizes and this is a significant advantage to children with fluctuating conductive hearing loss. These children would however benefit from the Sound Field Amplification systems.

3) The 3 older students with evidence of hearing loss from excessive noise exposure point to the need for increased hearing awareness among this age group. Whether the source of this noise is music or work related, their hearing has been permanently damaged.

BOOK 3

Sound Field Amplification

OPTIONS FOR USING FUNDING OBTAINED TO ASSIST THE CHILDREN WITH MILD HEARING PROBLEMS

If the Federal Government founds are made available to the two schools, consultations on to how to best expend the funds would be required. Consideration should be given to the strengths the schools already have.

> The two schools have a great advantage in having small class sizes. All the studies point to this as a key step in helping children with mild hearing losses and other learning disabilities.
>
> Neither school is near a busy highway or other sources of excessive noise which can complicate the situation elsewhere.

Given that class size and outside noise sources are already optimized at these schools, other approaches that may help these children need to be considered. These approaches include:

- Sound field amplification units.

> These devices cost between $800 and $2000. They amplify the teacher's voice sufficiently to help the children hear and pay attention more easily. Some national audiology organizations are suggesting to President Clinton that these devices should be available in all classrooms by 2005. It would be possible for White Earth to be a leader in the country by adopting this technology much sooner.

- Sound treatment of the classrooms.

> Typically this involves reasonably simple things like carpet on the floor are sufficient in most school buildings, sometimes significant modification is required. Costs for this vary greatly but can be as high as $30,000 for a classroom.

- Personnel FM systems

> These units cost between $400 and $800 per child. The child wears a receiver resembling a Walkman and the teacher wears a small microphone and transmitter. The child therefore hears the teacher's voice very clearly.

SOUND FIELD AMPLIFICATION

Introduction

Students with mild hearing loss may have difficulties in the classroom because what they hear sounds muffled. If this hearing loss is conductive, the sound they hear may also sound different from one day to another. When there is a lot of background noise present children with hearing loss hear even less clearly.

Many of these problems can be overcome by improving the listening conditions. (Smaller classes, quieter rooms etc as described above)

Sound field amplification systems do this by making sure that when you compare the teacher's voice with the background noise, the teacher's voice is louder and clearer.

All children benefit from improved listening conditions in the classroom, but this is critical for children with a hearing loss.

What is a Sound field amplification system?

A Sound field amplification system usually consists of:

- microphone
- transmitter
- receiver/amplifier
- speakers

The microphone is connected to the transmitter which is usually worn by the teacher. The microphone picks up the teacher's voice and the transmitter sends this signal to the receiver which amplifies the sound. This amplified sound is then sent through wires to the speakers. The students then hear the amplified teacher's voice through the speakers.

What are the benefits of using Sound field amplification systems?

Children with mild hearing loss benefit because they:

- are able to hear the teacher more clearly
- are able to follow oral instructions more easily
- show better behavior in the classroom as they are more aware of what is happening are less distracted by noises outside the classroom
- are more alert
- are more willing to participate in classroom activities
- are more attentive and stay on task much longer
- show better listening skills

Teachers benefit because they:

- don't have to raise their voice to be heard, therefore their voice is less tired at the end of the day

It is clear from studies now that children with a broad range of learning difficulties also benefit in similar ways to hearing impaired children when these devices are used in classrooms.

Which classrooms should be fitted with Sound field amplification systems?

Classrooms which can benefit from the use of Sound field amplification systems include:

- those with a high proportion of students with identified mild hearing loss
- those with a high proportion of students with otitis media
- those which are in a very noisy environment and contain children with mild hearing loss

ASSISTING CHILDREN WITH FLUCTUATING HEARING LOSS: *CREATING A MODEL FOR NATIVE AMERICAN NATIONS*

REASONS TO TRIAL SOUND FIELD AMPLIFICATION:

- Significant numbers of White Earth's children have chronic middle ear problems.

- Amplification will assist children with other problems.

- Places Tribal schools ahead of other schools on these issues

- Funding is available from The Federal government and groups such as the HIKE fund (Hearing Impaired Kids Endowment) and several of the equipment suppliers such as Phonic Ear can provide advice on seeking other grants for this purpose.

- Establishes a model for other Native American Nations

Model Program for Native American Schools

The use of Sound field amplification systems is becoming more common. They provide a way for schools to cost effectively support children with a range of problems in normal classrooms. The technology has had little impact in Native American education to date, despite being well suited to the needs of a number of Native American children. For reasons that are not clear, in the USA the use of this technology has been largely in middle class urban schools in the western States.

White Earth could trial Sound field amplification , and then carry out an evaluation of its effectiveness on behalf of the Native American school movement generally. In Australia, the Aboriginal community has found this technology to be very valuable, however given the differences between the two situations, this may or may not be found to be true at White Earth or other Native American Nations. Such a trial however, would ensure that the Tribally controlled schools of White Earth are at the leading edge of the implementation of this technology.

White Earth's Tribally controlled schools could be among the first Native American schools to evaluate Sound field Amplification in the classroom.

BOOK 4

Hearing Services For Elders

HEARING SERVICES FOR WHITE EARTH'S ELDERS.

Current Situation:

Most people over 65 have some degree of hearing loss due both to the gradual aging process and exposure to noise.

A significant proportion of the elders in the community are therefore likely to be able to benefit from hearing aids.

The IHS audiology service does not dispense hearing aids directly.

Elders (and children) must therefore travel considerable distance, often to Fargo, to have hearing aids fitted.

Hearing loss can lead to significant emotional and social impacts.

Possible Improvement to Services

1) Local Hearing aid Services. White Earth Council could consider attempting to arrange for more efficient use of the space and equipment at the IHS audiology clinic (which is unused several days each week) and at the same time making access to hearing assistance easier for these elders.

2) Elders Hearing Screening. The US Preventive Services Task Force has recommended aged persons be screened for hearing loss. White Earth could create a program of annual hearing screening for elders on the Reservation.

White Earth Tribal Council could establish :

- a visiting hearing aid service based at the IHS
- a hearing screening program for tribal elders

Using Tribal Sovereignty

Local Hearing Aid Services

The key to the initiative of having a hearing aid service available at White Earth is getting the IHS clinic to agree to sharing their facilities.

> The tribe could invite a dispensing audiologists from a nearby towns, to use the IHS center as a visiting site. Basically, **rather than have the elders travel to the services, have the services travel to the elders.** This type of arrangement becomes more important as elders become older and more frail.

The White Earth Council would have to present this to the IHS clinic as a significant local priority. The Council would not necessarily need to have the space provided at no charge, however any commercial arrangements would be between the visiting audiologist and the IHS clinic. The White Earth Tribal Council, as the initiator of this process, would however still be in a position to ensure that the visiting audiologist was someone the elders were happy to use.

The fundamental step in this proposal is therefore the White Earth Tribal Council attempting to have the local IHS clinic make an arrangement that suits the Council's requirements for developing this service. The exercise of Tribal sovereignty is required, rather than the expenditure of funds.

ASSISTANCE TO ELDERS ATTENDING MEETINGS

A common difficulty for elders with hearing loss is following what is being said at meetings. This difficulty is probably the frequently reported cause for elders limiting or ending their involvement in public forums.

A number of devices, generally called Assistive Listening Devices are available that are helpful in these situations. Such devices are useful whether or not hearing aids are worn. The specific devices that White Earth might usefully purchase would be dictated by the needs of individuals attending meetings and the format of the meetings themselves. However the general issue of attempting to ensure that elders are able to continue to participate effectively at meetings in clearly an important issue for sovereignty.

All members of White Earth and particularly those with the greatest experience, need to be encouraged to be involved with the Council's activities.

ELDERS HEARING SCREENING

The White Earth Council could establish this program to ensure that elders with hearing problems are aware that assistance is available to them.

A number of models could be considered for implementing this program. The screening could be arranged as part of annual event that attracts elderly members of the Reservation or a specific hearing screening day could be arranged.

One option would be to use the Tribally controlled schools as the location for the screening to build yet another link between the schools and the community.

The key issue would be to co-ordinate the equipment and staff from other programs at White Earth to be available for this screening day. This ability to arrange for supportive co-operation of programs points to a fundamental benefit of Tribal Sovereignty over the full range of services at White Earth.

SUMMARY OF PROPOSED HEARING SERVICES FOR ELDERS

Annual hearing screening program for elders

Negotiate for hearing aid services to be available at IHS offices

Include noise exposure information in Hearing Awareness Campaign

Access to Assistive Listening Devices at Tribal meetings etc.

REASONS TO ACT ON HEARING SERVICES FOR ELDERS

Take sovereign control of a health issue
Elders are traveling as far as Fargo for hearing aids

Most elders over 60 have hearing loss

IHS audiology clinic is unused several days each week

The Tribe could assist these elders at no cost, if IHS agrees

An audiologist is likely to visit the IHS clinic if invited and rent is minimal

Advice on Elders Services

A number of bodies have information available to assist in the development of policies relating to the hearing care for elders. The American Academy of Audiology has produced policy statements (Appendix H) and will provide further advice.

BOOK 5

Hearing Awareness Program

A MODEL HEARING AWARENESS PROGRAM

Some causes of hearing loss are preventable.

Excessive noise, whether from music or the workplace, leads to permanent hearing loss. This is a common problem in occupations from car mechanics to forestry workers and is becoming a more common among in teenage children.

Numerous public awareness campaigns have therefore been created as attempts to reduce the amount of noise that people allow themselves to be exposed to unnecessarily.

However none of the hearing awareness campaigns that I have been able to find are directly addressed to Native American Nations. The campaigns do not use Native American faces, examples, images or language.

This lack of a Native American focus even holds for information sheets that are used by the IHS clinics based on Reservations.

OPPORTUNITY FOR WHITE EARTH TRIBAL COUNCIL

The White Earth Tribal Council has considerable experience in creating and running culturally appropriate health awareness campaigns. The Council could consider creating and running a series of Hearing health campaigns that would cover a range of issues over several years. These campaigns could then be offered to other Native American Nations as the basis for similar campaigns.

Such campaigns could include input from the students at the Tribally controlled schools, including artwork and ideas about getting the information across to teenagers.

The campaign, as well as ensuring that the people of White Earth would be better informed, could also be used to build on White Earth's reputation within Native America generally.

White Earth could design a Hearing Awareness Program that would be a model for other Native American Nations.

POSSIBLE HEARING HEALTH CAMPAIGN AT WHITE EARTH

Given White Earth Tribal Council's expertise in running health related information campaigns, this section focuses on the clinical areas that could be addressed rather than the details of such campaigns.

Topics in Hearing Awareness:

1) The importance of early intervention for children with hearing problems.

2) The danger of excessive noise, particularly focusing on teenagers, loud music and the use of power tools (chain saws etc)

3) The range of services available to Tribal members with hearing loss and how to access these services.

4) Advice on the implementation of whatever preventive measures the University of Minnesota's otitis media research suggests and which the Council sees as crucial.

5) The value to elders of seeking help for hearing problems as soon as they recognize they feel they are having difficulty.

Clearly, there is a significant funding issue for the creation of such a program. The various hearing and disease prevention programs are the most likely sources of funding, however actually identifying the appropriate funding source will take sometime.

ACCESSING FURTHER ADVICE ABOUT TAKING ON THESE PROJECTS

A large amount of the required information in now available on the INTERNET.

Two sites include lots of information and connection to all the other important sites :

American Academy of Audiology (www.audiology.org)

and

American Speech and Hearing Association (www.asha.org)

Some information will require explanation, which these organizations would be happy to provide. The White Earth Tribal Council could also seek support from the Speech and Language Therapists at the Head Start program and the audiologist at the IHS clinic for interpreting technical material.

I will continue to be available once I return to Australia in August 1998 via Email:
paul.cameron@health.gov.au

Appendix A

Early Detection of Deafness

AAA Staff Contact Information

AAA Home | Professional Resources | Consumer Resources

AAA NATIONAL OFFICE HEADQUARTERS

Get map locating AAA National Office

American Academy of Audiology
8201 Greensboro Drive, Suite 300
McLean, VA 22102

General Telephone: 1-703-610-9022
Member Telephone: 1-800-AAA-2336
FAX: 1-703-610-9005

AAA NATIONAL OFFICE STAFF

Executive Director

Carol Fraser Fisk
extension 231
e-mail:cfisk@audiology.org

Coordinator of Meetings and Conventions

Lisa Cebulash
extension 240
e-mail:lac@audiology.org

Membership Coordinator

AAA Position Statement: Early Identification of Hearing Loss

Early Identification of Hearing Loss

This position statement was developed by the American Academy of Audiology's Task Force on Early Identification of Hearing Loss. Task Force members and their consultants that approved this statement include: Alan Diefendorf, Ph.D., Marion Downs, Ph.D., D.H.S., Terese Finitzo, Ph. D., Judith S. Gravel, Ph.D., Judith Marlowe, Ph.D., Terrey Oliver Penn, M.S., Yvonne Sininger, Ph.D., Wende Yellin, M.S., Thomas Mahoney, Ph.D. (Consultant).

The American Academy of Audiology supports early identification of hearing loss and early intervention services for infants, children and families. Appropriate aural habilitation strategies (including parent counseling, medical referral, selection and evaluation of personal amplification devices and educational placement) can only be initiated after the hearing loss has been detected. Therefore, the Academy strongly supports identification programs for the detection of hearing loss in newborns, infants and young children. The Academy supports the concept of hearing screening of all newborns before discharge from the hospital as an effective means of identifying the majority of infants with congenital hearing loss.

While endorsing the goal of universal detection of newborns with hearing loss, the Academy recognizes that implementation of such programs may not be immediately practical or fiscally feasible for every facility in the United States. For those facilities, the Academy encourages its membership to develop alternative and innovative approaches to early identification programs. These may include screening of high-risk populations only in the neonatal period, in conjunction with out-patient programs designed to identify infants and children with no known neonatal risk indicators, or mass screening at selected sites. The identification of hearing loss must continue throughout infancy and childhood to detect hearing losses which are of late onset, progressive or acquired secondary to disease or trauma as delineated by the High-Risk Indicators established by the Joint Committee on Infant Hearing (JCIH) 1994 Position Statement.

The Academy recognizes that any comprehensive hearing screening program (including those initiated in the neonatal/perinatal period) must: 1) ensure the validity and accuracy of the specific screening instrument(s) used in the screening program; 2) ensure the availability and accessibility of audiology facilities for the comprehensive audiologic assessment, intervention and family-centered management of neonates, infants and young children who fail hearing screening; 3) establish mechanisms to promote compliance with recommended follow-up; 4) periodically evaluate the success of the hearing screening program; and, 5) provide information concerning hearing loss, high risk indicators and normal communication development to parents of all neonates, infants and young children screened, regardless of screening outcome.

The Academy supports efforts directed at developing more efficient, simple, reliable and accurate instrumentation for detecting hearing loss in young children, as well as research efforts designed to study all aspects of hearing screening programs in infancy and early childhood. The Academy further supports current initiatives at state and national levels to establish and maintain early identification programs. The Academy will pursue activities, such as continuing educational programs for its membership, as well as establishing outreach programs to educate pediatricians, primary care providers, parents and caregivers about hearing and the risk indicators for hearing loss in childhood. The Academy will support a collaborative effort between audiologists, primary care providers and otolaryngologists aimed at early and frequent questioning of parents regarding their child's hearing, speech and language development and the routine assessment of risk indicators during well-baby visits. As a voting member of the Joint Committee on Infant Hearing, the Academy fully supports the initiatives and direction of the JCIH 1994 Position Statement. The Academy recognizes the importance of such joint professional efforts to achieve the goal of universal detection of neonates and infants with hearing loss and appropriate follow-up for timely and effective intervention.

The American Academy of Audiology affirms that early detection of hearing loss and prompt initiation of habilitative services to infants and children with hearing loss are of paramount importance to optimal child development. The Academy supports the collaborative initiatives of the Joint Committee on Infant Hearing. In concordance with the JCIH 1994 Position Statement, the Academy endorses the implementation of early identification programs designed to detect hearing loss in all children, beginning at birth and continuing throughout childhood.

Joint Committee on Infant Hearing

1994 Position Statement

This 1994 Position Statement was developed by the Joint Committee on Infant Hearing. Joint Committee member organizations that approved this statement and their respective representatives who prepared this statement include the American Speech-Language-Hearing Association (Allen O. Diefendorf, PhD, Chair; Deborah Hayes, PhD; and Evelyn Cherow, M A ex officio); the American Academy of Otolaryngology - Head and Neck Surgery (Patrick J Brookhouser, MD, and Stephen Epstein, MD); the American Academy of Audiology (Terese Finitzo, PhD, and Jerry Northern, PhD); the American Academy of Pediatrics (Allen Erenberg, MD, and Nancy Roizen, MD); the Directors of Speech and Hearing Programs in State Health and Welfare Agencies (Thomas Mahoney, PhD, and Kathie J. Mense, MS)

Position Statement

The Joint Committee on Infant Hearing endorses the goal of universal detection of infants with hearing loss as early as possible. All infants with hearing loss should be identified before three months of age, and receive intervention by six months of age.

I. Background

In 1982, the Joint Committee on Infant Hearing recommended identification of infants at risk for hearing loss in terms of specific risk factors and suggested follow-up audiologic evaluation until accurate assessment of hearing could be made (Joint Committee on Infant Hearing, 1982; American Academy of Pediatrics, 1982). In 1990, the Position Statement was modified to expand the list of risk factors and recommend a specific hearing screening protocol.

In concert with the national initiative Healthy People 2000 (U.S. Department of Health and Human Services, Public Health Service, 1990), which promotes early identification of children with hearing loss, this 1994 Position Statement addresses the need to identify all infants with hearing loss.

The prevalence of newborn and infant hearing loss is estimated to range from 1.5 to 6.0 per 1,000 live births (Watkin, Baldwin, & McEnery, 1991; Parving, 1993; White & Behrens, 1993). Risk factor screening identifies only 50% of infants with significant hearing loss (Pappas, 1983; Elssman, Matkin, & Sabo, 1987; Mauk, White, Mortensen, & Behrens, 1991). Failure to identify the remaining 50% of children with hearing loss results in diagnosis and intervention at an unacceptably late age.

1994 Position Statement

1. Endorses the goal of universal detection of infants with hearing loss and encourages continuing research and development to improve techniques for detection of and intervention for hearing loss as early as possible.

2. Maintains a role for the high-risk factors (hereafter termed indicators) described in the 1990 Position Statement, and modifies the list of indicators associated with sensorineural and or conductive hearing loss in newborns and infants.

3. Identifies indicators associated with late-onset hearing loss and recommends procedures to monitor infants with these indicators.

4. Recognizes the adverse effects of fluctuating conductive hearing loss from persistent or recurrent otitis media with effusion (OME) and recommends monitoring infants with OME for hearing loss.

5. Endorses provision of intervention services in accordance with Part H of the Individuals with Disabilities Education Act (IDEA).

6. Identifies additional considerations necessary to enhance early identification of infants with hearing loss.

.II. Considerations for Detecting Hearing Loss in Infants

A successful infant hearing program must detect hearing loss that will interfere with normal development of speech and oral language. Because normal hearing is critical for speech and oral language development as early as the first six months of life (Kuhl, Williams, Lacerda, Stephens, & Lindbloom, 1992), it is desirable to identify infants with hearing loss before three months of age.

Facilities or agencies that implement infant hearing programs must develop protocols to achieve identification of all infants with hearing loss. To gain access to most infants, the Joint Committee on Infant Hearing recommends the option of evaluating infants before discharge from the newborn nursery. For infants discharged early or delivered at an alternative birthing site, it is desirable to have their hearing assessed before three months of age.

Concern for hearing should not stop at birth. Some children may develop delayed-onset hearing loss. For infants identified with indicators associated with delayed-onset hearing loss (see Sections III B and III C, below), ongoing monitoring and evaluation will be necessary (ASHA, 1991).

A.Technical Considerations

Hearing loss of 30 dB HL and greater in the frequency region important for speech recognition (approximately 500 through 4000 Hz) will interfere with the normal development of speech and language. Techniques used to assess hearing of infants must be capable of detecting hearing loss of this degree in infants by age three months and younger. Of the various approaches to newborn hearing assessment currently available, two physiologic measures (auditory brainstem response [ABR] and otoacoustic emissions [OAE]) show good promise for achieving this goal.</p>

ABR has been recommended for newborn hearing assessment for almost 15 years (Schulman-Galambos & Galambos, 1979) and has been successfully implemented in both risk register and universal newborn hearing screening programs (Galambos, Hicks, & Wilson, 1982, 1984; Kileny, 1987; Amochaev, 1987; Hyde, Riko, & Malizia, 1990). Follow-up studies of infants screened by this technique demonstrate acceptable identification of infants with hearing loss (Stein, Ozdamar, Kraus, & Paton, 1983; Kileny & Magathan, 1987).</p>

More recently, OAEs have been introduced for risk register and assessment of newborn hearing (Bonfils, Uziel, & Pujol, 1988; Stevens et al., 1989, 1990; Kennedy et al., 1991; White & Behrens, 1993). Follow-up studies of infants screened by this technique are limited but suggest that OAEs can identify infants with hearing loss of approximately 30 dB HL and greater (Kennedy et al., 1991).

Specific characteristics of test performance for ABR and OAE have not been fully defined in universal infant hearing detection applications. Because direct comparisons of ABR and OAE test performance are not currently available, the Joint Committee on Infant Hearing recommends

that each team of health care professionals responsible for the development and implementation of infant hearing programs evaluate and select the technique that is most suitable for their care practices. New technologies or improvements to existing technologies that substantially enhance infant hearing assessment should be incorporated into existing programs as appropriate.

Each of the two physiologic measures has its advantages and disadvantages; both procedures outperform behavioral assessment in newborn hearing detection applications. Behavioral measures, including automated behavioral techniques, cannot validly and reliably detect the criterion hearing loss of 30 dB HL in infants less than six months of age (Jacobson & Morehouse, 1984; Durieux- Smith, Picton, Edwards, MacMurray, & Goodman, 1987; Hosford-Dunn, Johnson, Simmons, Malachowski, & Low, 1987). However, for infants six months developmental age and older, conditioned behavioral techniques provide reliable and valid measures of hearing sensitivity (ASHA, 1991).

B. Personnel

Teams of professionals, including audiologists, physicians (otolaryngologists and pediatricians), and nursing personnel, are often involved in establishing infant hearing programs. Audiologists should supervise infant hearing assessment programs. Personnel appropriate to the infant hearing program who are trained and supervised by an audiologist may conduct some aspects of the infant hearing program (National Institutes of Health, 1993).

C.Implementation

Conditions that permit implementation and/or conversion to a universal infant hearing program, as well as time-lines to initiate such programs, vary by program and location. However, program development and specific time-lines should be established by each program to move toward the Joint Committee's goal. Pending development of programs to identify all infants with hearing loss, the Joint Committee on Infant Hearing recommends that programs based on indicators and currently in operation continue to provide assessment services to identified infants. The section that follows lists indicators associated with sensorineural and/or conductive hearing loss in neonates (Section III A) and infants (Section III B). On implementation of universal infant hearing programs, these indicators may be used to aid in the etiologic diagnosis of hearing loss as well as to identify those infants who develop health conditions associated with hearing loss and who therefore require ongoing hearing monitoring.

D. Cost/Benefit Analysis

Cost/Benefit analysis of infant hearing programs should include consideration of direct cost of identification, assessment and intervention. In addition, it may be valuable to determine the cost savings that accompany early detection and subsequent management of the child with hearing loss. Each infant hearing program should develop a cost/benefit analysis associated with its specific protocol. The results of cost/benefit analysis vary widely because of differences in protocol, location, geographic and economic considerations, and other factors.

III. Indicators Associated with Sensorineural and/or Conductive Hearing Loss

A. For use with neonates (birth through age 28 days) when universal screening is not available.

1. Family history of hereditary childhood sensorineural hearing loss.

2. In utero infection, such as cytomegalovirus, rubella, syphilis, herpes, and toxoplasmosis.

3. Craniofacial anomalies, including those with morphological abnormalities of the pinna and ear canal.

4. Birth weight less than 1,500 grams (3.3 lbs).

5. Hyperbilirubinemia at a serum level requiring exchange transfusion.

6. Ototoxic medications, including but not limited to the aminoglycosides, used in multiple courses or in combination with loop diuretics.

7. Bacterial meningitis.

8. Apgar scores of 0--4 at 1 minute or 0--6 at 5 minutes.

9. Mechanical ventilation lasting 5 days or longer.

10.Stigmata or other findings associated with a syndrome known to include a sensorineural and/or conductive hearing loss.

B. For use with infants (age 29 days through 2 years) when certain health conditions develop that require rescreening

1. Parent/caregiver concern regarding hearing, speech, language, and/or developmental delay.

2. Bacterial meningitis and other infections associated with sensorineural hearing loss.

3. Head trauma associated with loss of consciousness or skull fracture.

4. Stigmata or other findings associated with a syndrome known to include a sensorineural and/or conductive hearing loss

5. Ototoxic medications, including but not limited to chemotherapeutic agents or aminoglycosides, used in multiple courses or in combination with loop diuretics.

6. Recurrent or persistent otitis media with effusion for at least three months.

C. For use with infants (age 29 through three years) who require periodic monitoring of hearing.

Some newborns and infants may pass initial hearing screening but require periodic monitoring of hearing to detect delayed-onset sensorineural and/or conductive hearing loss. Infants with these indicators require hearing evaluation at least every six months until age three years, and at appropriate intervals thereafter.

Indicators associated with delayed-onset sensorineural hearing loss include:

1. Family history of hereditary childhood hearing loss.

2. In utero infection, such as cytomegalovirus, rubella, syphilis, herpes, or toxoplasmosis.

3. Neurofibromatosis Type II and neurodegenerative disorders.

Indicators associated with conductive hearing loss include:

1. Recurrent or persistent otitis media with effusion.

2. Anatomic deformities and other disorders that affect eustachian tube function.

3. Neurodegenerative disorders.

IV. Early Intervention

When hearing loss is identified, evaluation and early intervention services should be provided in accordance with the Individuals with Disabilities Education Act (IDEA), Part H Public Law 102-119 (formerly PL 99-457). A multidisciplinary evaluation will be completed to determine eligibility and to assist in developing an individualized family service plan (IFSP) to describe the early intervention program. Because specific services and service eligibility are not uniform from state to state, potential service users and service providers should contact their state Resource Access Projects (RAP) coordinators for information

The full evaluation process should be completed within 45 days of referral. However, intervention services may commence before completion of the evaluation if parental/caregiver consent is obtained and an interim IFSP is developed. Specifically, early intervention services that might be offered before completing the full evaluation of all developmental areas include provision of amplification, support, and information to parents regarding hearing loss and the range of intervention alternatives available.

The interim IFSP should include the name of the service coordinator who will be responsible for both implementation of the interim IFSP and coordination of activities among other agencies and persons.

The multidisciplinary evaluation and assessment of an infant identified with hearing loss should be performed by a team of professionals working in conjunction with the parent/caregiver. The professionals may include, depending on the needs of the individual:

1. A physician with expertise in the management of early childhood otologic disorders.

2. An audiologist with expertise in the assessment of infants and young children to determine type, degree, symmetry, stability, and configuration of hearing loss, and to recommend amplification devices appropriate to the child's needs (e.g., hearing aids, personal FM systems, vibrotactile aids, and/or cochlear implants).

3. A speech-language pathologist, audiologist, sign language specialist, and/or teacher of children who are deaf or hard-of-hearing with expertise in the assessment and intervention of communication skills.

4. Other professionals as appropriate for the individual needs of the child and family.

This team will develop a program of early intervention services (an IFSP) based on the child's unique strengths and needs and consistent with the family's resources, priorities, and concerns related to enhancing the child's development. This multidisciplinary team must include the parent/caregiver. Team planning should be cognizant of and sensitive to the range of available communication and educational choices, and parents should be given sufficient information regarding all options to enable them to exercise informed consent when selecting their child's program. Components of an early intervention program for children with hearing loss and their families should include:

1. Family support and information regarding hearing loss and the range of available communication and educational intervention options. Such information must be provided in an objective, nonbiased way to support family choice. It is recommended to use consumer organizations and persons who are deaf or hard-of-hearing to provide such information. Professional, consumer, state and community-based organizations should be accessed to provide ongoing information regarding legal rights, educational materials, support groups and/or networks, and other relevant resources for children and families.

2. Implementation of learning environments and services designed with attention to the family's preferences. Such services should be family-centered and should be consistent with the needs of the child, the family, and their culture.

3. Early intervention activities that promote the child's development in all areas, with particular attention to language acquisition and communication skills.

4. Early intervention services that provide ongoing monitoring of the child's medical and hearing status, amplification needs, and development of communication skills.

5. Curriculum planning that integrates and coordinates multidisciplinary personnel and resources

so that intended outcomes of the IFSP are achieved.

V. Additional Considerations

Successful programs for identifying infants with hearing loss are characterized by commitment and support from health care administrators, physicians, audiologists, families, and caregivers, and a community educated about the importance of hearing and infant development. Because of the dynamic changes in technology and in education and health care policy, the Joint Committee on Infant Hearing recommends consideration of the following factors to facilitate establishment and maintenance of infant hearing programs:

1. Development of a uniform state and national database incorporating standardized technique, methodology, reporting, and system evaluation. This database will enhance patient outcomes, program evaluation (including efficacy and cost/benefit analysis), continuous quality improvement, and public policy development.

2. Development of a tracking system to insure that newborns and infants identified with or at risk for hearing loss have access to evaluation, follow-up, and intervention services.

3. Systematic evaluation of techniques for identification and assessment, and intervention for hearing loss in infants. Replication and ongoing assessment of current programs will assist in evaluating the efficacy of infant hearing programs and widespread acceptance of the benefits of early identification of infants with hearing loss.

4. Ongoing refinement of current indicators associated with sensorineural and/or conductive hearing loss.

5. Outcome studies to investigate the impact of early identification on the degree of literacy and communication competence achieved and to establish factors that contribute to the outcome.

6. Continued research into the prevention of hearing loss in newborns and infants.

STAFF

Christine Yoshinaga-Itano, Ph.D.. Principal Investigator. Dr. Yoshinaga-Itano's research focuses on the study of and improvement of general development and communication of infants and toddlers with educationally significant hearing loss.

Kathryn Hoberg Arehart, Ph.D.. Co-principal Investigator: Dr. Arehart develops and manages the database and research methodology for the grant. She provides semiannual and annual summaries of the accomplis hments and will coordinate the 1998 summer workshop in Colorado for technical assistance to states.

Vickie Thomson, M.A. CCC-A. Project Coordinator for Screening. Ms. Thomson provides technical assistance to states in the area of un iversal newborn hearing screening. She also works within the state of Colorado to insure the sustainability of the Colorado system and to work towards the goal of adding remaining hospitals to respond to the 1997 Colorado legislative mandate for universal newborn hearing screening.

Sandra Abbott Gabbard, Ph.D., CCC-A. Project Coordinator for Assessment and Amplification. Dr. Gabbard provides technical assistance to states to institute standard-of-care prot ocols for diagnosis and amplification. She also coordinates efforts to insure that financial resources can be obtained so that no deaf or hard-of-hearing child goes without needed amplification.

Arlene Stredler Brown, M.A., CCC-SLP. Project Coordinator for Intervention programs and developmental assessments. In Colorado, she is the director of the Colorado Home Intervention Program (CHIP). This early intervention program, sponsored by the Colorado Department of Public Health, is a model for parent centered intervention for children with hearing loss under 3 years of age.

Deborah Hayes, Ph.D.. CCC-A. Project Coordinator for National Task Force. Dr. Hayes coordinates the dissemination of information to national groups and is also responsible for the national advisory council and national network.

Cliff Moers, B.S., Liaison for Deaf and Hard of Hearing Community. Mr. Moers

provides information to Deaf and Hard of Hearing organizations. He is establishing and coordinating a communication network of Deaf and Hard of hearing Community liaisons from the 17 states and will enlarge the network to include representatives from other states.

Janet Des Georges. Liaison for Parents with Deaf and Hard of Hearing Children. Ms. Des Georges is a parent of a child with a moderate bilateral sensorineural hearing loss. She is the parent liaison for the Colorado Home Intervention Program and will be coordinating efforts to develop a communication network for parent groups throughout the 17 states. She will provide information about universal newborn hearing screening programs to parent groups in the 17 states and will solicit input from parents about ways to improve universal newborn hearing screening programs.

Danette Petersen, Administrative Assistant. Ms. Petersen provides administrative assistance to staff members, coordinates travel and other arrangements for conferences and coordinates distribution of technical assistance materials from the Marion Downs National Center.

Alison M. Mayne, M.A., CCC-A, doctoral student. Ms. Mayne is a research assistant for the MDNC, with an interest in the communication development of children with hearing loss.

NCHAM's BACKGROUND

Background

An invisible condition, congenital hearing loss often goes undetected until delays in language development have become so acute that parents and professionals are eventually led to investigate the child's ability to hear. Thus, children in the United States with severe to profound congenital hearing losses have been identified at an average age of about 2-1/2 years, with milder losses frequently not being identified until the child enters school. The implications of this situation are especially significant when one considers that language acquisition actually begins at birth and progresses rapidly during the first three years of life. Deprived of critical language-learning opportunities by an unidentified hearing loss, children with hearing impairments experience serious delays in social, emotional, cognitive, and academic growth--from which most children never fully catch up.

The reason children with congenital hearing losses in this country are identified relatively late is because we have not had reliable and economically feasible techniques for newborn hearing screening until just recently. Over the last 50 years, many different techniques have been used to attempt to reduce the average age at which hearing impairment is identified. Unfortunately, all of these previously available techniques have been inadequate. Behavioral screening techniques work well with children after six months of age, but by that time, many children are inaccessible for screening; high-risk registers are feasible to operate but miss at least half of the children with significant hearing loss; cribogram techniques have serious validity problems; and auditory brainstem response (ABR), which is generally recognized as the most valid technique, works well, but is too expensive to implement for all newborns.

Although the need to identify congenital hearing loss at a very early age has been recognized for over 50 years, very little progress had been made until just recently. The first real progress occurred in the late 1980's as a result of two independent technological developments. The first was the discovery by a British auditory physicist named David Kemp, which revolutionized our understanding of how the ear functions and provided the foundation for a new method of newborn hearing screening. Kemp showed that when auditory stimulation is introduced into the external ear canal, a healthy cochlea responds with a tiny signal which travels back through the external ear canal. This "echo" can be measured by a microphone connected to a computer. The measurement of this signal, now referred to as evoked otoacoustic emissions, can be done quickly, objectively, and easily by trained technicians. The second development was the refinement and automation of techniques for measuring auditory brainstem response (ABR). Although ABR had long been accepted as the gold standard for measuring infants' auditory status, conventional ABR measurement was too expensive, time-consuming, and difficult to allow it to be used as a universal newborn hearing screening technique. However, by the late 1980's, new developments in ABR measurement techniques and equipment resulted in feasible automated auditory brainstem response (AABR) measurement techniques, which could be conducted by trained technicians at a fraction of the time and cost required for conventional ABR measurements.

These new developments led to the establishment of several universal newborn hearing screening programs using either transient evoked otoacoustic emissions

(TEOAE) or automated auditory brainstem response (AABR). By 1992, there had been sufficient new developments and knowledge in the field that the National Institutes of Health (NIH) convened a Consensus Development Conference to review all of the evidence related to early identification of hearing loss and to make recommendations based on that evidence. In March of 1993, a 15-member Panel representing audiology, otolaryngology, pediatrics, speech and hearing sciences, epidemiology, heath care administrators, and the general public, after reviewing evidence presented by over 40 experts in the field, recommended that all children be screened for hearing loss before being discharged from the hospital. The preferred method recommended by the Panel at that time was the use of evoked otoacoustic emissions. Since the time of the Panel's recommendation, newborn hearing screening procedures and equipment have continued to develop rapidly, with dozens of operational programs now scattered throughout the United States using either evoked otoacoustic emissions or automated auditory brainstem response. Indeed, since the NIH Consensus Conference in March of 1993, there has been a five-fold increase in the number of hospitals doing universal newborn hearing screening. If this rate of increase continues, the goal set by former Surgeon General Dr. C. Everett Koop in 1989, when he challenged us to "reduce the average age at which children with significant hearing impairments are identified to 12 months of age" will be accomplished by the year 2000.

Shortly after the NIH Consensus Conference Statement was released, the Bureau of Maternal and Child Health, recognizing that the vast majority of hospitals in this country had very little or no experience with newborn hearing screening using the techniques recommended by the NIH Consensus Panel, funded a project at Utah State University to organize a Consortium of sites involved in doing universal newborn hearing screening. This Consortium was to provide training, technical assistance, and ongoing research to assist with the expansion and successful implementation of universal newborn hearing screening programs.

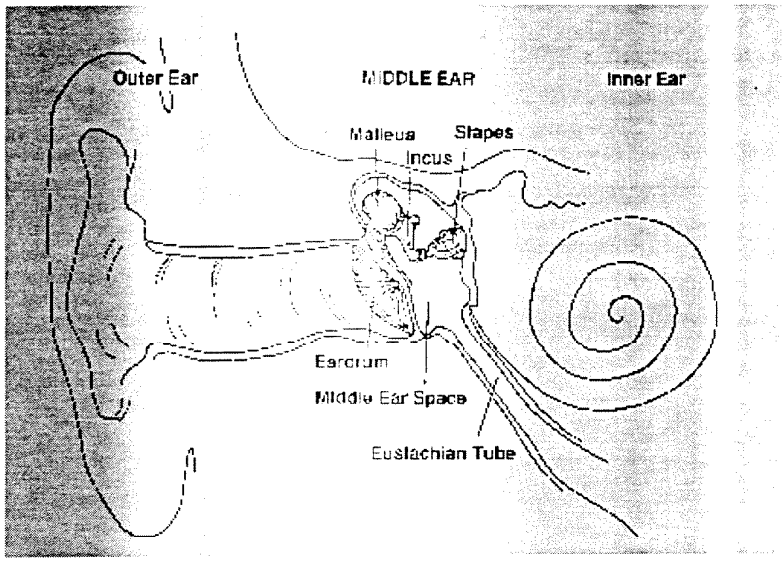
In 1995, the National Center for Hearing Assessment and Management (NCHAM) was established at Utah State University. Building on the work of the Consortium and several other research and training projects related to identification and management of hearing loss, the goal of the National Center is to promote the earliest possible detection of hearing loss and the best possible techniques for assisting people with hearing impairment. The Center receives funding from federal, state, and private sources to conduct research, develop training materials, provide training and technical assistance, and disseminate information about early identification and management of hearing impairment.

Appendix B

Otitis Media in Children

THE CENTER FOR HEARING LOSS IN CHILDREN
PROFESSIONAL INFORMATION SERIES

MIDDLE EAR PROBLEMS AND HEARING LOSS



What is Middle Ear Dysfunction?

The middle ear begins at the eardrum. Behind the eardrum is the middle ear space, which is normally filled with air. This space contains the three tiny bones of the middle ear, named for their shapes: the malleus (hammer), the incus (anvil), and the stapes (stirrup). This space also contains the opening of the eustachian tube. This tube connects the middle ear space with the upper part of the throat.

Anything which interferes with the proper working of all parts of the middle ear is called a dysfunction. The most common dysfunction seen in children is an improperly working eustachian tube. This tube opens and closes many times during the day, providing an exchange of air between the middle ear and the air around us. If the eustachian tube does not open often enough, the middle ear pressure changes and fluid may fill the middle ear space. The fluid can become infected.

Can Middle Ear Dysfunction Cause Hearing Loss?

Yes. Middle ear dysfunction is a health problem that requires medical attention. If left untreated, it may result in hearing loss and communication problems.

Hearing loss caused by middle ear dysfunction is called conductive hearing loss. This type of hearing loss is usually temporary, and hearing can be restored with appropriate medical treatment. The amount of hearing loss varies from child to child and may even change from day to day. A complete hearing evaluation is needed to determine the extent of the hearing loss. The hearing test, ear examination, and a history of ear problems are used by the doctor to create a medical treatment plan which is right for your child.

Can Middle Ear Dysfunction Affect Speech and Language Development or School Performance?

Yes. Children learn speech and language by listening to the people around them. If middle ear

dysfunction results in long-standing or repeated episodes of conductive hearing loss, speech and language development may be delayed. It also can cause listening problems in daycare or school, as well as at home. In some cases, the hearing problems may be mistaken for behavioral problems such as poor attention or distractibility. Hearing test results should be shared with your child's daycare providers or teachers.

If your child has had a history of frequent middle-ear problems or if you are concerned about your child's hearing, you should arrange for a complete hearing evaluation by a certified audiologist. Reliable results can be obtained for children of all ages, starting at birth. The information from an accurate hearing test can be one way to ensure that your child will develop normal communication skills and perform to the best of his/her ability in school.

What Can I Do if My Child has Middle Ear Dysfunction and/or Conductive Hearing Loss?

1. Get prompt medical attention to resolve the problem as soon as possible.
2. Create the best possible listening environment at home, daycare and school. Minimize background noise, get your child's attention before speaking, and position yourself close to your child while talking. In school, your child may benefit from sitting near the teacher during instruction and away from any sources of noise.
3. If you have concerns for your child's speech and language development, discuss the problem with your doctor, audiologist or personnel from the local school district.
4. Follow your physician's recommendations for treatment and follow-up. This might include retesting your child's hearing to make sure that it has returned to normal.

A National Research and Training Center
Funded by the National Institute on Deafness
and Other Communication Disorders

Boys Town National Research Hospital
555 North 30th Street, Omaha, Nebraska 68131
(402) 498-6749

Return to [illegible] or [illegible] to the Parent Page

Last modified: 30-May-96 vaughan@boystown.org

THE CENTER FOR HEARING LOSS IN CHILDREN
PROFESSIONAL INFORMATION SERIES

UNILATERAL HEARING LOSS: SUGGESTIONS FOR YOUR CHILD

My child has a unilateral hearing loss. What does this mean?

A *unilateral* hearing loss affects only one ear. The amount of loss in that ear can range from mild to total hearing loss. If the loss is mild, it is still possible to hear some sounds, but if the hearing loss is total, even very loud sounds will not be heard in that ear.

Because one ear still has normal hearing, a child will hear well in most situations but may experience problems with the following:

- hearing sounds directed toward the poorer ear
- locating the source of sounds (this is called *localization*)
- understanding speech in a noisy background_especially if the good ear is close to the noise.

Although some children with unilateral hearing loss receive benefit from the use of a hearing aid, a standard hearing aid will not be helpful in many cases.

What causes a unilateral hearing loss?

A unilateral hearing loss can be present at birth, or it may develop later in life. It may be hereditary, or it may be caused by problems during pregnancy or delivery. Among the causes are illnesses (such as meningitis and mumps) and serious ear infections. When a unilateral hearing loss is suspected, it is important to see an otolaryngologist, a physician who specializes in diseases of the ear. The doctor will make sure that the hearing loss is not medically treatable and that it is not associated with a more serious health problem. It is also important to see an audiologist for a complete hearing evaluation to determine the exact degree and type of hearing loss.

Does a unilateral hearing loss affect listening in the classroom? What about school performance?

Many children with unilateral hearing loss do well in school and their performance remains unaffected by the loss. Recent studies suggest that 25-35% of children with unilateral hearing loss are at risk for failing a grade. These children may be distractible or have a limited attention span. They also may have problems following directions or show signs of fatigue as the school day progresses. Your child's teacher should be made aware of the hearing loss so that classroom performance can be closely monitored. If hearing problems are causing academic problems, an involved teacher can help to make sure that this is discovered as soon as possible.

In the classroom, the child's normally-hearing ear should be closest to the teacher or main sound source. This might mean changing seats for different classroom activities. Limiting background noise will make it easier for your child to hear and understand speech. Common noise sources in classrooms include air conditioners, fans, heating units, doors, group work by other children, computer terminals, and pencil sharpeners. Any noise in a classroom is made worse by hard floors and walls. If you or your child's teacher feel your child is having difficulty hearing in school, there are assistive listening devices that might help. The audiologist will be able to discuss this with you in detail.

Can a unilateral hearing loss affect my child's safety?

A unilateral hearing loss makes it difficult to tell what direction sound is coming from. For this reason, it is important to teach your child to rely more on vision than on hearing in hazardous situations. Teach your child to look carefully both ways before crossing the street. Put rear-view mirrors on your child's bicycle to help him or her detect approaching vehicles.

What about the hearing in my child's better ear?

In most cases of unilateral hearing loss, the better ear stays the same. It is important, however, to take precautions to protect your child's hearing. Here are three things you can do:

1. Use earplugs to protect your child's hearing from very loud noises such as power tools, firecrackers, firearms, loud music, or snowmobiles.
2. When your child has an ear infection, you should seek medical attention promptly. Your child's hearing can be affected by such problems.
3. Have your child's hearing tested on a regular basis, as your physician and audiologist recommend. If you suspect any change in hearing, it is best to have your child retested immediately.

A National Research and Training Center
Funded by the National Institute on Deafness and Other Communication Disorders

Boys Town National Research Hospital
555 North 30th Street, Omaha, Nebraska 68131
(402) 498-6749

Return to Home Page or Return to the Parent Page

Last modified: 30-May-96 vaughan@boystown.org

Otitis Media, Hearing & Language Development

What is Otitis Media?

Otitis media is an inflammation in the middle ear (the area behind the eardrum) that is usually associated with a buildup of fluid. The fluid may or may not be infected. Symptoms, severity, frequency, and length of the condition vary. At one extreme is a single short period of thin, clear, non-infected fluid without any pain or fever but with a slight decrease in hearing ability. The other extreme is repeated bouts with infection, thick "glue-like" fluid, and possible complications such as permanent hearing loss. Fortunately, with early identification, serious medical complications can be controlled with medicine or surgery. However, there is one problem that nearly always occurs with all types of otitis media -- fluctuating hearing loss.

How common is otitis media?

Otitis media occurs most frequently in children. In fact, it ranks second to the common cold as the most common health problem in preschool children. Fifty percent of children have had at least one episode by one year of age. Between one and three years, 35% will have had repeated episodes. For school children, an estimated 5 million school days are missed every year due to otitis media.

Why is otitis media so common in children?

The Eustachian tube, a passage between the middle ear and the back of the throat, is smaller and more nearly horizontal in children than in adults. Therefore, it can be more easily blocked by conditions such as large adenoids and infections. Until the Eustachian tube changes in size and angle, children are more susceptible to otitis media.

How can otitis media cause a hearing loss?

Three tiny bones in the middle ear carry sound vibrations from the eardrum to the inner ear. When fluid is present, the vibrations are not transmitted efficiently and sound energy is lost. The result may be a mild or even a moderate hearing loss. Therefore, some speech sounds may be muffled or inaudible. Generally, this type of hearing loss is temporary. However, when otitis media occurs over and over again, damage to the eardrum, the bones of the ear, or even the hearing nerve can occur and cause permanent hearing loss.

Can hearing loss due to otitis media cause speech and language problems?

Children learn speech and language from listening to other people talk. The first few years of life are especially critical for this development. If a hearing loss exists, a child does not get full benefit of language learning experiences. Consequently, critical delays in speech and language development may occur. Otitis media without infection presents a special problem because symptoms of pain and fever are usually not present. Therefore, weeks, and even months, can go by before parents suspect a problem. During this time, the child may miss out on hearing the speech and language needed for normal development.

How can I tell if my child might have otitis media?

Even if there is no pain or fever, there are other signs you can look for that may indicate chronic or recurring fluid in the ear: inattentiveness, wanting the television or radio louder than usual, misunderstanding directions, listlessness, unexplained irritability, pulling or scratching the ears.

What should I do if I think that otitis media is causing a hearing, speech, or language problem?

A physician should handle the medical treatment. Ear infections require immediate attention, most likely from a pediatrician or otolaryngologist (ear doctor). If your child has frequently recurring infections and/or chronic fluid in the middle ear, two additional specialists should be consulted: an audiologist and a speech-language pathologist. An audiologist's evaluation will assess the severity of any hearing loss, even in a very young or uncooperative child, and will indicate if a middle ear disorder is present. A speech-language pathologist measures your child's specific speech and language skills and can recommend and/or provide remedial programs when they are needed.

Will my physician refer my child for these special evaluations?

As a parent, you are the best person to look for signs that suggest poor hearing. The American Academy of Pediatrics recognizes this when it states, "Any child whose parent expresses concern about whether the child hears should be considered for referral for behavioral audiometry without delay." Parents should not be afraid to let their instincts guide them in requesting or independently arranging for further evaluation whenever they are concerned about their children's health or development.

How can I find an audiologist or speech-language-pathologist?

For a complete list of professional services in audiology and speech-language pathology in your state, write or call the American Speech-Language-Hearing Association at the address listed below.

AMERICAN SPEECH-LANGUAGE-HEARING ASSOCIATION
10801 Rockville Pike
Rockville, MD 20852
800-638-8255 (Voice or TTY)
301-897-8682 (voice or TTY)
E-Mail: actioncenter@asha.org

AAA POSITION STATEMENT: AUDIOLOGIC GUIDELINES FOR THE DIAGNOSIS AND TREATMENT OF OTITIS MEDIA IN CHILDREN

Audiologic Guidelines for the Diagnosis and Treatment of Otitis Media in Children

We are convinced, from careful analysis of the voluminous research available, that a causal relationship does exist between communication disorders and early, recurrent, episodes of otitis media in infants and young children. Accordingly, we feel it is important to participate in this public meeting regarding the development of clinical practice guidelines for the diagnosis and treatment of this pathology and hearing disorder. Our Academy believes that while the disease process itself must be medically and surgically managed by physicians, the identification, assessment and management of any concomitant hearing loss falls within the scope of audiologic practice.

The American Academy of Audiology considers that developmental deficits in communication and behavioral/attention problems experienced by some children with recurrent otitis media are, for the most part, auditory-based. There is increasing evidence that the age of onset, as well as the nature, degree, and configuration of the peripheral conductive hearing loss which occurs secondary to otitis media, are critical components that place children at risk for developing communication and learning disorders. Early identification and management of hearing loss associated with otitis media is important for optimum developmental outcome. Thus, any Clinical Practice Guidelines developed for the diagnosis and treatment of otitis media in children, must specifically include audiologic assessment and management as integral components.

It is not the degree of hearing loss alone that is an issue, but the intrinsic nature of the conductive hearing loss associated with otitis media and middle ear effusion particularly when it occurs in early life. The hearing deficit is characterized as fluctuant; that is, existing only during the duration of the otitis media episode. At resolution, or between otitis media episodes, hearing presumably returns to the normal range. Therefore, hearing sensitivity may varywithin the same episode of otitis media, as well as between episodes within the same child; the actual number of episodes the child experiences within a particular time period is an additional consideration.

Finally, asymmetries in hearing sensitivity may exist between the child's two ears, thereby potentially disrupting critical binaural auditory processing skills.

The Academy believes that there is sufficient evidence to suggest that the auditory deficits associated with otitis media are far more than what is often termed a simple problem of attenuation.
Indeed, it is these fluctuations of hearing during sensitive developmental periods which are considered by some to be the root of an insidious process: the lack of development of a stable auditory base which normally serves as the very foundation of communication and attention behaviors.

Furthermore, we believe that some children with early language delay may not "catch up" with their non-otitis medial peers as they mature. We recognize the controversy over the research on language sequelae of otitis media in the child whose potentially best language function may not be just "normal," but should actually be superior. It is possible that if we ignore the potential language sequelae of otitis media in this population, we are condemning to mediocrity a population of children who should be most promising of high attainment.

Through otoscopic inspection alone, or even when otoscopy is supported by tympanometry, it is not possible to ascertain the degree of hearing deficit associated with any given episode of otitis media. Thus, audiometric evaluation is the only means of determining hearing sensitivity. Because hearing sensitivity is directly related to communication ability, routine audiometric assessment is necessary to identify children who require aggressive management to maintain their hearing within normal limits.

Recommended Audiologic Guidelines

Therefore, the American Academy of Audiology recommends the inclusion of the following principles in the Clinical Practice Guidelines:

1. That the identification process include screening of hearing, middle ear function, and communication development, particularly in "at-risk" populations. Such groups would include infants who develop otitis media at or before the age of six months, infants and young children care for in multi-child day care settings, and infants and children with known risk factors such as those with cleft lip or palate, native Americans, or those with Down Syndrome.

Children who have had middle ear effusion which persists for three months despite medical treatment, should be given monitoring hearing screenings, routine tympanometry, and language and speech screenings. Those children who fail any of these screening procedures should be referred for complete assessment with in-depth testing. Those children for whom communication skills are found to be delayed or abnormal, may need more assertive medical attention, and possibly appropriate communication therapy from a certified/licensed speech-language pathologist.

2. The assessment process should include complete audiologic evaluation to characterize the audiometric profile including the configuration and degree of hearing loss or each ear independently using air and bone-conduction testing.

In addition, it would be appropriate to include speech audiometry tests of speech thresholds and word recognition abilities (including higher-order auditory processing capabilities when

indicated), acoustic immittance assessment, and a formal language screening of the child's receptive and expressive language abilities. Children failing this screen should be referred to a certified/licensed speech-language pathologist for a formal comprehensive evaluation and for the determination of the need for therapeutic intervention.

3. Audiometric monitoring of hearing sensitivity should be a routine component of the management process. Children having documented histories of otitis media and accompanying hearing loss should receive periodic hearing evaluations by a certified/licensed audiologist even when they appear to be symptom-free. In particular, hearing assessment should be completed at the onset of the school year in pre-school and elementary students, and at least once during the winter months.

The management of infants and young children with otitis media and must further include parent/caregiver and teacher awareness of the implications of hearing loss on the communication process. We concur with the 1984 American Academy of Pediatrics position station that parents should be informed that a child with otitis media may not hear normally. We also agree with the American Academy of Pediatrics statement that any child whose parent expresses concern about whether the child hears, should be referred for behavioral audiometry without delay.

Additional management considerations might include

(a) the provision of information on optimizing auditory-based communication strategies during bouts of otitis media when hearing sensitivity might be compromised;

(b) the monitoring of auditory behaviors which might signal subsequent episodes of otitis media;

(C) suggestions for optimizing the classroom environment for all children who might experience "minimal fluctuant hearing losst" through the reduction of classroom noise and/or the provision of soundfield amplification systems.

Summary

In summary, the American Academy of Audiology recognizes that there are children who do not function to their full communicative and developmental potential because of hearing loss associated with early, recurrent episodes of otitis media with effusion. To be sure, not all children are affected, but through the development of well-founded Clinical Practice Guidelines, that include our suggested audiological screening, assessment and management procedures, we can substantially decrease the number of children who will be burdened with persistent communicative and learning deficits related to undetected and/or untreated otitis media.

Questions and Answers about Otitis Media, Hearing and Language Development

Source

American Speech-Language-Hearing Association

Forums

Health, Safety, Nutrition and Kids

Related Articles

General Information about Speech and Language Disorders

Middle Ear Fluid in Young Children

What is otitis media?

- Otitis media is an inflammation in the middle ear (the area behind the eardrum) that is usually associated with a buildup of fluid. The fluid may or may not be infected.
- Symptoms, severity, frequency, and length of the condition vary. At one extreme is a single short period of thin, clear, noninfected fluid without any pain or fever but with a slight decrease in hearing ability. The other extreme is repeated bouts with infection, thick "glue-like" fluid, and possible complications such as permanent hearing loss.
- Fortunately, with early identification, serious medical complications can be controlled with medicine or surgery. However, there is one problem that nearly always occurs with all types of otitis media-fluctuating hearing loss.

How common is otitis media?

- Otitis media occurs most frequently in children. In fact, it ranks second to the common cold as the most common health problem in preschool children. Fifty percent of children have had at least one episode by one year of age. Between one and three years, 35% will have had repeated episodes. For school children, an estimated 5 million school days are missed every year due to otitis media.

Why is otitis media so common in children?

- The Eustachian tube, a passage between the middle ear and the back of the throat, is smaller and more nearly horizontal in children than in adults. Therefore, it can be more easily blocked by conditions such as large adenoids and infections. Until the Eustachian tube changes in size and angle, children are more susceptible to otitis media.

How can otitis media cause a hearing loss?

- Three tiny bones in the middle ear carry sound vibrations from the eardrum to the inner ear. When fluid is present, the vibrations are not transmitted efficiently and sound energy is lost. The result may be a mild or even a moderate hearing loss. Therefore, some speech sounds may be muffled or inaudible.
- Generally, this type of hearing loss is temporary. However, when otitis media occurs over and over again, damage to the eardrum, the bones of the ear, or even the hearing nerve can occur and cause permanent hearing loss.

Can hearing loss due to otitis media cause speech and language problems?

- Children learn speech and language from listening to other people talk. The first few years of life are especially critical for this development.
- If a hearing loss exists, a child does not get full benefit of language learning experiences. Consequently, critical delays in speech and language development may occur.
- Otitis media without infection presents a special problem because symptoms of pain and fever are usually not present. Therefore, weeks, and even months, can go by before parents suspect a problem. During this time, the child may miss out on hearing the speech and language needed for normal development.

How can I tell if my child might have otitis media?

- Even if there is no pain or fever, there are other signs you can look for that may indicate chronic or recurring fluid in the ear: inattentiveness, wanting the television or radio louder than usual, misunderstanding directions, listlessness, unexplained irritability, pulling or scratching the ears.

What should I do if I think that otitis media is causing a hearing, speech, or language problem?

- A physician should handle the medical treatment. Ear infections require immediate attention, most likely from a pediatrician or otolaryngologist (ear doctor). If your child has frequently recurring infections and/or chronic fluid in the middle ear, two additional specialists should be consulted: an audiologist and a speech-language pathologist.
- An audiologist's evaluation will assess the severity of any hearing impairment, even in a very young or uncooperative child, and will indicate if a middle ear disorder is present.
- A speech-language pathologist measures your child's specific speech and language skills and can recommend and/or provide remedial programs when they are needed.

Will my physician refer my child for these special evaluations?

- As a parent, you are the best person to look for signs that suggest poor hearing. The American Academy of Pediatrics recognizes this when it states, "Any child whose parent expresses concern about whether the child hears should be considered for referral for behavioral audiometry without delay."
- Parents should not be afraid to let their instincts guide them in requesting or independently arranging for further evaluation whenever they are concerned about their children's health or development.

How can I find an audiologist or speech- language pathologist?

- For a complete listing of professional services in audiology and speech-language pathology in your state, write or call:
- **American Speech-Language-Hearing Association**
  - 10801 Rockville Pike
  - Rockville, Maryland 20852

Appendix C

Sound Field Amplification

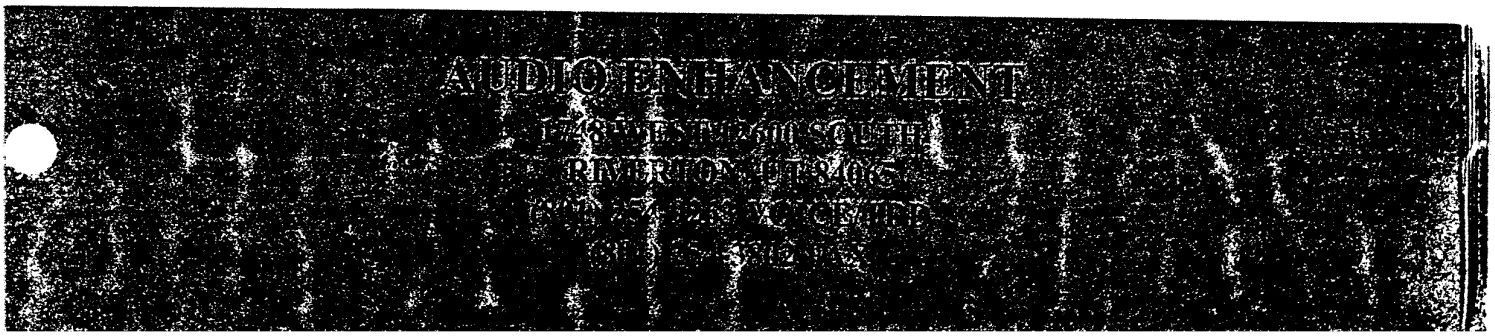
OMNI BASIC

OVERALL SPECIFICATIONS

Transmitter/Receiver
Frequency Range: 169 - 216 MHz
Frequency Response: 40 Hz to 15 KHz, (+) (-) 3 dB
Microphone: Uni Electret
Input Impedance: 2.2k OHMs
Battery: 9 Volt Alkaline
Battery Life: 20-25 hours
RF Output: 30 m.W
Possible Acoustical Gain: Up to 15 dB
S/N Ratio: Better than 95 dB
Oscillator/Modulation: Crystal Controlled/F.M.

Amplifier
Audio Power: 40 Watts peak 20 Watts RMS
Frequency Response: 40 Hz to 20 kHz
Power Requirements: 18 VAC 50 VA
Controls: 2 - Teacher volume control
1 - Auxiliary volume control
1 - Power switch
Inputs: 2 - Internal F.M. receiver modules
2 - Auxiliary (RCA type, Hi Z, mixed)
Indicators: Power on LED
Dimensions: 8"W x 5"H x 6"D

Speakers
45 Watts R.M.'s per speaker, (65 Watts Max)
8 OHMS
High Power-Low Distortion
50 Hz - 22 KHz
Dimensions: 7 1/4" x 4 3/4" x 3 3/4"
AC Power Requirements: 115 Volt AC

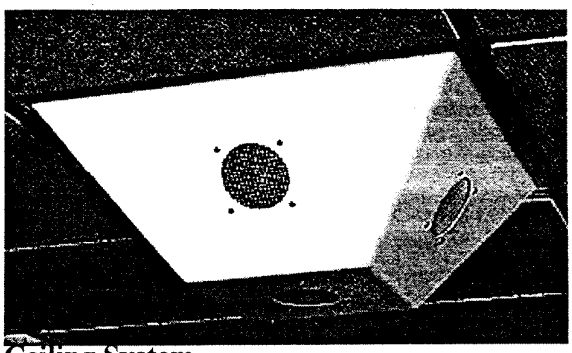


TELEX.

ClassMate Sound Field Systems

The ClassMate All Hear Ceiling Sound Field System.
The word from above has never been clearer.

Maximum Intelligibility. Minimum Interference.
The ClassMate AllHear Ceiling Sound Field System features a ceiling unit with 5 speakers, one more than other systems. As a result, sound is distributed more evenly throughout the classroom for maximum speech intelligibility.


Ceiling System

With 48 frequencies available, including 18 in the new, interference free 216-217 MHz frequency band, the ClassMate AllHear Ceiling System can provide virtually every classroom with a clear, clean signal.

Each ceiling speaker comes with a built in amplifier and FM receiver so you don't have to give up valuable shelf space for a separate amplifier and receiver. We've even put the volume control on the transmitter so it's easy for teachers to adjust the loudness level.

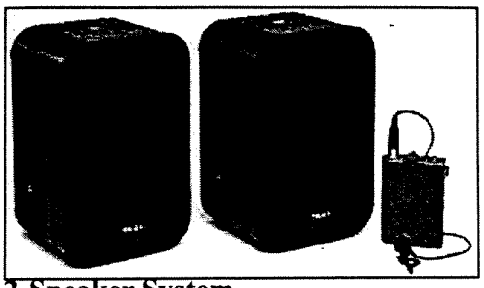
Easy to Install.
With the ClassMate AllHear Ceiling System, installation is a breeze. The ceiling speaker is designed to rest in the framework of most suspended ceilings. In any other ceiling, only two screws are required for installation. You don't even have to run speaker wires because, like all ClassMate products, the AllHear Ceiling System is completely wireless.

Team Teaching and Small Group Learning.
The ClassMate AllHear Ceiling System also comes with a Team Teaching option. The Team Teaching system features two transmitters and a ceiling speaker with two built in FM receivers. It lets two teachers speak to the class at the same time without having to pass a transmitter back and forth. No other ceiling speaker system has this option.

In addition, individual ClassMate shelf speakers ordered on the same frequency may be used in combination with the ceiling speaker for small group learning activities. With this combination, the teacher can speak to the whole class at once via the ceiling speaker, and switch to the individual speakers when involved in small group learning activities. All with one system, and all with no wires. Teachers don't even have to change channels or transmitters because each individual speaker has its own on/off switch.

ClassMate Sound Field Amplification System

The ClassMate 2-Speaker System features wireless shelf speakers that are very easy to install. Just plug them in and go. They can be used alone or in combination with ClassMate ceiling speaker systems.


2-Speaker System

Examples of situations effectively served by shelf speakers are:

- When system portability is a requirement.
- If there is a noise source in the room, placing a shelf speaker near the noise source (e.g. wall fan systems), and facing the speaker towards the listening area can improve intelligibility.
- For classrooms that incorporate small group learning activities. (For classrooms that incorporate both large group and small group learning activities, combine a central ceiling speaker and shelf speakers. Use the ceiling speaker for the large group situations. For the small group activities, turn the ceiling system off and the shelf speakers on to maximize intelligibility within each small group.)
- In an open concept classroom situation. Again, the shelf speaker should face the learning area.
- For especially narrow classrooms or L-shaped rooms. (For L-shaped rooms, combine shelf and ceiling speakers.)
- Because the student next to the speaker needs extra gain (e.g. cochlear implant students).

Request Information


Hearing Instruments Group


Telex Main Menu

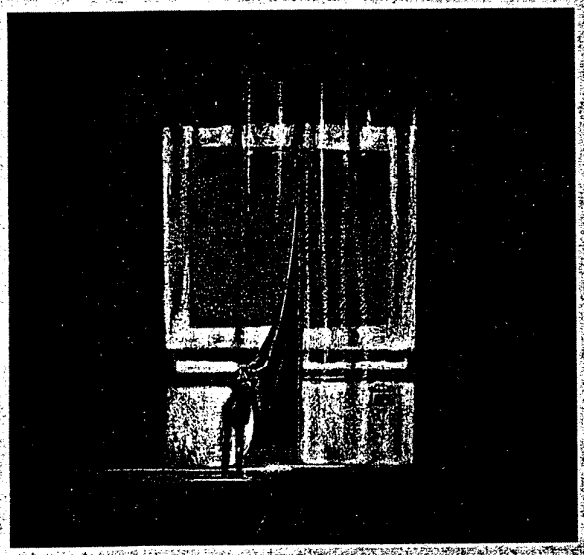
The EASY LISTENER sound field system is an economical, easy-to-install PA system. It's particularly appropriate for rooms in which speech clarity is compromised by noise, echo, and distance from the speaker. Studies have shown it to improve concentration and performance in noisy classroom environments.

Unlike traditional FM systems, the EASY LISTENER sound field system doesn't require listeners to wear receivers. Instead, speech is amplified 10 dB to 12 dB above room noise through a single ceiling speaker or through speakers placed around the room. This type of amplification allows the person speaking to move freely about while it improves speech clarity and helps reduce vocal fatigue.

Improves Signal-to-Noise Ratio through	*Wireless FM microphone and free-standing or ceiling speakers*
Common Applications	*Classrooms • Meeting rooms*
Technology	*FM*
Transmitter	*Body-worn*
Receiver	*Base-station*
Available Frequencies	*Up to 40 narrow-band (depending on your region)*
Channels	*1-6 crystal-controlled*
Range	*30 m (100 ft)*
Fitting Range	*Minimal to mild*
Fitter Controls	*None*
User Controls	*FM Volume • Auxiliary Volume • Tone • Off*
Installation	*Receiver • Speaker(s)*
Portability	*Suitcase*

ALD update: New trends and products in assistive technology

By Sara Bloom



In any discussion of assistive technology, a good place to start is with Cynthia Compton, director of the Assistive Devices Center at Gallaudet University's Department of Audiology and Speech-Language Pathology. Articulate, knowledgeable, and passionate about the importance of assistive products as part of a total program to solve the communications problems of deaf and hard-of-hearing people, Compton reads the literature, tests the products and, with Siskel-and-Ebertlike decisiveness, gives a thumbs up—or down—on new entries to the marketplace.

Happily, Compton likes what she is seeing lately. "Today's ALD technology is less about products performing new tasks and more about products performing tasks better," she says. "ALDs are less bulky, easier to use, and more versatile than their predecessors; they provide clearer speech discrimination than ever before and they offer compatibility features that respond to a technology-driven lifestyle."

This article will explore some current trends in assistive technology and also will call your attention to a number of ers and distributors of assistive listening devices and systems, some of which—but certainly not all—will be mentioned here. Hearing professionals can contact those manufacturers and distributors for more information about their products, or other providers of their choice for equipment that performs similarly.

SOUND FIELD FM AMPLIFICATION

Proponents of sound field amplification, a growing trend in educational audiology, point out that general amplification in classrooms enhances the learning environment and, as a result, the learning potential for all students—whether or not they have a hearing loss. Amplifying the teacher's voice, they say, overrides distracting environmental sounds and delivers information equally to every student, no matter if the learner is positioned right next to the teacher or in the back row.

So convinced is Carol Flexer, PhD, professor of audiology at the University of Akron, about the effectiveness of sound field FM technology that she predicts that every classroom in the country will be amplified by the year 2005. "Amplifying classrooms thoughtfully and appropriately can make a profound contribution to the education of children," she says.

Frequency-modulated (FM) sound field amplification systems are similar to small, high-fidelity, wireless, public address systems that are self-contained in a classroom. The teacher wears a small, unobtrusive wireless microphone that delivers speech to students through wall- or ceiling-mounted loudspeakers, providing a clear and consistent signal to all pupils at all times.

Improved academic performance

Sound field FM systems are not replacements for personal FM units, Flexer cautions. A personal FM, where speech travels from the teacher's microphone directly to the headphones of an individual student's FM unit, provides the most favorable signal-to-noise ratio. However, sound field FMs, where speech travels to a loudspeaker, improve the overall classroom signal-to-noise ratio (S/R) by about 10

The company's Vibrasound extra-loud alarm clock, out only 4 months, incorporates all the usual timekeeping features in a sleek, new design, plus it includes a loud wake-up alarm, adjustable pitch and gain capability, bedshaker jack, and a 50 Hz-to-60-Hz switch for travel abroad.

Silent Call Corp. of Waterford, MI, a well-known name in amplification, alerting, and communication products for hearing-impaired persons, offers a full catalogue of equipment for home and business use. Noteworthy innovations introduced in 1997 include the Coordinator Home/Business Paging System and the Silent Servant Welcome Kit for hotels, guest houses, and hearing-impaired individuals who travel frequently.

The Coordinator can send and receive messages up to 2 miles, can page and monitor equipment, and acts as a silent alarm with a vibrating alert signal. The Welcome Kit is a one-stop ADA-compliant product that contains an alarm clock, wireless strobe receiver, bed vibrator activated by telephone or doorbell, full-feature TTY, smoke detector, and telephone amplifier. It's compact, comprehensive, and easy to use, says George Elwell, Silent Call's president, who reports that the company has received two research grants in conjunction with Michigan State University to develop new home-use products for introduction in 2 or 3 years.

FINAL THOUGHTS

Can those 150 manufacturers and distributors of ALDs be wrong? Judging by the breadth of the field, the depth of commitment to research and development, and the proliferation of products on the market, the need—and the demand—for assistive listening equipment is tremendous. Likewise, providing this help to those who can benefit from it is tremendously rewarding.

To those already familiar with the advantages of assistive products as part of a complete hearing care program, the recent technologic advances mentioned in this article no doubt will enable your hard-of-hearing patients to reap the benefits. To others, perhaps what you have learned about the enhanced capabilities of new assistive products and their promise to ease the burden of your hearing-impaired patients will tempt you to investigate them further.

As Cynthia Compton of Gallaudet points out, "Hearing aids help patients *hear* better. But, with a little extra assistance, some patients in some situations can *live* better." (HJ)

Sara Bloom, a freelance writer in Scarsdale, NY, is a frequent contributor to *The Hearing Journal*.

with mild to moderate hearing impairments, or with cochlear implants; students with language, learning, or behavioral problems; students with central auditory processing or attention-deficit problems; and international students working to differentiate unfamiliar speech patterns and sounds.

"A positive acoustic learning environment can make the critical difference between the success or failure of a child's educational experience," Flexer says.

School districts are responding

Educational audiologist Dorinne S. Davis, MA, CCC-A, agrees. President of Hear You Are, an educational skills center in Netcong, NJ, Davis consults to school districts throughout the state and reports a rising acceptance rate among district administrators for the technology. Hard-wired systems for learning-disabled, deaf, and hard-of-hearing students are in widespread use, says Davis, but with a wireless system, the teacher is free to walk around the classroom and proceed with lesson plans in a more natural learning environment.

"About 15 years ago, Project MAARS, an amplification resource room study, documented improved learning results through testing in grades four, five, and six. And, while school districts have been slow to respond, the trend is there," Davis says. Today, sound field technology is in place in at least some school districts in most states across the country.

Some representative systems

Patrick Henry, national sales manager for Telex Communications in Minneapolis, reports a 300% increase in sales last year on the company's new wireless ClassMate AllHear Ceiling Sound Field System. The unit broadcasts through five speakers, each with its own amplifier, volume control, tone control and on/off switch. In addition, the system offers a team-teaching option with controls for two teachers to speak at once without having to pass a transmitter back and forth.

Phonic Ear Inc. in Petaluma, CA, is successfully marketing its Easy Listener sound-field system, plus accessory products that include a wireless pass-around microphone for improved interaction between students and teachers, and a boom microphone with a mute switch for greater flexibility in targeting information to specific groups within the classroom.

Lots of support materials help audiologists working in the schools understand fully how to maximize the acoustic benefits of the system, says Richard Steighner, vice-president of sales, explaining Phonic Ear's new emphasis on providing "good education as well as good products."

According to Steighner, school districts aren't the only users of sound field systems. Phonic Ear's new StarSound infrared systems are becoming increasingly popular in legitimate theaters, courtrooms, churches, and also movie houses, where speech discrimination can be compromised by the loudness of special effects. Moreover, says Steighner, unlike FM, infrared systems do not require users to choose a receiving channel, which makes them somewhat easier to use. Also, in movie multiplex applications, a line-of-sight infrared system from one screen will not carry over and interfere with the sound track next door.

FCC-APPROVED MHZ BAND

In another area of innovation in assistive technology, the Federal Communications Commission (FCC) in July 1996 approved the use of the 216-217 MHz band for auditory assis-

A sample ALD demonstration center

Suppose you wanted to create a new ALD demonstration center. What kinds of products would you include, and which companies, from the scores currently supplying the industry, would you choose?

Westchester County Medical County, a large hospital complex located about 20 miles north of New York City, recently renovated its Speech and Hearing Center to include an ALD demonstration area. How the medical center equipped its new department might help others begin to sort through the dizzying array of ALD providers and their products.

Point of View

Several key elements make the new center attractive to potential users. It's a bright, inviting room, where products are displayed openly, not locked up in cabinets, all of them connected to power sources or set up with fresh batteries so they function and encourage visitors to try them out. Also, the staff of 5 audiologists, supervised by Glen Datres, MS, CCC-A, knows how the products work; by demonstrating ease of operation, the staff guides those with hearing impairments to the help they need.

Among the alerting devices, the Speech and Hearing Center chose a clock with pillow vibrator, strobe light and loud alarm features by Global Assistive Devices, a Sonic Alert unit that detects smoke, fire, telephone, and a baby's cries with a flashing light, and a Tactaid vibrator that senses seven different sounds.

Visitors easily can compare hard-wired vs. wireless personal systems by testing a new, more costly FM auditory trainer against the older technology of the hard-wired PockeTalker, both by Williams Sound Corp. The company's infrared system can be tested in the WCMC's auditorium.

The all-encompassing Chorus, by Audiological Engineering Corp., offers snap-in FM or infrared modules for use in public buildings, plus an optional extension that connects to a Datawave speaker for stereo or TV at home.

Telecommunications a priority

The center's telecommunications display is particularly inviting with its array of operable units that illustrate various features. For instance, the Walker Clarity provides two levels of amplification more in the high frequencies; Ameriphone offers 30 dB of amplification with large, easy-to-manage buttons; Ameriphone's voice carry-over (VCO) system combines a standard telephone with a visual printout screen so that all members of the family can use it. Strap-on and in-line amplifiers and a vibrating pager by Walker are displayed as well. Above the phone display is a working television set with audio and closed captioning.

While there may be larger demonstration centers elsewhere, the one at WCMC covers all categories of ALDs without overwhelming visitors. The ALD department is a nonprofit, noncommissionable service provided by Westchester County, where "clients get only what they need," Datres says.

—SMB

Classroom Management Of Children With Minimal Hearing Loss

BY CAROL FLEXER

"We've finished all the hearing testing for your child and everything is okay. He doesn't seem to hear perfectly, but his hearing levels are around 20 dB to 25 dB. We consider this within the range of normal hearing. He needs to have his hearing checked periodically, but right now there doesn't seem to be anything to worry about."

A typical counseling statement to parents? Hopefully not, because there is something to worry about. We know that when it comes to classroom learning, hearing thresholds of 20 dB or 25 dB probably aren't good enough. Fortunately, today we have both personal and sound-field FM systems to assist these children in the classroom. So, are these amplification systems used routinely? Unfortunately, no. It's our job to help change this.

To provide us with some useful information on minimal hearing loss in children is this month's Page Ten

guest, Carol Flexer, PhD. Dr. Flexer, Professor of Audiology at the University of Akron, is currently President of the American Academy of Audiology. We've managed to pull her away from her hectic schedule long enough to answer 20 Questions on this important topic.

As Carol clearly points out, minimal hearing loss in children cannot be ignored, and classroom amplification strategies must be implemented whenever possible. If we could only find a way of bottling some of Carol's energy and enthusiasm, maybe we all could take a dose and help her advocate for improved acoustic accessibility for this neglected population of children.

Gus Mueller
Editor, Page Ten

1

What do you mean by "minimal hearing loss"?

Normal hearing for children is 15 dB HL or better at all frequencies with normal middle ear function.[1,2] All else is abnormal and places a child at risk for academic failure.[3] Because the normal-hearing boundary for children is 15 dB HL and a mild hearing loss is typically considered to start at 25 dB HL, most people define a minimal or slight hearing impairment as one that occurs from 16 dB HL to 25 dB HL. Most hearing losses do not have a flat configuration (they have a slope); therefore, a hearing loss may be minimal at some frequencies and worse or better at others. The hearing loss could be sensorineural or conductive. In fact, most minimal hearing losses are caused by otitis media with effusion.

Webster defines "minimal" as "the least possible degree or quantity."[4] Unfortunately, the term erroneously implies without consequence, insignificant. Implicit in the term "minimal" is permission to provide the least possible intervention and the fewest management strategies.

2

How many children in schools have minimal hearing losses? It couldn't be too many because hearing loss is considered a low-incidence disorder.

There are about 39.5 million school children in the United States, and approximately 8 million of them have some type and degree of hearing loss.[5] Fewer than 700 audiologists are employed by school systems to manage these 8 million children.[6] Consequently, fewer than 1% of children with hearing problems are being served, an appalling figure.[5] Most of the children who are not identified, not served, or underserved are those with minimal, mild, or unilateral (stable or fluctuating) hearing impairments. Several colleagues and I recently conducted a longitudinal study and found that one quarter to one third of kindergarten and first grade children in typical classrooms did not hear normally on any given day.[7] So, we're talking about a lot of children—not just one or two per school district!

3

What kind of problems could such a slight hearing loss cause for children in classrooms?

Children with minimal hearing losses experience problems in the following areas: hearing faint or distant speech (more than 25% of classroom instruction could be missed); hearing subtle conversational cues that could cause a child to react inappropriately; following fast-paced verbal exchanges; and hearing the fine word-sound distinctions that denote plurality, tense, possessives, etc.[2,3,8] In addition, a child with a minimal hearing loss may appear immature and become more fatigued than normal-hearing classmates because of the extra effort needed to hear.[9] In fact, when teachers or parents notice attention and behavior problems, they often do not even consider hearing loss as the source of a child's problems.

4

It's hard to believe that such a slight hearing loss could be so problematic. Tell me more about the

ALD PRODUCT GUIDE

Assistive Listening Products

Manufacturers and Suppliers	Alerting devices and/or systems	Auditory trainers and/or personal FM systems	Personal amplifiers	Telecaption decoders	Telephone amplifiers	TV/radio listening systems	TTD/TTY systems	Wide-area Listening Systems		
								FM	Induction-loop systems	Infrared
ADCO Hearing Products, Inc.	●	●	●	●	●	●	●	●		
ALDS	●	●	●	●	●	●	●	●	●	●
American Loop Systems	●	●	●			●		●	●	●
Ameriphone, Inc.	●				●		●			
Audio Enhancement		●				●		●		
Audiological Engineering Corp.		●	●			●				
AVR Sonovation, Inc.		●	●					●		
Everett Assistive Devices					●					
Global Assistive Devices, Inc.	●									
Hal-Hen, Co.	●	●	●	●	●	●	●			
HARC Mercantile	●	●	●	●	●	●	●	●	●	●
Harris Communcations, Inc.	●	●	●	●	●	●	●	●	●	●
Hear You Are, Inc.	●	●	●	●	●	●	●	●	●	●
HITEC Group	●		●	●	●	●	●	●		
National Hearing Aid Distributors		●	●	●	●	●	●			
Oval Window Audio									●	
Phonak, Inc.		●								
Phonic Ear, Inc.		●						●		●
Potomac Technology	●	●	●	●	●	●	●	●	●	●
Sennheiser Electronics Corp.		●	●			●				●
Siemens Professional Products	●	●	●		●	●				●
Televox Industries	●	●	●	●	●	●	●			
Telex Communications		●								
Ultratec, Inc.	●							●		
Warner Technologies	●	●	●	●	●	●	●	●		●
Weitbrecht	●	●	●	●	●	●	●	●	●	●
Williams Sound	●	●	●		●	●		●		●

relationship between hearing and classroom learning.

In mainstreamed classrooms, hearing/listening is the cornerstone of the educational system.[8] If a child cannot clearly hear the teacher, the entire premise of the educational system is undermined. There is a big difference between an "audible" signal and an "intelligible" signal.

5

Really? What is the difference?

Speech is *audible* if the person is simply able to detect its presence. However, for speech to be *intelligible*, the person must be able to discriminate the word-sound distinctions of individual phonemes. As Mark Ross has often said, the major problem with having a hearing loss is that you can't hear so good! Consequently, speech might be very audible, but not consistently intelligible to a child with a minimal hearing loss, causing the child to hear, for example, words such as "walked," "walking," "walker," and "walks" all as "__ah."

6

If a child isn't hearing clearly, won't he or she just tell the teacher?

It seems as though people ought to know when they are missing verbal information; however, that's not the case, especially with children. The problem with "not hearing so good" is that you don't hear what you don't hear, and you don't know that you didn't hear it—because you didn't hear it! Moreover, most children (and adults, for that matter) may not know that they "misheard" a message unless they have already had experience with the language and topic under discussion. Consequently, children often have an unrealistic perception of the amount and accuracy of the information that they are receiving from the environment. So, even if a teacher asks, "Are you hearing me?", the child will almost always say, "Yes." How can a child estimate the quantity and quality of the information that he/she did *not* hear? Because hearing is a first-order event in a mainstream classroom, if children don't hear clearly and consistently their academic potential is compromised due to the acoustic filter effect of hearing loss.

7

What is "acoustic filter effect of hearing loss?"

Hearing loss of any degree can interfere with the development of a child's spoken language, reading and writing skills, and academic performance.[8,10] That is, hearing loss can be described as an invisible acoustic filter that distorts, smears, or eliminates incoming sounds, especially sounds from a distance—even a short distance. The negative effects of a hearing loss may be apparent, but the hearing loss itself is invisible and easily ignored or underestimated.

8

What does "distance hearing" have to do with learning?

Persons with hearing losses, even minimal ones, cannot receive intelligible speech well over distances. This reduction in earshot has tremendous consequences for life and classroom performance because distance hearing is linked to passive/casual/incidental listening and learning.[11] Also, the farther away a child is from the sound source, the poorer the speech-to-noise ratio.

9

How does speech-to-noise ratio relate to minimal hearing loss?

Speech-to-noise ratio (S/N ratio) is a critical concept relative to the reception of intelligible speech and the justification for using S/N-ratio-enhancing technology in addition to or instead of hearing aids in a classroom. S/N ratio is the relationship between the primary speech or input signal and background sounds. The more favorable the S/N ratio, the more intelligible that speech signal will be for a child. Adults with normal hearing sensitivity and language abilities typically require a S/N ratio of +6 dB—speech is twice the sound pressure level of the noise—for the reception of intelligible speech.[12]

Because of internal auditory distortion, children with any degree of hearing impairment need a more favorable S/N ratio of about +15 to +20 dB in the classroom, even when they are already wearing hearing aids.[12] That is, speech needs to be approximately 10 times the level of background noise. Because of noise, reverberation, and frequent changes in teacher and pupil locations in the classroom, the average classroom S/N ratio is only +4 dB, and may be worse than 0 dB, which is far from ideal even for children with normal hearing sensitivity.[13]

10

Doesn't preferential seating solve the speech-to-noise-ratio problem, especially if the teacher has a loud voice?

No!

11

Why not? After all, preferential seating is a routine recommendation?

Because the hearing sensitivity of the child, the classroom acoustic environment, and the speech of the teacher are all variables—not constants—preferential seating for acoustic advantage is ineffective. To explain, due to fluctuating middle ear systems, many otherwise typical young children do not hear well consistently.[14] Also, noise levels in classrooms can vary tremendously throughout the day depending on such factors as hall traffic, windows open or shut, blowers of fans on or off, lights humming, overheads in use, not to mention the noise that a roomful of children make. And, don't forget, the teacher is not nailed to the floor. He or she often will walk around the room when teaching. Unless all children with hearing problems (and there might be as many as 10 per classroom) can remain very close to the teacher at all times, they will not receive a consistently intelligible speech signal. Remember, noise and reverberation are not the only negative factors in classrooms. Distance from the primary sound source is also a critical variable.[15]

You asked if teachers with loud voices can overcome poor classroom acoustics.

While it might seem as if yelling should solve some listening problems, actually, it doesn't. An analysis of acoustic phonetics shows that when someone speaks loudly, vowel energy is increased, but consonant energy is not increased to the same degree.[10,13] Thus, ironically, loud speech or yelling increases audibility, but it may *decrease* intelligibility! So, a child might hear more sound from a loud-spoken teacher, but understand fewer words.

12

So, what do you do?

Recognizing that hearing is a first-order event in the classroom, I feel that our first responsibility is to provide children with clear and consistent access to spoken instruction.

13

How do you do that?

By using some form of S/N-ratio-enhancing technology, such as a low-gain, low-power-output personal FM system or a sound-field (classroom) FM amplification system, we can control the intelligibility of spoken instruction no matter where the teacher or child is located.

14

Are you saying that you might not fit a hearing aid first on a child with a minimal hearing loss; instead you might fit some type of FM system first? I thought that a hearing aid should always be the first form of amplification employed.

The type of amplification technology used depends upon your desired outcome, and the demands and constraints of the listening environment. If the desired outcome is that the child learn in the classroom, and, given that a mainstreamed classroom is an auditory-verbal environment, then we must enable the child to hear clearly and consistently in order to learn. Because of noise, reverberation, and distance factors, signal intelligibility is compromised unless the listener can be very close, physically or technologically (remote microphone), to the speaker. Therefore, some form of S/N-ratio-enhancing equipment is imperative. Note that the key to the technologic improvement of the S/N ratio is the use of a remote microphone that can be placed very close to the sound source.

15

I know what a personal FM system is, but what is a sound-field FM system?

A sound-field FM system is an exciting educational tool that allows control of the acoustic environment in a classroom, thereby facilitating acoustic accessibility of teacher instruction for *all* children in the room.[16] Sound-field FM units are small, wireless, high-fidelity public-address systems that are self-contained in a classroom.[17] The classroom is amplified through the use of one to five wall- or ceiling-mounted loudspeakers. The teacher wears a wireless FM microphone transmitter, just like the one used for a personal FM unit. The radio signal is sent to an amplifier that is connected to the loudspeakers.

16

Which has a better S/N ratio, a personal FM or a sound-field FM?

Good question. A major difference between sound-field FM units and personal FM systems is that the personal FM, if fit appropriately, can provide the most favorable S/N ratio: +20 dB to +30 dB.[18] When a personal FM unit is used, the speech signal travels directly from the microphone transmitter, which is positioned about 6 inches from the teacher's mouth, into the ear of the child who is wearing the FM receiver. In the case of a sound-field unit, the teacher's speech is transmitted from the microphone worn 6 inches from his or her mouth to the amplifier/loudspeakers, which are located at some distance from the children. The students can be consistently closer to loudspeakers than they can be to the teacher, but not as close as a child is to the headphones of his or her personal FM receiver. Typically, sound-field FM units improve the classroom's S/N ratio by about 10 dB to 15 dB.[5,17] Therefore, the decision as to which type of S/N-ratio-enhancing technology will be most appropriate depends upon the specific population of children to be served and their particular educational placements and needs.

17

What about unilateral hearing loss? Wouldn't a CROS hearing aid be most appropriate?

It depends on the situation. If the child is in a classroom and the desired outcome is the clear and consistent reception of spoken instruction, then an FM unit would be essential. In typical classrooms, a CROS hearing aid does not improve the S/N ratio.[19]

18

How do you fit a personal FM unit on a child with a unilateral hearing loss?

After evaluating numerous coupling options (Walkman headphones, earbud, standard earmold), we found that a custom standard earmold designed to accommodate the FM button receiver, with a short canal portion, belled bore, IROS venting, and a helix lock, appeared to be the most effective and comfortable way of coupling a low-gain, low-power-output personal FM unit to the *better* ear of children with unilateral hearing impairments. Such coupling allowed the children to hear the teacher at a favorable S/N ratio while not occluding their ears to their own and classmates' voices. The value of also coupling the FM to the poorer ear of a child with a unilateral hearing loss would need to be determined on an individual basis.

In addition, we are in the process of collecting data about using sound-field amplification instead of a personal FM unit, and seating the child with his or her better ear toward a loudspeaker. Sound-field FM amplification seems to hold promise for improving and controlling acoustic accessibility for this population as well.

19

Promoting S/N-ratio-enhancing technology is very nice, but children with minimal and unilateral hearing loss typically do not qualify for

special-education services in schools. How can we help these kids get what they need?

Special services for children with hearing problems in schools are mandated by two main federal laws.[21] One is the Education for All Handicapped Children Act of 1975 (Public Law 94-142). In 1990, this law was amended and its name changed to the Individuals with Disabilities Education Act (IDEA). The other law is the Rehabilitation Act of 1973, Section 504, which was amended in 1992.

IDEA provides access to special-education funds by developing an IEP (Individualized Education Plan) to identify necessary accommodations for a child who has a disability. Most students who experience minimal, mild, or unilateral hearing impairments would not qualify for special school services through IDEA because their hearing impairments might not be severe enough or the child might not yet have failed enough.

Thus, Section 504 of the Rehabilitation Act of 1973 is usually the most relevant legislation. By using the concept of "acoustic accessibility," we can recommend S/N-ratio-enhancing technology for children with minimal hearing losses.[16] That is, we can advocate proactively, stating that a child's hearing problem interferes with his or her access to spoken instruction; therefore, the child is being denied an appropriate education.

20

It seems that "minimal" is certainly not "simple." Would you say that advocacy and information provision are as critical as fitting S/N-enhancing-technology when dealing with this population of children?

Absolutely! Who will advocate for acoustic accessibility if we don't? *Nobody!* And who will recommend and fit FM technology if we don't? *Nobody!* The problem is not that other professionals care less than we do about children's opportunities to learn. The problem is that hearing loss is invisible, and minimal hearing loss seems as if it should be "insignificant." Therefore, hearing is an underestimated factor in a child's educational progression.

By providing information about hearing and by advocating for and accessing the critically important auditory modality, we can help this neglected population of children with minimal hearing impairments succeed in a mainstreamed classroom.

REFERENCES

1. Northern JL, Downs MP: *Hearing in Children* (4th ed.). Baltimore: Williams & Wilkins; 1991.
2. Dobie RA, Berlin CI: Influence of otitis media on hearing anddevelopment. *Ann Otol Rhinol Laryngol* 1979;88:46-53.
3. Bess FH: The minimally hearing-impaired child. *Ear Hear* 1985;6:43-47.
4. *Websters II New Riverside Dictionary.* New York: Berkley Books; 1988.
5. Berg FS: Characteristics of the target population. In: Berg FS, Blair JC, Viehweg JH, Wilson-Vlotman A, eds. *Educational Audiology for the Hard of Hearing Child.* New York: Grune & Stratton;1986:1-24.
6. Wilson-Vlotman AL, Blair JC: A survey of audiologists working full-time in school systems. *Asha* 1986;27:33-38.
7. Flexer C, Richards C, Buie C, Brandy W: Making the grade with amplification in classrooms. *Hear Instr* 1994;45(10):24-26.
8. Davis J: *Our Forgotten Children: Hard-of-Hearing Pupils in the Schools.* Bethesda MD: Self Help for Hard of Hearing People; 1990.
9. Anderson KL: Hearing conservation in the public schools revisited. In: Flexer C, ed. Current audiologic issues in the educational management of children with hearing loss. *Sem Hear* 1991;12:340-364.
10. Ling D: *Foundations of Spoken Language for Hearing Impaired Children.* Washington DC: Alexander Graham Bell Association for the Deaf; 1989.
11. Ross M, Brackett D, Maxon A: Assessment and Management of Mainstreamed Hearing Impaired Children. Austin TX: Pro-Ed; 1992.
12. Finitzo-Hieber T, Tillman T: Room acoustics effects on monosyllabic word discrimination ability for normal and hearing-impaired children. *J Speech Hear Res* 1978;21:440-458.
13. Berg FS: *Acoustics and Sound Systems in Schools.* San Diego: Singular Publishing Group;1993.
14. Tos M, Holm-Jensen S, Sorensen CH, Morgensen C: Spontaneous course and frequency of secretory otitis in 4-year-old children. *Arch Otolaryngol* 1982;108:4-11.
15. Leavitt RJ, Flexer C: Speech degradation as measured by the rapid speech transmission index (RASTI). *Ear Hear* 1991;12:115-118.
16. Flexer C: *Facilitating Hearing and Listening in Young Children.* San Diego: Singular Publishing Group;1994.
17. Crandell CC, Smaldino JJ, Flexer C: *Sound-Field FM Amplification: Theory and Practical Applications.* San Diego: Singular Publishing Group;1995.
18. Hawkins DB: Comparisons of speech recognition in noise by mildly-to-moderately hearing impaired children using hearing aids and FM systems. *J Speech Hear Dis* 1984;49:409-418.
19. Updike CD: Comparison of FM auditory trainers, CROS aids, and personal amplification in unilaterally hearing impaired children. *JAAA* 1994;5:204-209.
20. Cargill S, Flexer C: Strategies for fitting FM units to children with unilateral hearing losses. *Hear Inst* 1991;42(7):26-27.
21. DuBow S, Geer S, Strauss KP: *Legal Rights: The Guide for Deaf and Hard of Hearing People* (4th ed.). Washington DC: Gallaudet University Press; 1992.

CLASSROOM MANAGEMENT OF CHILDREN WITH HEARING LOSS: PREFERENTIAL SEATING IS NOT ENOUGH

Carol Flexer, Ph.D.
Professor, Audiology
The University of Akron

The population of children with hearing impairment is shifting; there is less than one-half the number of children with severe-profound hearing loss today than a decade or two ago. Conversely, there are now more than ten times the number of children with mild-moderate hearing impairments. Thus, educational management needs are changing significantly. The purpose of this presentation is to discuss audiologic, teacher, and classroom management of TODAY'S children who experience hearing problems of any type and degree, including otitis media and unilateral hearing impairment. There will be discussions and demonstrations of the technology needed to enhance a listening function: sound-field FM amplification systems, and mild-gain personal FM units. Classroom management strategies will be discussed as will the inclusion of hearing-related objectives on educational management plans.

RELATIONSHIP OF DEGREE OF LONGTERM HEARING LOSS TO PSYCHOSOCIAL IMPACT AND EDUCATIONAL NEEDS

Degree of Hearing Loss Based on modified pure tone average (500-4000 HZ)	Possible Effect of Hearing Loss on the Understanding of Language & Speech	Possible Psychosocial Impact of Hearing Loss 	Potential Educational Needs and Programs 
/ORMAL IEARING 0 - +15 dB HL	Children have better hearing sensitivity than the accepted normal range for adults. A child with hearing sensitivity in the -10 to +15 dB range will detect the complete speech signal even at soft conversation levels. However, good hearing does not guarantee good ability to discriminate speech in the presence of background noise.		
IINIMAL (ORDERLINE) -25 dB HL	May have difficulty hearing faint or distant speech. At 15 dB student can miss up to 10% of speech signal when teacher is at a distance greater than 3 feet and when the classroom is noisy, especially in the elementary grades when verbal instruction predominates.	May be unaware of subtle conversational cues which could cause child to be viewed as inappropriate or awkward. May miss portions of fast-paced peer interactions which could begin to have an impact on socialization and self concept. May have immature behavior. Child may be more fatigued than classmates due to listening effort needed.	May benefit from mild gain/low MPO hearing aid or personal FM system dependent on loss configuration. Would benefit from soundfield amplification if classroom is noisy and/or reverberant. Favorable seating. May need attention to vocabulary or speech, especially with recurrent otitis media history. Appropriate medical management necessary for conductive losses. Teacher requires inservice on impact of hearing loss on language development and learning.
ILD -40 dB HL	At 30 dB can miss 25-40% of speech signal. The degree of difficulty experienced in school will depend upon the noise level in classroom, distance from teacher and the configuration of the hearing loss. Without amplification the child with 35-40 dB loss may miss at least 50% of class discussions, especially when voices are faint or speaker is not in line of vision. Will miss consonants, especially when a high frequency hearing loss is present.	Barriers beginning to build with negative impact on self esteem as child is accused of "hearing when he or she wants to," "daydreaming," or "not paying attention." Child begins to lose ability for selective hearing, and has increasing difficulty suppressing background noise which makes the learning environment stressful. Child is more fatigued than classmates due to listening effort needed.	Will benefit from a hearing aid and use of a personal FM or soundfield FM system in the classroom. Needs favorable seating and lighting. Refer to special education for language evaluation and educational follow-up. Needs auditory skill building. May need attention to vocabulary and language development, articulation or speechreading and/or special support in reading. May need help with self esteem. Teacher inservicerequired.
)DERATE 55 dB HL	Understands conversational speech at a distance of 3-5 feet (face-to-face) only if structure and vocabulary controlled. Without amplification the amount of speech signal missed can be 50% to 75% with 40 dB loss and 80% to 100% with 50 dB loss. Is likely to have delayed or defective syntax, limited vocabulary, imperfect speech production and an atonal voice quality.	Often with this degree of hearing loss, communication is significantly affected, and socialization with peers with normal hearing becomes increasingly difficult. With full time use of hearing aids/FM systems child may be judged as a less competent learner. There is an increasing impact on self-esteem.	Refer to special education for language evaluation and for educational follow-up. Amplification is essential (hearing aids and FM system). Special education support may be needed, especially for primary children. Attention to oral language development, reading and written language. Auditory skill development and speech therapy usually needed. Teacher inservice required.

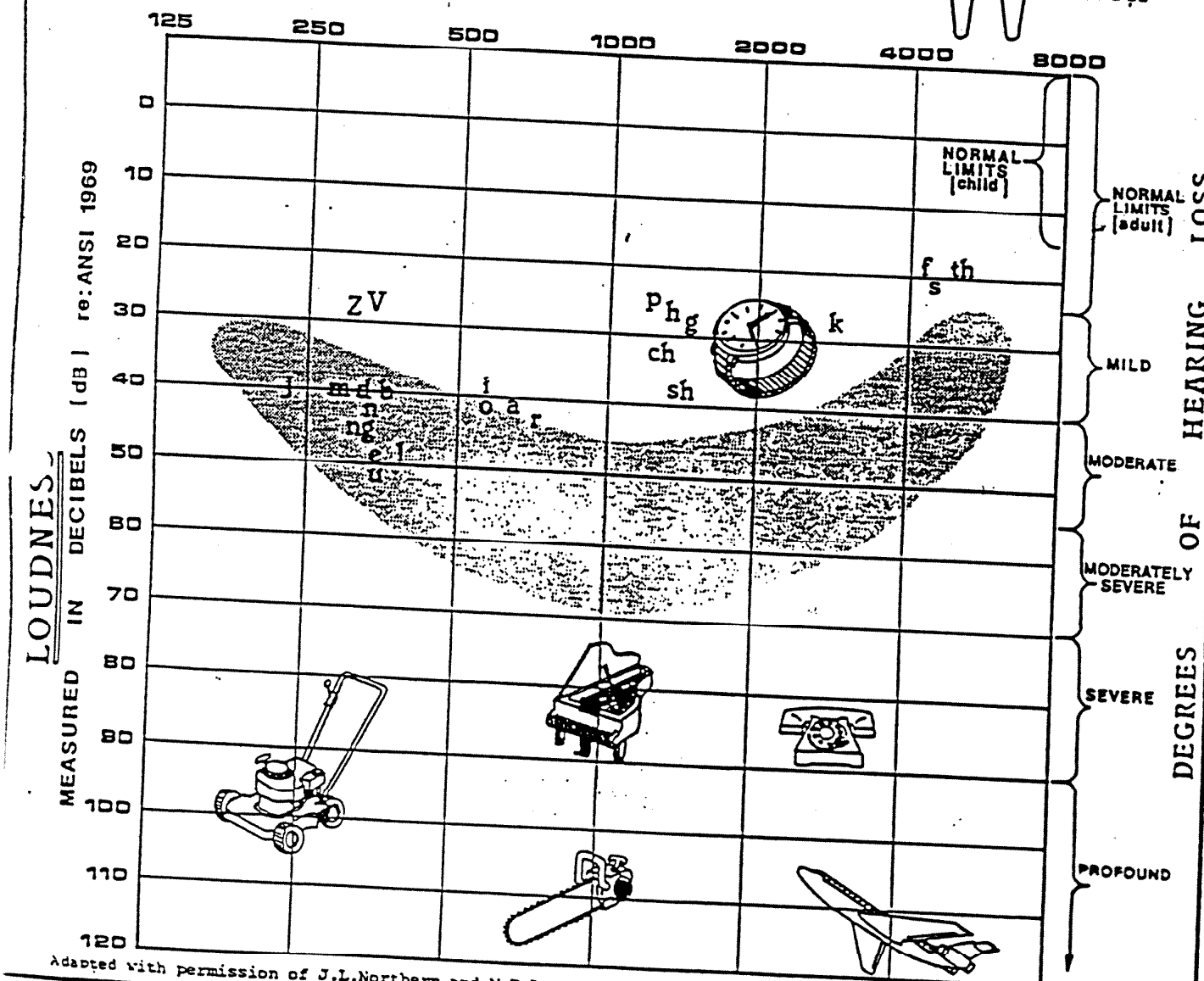
FAMILIAR SOUNDS AUDIOGRAM ©

NAME

DATE

PITCH [Or FREQUENCY]

LOW MEASURED IN CYCLES PER SECOND HIGH



Adapted with permission of J.L.Northern and M.P.Downs from HEARING IN CHILDREN, (Williams & Wilkins, 1984)

LOUDNESS LEVELS OF COMMON SOUNDS [IN DECIBELS]

10 dB	Breathing	80 dB	Rush Hour Traffic	120 dB	Jet Airport
dB	Whisper	80 dB	Food Blender	140 dB	Shotgun Blast
-80 dB	Conversation	100 dB	Train		
70 dB	Typewriter	110 dB	Chain Saw		

SHADED AREA REPRESENTS RANGE OF CONVERSATIONAL SPEECH

DOS Familiar Sounds Audiogram Form-2, 6/84

To Reorder, call or write: Louisville Deaf Oral School, 414 W. Ormsby, Louisville, Ky.. 40203

B.A.Chaudoin, M.S.,CCC-A

TABLE 1

(Adapted from Anderson in press)

HISTORY OF EAR AND HEARING PROBLEMS

Parent or guardian, please answer the following questions:

Child's Name_____ Birthdate_____

EAR PROBLEM = ear infection, ear aches, draining ears, medicine taken for ears, doctor noticed fluid behind eardrum, hole in eardrum, etc.

		YES	NO
1.	Did your child have any ear problems before the age of 1?	___	___
2.	Has your child ever had a draining ear?	___	___
3.	Approximately how many ear problems has your child had in his/her life?		
	0-2_____ 3-5_____ 6-10_____ 10 or more_____		
4.	Does your child tend to have 4 or more ear problems each year?		
5.	Has your child had an ear problem in the last 6 months?	___	___
6.	Has your child ever had an ear problem that lasted 3 months or longer? (with or without medication)	___	___
7.	Has anyone related to the child had many ear problems? (parents, brothers or sisters, cousins)	___	___
8.	Has your child ever been seen by an Ear Doctor (Otologist)?	___	___
	If yes, what Doctor _____	___	___
	Mo/Yr of last visit?_____		
9.	Has your child ever had tubes placed in his/her eardrums?	___	___
	If yes, how many times? ____ At what age(s) _____		
10.	Does your child have:		
	a) Frequent runny nose?	___	___
	b) Frequent colds or sinus infections?	___	___
	c) Allergies?	___	___
11.	Does your child have any permanent hearing loss that you know about? (For example: deaf in one ear, can't hear high pitch sounds). Please describe:		
12.	Please write any additional comments on the back.		

Completed by: _____ School _____

Date completed: _____

S.I.F.T.E.R.

SCREENING INSTRUMENT FOR TARGETING EDUCATIONAL RISK

by Karen L. Anderson, Ed.S., CCC-A

STUDENT_____ TEACHER_____ GRADE_____

DATE COMPLETED_____ SCHOOL_____ DISTRICT_____

The above student is suspect for hearing problems which may or may not be affecting his/her school performance. This rating scale has been designed to sift out students who are educationally at risk possibly as a result of hearing problems.

Based on your knowledge from observations of this student, circle the number best representing his/her behavior. After answering the questions, please record any comments about the student in the space provided on the reverse side.

ACADEMICS ☐

1. What is your estimate of the student's class standing in comparison to that of his/her classmates?	UPPER 5	4	MIDDLE 3	2	LOWER 1
2. How does the student's achievement compare to your estimation of his/her potential?	EQUAL 5	4	LOWER 3	2	MUCH LOWER 1
3. What is the student's reading level, reading ability group or reading readiness group in the classroom (e.g., a student with average reading ability performs in the middle group)?	UPPER 5	4	MIDDLE 3	2	LOWER 1

ATTENTION ☐

4. How distractible is the student in comparison to his/her classmates?	NOT VERY 5	4	AVERAGE 3	2	VERY 1
5. What is the student's attention span in comparison to that of his/her classmates?	LONGER 5	4	AVERAGE 3	2	SHORTER 1
6. How often does the student hesitate or become confused when responding to oral directions (e.g., "Turn to page . . ."?	NEVER 5	4	OCCASIONALLY 3	2	FREQUENTLY 1

COMMUNICATION ☐

7. How does the student's comprehension compare to the average understanding ability of his/her classmates?	ABOVE 5	4	AVERAGE 3	2	BELOW 1
8. How do the student's vocabulary and word usage skills compare with those of other students in his/her age group?	ABOVE 5	4	AVERAGE 3	2	BELOW 1
9. How proficient is the student at telling a story or relating happenings from home when compared to classmates?	ABOVE 5	4	AVERAGE 3	2	BELOW 1

CLASS PARTICIPATION ☐

10. How often does the student volunteer information to class discussions or in answer to teacher questions?	FREQUENTLY 5	4	OCCASIONALLY 3	2	NEVER 1
11. With what frequency does the student complete his/her class and homework assignments within the time allocated?	ALWAYS 5	4	USUALLY 3	2	SELDOM 1
12. After instruction, does the student have difficulty starting to work (looks at other students working or asks for help)?	NEVER 5	4	OCCASIONALLY 3	2	FREQUENTLY 1

SCHOOL BEHAVIOR ☐

13. Does the student demonstrate any behaviors that seem unusual or inappropriate when compared to other students?	NEVER 5	4	OCCASIONALLY 3	2	FREQUENTLY 1
14. Does the student become frustrated easily, sometimes to the point of losing emotional control?	NEVER 5	4	OCCASIONALLY 3	2	FREQUENTLY 1
15. In general, how would you rank the student's relationship with peers (ability to get along with others)?	GOOD 5	4	AVERAGE 3	2	POOR 1

Additional copies of this form are available in pads of 100 each from
The Interstate Printers & Publishers, Inc., Danville, Illinois 61834-0050.

Laws Impacting Accessibility in Schools

1. Public Law 94-142 -- Passed in 1975; Regulations adopted in 1977; The Education for All Handicapped Children Act

   Renamed in 1990 = IDEA = Individuals with Disabilities Education Act.

This law requires public school systems to provide children with disabilities a free, appropriate public education. IDEA also provides the states with money for special education and mandates clear procedural and substantive requirements on how that special education should be delivered.

2. The Rehabilitation Act of 1973, Title V, Section 504, Subpart D: Preschool, Elementary, and Secondary Education.

   This law was amended in 1978.

   This Act is called the "Bill of Rights" for persons with disabilities

No otherwise qualified person with a disability in the United States...shall, solely by reason of his or her disability be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance or under any program or activity conducted by any Executive Agency or by the United States Postal Service.

Comparison of IDEA and Section 504 of the Rehab Act of 1973:

IDEA mandates that special education and related services are to be provided through an IEP, whereas Section 504 implies that an appropriate education could be provided through regular education without the development of an IEP.

IMPLICATIONS

1. There are many more children who might be eligible to receive services through Section 504 than through IDEA. That is, children might not meet the eligibility criteria for special education...but...they still do not have access to a free and appropriate public education (FAPE) because of a disability.

2. If a child is serviced through Section 504 of the Rehab Act of 1973, a school district might be obligated to use regular education funds to provide related services or accommodations for a child who experiences a disability.

3. For children with hearing, processing, or attention difficulties, the issue that we focus on when requesting services under Section 504 is Acoustic Accessibility.

4. As audiologists, we need to demonstrate that the child in question is being denied an appropriate education because he or she does not have acoustic accessibility to instructional and/or extracurricular information.

Communication/Acoustic Accessibility in School is NOT Limited to Instructional Services

Consider the Following:

School Public Address Announcements

Fire Alarms and Other Warning Devices

Time Tests

Telephone Access

Extra Curricular Activities
such as athletics, transportation, health services, recreational activities, special school-sponsored clubs, school employment, and counseling

---

The ADA Provides Access and Removal of Barriers to the General Population when they come to school.

Consider the Following:

Public attendance at school-sponsored programs

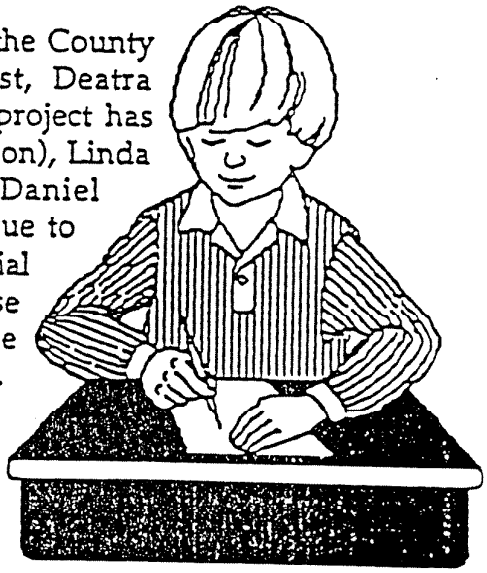
PTO Meetings

School Board Meetings

TURN ON SOUND: AN ODYSSEY OF SOUND FIELD AMPLIFICATION

Carol Flexer, Ph.D.
The University of Akron

On December 19, 1988, I visited the Putnam County Schools. The seat of Putnam County Schools is in the small town of Ottawa, Ohio, about 50 miles southwest of Toledo. Putnam County is rather isolated, very rural, limited in resources, and is made up of nine local districts. Putnam County also has 47 sound field units in place and operating, and is acquiring more each year! How did they do that? What do they know that most school districts do not know? Why are principals willing to use building funds and State flow-through funds to obtain units? Why are teachers begging for units in their classrooms and refusing to "share" units once they have one of their own? Why are parents insisting that their children have amplified classrooms? The obvious, simple answer is, as expressed by Larry Bracken, Putnam County Superintendent, "If kids hear better, they do better in school!" In fact, Mr. Bracken stated, "I feel that the promotion and use of sound field equipment is the single most innovative project for children with which I have been associated!"



Putnam County does not have an Educational Audiologist; the County received consultation from the Wood County audiologist, Deatra Popplewel. The Putnam County sound field amplification project has been spearheaded by Jan Osborn (Director of Special Education), Linda Graves (Elementary Curriculum Coordinator), and Daniel VonderEmbse (one of three County School Psychologists). Due to a constant and disturbing growth in student referrals for special services, especially for Learning Disabilities Placement, these directors of special services felt that alternative prevention/intervention options needed to be investigated. Their first step was to explore the link between hearing loss, specifically mild-moderate fluctuating hearing loss associated with otitis media, and the need for special services.

The County office purchased a sound room to screen hearing, because they agreed with the literature that a 15dB hearing loss can be educationally significant. That is, even though a 15dB hearing loss would not label children as "hearing handicapped", a 15dB hearing loss could put children "at risk" for educational difficulties. They found, in the primary grades, that when a 15dB criterion was used, 43% of the students failed the hearing screening on any given day! Even more astounding, approximately 75% of the primary-level children in the first LD class tested, failed the hearing screening. Because classroom instruction is auditory-verbal in nature, with information being presented through speech, the fact that about one-half of the class is not hearing clearly, is detrimental to instruction!

This hearing loss information was presented to school principals along with the suggestion that amplified classrooms could directly address the problem of hearing. In addition, the County wanted to do a three year study of amplification effects on achievement. Seventeen sound field units were obtained that first year, growing to 47 by the third year of implementation.

A great deal of data has been obtained and is in the process of being analyzed through the

(Continued from Page 6)

University of Toledo; and will hopefully be published soon in administration journals.

The following is a summary of the findings:
1) Hearing loss statistics have been stable over the three years studied. That is, about 43% of primary-level students continue to fail a 15dB hearing screening and/or immittance screening on any given day.

2) Even though the overall County pupil count has gradually increased during the three years studied, the number of students receiving special services has decreased from 945 prior to amplified classrooms, to 850 children in 1988. Think about what that decrease means in terms of the money needed to provide special services to even a single child!

3) Using the IOWA TBS to evaluate achievement in amplified as compared to unamplified classrooms, the following was noted: The amplified Kindergarten classes showed the most dramatic results with significantly higher scores on listening, language, and word analysis. The amplified first grade classes showed superior performance on word analysis and vocabulary. The amplified second grade classrooms showed better scores on math concepts and computation, and amplified third grade classrooms showed superiority on math computation and concepts, and reading.

4) Formal classroom observations in amplified and unamplified classrooms showed that students in amplified classrooms had better student production and on-task behaviors. Kindergarten teachers in amplified classrooms tended to talk more evenly, with less repetition and less rephrasing.

5) Principals have noticed fewer teacher absences due to fatigue and laryngitis.

6) The FM microphone has been incorporated into instructional activities, and teachers report that children use better voicing, longer utterances and display more confidence when using the microphone.

In my opinion, Putnam County has done all the right things for the right reasons. The project is motivated and directed by very dedicated and caring professionals in the County Office. The equipment has been carefully selected and maintained. Principals and teachers have received in-services and support; equipment has not simply been installed and forgotten. Questions and/or difficulties receive immediate attention.

Putnam County has shown us that it is worthwhile and operational to install and use numerous sound field units; and I applaud their efforts. Putnam County has "discovered" what we, as audiologists, have been saying for years: Hearing Matters!

For additional information, contact Jan Osborn, Linda Graves or Daniel VonderEmbse at Putnam County Schools, P.O. Box 190, Ottawa, Ohio 45875. Phone: 419-523-5951.

Assignment: A study of fluctuating hearing loss and teacher-rated performance.

Making the grade with amplification in classrooms

CAROL FLEXER, PHD; CATHERINE RICHARDS, MA; CHERYL BUIE, MA; AND WILLIAM BRANDY, PHD

Mainstream classrooms [illegible]verbal environments. That is, instruction is presented through the speech of the teacher with the assumption that students can hear and attend to spoken communication.[8] Also, research by Elliott, Hammer and Scholl[7] revealed that auditory discrimination has primary importance for the development of the basic academic competencies that underlie school success. Logically, then, improvement of students' abilities to hear and attend to the teacher's speech should enhance pupil performance.

A major problem in the typical classroom is that background noise levels tend to be similar throughout the room, but the teacher's speech level at the student's ear gets weaker as the distance between teacher and student increases. Therefore, in some locations, the speech-to-noise ratio (the ratio in dB of the speech signal level to the ambient noise level) may be so poor at the student's ear that critical speech components are masked by noise.[10]

Another problem is that some students will not be hearing normally on any given day. Otitis media is the primary cause of hearing loss in children, and even a minimal hearing loss can interfere with academic performance.[11]

Purpose of the study

There were three purposes of this study. The first was to determine the incidence of early and continuing hearing problems in typical kindergarten and first grade children. The second was to assess whether or not sound field amplification is effective in typical classrooms (sound field amplified rooms versus rooms with no sound field amplification). The third was to assess, as a function of the amplified classrooms, teacher-perceived performance of the group of children with early and continuing histories of hearing problems versus teacher-perceived performance of the group of children with no known histories of hearing problems. That is, do typical children benefit as much from sound field amplification as those children with known histories of middle ear/hearing problems?

Method

Subjects — Six regular kindergarten and six regular first grade classrooms were selected from the same school district; three classes were amplified per grade and three were unamplified per grade. A total of 282 children were in the 12 classrooms. None of the children had been diagnosed as experiencing hearing impairment or any other disability. In addition, there was no attempt made to influence the assignment of children to classrooms.

The students in this study were from a suburban school district in a medium-size midwestern city. This school district has an enrollment of approximately 5900 students. Socioeconomic status is predominantly middle class (only 7% of the system's population qualifies for the Federal Free Lunch Program).

Equipment — The sound field systems used in the six amplified classrooms were the Omni-2001 units. These units include a Comtek M-72LS transmitter, AT-831 unidirectional microphone, SC2001 AC/DC powered receiver amplifier (which also houses a loudspeaker) and two SC20002 add-on loudspeakers.

The two loudspeakers were mounted approximately five feet up the side walls of each classroom, and the third loudspeaker/amplifier was positioned approximately three feet high in the back of the room. The teacher speaking from the front of the classroom provided the fourth "speaker" location.

Measures were made of both the ambient levels and variations in teacher speech intensity at five evenly spaced positions around each classroom, following the protocol used by Flexer, Millin and Brown.[9] Each teacher spoke at typical classroom teaching intensity, first without amplification and then with the amplifier functioning. A-weighted, overall sound level measures were made in unoccupied and then occupied classrooms. The objective was to obtain an amplified level which was as nearly constant as possible at all room positions. The A-weighted unamplified voice levels were clearly uneven across positions. Amplification increased the overall speech level by an average of 10 dB across positions, and less variation in level was noted across positions.

Teachers in amplified classrooms received extensive in-service training about the purpose, function, use and troubleshooting of equipment.

What is sound field technology?

FM sound field amplification systems are small, wireless, high fidelity, public address systems that are self-contained in a single classroom. Through the use of one to five loudspeakers mounted on speaker stands, walls or ceilings, the teacher's voice is transmitted via a wireless FM unit and amplified evenly throughout the room, no matter where the teacher or students are positioned.[5]

Sound field amplification equipment is meant to enhance acoustic accessibility to teacher instruction for all children by: increasing the overall level of the teacher's speech; substantially improving the speech-to-noise ratio; and producing a nearly uniform speech level in the classroom that is unaffected by teacher or pupil position.[4, 9, 12]

Procedure — Each child in the study: 1) had their parents fill out a one-page questionnaire about their history of ear and hearing problems; 2) received four pure tone and immittance screening tests during the academic year; and 3) had SIFTERs (Screening Instrument for Targeting Educational Risk) filled out by their teachers four times during the academic year.

Ear and Hearing Loss Parent Questionnaire — Parents of children in the study filled out a one-page, 13-item "yes/no" questionnaire,[13] adapted from Anderson[2] about their children's ears and

Carol Flexer, PhD, is with the Univ. of Akron; Catherine Richards, MA, was with Ohio Head and Neck Surgeons; Cheryl Buie, MA, is with Cuyahoga Falls Public Schools; and William Brandy, PhD, is also with the Univ. of Akron.

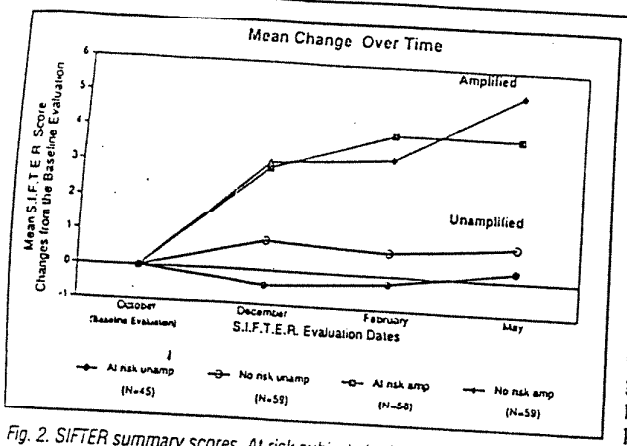


Fig. 2. SIFTER summary scores. At risk subjects had total risk scores equal to or greater than 15 on the Ear and Hearing History Questionnaire. No risk subjects had total risk scores less than 6 on the Ear and Hearing History Questionnaire.

ter screening; 96 children (34%) failed the second winter screening; and 77 (27%) failed the spring hearing screening. Thus, on any given day, one-fourth to one-third of these typical kindergarten and first-grade children were not hearing clearly enough to perceive the word-sound distinctions that underline the development of academic competencies (Fig. 1).

Note that Fig. 1 compares the percent of children in this study who were identified using the 15 dB cut-off criteria (best practice), to the percent of children who would have been identified by the school's criteria (current practice). For example, for the fall hearing screening, only 8% of the children met the school's current criteria for failure, while 33% of the children met the stricter criteria imposed by this study. The point is, most of the children identified by the stricter criteria did not require medical treatment: however, they were not hearing normally, and thus their classroom learning may have been compromised.

SIFTER

The teacher-perceived performance of the group of children with early and continuing histories of hearing problems (at risk group) was compared to the teacher-perceived performance of children who did not have histories of early and continuing hearing problems (no risk group) in Fig. 2.

The at risk group and the no risk group were identified from the Ear and Hearing Loss Parent Questionnaire using the criteria developed by Richards, Flexer, Brandy and Wray.[13] Teachers did not know which children fell into each group. The at risk and the no risk groups were further categorized as being in amplified or unamplified classrooms.

The SIFTER graph can be explained as follows. For each child, a perfect score on the SIFTER would be 75. That is, for each of the 15 times, the most positive rating would be a 5; the poorest rating would be 1. Five times 15 (15 items) is 75. A total SIFTER score was obtained for each child. Then, the total SIFTER scores were averaged for each of the four groups (at risk amplified; no risk amplified; at risk unamplified; no risk unamplified). In order to track teacher-perceived performance for the four groups across an academic year, the first SIFTER was baselined to zero. The subsequent three SIFTERS are charted as difference scores from the baseline SIFTER. For example, the at risk unamplified group (children who were in unamplified kindergarten and first grade classrooms who had scores on their Ear and Hearing Loss parent questionnaires equal to or greater than 15), did .5 points poorer on their December SIFTER than they did on their baseline October SIFTER. On the other hand, the at risk children who were in amplified classrooms performed 3 points better on their December SIFTER than they did on their baseline October SIFTER.

The last SIFTER in May shows that the children in the amplified kindergarten and amplified first grade classrooms continued to progress in their teacher-perceived performance; the at risk children improved 4 points on the SIFTER and the no risk children improved 5.5 points. In the unamplified kindergarten and first grade classrooms, the at risk children gained only 1/3 of a point over their baseline SIFTERs, and the no risk children gained less than 1 point. Note that the at risk children who were in unamplified classrooms actually performed worse during the winter months (probably due to continuing middle ear problems) than they did in the fall.

Teachers knew, of course, which classrooms were amplified. However, they did not know which children had histories of ear and hearing problems and which children did not. Moreover, we have no reason to believe that teachers in unamplified classrooms wanted their children to look as if they performed poorer than did children in amplified classrooms. On the contrary, teachers in unamplified classrooms were heard to say that their pupils probably wouldn't require the technology in order to perform well.

Teachers' comments about the sound field technology were universally favorable as were the pupil reports. In fact, teachers in the unamplified classrooms strongly requested sound field technology for their classrooms, once the study had been completed.

Children in amplified kindergarten and first grade classrooms, whether or not they had histories of ear and hearing problems, performed better according to teacher ratings, than did children in unamplified classrooms.

Conclusions

1. There was a high incidence of minimal hearing loss in typical kindergarten and first grade school children; 1/4 to 1/3 of the kindergarten and first grade children in this study did not hear normally (15 dB or better at all frequencies with normal middle ear function) on any given day.

2. This minimal hearing loss would NOT be detected by typical school hearing screenings.

3. Children with this minimal hearing loss did not necessarily require medical treatment; however, they needed to hear better in the classroom.

4. Having access to a consistent speech signal at a favorable speech-to-noise ratio benefited these children, whether or not they had histories of past and/or current hearing problems. ❐

References

1. American Speech-Language-Hearing Assn: Guidelines for screening hearing impairments and middle ear disorders. *ASHA* 32(Suppl. 2):17-24, 1990.
2. Anderson KL: Screening Instrument for Targeting Educational Risk (SIFTER). Austin, TX. Pro-Ed, 1989.
3. Anderson KL: Hearing conservation in the public schools revisited. In Flexer C (Ed.), *Current Audiologic Issues in the Educational Management of Children with Hearing Loss.* Seminars in Hearing 12:340-364, 1991.
4. Berg FS: Acoustics and sound systems in schools. San Diego: Singular Publishing Group, 1993.
5. Crandell C, Smaldino J and Flexer C: sound field amplification: A practical user's guide. San Diego: Singular Publishing Group, in press.
6. Dobie RA and Berlin CI: Influence of otitis media on hearing and development. *Annals of Otology, Rhinology and Laryngology.* 89, 168-171, 1979.
7. Elliott LL, Hammer MA and Scholl ME: Fine grained auditory discrimination in normal children and children with language-learning problems. *J Speech Hear Research* 32:112-119, 1989.
8. Flexer C: Facilitating hearing and listening in young children. San Diego: Singular Publishing Group, 1994.
9. Flexer C, Millin JP and Brown L: Children with developmental disabilities: The effect of sound field amplification on word identification. *Language, Speech and Hearing Services in Schools* 21:177-182, 1990.
10. Leavitt RJ and Flexer C: Speech degradation as measured by the rapid speech transmission index (RASTI). *Ear Hear* 12:115-118, 1991.
11. Northern JL and Downs MP: Hearing in Children. (4th edition) Baltimore: Williams & Wilkins, 1991.
12. Ray H, Sarff LS and Glassford FE: Sound field amplification: An innovative educational intervention for mainstreamed learning disabled students. *The Directive Teacher* Summer/Fall 18-20, 1984.
13. Richards C, Flexer C, Brandy W and Wray D: Signal-to-noise enhancing devices can improve kids' reading skills. *Hear Instr* 44:12-15, 1993.

EVALUATION OF CLASSROOM LISTENING BEHAVIOR

STUDENT DATA

Student Initials _____ Sex _____ D.O.B. _____ Date Completed _____

Teacher _____ School _____ Grade _____

DIRECTIONS: Rate the student on the following classroom listening behaviors on the 5-point scale.
5 = Frequently *3 = Sometimes* *1 = Seldom*

1. Responds when name is called at a close distance. (3-6 feet) 5 4 3 2 1
2. Responds when name is called at a far distance. (6-20 feet) 5 4 3 2 1
3. Attends to a single oral direction. 5 4 3 2 1
4. Attends to a series of oral directions. 5 4 3 2 1
5. Attends to oral instruction. 5 4 3 2 1
6. Comprehends oral instructions in a one-to-one situation. 5 4 3 2 1
7. Comprehends oral instructions in a group situation. 5 4 3 2 1
8. Comprehends oral instructions in a quiet environment. 5 4 3 2 1
9. Comprehends oral instructions in a noisy environment. 5 4 3 2 1
10. Comprehends oral instructions without visual cues. 5 4 3 2 1

COMMENTS:

Appendix D

Hearing Loss in Elders

AAA Position Statement: Aged Persons with Hearing Impairment

Aged Persons with Hearing Impairment

Report of the Task Force on Hearing Impairment in Aged People

One of the demographic imperatives affecting the United States' present and future course is the aging of Americans. The number of persons aged 65 years and older is growing more rapidly than the rest of the U.S. population.

The expansion of the nation's aged population has considerable implication for health status, health care utilization, and health care delivery.

Hearing impairment is the third most commonly reported chronic problem affecting the aged population. At present, more than 7 million aged persons suffer from some degree of hearing impairment. Given the rapid growth in the population over 75 years of age, it is projected that more than 11 million members of this age group will have significant hearing impairments by the turn of the century. The aging of the population will be accompanied by an increase in the prevalence and severity of hearing loss, due to the direct correlation between age and hearing loss.

Presbycusis often is defined as hearing loss associated with the aging process. However, the Committee on Hearing, Bioacoustics and Biomechanics considers presbycusis to be the sum of hearing losses which result from several varieties of physiological degeneration. These include insults due to noise exposure, ototoxic agents, polypharmacy, and medical disorders as well as the effects of physiological aging .

Irrespective of the etiology, the interference with communication created by sensorineural hearing impairment has profound negative effect on the lives of aged persons. In addition to its threat to personal safety, hearing impairment has an adverse effect on physical, cognitive, emotional, social, and behavioral function. These manifestations are often viewed by the hearing impaired person as representing a very significant handicap, despite the audiologic appearance of a relatively mild hearing loss.

Fortunately, the negative influences of hearing impairment are amenable to intervention. Hence, hearing health care professionals must strive to identify individuals with hearing impairments in order to remediate the permanent impact of hearing loss.

Identification of Impairment in the Aged Population

The U.S. Preventive Services Task Force has recommended that aged persons be screened for hearing impairment. The goal of any screening program is to reach as large a proportion of the eligible target population as possible. To this end, a number of potential settings are available for screening aged individuals for hearing impairments and handicaps. Potential settings for screening include health fairs, community based programs, primary care physician's offices, acute care settings, nursing facilities and possibly the home. Each of these settings has advantages and disadvantages, with the limiting factors in any screening setting being ambient noise level, professional resources available to administer the screen, and money available to purchase the requisite equipment. Nevertheless, a screening program should use tools that are appropriate for the particular setting, and should employ professionals who are well trained to perform the screen. Screening conducted in the offices of primary care physicians is particularly attractive because most persons over 65 years old visit their primary care physician on an annual basis and the office may provide a relatively quiet setting for screening.

A number of screening tools are available to detect clinically important hearing impairments and handicaps in aged people. An impairment is defined as "any loss or abnormality of psychological, physiological or anatomical structure or function," whereas a handicap is " a disadvantage for a given individual resulting from an impairment that limits or prevents the fulfillment of a role that is normal for that individual. Screening tools designed to detect hearing handicaps and impairments fall into two broad categories: hearing handicap scales and audiometric screening. Hearing handicap scales assess the perceived effects of hearing loss on various aspects of daily function. A screening version of one such scale, the Hearing Handicap Inventory for the Elderly (HHIE-S), is a reliable and valid method for identifying handicapping hearing impairment among aged persons. The sensitivity and specificity rates of this tool are approximately 70 to 80% for identifying hearing losses of moderate or greater degree.

An audiometric screen is a quick and valid method for detecting hearing impairment among aged individuals. Screening for hearing impairment requires the use of one of two methods:

1) a calibrated audiometer in a quiet environment,

or

2) an otoscope with a built-in audiometer (e.g. audioscope).

The advantage of using a calibrated audiometer is that it is a valid and reliable technique. The

requirement of a quiet environment, however, may not be practical in all settings. The audioscope delivers selected frequencies (500, 1000, 2000, and 4000 Hz) at one of three intensities to the entrance of the ear canal. The audioscope has an overall accuracy for hearing screening of 75-80%. Screening with both a hearing handicap scale and either an audiometer or audioscope is recommended, because the correlation between hearing impairment and handicap is imperfect. Thus, combining the two techniques may increase the overall accuracy of the screening program.

Once identified through a screening program as being likely to have a hearing impairment or handicap, an aged person should be referred to an audiologist for thorough, audiologic evaluation and appropriate recommendations for aural rehabilitation. Medical clearance should also be obtained to rule our pathological conditions that would contraindicate hearing aid use. Unfortunately, the rate of compliance with the recommendation for further audiometric evaluation among aged persons can be as low as 50% and ranges between 50 and 90%.

Moreover, in most circumstances, only 10 to 20% of this population subsequently obtains hearing aids. Barriers to compliance include confusion about the hearing aid delivery system, the cost of evaluation and hearing aids, social stigma, unwanted amplification of background noise, and myths about the efficacy of hearing aids.⁶ An integral part of any screening program should be mechanisms to enhance the probability that individuals will comply with referrals for additional evaluation and remediation.

Strategies in Intervention

The audiological evaluation establishes the need for possible aural rehabilitation and medical evaluation. In most cases, the aged person's auditory capabilities can be assessed with standard audiometric techniques. Occasionally, the behavioral assessment must be modified to accommodate physical or cognitive limitations of aged individuals. The typical presbycusic hearing loss is sensorineural, sloping, and ranges in degree from mild to moderately-severe. Moreover, pure tone sensitivity tends to deteriorate with age, and males exhibit poorer thresholds than females of comparable age.
The hearing loss observed in older people often limits their reception of conversational speech, especially in noisy environments. While the typical presbycusic hearing loss is not amenable to medical intervention, the handicapping effects of the hearing impairment often can be remedied successfully with selected audiologic intervention strategies.

Hearing aids are the principal resource for improving communication and reducing handicaps in aged people. Hearing aids amplify speech so that it becomes comfortably audible to the hearing-impaired user, but does not exceed the user's tolerance level for loud sounds. Significant improvements in hearing aid design have enabled greater flexibility in selecting hearing aids for the typical hearing loss patterns associated with aging. The newest generations of hearing aids

includes digitally controlled analog designs. In addition, hearing aids can now be modified to ease manipulation of volume controls, battery compartments, and switches, thereby improving hearing aid use for aged individuals with manual dexterity problems. Recent evidence indicates that hearing aids successfully reduce the social, emotional, and functional handicap often resulting from hearing impairment in aged people.

In addition to hearing aids, assistive living devices can be used effectively by aged people to improve communication in specific situations. Assistive listening devices transmit acoustic signals by wire, magnetic induction, infrared light or radio frequency. They are particularly useful when room acoustics are poor. The use of assistive devices is expanding in theaters, public meeting rooms, and houses of worship. They can be adapted for use in personal living areas and common areas of nursing homes where communication may be difficult.

Alerting devices, which use lights to signal fire alarms or the telephone or doorbell ringing, can reduce the hazards to safety imposed by the hearing loss.

Telephone amplifiers with adjustable volume controls are becoming an integral part of many new telephone designs.

The television caption decoder can be used by those with reasonable vision, but whose hearing is limited despite rehabilitation. Assistive listening and alerting devices are effective, and their use should be encouraged in hospitals, nursing facilities, and the home.

Hearing aids should be within the greater context of aural rehabilitation. Aural rehabilitation includes any non-medical rehabilitation. Aural rehabilitation includes any non-medical intervention designed to remediate hearing loss and improve communication. It also includes counseling the hearing-impaired person and his or her family about the implications of hearing impairment, as well as conducting a hearing aid orientation and follow-up to ensure proper hearing aid use. Suggestions for maximizing the use of visual cues and residual hearing are provided. Formal speechreading instruction or auditory training may be recommended to enhance the information received through amplification.

The aural rehabilitation process should include not only the aged hearing-impaired person, but a family member or significant other as well. For the aged individual to achieve maximum benefit, the family and health care staff must appreciate the impact of the hearing impairment, the operation of the amplification device, the benefits and limitations of the procedures being used, and their own role in improving and promoting communication.

Role of the Audiologist

The audiologist is the primary hearing health care provider for aged individuals with hearing impairment. An audiologist is a person who, by virtue of academic and clinical training, and appropriate certification and/or licensure, is uniquely qualified to provide a comprehensive array of professional services relating to the prevention, evaluation, and rehabilitation of auditory impairment and its associated communicative disorders. The audiologist may provide these services independently or as part of an interdisciplinary professional team involved in identification, diagnosis, and treatment of individuals who have disorders related to auditory dysfunction.

The audiologist serves as the primary expert in the assessment and non-medical diagnosis of auditory impairment in aged people. Assessment includes, but is not limited to, the administration and interpretation of behavioral, electroacoustic, and electrophysiologic measures of the status of peripheral and central auditory systems and measures of hearing handicap.

Methods of assessment include hearing-handicap scales, pure-tone audiometry, immittance audiometry, speech audiometry, and auditory evoked potential measurement.

Audiologists are uniquely qualified to provide a full range of auditory rehabilitative services to aged individuals. The audiologist is the primary individual responsible for the evaluation and fitting of all types of amplification systems, including hearing aids and assistive listening devices. The audiologist determines whether the aged individual is a suitable candidate for an amplification system, evaluates the benefit that the individual may expect to derive from such systems, and makes an appropriate recommendation. In connection with such recommendations, the audiologist may take ear impressions, fit and dispense the amplification system, and provide counseling regarding its use.

The audiologist also provides rehabilitative services and education to individuals with auditory impairment, to family members, and to the public. The audiologist provides information concerning hearing and hearing impairment, the use of prosthetic devices, and strategies for improving speech recognition by exploiting auditory, visual, and tactile speech information. The audiologist also counsels patients regarding the effects of auditory impairment on communicative and psychosocial status. In addition, the audiologist determines the need for additional aural rehabilitation and, if indicated, the nature of the rehabilitation program. In connection with such determinations, the audiologist may conduct individual and/or group rehabilitation programs.

The audiologist serves as an advocate for aged individuals by encouraging equal access for those with communicative disorders, by prompting "self-help, consumer groups, and by encouraging third-party reimbursement of audiological services. The audiologist should be an integral member of any multidisciplinary team involved in the evaluation of the social,

psychological, physical, and mental status of elderly people. The audiologist also serves aged people by promoting awareness of hearing impairment, available audiological services, and available remediation devices and programs to the hearing-impaired individuals, their spouses and children, and to other caretakers who constitute their support system.

Recommendations

The membership of the American Academy of Audiology seeks to maximize communication skills in aged hearing-impaired individuals. A comprehensive approach for providing effective services to aged individuals involves cooperative efforts among a variety of professional organizations and specialists. As a consequence, the Academy membership actively pursues close professional ties with other gerontology specialists toward meeting the hearing health care needs of aged people.

The American Academy of Audiology has developed five recommendations for improving the quality of life for hearing-impaired aged individuals.

1. The Academy advocates the use of screening procedures for identifying persons with hearing impairment or hearing handicap. Screening procedures should be used to identify the greatest number of hearing-impaired aged people. Screening should be coupled with efforts to maximize compliance with referral recommendations for audiologic or medical evaluation.

2. The Academy promotes the provision of high quality audiological services for aged people. State-of-the-art knowledge and technology should be applied in the evaluation of hearing impairment in aged individuals as well as in the selection of aural rehabilitative procedures, including hearing aids, for aged individuals.

3. The Academy promotes funding for research on hearing impairment and aging by government agencies and private foundations. Critical issues that need investigation include prevention of age-related hearing loss, understanding the auditory degenerative processes that account for age-related hearing loss, improving the design of hearing aids to overcome specific speech understanding problems of aged people, and developing valid outcome measures of audiological management strategies.

4. The Academy promotes equitable third-party payment from insurance companies, retirement health plans, state agencies, and federal agencies for hearing-related services and devices for aged people. The limited financial resources of many older people often restrict access to effective audiological services and therefore prevent them from receiving the benefits of a hearing aid.

Consumers

ASHA Search Site Site Index

AMERICAN SPEECH-LANGUAGE-HEARING ASSOCIATION

Assistive Listening Devices

What are Assistive Listening Devices?

Like a hearing aid, an assistive listening device make sounds louder. Typically, a hearing aid makes all sounds in the environment louder. An assistive listening device can increase the loudness of a desired sound (a radio or television, a public speaker, an actor or actress, someone talking in a noisy place) without increasing the loudness of the background noises.

Are assistive listening devices only for people with hearing aids?

No. People with all degrees and types of hearing loss -- even people with normal hearing -- can benefit from assistive listening devices. Some assistive listening devices are used with a hearing aid. Some can be used without a hearing aid.

What kinds of assistive listening devices are available?

There are many assistive listening devices available today, from sophisticated systems used in theaters and auditoriums to small personal systems. Various kinds of assistive listening devices are listed below.

- **Personal Listening Systems:** There are several types of personal listening systems available. All are designed to carry sound from the speaker (or other source) directly to the listener and to minimize or eliminate environmental noises. Some of these systems, such as auditory trainers, are designed for classroom or small group use. Others, such as personal FM systems and personal amplifiers, are especially helpful for one-to-one conversations in places such as automobiles, meeting rooms, and restaurants.
- **TV Listening Systems:** are designed for listening to TV, radio, or stereo without interference from surrounding noise or the need to use very high volume. Models are available for use with or without hearing aids.
- **Direct Audio Input Hearing Aids:** are hearing aids with audio input connections which can be connected to TV, stereo, tape, and radio as well as to microphones, auditory trainers, personal FM systems and other assistive devices.
- **Telephone Amplifying Devices:** Many, but not all, standard telephone receivers come with an amplifying coil. This coil is activated when the telephone receiver is picked up by a person whose hearing aid is in the "T" position. This position allows the aid to be used at a comfortable volume without feedback and with minimal background noise. These phones are called "hearing-aid compatible," and you should be able to get one from your telephone company. Not all hearing aids have a "T" switch so make sure that your aid has one before asking for a hearing aid compatible phone. In addition there are specially designed telephone receivers which amplify sound. Or, special amplifying devices can be purchased that attach to a regular telephone receiver. Most of these devices have volume control dials. Some are recommended only for use where all household members have hearing loss. Some return to standard sound levels automatically and can be used in homes for people with or without hearing loss.
- **Auditorium Type Assistive Listening Systems:** Many major auditoriums and

theaters, churches, synagogues, and other public places are equipped with special sound systems for people with hearing loss. Essentially, they consist of a transmitting system which uses one of a variety of method to send sound signals to an individual receiver. (Sometimes there is a rental fee for the receiver.) Some systems must be used with a hearing aid; other systems can be used with or without a hearing aid.

Where can I find an assistive listening device?

If you are considering assistive listening devices for personal use, such as personal FM systems and personal amplifiers, you should seek the help of an audiologist who has expertise in working with assistive listening devices to determine which device is best for you. An audiologist is a professional specially trained to identify and help people with hearing problems. The audiologist you select should hold a Certificate of Clinical Competence (CCC) in Audiology from the American Speech-Language-Hearing Association (ASHA). In many states a license is also required. For further information about assistive devices, including:

- Lists of certified audiologists in your area,
- Lists of assistive listening device "showrooms" in the United States
- Information about TTYs, Telecaption Decoders, and signaling/alerting devices,
- Other information about assistive listening devices, contact ASHA and ask for our ALD packet (single copy free).

AMERICAN SPEECH-LANGUAGE-HEARING ASSOCIATION
10801 Rockville Pike
Rockville, MD 20852
800-638-8255 (Voice or TTY)
301-897-8682 (voice or TTY)
E-Mail: actioncenter@asha.org

Send questions and comments to actioncenter@asha.org
Email technical questions or comments to webmaster@asha.org
This page was last updated on November 04, 1997

Appendix E

Noise Induced Hearing Loss

Consumers

ASHA Search Site Site Index

AMERICAN SPEECH-LANGUAGE-HEARING ASSOCIATION

Noise & Hearing Loss

Does Noise Cause Hearing Loss?

Yes. If you experience any or all of the following:

- a one-time exposure to extremely loud noise,
- repeated or long exposure to loud noise,
- extended exposure to moderate noise

Noise-induced hearing loss is usually gradual and painless, but, unfortunately, permanent.

How Does Noise Cause Hearing Loss?

Your ear receives sound waves and sends them through a delicately balanced system to the brain. Part of this remarkable system is a chamber in the inner ear filed with fluid and lined with thousands of tiny hair cells. The hair cells signal the auditory nerve to send electrical impulses to the brain. The brain interprets these impulses as sound. When you are exposed to loud or prolonged noise, the hair cells are damaged and the transmission of sound is permanently altered.

Am I Exposed To Damaging Noise?

Today, over 20 million people in the United States are exposed to environmental noise that can damage hearing. If you use stereo headsets, operate power tools for yard work, have a long daily commute in heavy traffic, or use a number of household appliances, you too may be exposed to potentially damaging noise. Many people are exposed to hazardous noise levels at work, including: firefighters, military personnel, disc jockeys, construction workers, farmers, industrial arts teachers, computer operators, factory workers, as well as cab, truck, and bus drivers, to name a few. Exposure to damaging noise does not come only from the workplace. Recreational activities such as hunting, motorboating/water-skiing, snowmobiling, motorcycling, and exposure to rock music or the use of stereo headsets, also expose you to hazardous noise.

What Is A Dangerous Noise Level?

Both the amount of noise and the length of time you are exposed to the noise determine its ability to damage your hearing. Noise levels are measured in decibels (dB). The higher the decibel level, the louder the noise. Sounds louder than 80 decibels are considered potentially hazardous. The noise chart below gives an idea of average decibel levels for everyday sounds around you.

Painful:
140 dB = firearms, air raid siren
130 dB = jackhammer
120 dB = jet plane takeoff

Extremely Loud:

110 dB = rock music
100 dB = snowmobile, chain saw
90 dB = lawnmower

Very Loud:
80 dB = alarm clock
70 dB = busy traffic, vacuum cleaner
60 dB = conversation, dishwasher

Moderate:
50 dB = moderate rainfall
40 dB = quiet room

Faint:
30 dB = whisper

What Are Warning Signs That Noises Around Me Are Too Loud?

- You have to raise your voice to be heard.
- You can't hear someone two feet away from you.
- Speech around you sounds muffled or dull after leaving a noisy area.
- You have pain or ringing in your ears after exposure to noise.

What Can I Do To Protect Myself?

First, avoid loud noise whenever possible. If you cannot avoid exposure to noise:

- Wear hearing protectors: ear plugs or earmuffs (you can probably get them from your drug store, hardware, or sporting goods store). Using cotton in your ears does not work. When using hearing protectors, you can still hear and understand voices and other sounds with ease.
- Have your hearing tested by an audiologist.
- Limit periods of exposure to noise; for example, if you are at a rock concert, walk out for a while -- give your ears a break.
- Be aware of the noise in your environment and take control of it when you can. Your county may have a local noise ordinance. Find out what you can do in your community to advocate for quiet. For example, some high schools have set a decibel limit for the music played at school dances to protect the students' hearing. An audiologist can measure sound levels at a specific location and make recommendations for keeping sound levels safe.

What Resources Are Available To Me If I Think I Have A Hearing Problem?

For an evaluation of hearing abilities, an audiologist should be contacted. When hearing loss is the result of current disease, or if a medical problem is suspected, a physician should be seen. The audiologist you select should hold a Certificate of Clinical Competence (CCC) from the American Speech-Language-Hearing Association (ASHA). In many states a license is also required.

AMERICAN SPEECH-LANGUAGE-HEARING ASSOCIATION
10801 Rockville Pike
Rockville, MD 20852
800-638-8255 (Voice or TTY)
301-897-8682 (voice or TTY)
E-Mail: actioncenter@asha.org

Appendix F

Funding Sources

Education Department Funding Individuals with Disabilities

Department of Education
600 Independence Ave, SW
Switzer Bldg
Washington, DC 20202

Innovative Programs for Children and Youth with Severe Disabilities Grants
Program: Support is provided to improve and develop innovative educational/training services for children and youth with severe disabilities and to increase acceptance of people with disabilities by the general public. Proposals must focus on the delivery of educational services in the least restrictive environment and/or integrated settings.
Eligibility: Public and private organizations including state department of special education, intermediate or local educational agencies, institutions of higher learning, professional organizations, and volunteer associations.
Funds: $190,000
Program no.: 84.086
Contact: Dawn Hunter, Division of Educational Services, Special Education Programs, Office for Special Education and Rehabilitation Services, (202) 205-5809.

Early Education for Children with Disabilities Project Grants
Program: Grant support for the demonstration, dissemination, and implementation of effective approaches to preschool and early childhood education for children with disabilities. Support includes parent participation, dissemination of information to the professional community and general public, and a project effectiveness evaluation.
Eligibility: Public agencies, private nonprofit and some for-profit organizations.
Funds: Average grant, $206,000
Program No.: 84.024
Contact: Gail Houle, Division of Educational Services, Special Education Programs, Office for Special Education and Rehabilitation Services, (202) 205-9045.

Postsecondary Education for Individuals with Disabilities
Program: ED seeks applications to establish four regional technical assistance center on postsecondary education for individuals who are deaf and hard of hearing to help education institutions implement proven models, components of models and other exemplary practices, including innovative technology, to increase and improve postsecondary opportunities for individuals who are deaf and hard of hearing.
Eligibility: State or local educational agencies, public and private institutions of higher learning, junior and community colleges, vocational and technical institutions and other nonprofit education agencies and organizations.
Funds: $4 million in first-year funding for four awards ranging from $800,000 to $1.2 million for a total project period of up to 60 months.
Program No.: 84.078A.

Program No.: 84.078A.
Contact: Ramon Rodriguez, above address, Room 3125, (202) 205-8555; fax, (202) 205-9252; e-mail, ramon_rodriguez@ed.gov.

Research in Education of Individuals with Disabilities
CDFA 84.023 grants provide support for the development and implementation of new or improved approaches to education for school-age children with disabilities.
Eligibility: State or local educational agencies, public and private institutions of higher learning, other public or private education or research agencies and organizations. *Contact:* For applications, Claudette Carey, Office for Special Education and Rehabilitation Services, (202) 205-9864.
Grants under this program:

1. **Student-Initiated Research**
   Program: CFDA 84.023B focuses on (a) special education and related services for disabled children and youth, or (b) early intervention services for infants and toddlers.
   Funds: Approximately 18 grants ranging from $10,000-$20,000.
   Contact: Doris Andres, above address, (202) 205-8125.
2. **Alternatives for Outcome Assessment**
   Program: CFDA 84.023F will fund projects that pursue systematic applied research on issues related to assessment or results-based accountability for disabled students such as (a) testing accommodations and adaptation, (b) providing alternative assessments for disabled students, and (c) developing more inclusive general educational assessments for disabled students.
   Funds: Approximately 5 grants averaging $175,000.
   Contact: David Malouf, above address, (202) 205-8111.
3. **Early Intervention, Special Education, and Related Services for Children with Disabilities**
   Program: CFDA 84.023N invites applications to conduct research on early intervention, special education, and related services for children with disabilities. Projects would strive to improve early intervention services for infants and toddlers, and special education for children and youths with disabilities. ED is interested in funding researchers in the beginning stages of their research careers (i.e., in the first three years following their doctoral program).
   Contact: Doris Andres, above address, (202) 205-8125; fax, (202) 205-8105; e-mail, doris_andres@ed.gov.

Technology, Educational Media, and Materials for Individuals with Disabilities
Program: Provides funds for projects and centers to advance the availability, quality, and use of new technology, assistive technology, educational media, and materials for children and youth with disabilities, and establishing partnerships with other organizations and developing and implementing a strategic plan.
Eligibility: State and local education agencies, institutions of higher education, for-profit and nonprofit public and private agencies and organizations.
Program No.: 84.180U1
Contact: Yolanda Abney or Thomas Adams, Grants and Contracts Services, 7th and D Sts SW, Room 3633, ROB, Washington, DC 20202-4337.

Education Media Research, Production, Distribution and Training
Program: ED invites cooperative agreement applications to promote the welfare of deaf and hard of hearing individuals and to promote the education of disabled individuals. Includes funding for television program closed captioning.
Eligibility: Public and private agencies, organizations and institutions.
Contact: Ernest Hairston, (202) 205-9172, fax (202) 205-8971.

Preschool Grants Program
Program: Funds to assist states in providing special education and related services to preschool children with disabilities (ages 3-5 years), and to any 2-year-old children with disabilities who will reach age 3 during the school year.
Eligibility: State education agencies.
Program No.: 84.173
Contact: Division of Educational Services, (202) 205-9097.

Infants and Toddlers with Disabilities
Program: Funds provided to assist states in developing statewide, comprehensive, coordinated, multidisciplinary, interagency systems of early intervention services for infants and toddlers with disabilities, age birth through 2 years, and for their families.
Eligibility: State education agencies and the U.S. Department of the Interior.
Program No.: 84.181
Contact: Division of Educational Services, (202) 205-9084.

Services for Children with Deaf-Blindness
Program: For infants, toddlers, children, and youth. Provides services and demonstration activities: technical assistance to agencies, institutions, or organizations that provide early intervention or educational services; personnel preservice or inservice training.
Eligibility: Public and nonprofit organizations.
Program No.: 84.025
Contact: Division of Educational Services, (202) 205-9503.

Special Studies for Persons with Disabilities Program
Program: Funds to collect data, and conduct studies, investigations, analyses, and evaluations to assess the impact and effectiveness of state and local efforts and the Secretary of the Interior's efforts in meeting the mandates of the Individuals with Disabilities Education Act to provide education for all children with disabilities, including early intervention services to infants and toddlers with disabilities.
Eligibility: State and local education agencies, higher education institutions, public agencies, private nonprofit and some for-profit organizations.
Funds: Average grant, $295,000.
Program No.: 84.159
Contact: Lou Danielson, Division of Innovation and Development, Office of Special Education Programs, (202) 205-8106.

High-Tech Special Ed Research
Program: Short-term pilot project proposals to test innovative ideas and technologies: projects to develop or adapt assistive technologies for disabled individuals; technologies to enhance job development or transition from school to work for people with disabilities; technologies to enhance learning and development for children with disabilities; and technologies to promote inclusion in regular classrooms. Also includes support for new technologies and materials to train teacher assistants working with limited-English-proficient (LEP) students; technologies to encourage acquisition of English through visual and auditory interactive teaching for LEP adults; and technologies to aid job readiness for LEP adults.
Eligibility: Small businesses; may collaborate with higher education and nonprofit institutions.
Contact: Information: John Christensen, Education Department, Office of Educational Research and Improvement, 555 New Jersey Ave NW, Room 602D, Washington, DC 20208, (202) 219-2065.
Applications: LaTona Simpson, Education Department, Application Control Center, Room 3633 Mail

Applications: LaTona Simpson, Education Department, Application Control Center, Room 3633 Mail Stop 4725, GSA Bldg, 7th and D Sts SW, Washington, DC 20202, (202) 708-8191.

Technology-Related Assistance for Individuals with Disabilities Demonstration and Innovation Projects Grants
Program: Grant support for model service delivery demonstrations, research and development, and direct loan demonstration projects to enhance the provisions of technological devices and services for individuals with disabilities.
Eligibility: Public and nonprofit organizations.
Funds: $100-$175,000
Program No.: 84.231
Contact: Carol G. Cohen, National Institute on Disability and Rehabilitation Research, (202) 205-5666. Education Department, 330 C Street SW, Washington, DC 20202-2572.

National Institute on Disability and Rehabilitation Research (NIDRR)
Program: To improve the lives of people with disabilities, especially the severely disabled, through research, NIDRR supports disability and rehabilitation research for all types of disabilities.
Funds: $10,000-$750,000; average grant, $150,000 per year.
Program No.: 84.133
Contact: Ellen Blasiotti, Fellowships Officer, (202) 205-9800, or Dianne Villines, Grants and Contracts Officer, (202) 205-5450 (Office for Special Education and Rehabilitative Services.

Rehabilitation Research and Training Centers
Program: Centers will be funded by ED to improve service systems for children and youth with serious emotional disturbances who often fall through the cracks of the education, welfare, juvenile justice, mental health, health and vocational rehab systems; to service families of children with severe emotional disturbances; to rehabilitate people with long-term mental illness, pediatric rehabilitation, emphasizing family-centered, community-based care; mental health and hearing impairment; and medical rehabilitation services.
Deadline: March 4
Funds: $400,000 to $650,000 per year for 6 centers for 3 to 5 years.
Eligibility: Public and private organizations, including higher education institutions, Indian tribes and organizations.
Contact: Dianne Villines, (202) 205-5450. CFDA 84.133B.

National Institute on Disability and Rehabilitation Research (NIDRR)
Program: NIDRR invites applications to develop solutions to and conduct research on problems experienced by individuals with disabilities in their daily lives. Emerging disabilities projects should define and characterize emerging disabilities; assess incidence and prevalence; identify associated etiologies; and evaluate implications for service systems and social policy. Rehabilitation Research and Training Centers (RRTC) should conduct research related to vocational rehabilitation for individuals who are blind/visually impaired or deaf/hearing impaired; solicit and use input form either blind/visually impaired or deaf/hearing impaired individuals to plan, develop and implement activities; and coordinate efforts with other ED grantees addressing similar issues. The Rehabilitation Engineering Research Center (RERC) should identify needs for assistive technology; develop design modifications to existing devices and disseminating the to developers; develop and evaluate unique assistive technology devices; and identify and develop solutions for problems of service delivery.
Funds: For three years: $350,000 for one emerging disabilities award; $1.3 million to two RRTC; $500,000 for one RERC.

Eligibility: For emerging disabilities, public and private nonprofit and for-profit organizations. For research centers, nonprofit or higher education institutions in collaboration with other public or private entities when appropriate.
Contact: David Esquith, Room 3424, (202) 205-8801; e-mail, david_esquith@ed.gov.

Deafness and Communication Disorders
Rehabilitation Services Administration (RSA)
605 G Street, NW, Room M101
Washington, DC 20001
(202) 205-9400
RSA, an agency of the Education Department, provides funding to improve and expand rehabilitation services for individuals with hearing impairments, speech disorders, or language disorders.

Search | Index | Professionals | Students | Consumers | Home

To email ASHA staff, go to the National Office Email Directory
Email technical questions or comments to webmaster@asha.org
This page was last updated on November 03, 1997

Speech-Language-Hearing Professionals

ASHA Search Site Site Index

AMERICAN SPEECH-LANGUAGE-HEARING ASSOCIATION

Private Funding Sources

Also on this page:

AlliedSignal
PO Box 2245
Morristown, NJ 07962
Program: The program supports individuals and organizations that focus on medical and health care problems of older people. Two types of grants are made in the field of aging: (a) two-year grants are made for a specific area of biomedical research, and (b) annual grants are made to individual investigators to initiate or continue research. Past funding has been awarded in such areas as Alzheimer's, hearing impairment, stroke, and Parkinson's disease.
Funds: One two-year grants of $200,000; four annual research grants up to $25,000.
Contact: For general program information, Alan Painter, Director, Corporate Affairs, AlliedSignal Program on Aging, (201) 455-5876. For *two-year biomedical research grants*, Alliance for Aging Research, 2021 K St. NW, Suite 305, Washington, DC 20006, (202) 293-2856. For *annual research grants*, American Federation for Aging Research, 725 Park Ave, New York, NY 10021, (212) 570-2090.

American Federation for Aging Research (AFAR)
1414 Ave of the Americas
New York, NY 10019
Program: AFAR makes grants to encourage new investigators to direct their careers into geriatrics or gerontology. Funding is provided for pilot research projects that address the basic mechanisms of aging; aging and the pathogenesis of disease; and the nature of age-related deficits, such as arthritis, memory loss, visual and hearing impairment, confusion, and incontinence.
Funds: $40,000 awarded in research grants.
Contact: Stephanie Lederman, Executive Director, (212) 752-2327.

American Speech-Language-Hearing Foundation (ASHF) Speech, Language, and Hearing Clinical Recognition Awards
10801 Rockville Pike
Rockville, MD 20852
Louis M. DiCarlo Award for Recent Clinical Achievement: ASHF awards a grant to an individual demonstrating the most outstanding clinical accomplishment that has advance clinical knowledge within the past three years. Rolland J. Van Hattum Award: Awarded to an individual demonstrating exemplary commitment and contribution in the delivery of speech-language pathology or audiology services in a school setting. Frank R. Kleffner Lifetime Career Award recognizes an individual's contribution to clinical science and practice in communication sciences and disorders over a 20-year period or longer.
Deadline: May 1
Contact: Nancy Minghetti, Executive Director, (301) 897-5700 ext. 136.

American Speech-Language-Hearing Foundation (ASHF) Speech, Language, and Hearing Clinical Research Grant
10801 Rockville Pike
Rockville, MD 20852
ASHF invites clinical researcher to submit proposals for new research, to supplement and support existing research, to acquire research equipment, to secure clinical research subjects, or to finance

existing research, to acquire research equipment, to secure clinical research subjects, or to finance research-related travel. Requirements: Applicants must have received a graduate degree in communication sciences and disorders and demonstrate at least five years of professional experience.
Funds: Average award $4,000. *Deadline:* June 1
Contact: Nancy Minghetti, Executive Director, (301) 897-5700 ext. 136.

American Speech-Language-Hearing Foundation (ASHF) Speech. Language, and Hearing Research Grants for New Investigators
10801 Rockville Pike
Rockville, MD 20852
ASHF invites clinical research proposals from new scientists who earned their latest degree within the last five years.
Requirements: Applicants must have received a graduate degree in communication sciences and disorders within the past five years, must not have received prior funding for research, and the proposal must be for research to be initiated.
Funds: Average award $4,000.
Deadline: July 15
Contact: Nancy Minghetti, Executive Director, (301) 897-5700 ext. 136.

Amyotrophic Lateral Sclerosis (ALS) Research Grants and Fellowships
ALS Association
21021 Ventura Blvd, Ste 321
Woodland Hills, CA 91364
Program: Support for clinical and nonclinical research into the cause, prevention, alleviation, and treatment of ALS.
Contact: Robert V. Abendroth, Acting President, (818) 340-7500.

Annenberg Foundation
150 Radnor-Chester Rd, Ste A-200
St Davids, PA 19087
Program: Project/program grants; seed money grants Primary, secondary, early childhood education, culture, and health.
Funds: $25,000-$250,000.
Contact: Annenberg Foundation, (215) 341-9066; fax, (215) 964-8688.

Charles A. Dana Foundation
745 Fifth Ave, Ste 700
New York, NY 10151
Program: The foundation funds neuroscience health projects and early childhood education initiatives.
Funds: $50,000.
Eligibility: U.S. nonprofit organizations.
Contact: Cynthia Read, Director, Awards Program, (212) 223-4040.

Dole Foundation
1819 H St, NW Ste 850
Washington, DC 20006
Program: A grant-making foundation supporting innovative research conducted by nonprofit organizations concerning assistive technology, minorities or women, career advancement, aging workers.
Contact: Dole Foundation, (202) 457-0318.

Easter Seal Research Foundation
70 E Lake St, Ste 1500
Chicago, IL 60601
Program: Research support is provided to fund research aimed at the development and delivery of services for individuals with disabilities, particularly through technology and rehabilitation. Funding is provided for projects to develop assistive devices for individuals, or to develop systems to improve transportation, buildings, facilities, and communication for persons with disabilities.
Funds: Maximum $40,000 per year for up to two years.

Funds: Maximum $40,000 per year for up to two years.
Contact: Norman D. Grunewald, Vice President (312) 726-6200; TDD (312) 726-4258.

Gallaudet University Alumni Association Fellowships
Gallaudet University Alumni Association
800 Florida Ave NE
Washington, DC 20002-3695
Program: Fellowships offered to deaf college graduates who wish to pursue graduate study at a university for hearing people. One-year, renewable fellowships.
Eligibility: Must be hearing-impaired graduates and accepted at a college or university for people who hear normally. Preference is given to applicants who already possess a master's degree and are seeking a doctorate.
Deadline: April 15.
Contact: Graduate Fellowship Fund, Alumni House, Peikoff Alumni House, (202) 651-5061 TTY or voice.

General Semantics Foundation Project Grants
General Semantics Foundation
14 Charcoal Hill
Westport, CT 06880
Program: Grant support for research projects specifically in or explicitly related to the field of general semantics.
Funds: $300-$4500
Contact: Harry E. Maynard, President, (203) 226-1394.

Hasbro Children's Foundation
32 W 23 St
New York, NY 10010
Program: Project/program grants, demonstration grants, and seed money grants for special education with focus on individuals with disabilities.
Funds: $5,000-$1 million
Contact: Address above

IBM Corporation Grants Program
IBM Corporation
Old Orchard Rd
Armonk, NY 10504
Program: Support for educational, social, and community programs. Equipment grants are made to educational institutions for emphasizing research and instruction, special education training, and special learning centers. Social programs support social services to the handicapped and the elderly. Equipment and technical support are offered to job training programs for the disadvantaged and the handicapped
Contact: Percy E. Pollard, Director, Cultural and Human Services Program, (914) 765-1900, ext 4644

International Reading Association
PO Box 8139
800 Barksdale Rd
Newark, DE 19714-8139
(302) 731-1600
Program: Albert J. Harris Award: Award granted for outstanding contribution to the prevention/assessment of reading or learning disabilities.
Funds: $1,000
Contact: Address above.

Kresge Foundation
3215 W Big Beaver Rd
PO Box 3151
Troy, MI 48007-3151
Program: The foundation makes challenge grants to buy major equipment and upgrade scientific

Program: The foundation makes challenge grants to buy major equipment and upgrade scientific equipment of at least $300,000 by higher education, health care, human services, arts and environmental nonprofit education and research organizations. Applicants must raise initial funds toward projects before applying.
Contact: John Marshall, President, (810) 643-9630.

Linguistic Institute Fellowships
Linguistic Society of America
1325 18th St NW, Ste 211
Washington, DC 20036-6501
Program: Fellowships cover tuition for the study of linguistics for undergraduate and graduate students.
Contact: LSA Secretariat (202) 835-1714.

John S. and James L. Knight Foundation
2 S Biscayne Blvd, Ste 3800
Miami, FL 33131
Program: Support for education, journalism, the arts, and community improvement initiatives. Grants are made for projects that develop innovative approaches to education.
Deadline: Jan 1, Apr 1, July 1, Oct 1.
Funds: $5,000 to $5 million.
Eligibility: Nonprofit education, journalism, the arts, and community improvement organizations.
Contact: A. Richardson Love Jr., Director of Education Programs, (305) 539-0009.

National Association of the Deaf (NAD)
814 Thayer Ave
Silver Spring, MD 20910
Program: William C. Stokoe Scholarship. The goal of this scholarship is to increase the number of deaf social scientists involved in research on sign language or the deaf community. It provides financial assistance to a student who is deaf or hard-of-hearing and pursuing graduate studies. Recipient must complete within one year a project that relates to sign language or the deaf community.
Eligibility: Any part- or full-time deaf or hard-of-hearing student pursuing graduate studies in a field related to sign language or the deaf community, or who is developing a special project on one of these topics.
Award: $1,000
Deadline: March 1
Contact: Stokoe Scholarship Administrator, (301) 587-1788; TDD (301) 587-1789.

Ronald McDonald Children's Charities
One McDonald's Plaza, Kroc Dr
Oak Brook, IL 60521
Program: Capital grants, project/program grants, and seed money grants are made in the areas of health care, medical research, education, civic concerns, and social programs.
Funds: $25,000-$250,000.
Contact: Ken Barun, President, (708) 575-7048; fax, (708) 575-5792.

Sertoma International
1912 E Meyer Blvd
Kansas City, MO 64132
Program: Sertoma International (Service to Mankind) invites applications for scholarships for deaf and hard of hearing college students pursing degrees at four-year universities in the United States and Canada.
Eligibility: Applicant must have a 3.0/4.0 cumulative GPA, have documented hearing loss and be a full-time entering or continuing student in a degree program.
Funds: 10 awards of $1,000 each.
Contact: Terri McCaffrey, Director of International Sponsorships, (8116) 333-8300; fax, (816) 333-4320.

Siragusa Foundation

Siragusa Foundation
919 North Michigan Ave, Ste 2701
Chicago, IL 60611
Program: Project/program grants in child development, education of individuals with disabilities.
Geographic preference: Midwest, particularly greater Chicago metropolitan area.
Funds: $250-$35,250.
Contact: John Siragusa, President, (312) 280-0833; fax, (312) 943-4489.

Southwestern Bell Foundation Grants Program
One Bell Ctr, Ste 223
St Louis, MO 63101
Program: The foundation supports health and welfare research. Programs assist those with disabilities such as blindness, deafness, or speech impairment.
Eligibility: Nonprofit organizations.
Contact: Charles DeRiemer, Executive Director, (210) 351-2211.

United Airlines Foundation
PO Box 66100
Chicago, IL 60666
Program: United Airlines Foundation funds organizations whose focus is preschool through secondary education, minority development and opportunity programs, and quality-of-life improvement for individuals with disabilities.
Eligibility: U.S. nonprofit organizations.
Contact: Eileen Younglove, Contributions Manager, (708) 952-5714.

University of Kansas
1082 Dole Ctr
Lawrence, KS 66045
Program: Language Impairments Across the Life Span Research Traineeships program is funded by the National Institute on Deafness and Other Communication Disorders (NIDCD) and sponsored by the Child Language Doctoral program, the departments of Speech-Language-Hearing Sciences and Disorders, Psychology, and Linguistics at the University of Kansas (UK) and the Department of Hearing and Speech at the UK Medical Center. The interdisciplinary program provides research training to prepare researchers to investigate language impairments.
Eligibility: Applicants must be U.S. citizens or permanent residents enrolled in a doctoral program at the university.
Funds: $10,000 annually plus research supplies, equipment, tuition waiver, and travel assistance.
Deadline: March 1.
Contact: Mabel Rice, Director, Child Language Program, (913) 864-4570; fax, (913) 864-3523.

Gerontology

AARP Andrus Foundation
1901 K Street, NW
Washington, DC 20049
(202) 662-4922
Program: Applications must be submitted for research directed toward producing information of a practical, usable character that will assist the association, its members and older persons in general, policy planners, service providers, and practitioners.
Eligibility: To qualify for research grants, the sampling focus must be on older persons. Applications are accepted only from universities and colleges.
Award amount: $75,000
Deadline: June 1, Dec 1.
Contact: Address above.

Alzheimer's Association
70 E Lake Street
Chicago, IL 60601

fellowships may be offered to students enrolled in degree programs who are engaged in research on specific projects in the field of aging.
Eligibility: Institutions may apply on behalf of degree candidates for scholarships for undergraduate students and/or fellowships for graduated student.
Award amount: $500-$1000 per semester
Deadline: Applications may be submitted at any time.

American Federation for Aging
725 Park Avenue
New York, NY 10021
Program: One year grants are available for clinical and basic research on all biomedical aspects of aging. Topics of interest include basic mechanisms of aging, how age predisposes to disease, and age-related disorders, such as sensory failure, memory loss and confusion. Grant proposals based on other projects are also welcome.
Eligibility: Applications must be citizens or permanent residents of the U.S. and must be affiliated with an institution in the U.S. where the research will be conducted. Preferred applications are investigators who are in the early stages of their research careers.
Award amount: $25,000
Deadline: January 15

Brookdale Foundation
126 E. 56th Street
New York, NY 10022
Program: Brookdale Foundation National Fellowship Program. The fellowship program was initiated to encourage a wide range of gerontological and geriatric research projects. Fellowships funds are granted to medical schools, institutes and gerontological centers who make nominations.
Eligibility: Candidates are nominated by institutions and invited to participate in the fellowship rounds. Each institution may submit one candidate in medicine or science and one in the social sciences or humanities.
Award amount: $5 million total
Deadline: Not Specified

Dystonia Medical Research Foundation
One East Wacker Drive
Suite 2430
Chicago, IL 60601-1905
Program: Expanding Research Opportunities in Dystonia. The Dystonia Medical Research Foundation supports research focusing on genetics, human brain tissue, anatomy, and physiology of the basal ganglia and relevant brain circuitry. Research should be hypothesis driven.
Funds: Usually $25,000 per year for 1-3 years.
Deadline: Dec. 15.
Contact: The Foundation at 312-755-0198; fax, 312-803-0138; e-mail, dystfndt@aol.com.

National Spasmodic Dysphonia Association (NSDA)
University of California
Irvine Medical Center
101 City Drive South
Orange, CA 92668
Program: NSDA received a $3,000 donation for research.
Eligibility: Neurologists, otolaryngologists, or speech pathologists may apply.
Contact: Forward a maximum of two pages describing the proposed project and a current C.V. to Daniel D. Truong, MD, Chairman of the Medical Advisory Board.

United Parkinson's Foundation
833 W Washington Blvd
Chicago, IL 60607
Program: Parkinson's Disease Research Grants. Research grants are awarded to established scientists with extensive experience in the field of Parkinson's disease and related disorders to determine the cause

with extensive experience in the field of Parkinson's disease and related disorders to determine the cause of and better controls for the cure of the disease.
Contact: Judy Rosner, Executive Director, (312) 733-1893.

The Gerontological Society of America
1275 K Street
Washington, DC 20005
Eligibility: Postdoctoral Fellowships in Applied Gerontology and Student Fellowships in Gerontology. For the postdoctoral fellowships, grants are given to researchers with backgrounds in health sciences, behavioral and social sciences. Applicants for the student fellowships must be enrolled in a degree-granting program and selection is based on demonstrated interest in geriatrics as well as other factors.
Award amount: $6,300 for postdoctoral fellowship; 2,000 for student fellowship.
Deadline: Feb 1.

Duke Center for the Study of Aging and Human Development
Box 2908
Duke University Medical Center
Durham, NC 27710
Programs: Research Training Program in Behavior and Physiology of Aging Research Training Program in Aging. Grants are given to support individuals with research career interests in the biomedical, behavioral, and social science aspects of aging. The program is designed to provide the participant with research skills in the field of aging. To initiate the application, applicant must send a letter describing the proposed research and a curriculum vitae.
Eligibility: Applicants must have completed the PhD and be no more than 7 years past receipt of doctorate.
Award amount: $17,000-31,500
Deadline: May 1

Retirement Research Foundation
1300 W. Higgens Road, Suite 214
Park Ridge, IL 60068
Program: Grants are available to support basic, applied and policy research that seeks causes and solutions to the problems of the aged. The foundation is particularly interested in innovative projects that