Vision Screening of Preschool Children in Mobile Clinics in Iowa

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ALTHOUGH the field clinic program of the State Services for Crippled Children (SSCC) at the University of Iowa is basically a diagnostic service for children under 21 years of age with specific health problems, some aspects of the program reflect efforts in case-finding and screening. Physicians with various specialties and other health professionals from the university provided diagnostic health services for 6,343 young people in 1968 in 76 mobile clinics. About half of the clinics were conducted for the general evaluation of children with a variety of health problems. Vision screening of preschool children was carried out in 60 of the clinics. Special field clinics also were operated for cardiac and ear, nose, and throat problems and for the followup of infants with low birth weight or other perinatal abnormalities.

In addition to reporting the results of our preschool vision screening activities, we wish to review certain clinical measures concerning the eye that can be included in the routine health supervision of infants and children to identify those in need of complete professional eye examination.

Tests and Criteria Used

The SSCC program of preschool vision screening was designed for the early identification of children needing eye care. Since 1967 children between 4 and 6 years of age have had their vision tested at field clinics regardless of the chief reason for referral. Nonmedical personnel were trained specifically for this screening by an ophthalmologist. The Michigan Preschool Acuity Test was used with the Titmus optical vision tester. Criteria for a complete professional eye examination were (*a*) failure to read the 20/30 slide in the Michigan test, (*b*) a two-line difference in visual acuity between the eyes, (*c*) signs of eye muscle imbalance, or (*d*) specific symptoms of eye trouble. Follow-through on tests of children referred for complete eye examination was sought by report letters to the parents and referring physician and by a standard report form from the professional eye examiner denoting diagnosis and prescribed treatment.

Results of 1967 and 1968 Clinics

During 1967 the vision of 585 preschool children was tested successfully by the method described (see table). Forty-nine children, or 8.4 percent, failed the test and were referred for complete professional eye examination, but only 22 percent of the 49 reportedly received an examination.

In the first year (1967) of the vision screen-

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ing program, the SSCC recommended complete eye examination only in the clinic report letter to the family physician. Follow-through was pursued more vigorously in 1968, when both parent and family physician were encouraged to arrange for a complete eye examination for the referred child. The time interval between the screening examination and the issuance of the various report letters also was considerably shorter in 1968. In addition, a report form for the professional examiner, denoting diagnosis and treatment and requesting a reply, was enclosed with the letter to the parents encouraging referral for eye examination.

As a result of these modifications in follow-through procedures, almost two-thirds of the children referred during 1968 reportedly completed an eye examination. Of the 648 preschool children successfully tested, 43, or 6.6 percent, were referred for additional eye examination and 27, or 63 percent, carried through with this advice (see table).

Ophthalmologists examined 11 of these children, and 16 were examined by optometrists. No significant eye abnormality was found in three children. Diagnoses of the 24 children with eye defects follow. Some had more than one diagnosis. Glasses were prescribed for 18 children, and four others are now being managed by eye patching.

Diagnoses	*Number of conditions*
Refractive error	26
Astigmatism	12
Hyperopia	8
Myopia	6
Strabismus (tropia)	4
Amblyopia	4
Total	34

Iowa State Services for Crippled Children preschool vision screening program

Results	1967		1968	
	Number	Percent	Number	Percent
Children screened	585	100.0	648	100.0
Not referred	536	91.6	605	93.4
Referred	49	8.4	43	6.6
Disposition of children referred:				
Professional examination	11	22.4	27	62.8
With diagnosed defect	9	18.3	24	55.8
Without defect	2	4.1	3	7.0
Proportion of total screened with diagnosed defect		1.5		3.7

Other Preschool Vision Screening Programs

In other organized vision screening programs for preschool children for which trained volunteers, certified vision technicians, and public health nurses administered the tests, the rate of screening failures varied, similarly to ours, from 5.0 to 7.5 percent (*1–3*).

The National Society for the Prevention of Blindness reported its experience in preschool vision screening during 1965–66 (*4*). The test results on more than 156,000 children are summarized as follows:

1. Almost 6 percent of the screened children failed the criteria of the test and were referred for complete professional eye examinations.
2. Two-thirds of the referred children reportedly received an eye examination.
3. An abnormal eye condition was found in 75 percent of those examined, while in 17 percent the examination was normal and in 7 percent no report of diagnostic findings was available.
4. The overall eye defect rate, therefore, was about 3 percent of the children screened.
5. Refractive errors, eye muscle imbalance, and amblyopia were the main diagnostic categories reported. Such refractive errors as hyperopia, myopia, and astigmatism were found in 87 percent of the children for whom a specific diagnosis was reported. Muscle imbalance, usually strabismus, was reported for 22 percent of this group and amblyopia for 11 percent.
6. Twenty percent of the diagnosed children had more than one type of eye defect.

Care and Prevention of Defects

Eye defects consistently lead the list of childhood handicapping conditions in the United States. More than 11 million in the 5- to 17-year age group are visually handicapped to some degree (*5*). One source estimates that 12.5 million children in this age group will require eye care by 1970 (*6*). Approximately one school child in four now requires eye treatment, mainly glasses, but only 17 percent wear glasses (*5, 7*). The prevalence of eye defects in several studies

reported by professional eye examiners varied from 18 percent among entering school children to 31 percent among youths in the 13- to 15-year age group (*8–10*). According to one of these reports (*10*), over a 2-year span there was only a 6.2 percent correction rate for the defects identified through the coordinated efforts of professional eye examiners, educators, public health workers, and parents.

Of the eye troubles causing rejection of 18-year-old noncollege-bound youths from the armed services (1964–65) on Selective Service examination, an estimated 75 percent were preventable or correctable through appropriate casefinding and treatment during early childhood (*5*).

Amblyopia occurs in 2 to 3 percent of school children (*5*). According to Burian (*11*), functional amblyopia is "a unilateral defect in visual acuity in strabismic or non-strabismic patients for which no obvious cause can be detected by physical examination of the eye. . ." Traditionally, the etiology of amblyopia has been ascribed to suppression of the amblyopic eye or to its nonuse. Most recent experimental data are complex and suggest additional causative factors. Burian's paper (*11*) and recent reports by Von Noorden (*12*) and Henderson (*13*) have also expanded the traditional classification of amblyopia.

Treatment essentially is complete patching of the preferred eye so that the child is compelled to use the amblyopic eye. In addition, correction of the refractive error and planned fixation exercises appropriate to the age of the child are desirable adjuncts to occlusion therapy (*11, 13*).

Emphasis in our report is on the preventable nature of amblyopia and other eye defects through early identification by family physicians, pediatricians, and trained volunteers who perform the vision screening of preschool children. The practicing physician can incorporate several preventive measures into his routine health supervision of children. The alinement of an infant's eyes should be noted at every well-baby examination. Infants with eyes that are obviously out of alinement should be referred at that time to an ophthalmologist for definitive diagnosis and treatment. Penlight examination of the eyes of infants and young children allows the physician to assess the alinement while fixating an object (the light). Properly alined eyes should have a central corneal reflection of light; reflection that is only a few millimeters off center may indicate a significant strabismus. Penlight examination, with a careful alternate cover maneuver, can also help the examiner identify eyes that may have a latent tendency to deviate. Although these procedures are not a substitute for professional eye examination they serve an important function in identifying infants and children who are in need of a more complete ophthalmological evaluation.

Some 3- and certainly most 4-year-old children of normal intelligence can cooperate in a visual acuity examination with the illiterate "E" game. Referral to an ophthalmologist for a complete eye examination is indicated if the child (*a*) cannot identify correctly four of six 20/30 Snellen E symbols with either eye, (*b*) shows a difference in visual acuity of two lines or more between the eyes, (*c*) shows evidence of strabismus, or (*d*) has eye symptoms requiring evaluation.

When testing young children, certain factors including a short span of attention, easy distractibility, and minor behavioral abnormalities exhibited during the stress of the examination need to be considered (*14*). A young child may need to practice the E game at home with his mother before he can be satisfactorily retested. He may proceed better with the test if it is presented as a series of single E symbols rather than as an entire line. Furthermore, since the most important reason for early vision screening is the detection of amblyopia so that loss of vision can be prevented, it is essential that each eye be tested separately.

Infancy and the preschool period are the critical times to diagnose and treat many preventable eye conditions. Refractive errors, strabismus, and amblyopia can be identified and diagnosed in infancy and early childhood. Treatment by qualified professional examiners should be initiated during this period to achieve optimal visual acuity in each eye. Failure to identify children with eye defects and to institute early treatment may limit the successful prevention of many of these defects. Therefore it is the responsibility of physicians caring for

infants and children to adequately examine the eyes of their patients so that early referral and treatment can prevent amblyopia and other causes of visual loss.

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Tearsheet Requests

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MEDINET

Medical Information Network, MEDINET, is the new name of the Public Health Service Emergency Radio Network. The network, organized in November 1968 by the Division of Emergency Health Services, Health Services and Mental Health Administration, provides emergency communication among Federal, State, and local health officials during disasters.

MEDINET is composed of employees of the Department of Health, Education, and Welfare who live outside the Washington Metropolitan area and who are licensed amateur radio operators, or "hams." They participate in MEDINET voluntarily as a public service. During a disaster, when normal communication systems have failed, MEDINET members are excused from their normal duties to participate in the network. In an emergency all hams may participate in the network.

The change of name, from PHS Emergency Radio Network to MEDINET, will permit routine on-the-air meetings of the network's members without any Federal connotation. To promote the use of a single frequency by all medically oriented networks, MEDINET's frequencies have been changed to 7260 kHz and 14280 kHz with 21360 kHz as an alternate.

MEDINET meets on the air every Monday at 12 noon and every Wednesday at 5 p.m. eastern time. MEDINET Control, the NIH Radio Amateur Radio Club Station K3YGG, operates at 20 meters on 14280 kHz and 40 meters on 7260 kHz simultaneously at these times.

MEDINET can relay messages from station to station across the continent. This technique was used with dramatic success in the Hurricane Camille disaster on the gulf coast.