A New School-based Program to Provide Eyeglasses: ChildSight

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Objective: To address the unmet need for glasses encountered in an urban school setting by developing and implementing a school-based, cost-effective program that provides appropriate spectacle correction to needy children. ***Methods:*** A total of 5851 students 9 to 15 years of age in 4 middle schools in northern Manhattan were screened for vision. Those with vision worse than 20/40 were examined, given glasses if appropriate, or referred for additional evaluation. ***Results:*** Of the 5851 children screened, 1614 (28%) had a failing result, with visual acuity less than 20/40 in the worse eye. Of this group, 1082 were given glasses that were assembled at the school within 1 hour of testing. Ten percent of the group that required glasses already had them, and the remaining were referred for a complete ophthalmic examination that was completed in 58 cases. Only 14 of these had vision loss unrelated to refractive error. ***Conclusions:*** The program successfully treated 88.3% of the children within the school who needed glasses. Given that only 10% of children who needed glasses had them, it indicates a huge need to provide glasses to at least a million children in this age group in the United States. (J AAPOS 1998;2:372-4)

Children in early adolescence are at risk for the development of significant refractive error. More than 25% of children older than 11 years of age may have uncorrected vision worse than 20/40.[1-4] This degree of vision loss would preclude clear viewing of blackboard writing. Many factors, poverty among them, may prevent children in inner-city settings from having access to the health care system to obtain spectacles.[5,6] In response to a specific request from the Columbia University School of Public Health (CUSPH) school-based clinics for assistance in meeting such needs, Helen Keller International developed ChildSight, a program to screen school children for vision loss and to provide spectacles in a timely fashion.

PATIENTS AND METHODS

All children between the ages of 11 and 14 years who were enrolled in 4 public intermediate schools in Washington Heights, Manhattan, in New York were included in the program. The program began in October 1995 and concluded in December 1996. Three parent volunteers were trained in the assessment of visual acuity using a Snellen wall chart using "tumbling E" optotype. Children were tested individually without correction first and then with correction if available. Those who failed to read at least 2 letters on the 20/40 line or worse with either eye were referred for further testing. Children who failed the acuity test were then examined using an autorefractor (Allergan Humphrey Corporation, San Leandro, Calif), which determined visual acuity as well as the extent of refractive error. This examination was conducted by a licensed optometrist. Once the refractive error was determined, the machine would test visual acuity with this correction and determine whether vision of better than 20/25 was achieved. If this was the case, glasses were made from an inventory of lenses and frames present at the school (Morrison International, Sarasota, Fla). Once the glasses were assembled they were fit to the child and acuity measured. If the fit was comfortable and obtained an acuity of 20/25 or better, the glasses were dispensed. If a child was unable to obtain vision better than 20/25 in either eye, had a correction outside the range of available lenses (–5.00 to +5.00 D in one half D increment and astigmatic correction +0.50 to +3.00 cylinder power), an intrapupillary distance wider than 67 mm, anisometropia greater than one D of spherical or astigmatic correction, or in the view of the examining optometrist merited closer study, he or she was referred to the E. S. Harkness Eye Institute for evaluation. The examining optometrist based this decision on the presence of obvious physical anomalies, lack of cooperation or hesitancy in responding to questions during the screening, or to any subjective complaint made by the student. If the glasses needed were simply outside of the available range, they were purchased from a local optical shop. Children who were referred for further examination and who failed to appear for this examination were contacted a total of 3 times by the parent volunteers and the school nurse. When necessary, an ophthalmologist visited the schools to examine these children.

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Submitted January 12, 1998.
Revision accepted June 16, 1998.
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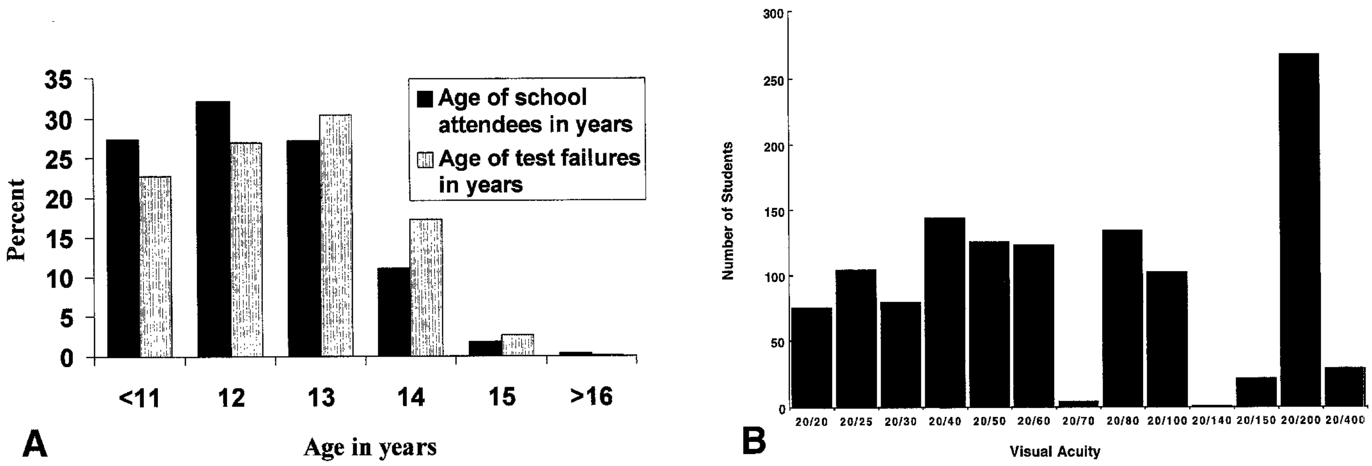

FIG 1. A, Age of school attendees for both sexes as well as age of children who failed the vision screening test with vision worse than 20/40 in either eye. **B,** Distribution of visual acuity in the right eye for 1208 children who failed the screening test.

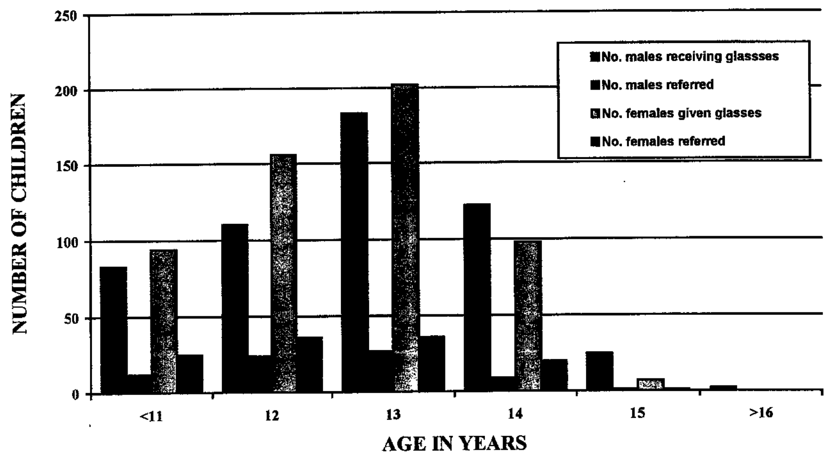

FIG 2. Age of children by sex for those who received glasses and those who were referred for further care.

To assess the ability of the autorefractor to render an accurate refraction for prescribing glasses, the first 46 children who failed the acuity test were refracted using the autorefractor and then tested with a red-green duochrome screen and rerefracted on the basis of the findings.

RESULTS

Visual acuity testing using the Snellen chart revealed that 1614 of 5851 children (28%) tested had vision of 20/40 or worse in one or both eyes. All children who failed the test were referred for evaluation by an optometrist at the school-based clinic. Of these, 1524 children (94%) were examined at the clinics. There was no difference in failure rates based on sex. The breakdown of school attendees and those who failed the screening test is seen in Figure 1, *A*. Figure 1, *B*, demonstrates the uncorrected visual acuity in the right eye for 1208 of the children who failed the screening test, for whom data were available.

At the time of examination, refraction was determined and glasses were given to those children whose vision could be corrected to at least 20/25 in each eye. This was accomplished for 1082 children (71%). Of the remainder, 108 children were found to be normally sighted on examination, and 110 had glasses in their possession. Forty-three children required prescriptions that were outside of the range of available glasses and so were fitted by local optical shops. Those 181 children whose vision could not be corrected to an appropriate degree at the school were referred for further care. The age and sex of those who received glasses and were referred are found in Figure 2. The distribution of prescription lenses given out to the first 555 children (a total 1110 lenses) is found in Figure 3. Astigmatic lenses with cylinder of 1.00 D or greater were used in 177 of the 1110 lenses. Their distribution was as follows: 1.00 D, 90; 1.50 D, 44; 2.00 D, 20; 2.50 D, 12; and 3.00 D, 11.

As noted, a subset of 46 children who had failed the screening examination were refracted with the autorefractor and then given the red-green duochrome test and rerefracted. Of the 92 eyes so tested, 53 were found to be equal on the duochrome test. The remaining 39 required adjustment of the refraction, all requiring less myopic correction, with a mean change of +0.43 D.

Of the 181 children referred for further examination, only 58 were actually examined despite multiple appointments

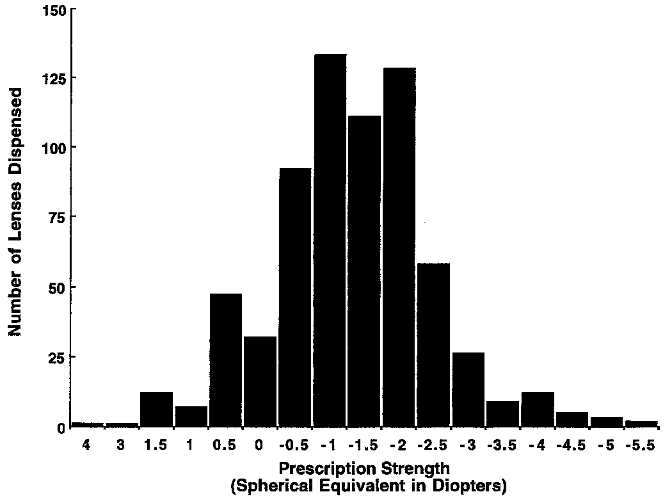

FIG 3. Distribution of lenses dispensed by spherical equivalent.

and follow-up. One of the authors (L.D.P.) visited 2 of the schools and performed 27 of the 58 examinations. The mean age of the 58 children who were examined was 12.5 years, and 30 were boys. Forty-four children were corrected to 20/20 vision in both eyes. Most of these children were found to be emmetropic and when asked indicated that they had deliberately failed the test to obtain the glasses that they felt were a positive fashion statement. Of the remaining 14, 11 could be corrected to 20/20 in at least one eye. The cause of vision loss in 17 eyes with corrected vision worse than 20/30 were amblyopia,14; trauma, 2; and optic atrophy, 1.

DISCUSSION

Uncorrected refractive error was a significant problem in a group of New York City junior high school children. One quarter of children who were screened for visual acuity had vision worse than 20/40 in either eye. Further examination of these children revealed that uncorrected refractive error was responsible for vision loss in all but 9 cases.

Trained lay screeners have been used successfully by other organizations to identify children with poor vision.[7] The volunteers used in this program were trained in the techniques of obtaining visual acuity and performed the initial screening within the school. In addition, teachers were asked to report any child who was thought to have a visual difficulty, regardless of screening result. This technique permitted rapid identification of children with low vision. Those children who were found to have a significant visual problem and who were referred to an outside clinic only had a 15% rate of compliance (31 of 181 cases), as opposed to the 94% compliance rate among children who were treated at the school. The use of the autorefractor permitted as many as 40 children to be examined in 1 day, given the time constraints of an active school day.

The adequacy of autorefractor-based prescriptions was of concern at the beginning of the program. The duochrome test that was described previously indicated that most children were not overcorrected by this method. Because a significant number (39 of 92 eyes) were overcorrected, the policy was established to dispense a lens rounded down by 0.5 D for minus power to the nearest half D. When each child was given an acceptance acuity test with the new glasses, this was found to achieve visual acuity of at least 20/25 in each eye.

The children whose vision was unable to be corrected and who were subsequently referred for further examination were of particular interest. Unfortunately, only 58 of the 181 were examined, and thus our understanding of the etiologic factors of vision loss in this group is incomplete. It is of interest that no child required treatment for vision loss other than provision of glasses. All other causes of vision loss were essentially untreatable at the time of the intervention. It is important to stress that this program is targeted at vision testing and not evaluation of ocular disease. However, Ariyasu and coworkers[8] have shown that distance acuity measure is a reasonably sensitive test of eye disease.

Only approximately 100 of 1524 children (6.6%) with significant vision loss had glasses at the time of the screening. This represents a huge unmet need in school children in similar circumstances and is a matter of great concern. One half of these children were insured by the Medicaid program, meaning that they had access to vision care; yet fewer than 10% had glasses. There may be many reasons to account for this discrepancy. However, whatever the cause, the message is clear: we must reach out and identify children with poor vision in the school setting. This study demonstrates that provision of glasses can normalize visual acuity for the vast majority of children in this age group.

In the United States, there are approximately 4 million children between the ages of 11 and 14 years who live below the poverty threshold.[9] If 25% are in need of optical correction and only 10% of this group have appropriate glasses, there are potentially 900,000 children each year who would benefit from an improved outreach program. This represents a major challenge to those who would improve the health status of children at risk in our country. It will require a reallocation of existing funding. ChildSight is a cost-effective mechanism to successfully address the problem.

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25th Annual Meeting

The American Association for Pediatric Ophthalmology and Strabismus

The Westin Harbour Castle
Toronto, Ontario, Canada
April 15–18, 1999

IMPORTANT DATES:

July 1998	Call for Papers
September 1998	Registration Opens
October 2, 1998	Deadline for Receipt of Abstracts
January 15, 1999	Deadline for Presenters to Register
March 1, 1999	Deadline for Hotel Reservations
March 26, 1999	Preregistration Closes

THURSDAY, APRIL 15

Registration	12:00 noon - 6:00 p.m.
Board of Directors Meeting	8:00 a.m. - 5:00 p.m.
Opening Reception	6:30 p.m. - 8:30 p.m.

FRIDAY, APRIL 16

Scientific Sessions/Workshops/Posters	8:00 a.m. - 1:00 p.m.

SATURDAY, APRIL 17

Scientific Sessions/Workshops/Posters	7:00 a.m. - 11:45 a.m.
AAPOS Business Meeting & Luncheon	12:00 noon - 1:30 p.m.
Workshops	1:45 p.m. - 4:00 p.m.
Dinner/Dance	7:00 p.m. - 11:00 p.m.

SUNDAY, APRIL 18

Scientific Sessions/Workshops/Posters	8:00 a.m. - 12:30 p.m.
Adjournment	12:30 p.m.

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Registration materials and a hotel reservation card will be sent to you in the September newsletter mailing. Please use this card when making reservations to guarantee the special group rate.

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