The Oregon statewide vision clinic: A pilot project

Frances G. Cloyd

Pacific University
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Abstract
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Great emphasis is placed on recommendations as to optimum visual aids, optimum visual stimulation and demonstrations to others as to how each child "sees". Of the children examined, 19.6% required new or updated optical aids with 11.4% requiring special lens powers for near viewing.

For 59.1% of those children demonstrating functional visual abilities, this was the first time that a minimum visible target size was determined. This success was attributed to the use of the Preferential Looking acuity card technique described in the presentation.

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THE OREGON STATEWIDE VISION CLINIC

A PILOT PROJECT

By

FRANCES G. CLOYD, B.S., C.P.A.

A thesis submitted to the faculty of the
College of Optometry
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Adviser:

Sandra K. Landis, O.D.
Author:

Frances G. Cloyd, B.S., C.P.A.

Adviser:

Sandra K. Landis, O.D.
ABOUT THE AUTHOR

Frances G. Cloyd is a mother of three and has resided in Forest Grove, Oregon, for the past nine years. Mrs. Cloyd will be receiving her Doctor of Optometry degree from Pacific University College of Optometry in May, 1988. She currently holds the degree of Bachelor of Science in Business Administration from Humboldt State University (1976) and is a licensed Certified Public Accountant (retired) in the states of Oregon and California.

Upon graduation, Mrs. Cloyd intends to spend a year enjoying her family before launching into a career as a pediatric optometrist specializing in pediatric low vision and vision therapy.
ACKNOWLEDGMENTS

I wish to thank Sandra K. Landis, O.D., for allowing me to observe and assist in the examination of those special children seen at the Oregon Statewide Vision Clinic during its first six months of operations and for making her records available to me for this compilation of the results. Her efforts on behalf of these children have been an inspiration to me and have made a real difference in many of their lives.

My appreciation also goes to the members of my family, Karl, Kelley, KC and Kevin, for putting up with my long hours as the deadline approached for the presentation at the 115th Annual Meeting of the American Public Health Association.

A special note of thanks is due to my fellow optometry students for vacating the school's computer terminals to allow me to make last minute corrections, and especially to Phillip Owsley, for allowing me to borrow his personal computer to do a substantial amount of the work in my home.

Frances G. Cloyd
DEDICATION

While a dedication of a doctoral thesis may seem a bit unusual, it is entirely appropriate in this case as it comes from the heart.

I wish to dedicate this paper to my three children, Kelley, age four, KC, age two, and Kevin, who was conceived and carried in the womb during nine months of this work and who's untimely death from SIDS at the age of five weeks left me wondering if I would ever complete it. But, complete it I have and in so doing have come to love and appreciate them all the more for the children they are.

To
Kelley, KC and Kevin

From Mom
THE OREGON STATEWIDE VISION CLINIC

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As presented at

The 115th Annual Meeting of
The American Public Health Association

by

Sandra K. Landis, O.D.

and

Frances G. Cloyd
ABSTRACT

The Oregon Statewide Vision Clinic is a pilot program offering functional vision assessments to visually impaired children in Oregon, many of whom have multiple handicaps. Sixty children were seen at the clinic from September 1, 1986, to February 28, 1987. Of these, 67.8% presented with multiple handicaps. The children ranged in age from 1.1 years to 20.2 years, with the mean age being 9.7 years.

Great emphasis is placed on recommendations as to optimum visual aids, optimum visual stimulation and demonstrations to others as to how each child "sees". Of the children examined, 19.6% required new or updated optical aids with 11.4% requiring special lens powers for near viewing.

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INTRODUCTION

The visually impaired child often suffers from multiple handicaps. This is a child for whom conventional spectacles and/or contact lenses are unable to sufficiently correct vision, resulting in an adverse affect on the child's educational performance. Included are both the partially seeing and the totally blind child. The visual examination of such a child is difficult and time-consuming; yet, the results are critical in structuring that child's school and home environment to allow the child to interact with the world to the fullest possible extent.

In 1984, Sandra K. Landis, OD, Terrel D. Dutson, OD, and William Ludlam, OD, conducted visual examinations on the resident population of the Oregon State School for the Blind in Salem, Oregon, to determine if the need existed for additional vision care in that population. The results of their study strongly suggested that visually impaired children throughout the state of Oregon may be in need of additional vision care, especially in the area of functional vision.

With this in mind, the Oregon Statewide Vision Clinic, a pilot program, began operations in September, 1986. Its main goal is to extend the availability of functional vision care to this population. Any child under age 21 who has been diagnosed or is suspected as having impaired vision meets the criteria for these services. The child must be referred to the clinic by an educator, optometrist, ophthalmologist or other physician.

The clinic is open one day per week on the campus of the Oregon State School for the Blind in Salem, Oregon. For children who cannot be transported to Salem, optometric personnel travel to the child.

Functional vision assessments are conducted by Sandra K. Landis, OD, assisted by optometric interns from Pacific University College of Optometry in Forest Grove, Oregon. Assessments are scheduled for 1.25 hours each, with approximately 85% being conducted within a single visit. Return visits are scheduled as needed to obtain more information about the child's vision.
THE FUNCTIONAL VISION ASSESSMENT

The functional vision assessment generally encompasses all areas of a standard vision evaluation, with a distinct emphasis on visual function during the normal awakened state.

The typical case history of a visually impaired child, especially one with multiple handicaps, includes vision examinations performed while the child is sedated. While this is very often necessary to obtain certain findings, it precludes the testing of the child's visual system while the child is in full operation. It is this fully operating child who must interact with the world.

Each assessment is individualized. The exact nature of the visual deficit and any additional handicapping conditions varies from child to child. Many of the children are non-verbal. These considerations pose multiple problems in applying traditional testing methods.

Once the extent of visual functioning has been determined, the emphasis switches to providing information and recommendations to parents, educators and the child as to how to optimize the use of that child's current visual skills.

This involves one or more of the following:

a. **Recommend optimum visual aids**, such as
   1) spectacles and/or contact lenses
   2) low vision aids (telescopes, magnifiers)
   3) head tilt to reduce nystagmus

b. **Recommend optimum visual stimuli**, such as
   1) minimum-sized symbols appropriate to child's visual acuity
   2) yellow acetate over purple mimeograph to enhance contrast
   3) backlighting of reading materials

c. **Recommend visual activities**, such as
   1) practice tracking abilities with toys, food or colored flashlights
   2) hand-eye coordination by grasping small foods skewered on toothpicks
   3) visual stimulation
d. **Demonstrate how the child "sees", through**
   1) observation by parent and/or teacher of performance during the visual exam
   2) use of lenses/optical aids to simulate child's vision
   3) sketches and explanations of specific visual function limitations

### THE PATIENT POPULATION

According to the Oregon Department of Education, there are approximately 600 children under the age of 21 within the state who are visually impaired (visual acuity of 20/70 or worse). Sixty such children were seen for vision care during the six months from September 1, 1986 to February 28, 1987. Of these children, 51.7% were male and 48.3% were female. They ranged in age from 1.1 to 20.2 years, with the mean age being 9.7 and the median age being 8.0 (Figure 1).

The majority of these children (67.8%) presented with multiple handicaps, whereas the minority (32.2%) presented with isolated visual impairments. Of those children with multiple handicaps, 45.0% had cerebral palsy, 10.0% had congenital rubella syndrome, while the remaining 45.0% presented with numerous other conditions.

All of the children were referred to the clinic by educators. Of those with records available, 53.1% had received their latest vision care from ophthalmologists and 46.9% had received their latest care from optometrists. The mean time since the last vision exam was 1.7 years, with a range of 0.2 to 5.5 years and a mode of 2.4 years.

### THE NEED FOR OPTICAL AIDS

The refractions performed to determine the need for prescription lenses resulted in recommendations for significantly different lens prescriptions ($\geq 0.50$ D change) for 19.6% of the children examined. While the mean dioptric change in prescription was 4.96 D, one child required a change of 18.00 D for each eye. Discarding the data from this child, the mean change drops to 3.51 D, with a range of 0.50 D to 9.25 D and the median being 3.00 D.
Figure 1: Frequency Distribution of Patient Age
The distribution of refractive errors (Figure 2) follows closely that of a population of normals as determined by Sorsby. The mean refractive error in spherical equivalent was 0.45 D of myopia (near-sightedness). The range was from 15.25 D of myopia to 13.00 D of hyperopia (far-sightedness) with a median and mode of 0.00 D (no refractive error).

A majority of the children (81.8%) required the same lens power for distance use as for near. A different lens power for near viewing due to previous cataract surgery was required for 6.8%, and 11.4% required a different lens power for near viewing due to a dysfunction or inefficiency of the accommodative system responsible for focusing the eye when viewing a close target. This latter type of prescription is especially important in the classroom and in the generally constricted world of the visually impaired.

Recommendations for low vision aids were positive for 8.5% of the children. For 80.0% of these, new or different aids were recommended over those that were currently being utilized. The use of low vision aids in this population was generally hampered by chronological and mental age of the patients and by manual dexterity requirements to utilize certain aids.

THE USE OF PREFERENTIAL LOOKING

As was noted earlier in discussing the functional vision assessment, non-traditional testing methods may be required to obtain valuable information about the child's vision. One such method found to be extremely useful utilizes the Preferential Looking acuity cards designed by Teller and Dobson at the University of Washington to assess visual acuity in infants and very young children.

As with the very young, the multi-handicapped individual is often limited in participation skills necessary for the successful use of traditional acuity tests utilizing letters, numbers or pictures. These tests require literacy skills, cognitive skills, communication skills, and an ability to follow instructions.

The Preferential Looking technique, however, requires a low degree of patient participation. The patient need not be literate or be able to recognize symbols. The patient need not be able to communicate intentionally to the examiner and no instruction set is required.
Figure 2: Frequency Distribution of Refractive Errors in a Population of Visually Impaired Children
The technique utilizes a series of square-wave gratings (vertical black and white stripes) of different spatial frequencies, each inserted within a surround of gray matched to within 1% of space-average luminance. The result is a rectangular card, one half of which contains a patch of black and white stripes; the balance of the card is gray. It is known that an infant who is shown a coarsely patterned target (such as the stripes) paired with a blank target of equal luminance will look more at the patterned than at the blank target.

If the eye cannot detect the presence of the stripes, the matching of the luminance with the rest of the card results in the perception of a uniform gray card with no stripes. The smallest stripes seen indicates the child's visual acuity and is converted into equivalent Snellen value.

The examiner presents each card to the child at a known distance (usually 38 cm). The gaze response of the child is observed and noted. Multiple presentations of the same card are made. Children who are capable of a motoric response are asked to point to the stripes for confirmation. Smaller and smaller gratings are presented until the child shows no preference in gaze for the stripes over the gray surround.

Studies have shown the technique to correlate favorably with the results obtained using the traditional Snellen letter chart in literate subjects and to be significantly reliable upon test/retest.

The Preferential Looking technique was used to assess near visual acuities in 52.5% of the children seen at the clinic (Figure 3). Pointing responses were obtainable from 58.1% of those tested with the remaining 41.9% providing gaze responses. Traditional techniques (letter/number/picture charts) were utilized in 20.3% of the children and 23.7% were determined to have no functional vision. The remaining 3.4% represents children for whom a visual acuity could not be determined by any method due to a lack of cooperation (would not open eyes, etc.).

For 59.1% of the children demonstrating any functional vision, the Preferential Looking technique allowed the first determination of a minimum target size visible to each child. This information can be extremely important to educators to assure that teaching aids are of an appropriate size for the children. The mean age of these children was 6.7 years, with a range of 1.1 to 19.3 years and a median age of 6.2 years.
Figure 3: Methods Used to Assess Visual Acuity
CONCLUSIONS

Based on the findings from the Oregon Statewide Vision Clinic, it is apparent that a need exists in Oregon for such services as functional vision assessments. The high number of children requiring new or updated lens prescriptions and the overwhelming number of children for whom visual acuities were determined for the first time attest to the success of the clinic.

It has been shown that much valuable information can be obtained from visually impaired and multi-handicapped children while they are in their normal awakened states. The relatively large percentage of children requiring special lenses for near work points to the importance of proper vision care to the goals of education. The fact that all referrals to the clinic were from educators speaks highly of their devotion to these children.

Sponsors of the pilot program during these months included the Oregon State School for the Blind, Pacific University College of Optometry, Sandra K. Landis, OD, and Members of the Statewide Vision Clinic Committee. Funding to continue the program beyond February, 1988, is currently being sought.