

VISUAL AIDS FOR THE PARTIALLY SIGHTED*

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DEFINITION OF PARTIALLY SIGHTED PERSONS

THOSE who are substantially and permanently handicapped by defective vision resulting from illness, injury, or congenital deformity may be described as partially sighted. The following criteria are suggested as a general guide in estimating "substantial handicap":

- (1) Visual acuity 3/60 to 6/60, with full visual fields.
- (2) Visual acuity up to 6/24, with moderate contraction of the visual fields, opacities of the ocular media, or aphakia.
- (3) Visual acuity of 6/18 or better, if gross visual field defects (*e.g.* hemianopia, pigmentary degeneration, etc.) are present.

VISUAL AIDS AVAILABLE

- (1) Binocular telescopic "bar type" units.
These units have changeable pupillary distance bars allowing for distance between 52 and 74 mm. The magnifications produced are 2, 3, 4, and 5 ×.
- (2) Unocular telescopic units with magnifications of 6, 8, and 10 ×.
- (3) Full field binocular units with magnifications of 1, 6, and 2 ×.
- (4) Full field unocular units with magnifications of 2, 3, 4, 6, and 8 ×.
- (5) Illuminated hand-magnifier with magnifications from 10 to 20 ×.

SCOPE OF INVESTIGATION

The use made of these visual aids formed part of a general inquiry concerning the partially sighted patients who attended the Eye Department of the Royal Infirmary, Edinburgh, during a period of 1 year and 8 months. The objects of the investigation were as follows:

- (1) To find out the effectiveness of visual aids in restoring useful near and distance vision.
- (2) To find out how the use of a visual aid influenced the patient's mode of life, especially with reference to work, study, reading, etc.
- (3) To establish some criteria as a guide to the prescribing of visual aids.
- (4) To demonstrate the various pathological conditions of the eye in which visual aids may be helpful.

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METHOD OF EXAMINATION

All the patients were examined at the Eye Department of the Royal Infirmary.

An explanation of the aims of the investigation was given to each patient and it was emphasized that in order to achieve good results the use of a visual aid demanded good light, keenness, and concentration. The introductory interview served to give some idea of the patient's mental fitness to use an aid to the best advantage.

The mode of onset and the degree and duration of the visual failure were noted as well as any deterioration in vision in the week or fortnight before the examination, which might indicate the presence of an active pathological process. Short notes were also taken of the patient's general health, with special reference to the cardiovascular system and diabetes.

The next stage was the actual testing of the patient's visual acuity with and without glasses, using the Keeler "A" Series. The visual acuity was estimated by the "A" Series and by reference to a Table so compiled that the magnification required could be read off. The appropriate visual aid was then tried. In practice it was often found that the usefulness of the visual aid indicated could be improved by changing the magnification. If one type of aid did not prove successful other types were tried.

The 231 patients tested were taken from the total number registered at the Royal Infirmary as partially sighted. Some were also on the official Blind Register.

The young and middle-aged were tested first, as these patients, apart from their defective vision, were fit for normal schooling, study, or work.

On the whole the "A" Series proved to be a good guide to the visual aid to be tried. In nearly all cases tested only the near vision was dealt with as this was the main handicap complained of, but two patients were given distance visual aids which would be helpful in their work.

Table I shows that visual aids were supplied to 100 patients (50 men and 50 women), representing 43.2 per cent. of the total.

TABLE I
USE OF VISUAL AIDS BY 231 PATIENTS

Classification of Cases	Sex		
	Male	Female	Total
Supplied with visual aid	50	50	100
Not needing any visual aid	31	44	75
Not improved with any visual aid	21	12	33
Not interested or unfit for any visual aid	4	19	23
Total Cases Examined	106	125	231

OCULAR PATHOLOGY

As was to be expected, most of the patients were in the older age groups, and these all showed degenerative changes related to their age or general state of health. The middle-aged and younger patients were suffering from inflammatory, traumatic, hereditary, and congenital conditions. In a few cases the condition was cerebral in origin, vascular accidents or brain tumours interfering with the optic pathways.

The ocular pathology and the number of visual aids supplied in each group are set out by sex in Table II. Seventeen different pathological conditions were seen. In cases of mixed pathology only the main factor responsible for the visual failure is indicated.

TABLE II
PATHOLOGICAL CONDITIONS RESPONSIBLE FOR VISUAL FAILURE
AND AIDS SUPPLIED, BY SEX

Condition	Total Cases			Visual Aids Supplied		
	Male	Female	Total	Male	Female	Total
Macular Degeneration	18	39	57	10	22	32
Myopic Degeneration	22	22	44	10	10	20
Cataract	17	16	33	3	1	4
Optic Atrophy	11	2	13	8	—	8
Glaucoma	10	3	13	5	—	5
Diabetic Retinopathy	3	18	21	2	8	10
Iridocyclitis	4	3	7	2	3	5
Retinitis Pigmentosa	3	2	5	2	—	2
Retinal Detachment	4	3	7	2	—	2
Chorio-Retinitis	4	3	7	—	2	2
Corneal Scarring and Dystrophy	4	4	8	1	3	4
Interstitial Keratitis	—	3	3	—	—	—
Retinal Vessel Occlusion	2	3	5	2	—	2
Hemianopia	1	1	2	—	—	—
Albinism	1	1	2	1	1	2
Sympathetic Ophthalmitis	2	1	3	2	1	2
Disseminated Choroiditis	—	1	1	—	—	—
Total	106	125	231	50	50	100

Macular degeneration forms the largest group. The females outnumber the males by nearly 2 to 1, and the average age is 70 years for both sexes.

Myopic degeneration forms the second largest group, the sexes and the number of visual aids ordered being evenly distributed. The average age is 53 years for males and 60 for females. This group contains the largest number of patients not needing visual aids, their reading vision being adequate with or without glasses.

The cataract cases comprise a mixed group. The majority of patients with senile cataract had had their cataracts operated upon between the time of their registration as partially sighted and the visual aid trials, and consequently no longer needed any visual aid. A few patients with congenital cataract have had their reading ability greatly improved, and they have all had needling operations.

All patients in the glaucoma group show visual field changes and most of them have had drainage operations. The patients supplied with visual aids have had good results, reading N5 and maintaining that vision for a period of 6 months to one year. This group includes one of the patients to whom a distance visual aid has been supplied. His near vision is satisfactory but his distance vision with correction is 6/36 in the right eye and hand movements in the left. He works in a grocer's shop and used to find it very difficult to read labels, etc., on articles on shelves, but with a right monocular telescopic unit of $2\frac{1}{2}$ magnifications, he can manage his work very well.

The great majority of diabetic patients were females. This proved a rather difficult group as the retinopathy of the diabetic fundus is variable and causes frequent fluctuations in the visual acuity. Several trials were needed, with intervals of 2 months between each trial, and only those patients in whom the disease appeared to be stable could be supplied with visual aids.

Optic atrophy due to different causes responded quite well to the visual aids. A patient with frontal meningioma with optic atrophy, who had been operated upon years ago, could read only with the greatest difficulty, but a right monocular telescopic unit of $8\times$ enabled him to read N6. A patient with a supracellar cystic tumour with field defects could read N6, post-operatively, using a left monocular telescopic unit of $3\times$.

An elderly patient aged 76 years, who developed bilateral optic atrophy due to temporal arteritis, has had his reading vision improved to N8 and then to N6 by a visual aid.

The use of visual aids in retinal detachments has proved to be of great value in two cases. One had a bilateral detachment of many years' duration. After a detachment operation to the right eye he could just manage N8 to N6 with a visual aid; a cataract then developed and since its removal the same visual aid enables the patient to read N6 comfortably.

Two patients with sympathetic ophthalmitis have been given visual aids and in both cases N6 could be read. One is now able to attend an ordinary school instead of a Partially Sighted School; he reads N5 and is second in his class.

VISUAL AIDS

Telescopic spectacles have been in existence for many years and simple magnifiers for many centuries. For practical purposes these aids, which are made mainly of glass, have been limited to powers of up to $6\times$ magnification.

Plastic materials have recently made it possible, however, to mould lenses in aspherical form and this has enabled magnifications to be greatly increased, in some cases up to $20\times$ with compound aspherical systems.

Ordinary magnifiers always present the problem of peripheral distortion, but the aspherical telescopic lenses give good definition right to the edge of the lens, and patients with sub-normal vision can derive great benefit from this combination of increased magnification with clarity. It is remarkable how flat and clear the reading material appears with a $20\times$ (+80 dioptries) compound magnifier.

An innovation of the Keeler Low Visual Acuity Scheme provides binocular vision for close work with magnifications up to $5\times$. These binocular telescopic spectacles, which are quite light in weight and can be worn for a long time without discomfort, constitute a major step forward in helping the partially sighted to read. The principle of the lens is the same as that of any other magnifier in that it presents an enlarged image to the retina and so stimulates more cones.

Fifty-six of the 117 cases supplied with a Keeler Aid were given binocular telescopic spectacles, 56 monocular telescopic spectacles, two a simple aspherical spectacle, two a distance telescopic spectacle, and one an illuminated hand magnifier.

Method of Supply—The visual aids were supplied through an optician appointed for this work. These types of apparatus are not designed individually for any one eye, and it was therefore thought that it should be possible to recover the visual aid for further use if the eye condition of the user deteriorated, or if he died. The arrangement finally made was that the visual aid should be “lent” by the hospital to the patient as long as it helped him. If, however, his vision failed to such an extent that the aid was of no more use or if the patient died, the aid was returned to the Eye Department of the Royal Infirmary. In this way a “library” of visual aids has been built up for the re-issue to new patients.

In the present series seven patients have died and the visual aids have been returned and one patient has given up using the visual aid because his vision has deteriorated. These aids had been in use for periods varying from 8 months to 1 year.

Patients who were supplied with visual aids were re-examined several times during the period of investigation. Most of them had maintained their visual improvement, but a few had deteriorated to some degree; even so a reading vision of N8 to N10 was obtained. In the future the Health Visitors will visit the patients and their investigations will include an inquiry into the continued usefulness of the visual aid.

The visual results in 109 cases are shown in Table III (opposite).

THE PARTIALLY SIGHTED SCHOOL

The Edinburgh School for the Partially Sighted was visited several times in order to find out if visual aids could be of any use in the training of pupils. Only those children who could read letters or words (24 cases) were tested.

TABLE III
DETAILED ANALYSIS OF IMPROVEMENT GAINED WITH TELESCOPIC SPECTACLES

Visual Acuity without Telescopic Spectacles	Visual Acuity with Telescopic Spectacles			
	N5	N6	N8	Total
N8 to N14	55	5	1	61
N18 to N24	23	14	—	37
N36 to N48	3	5	3	11
Total	81	24	4	109

The pathological causes of poor vision in these 24 children and results of supplying visual aids to nine of them are shown in Table IV.

TABLE IV
VISUAL AIDS SUPPLIED TO PATIENTS AT THE PARTIALLY SIGHTED SCHOOL

Pathological Conditions	No. of Children	No. of Visual Aids Supplied	Results
Myopia	9	3	Reads N5 at a good distance
Hypermetropia	1	—	—
Congenital Cataract	6	2	Reads N6-N5 at a good distance
Albinism	4	2	Reads N5
Choroiditis	2	1	Reads N5
Retrolental Fibroplasia	2	1	Reads letters at 5 to 6 in.
Total	24	9	—

All the cases of cataract which were tested had been operated upon. Most of the children not supplied with visual aids had good reading vision with their own glasses or could read unaided, but a few had not had sufficient training to be able to use a visual aid properly. All the children supplied with an aid have since been re-examined and they are happy to be able to read in comfort with its help. The speed and eagerness with which a child takes to the use of an aid is very encouraging. The school will be visited at intervals to re-examine those who were unable to use an aid at the first test and also to test new pupils.

SUMMARY

In the course of this investigation 231 partially sighted patients have been examined as to the usefulness of various types of visual aids. In all, one hundred

patients were supplied with aids, 75 patients did not need any visual aid as their reading vision was adequate, 33 showed no improvement with any of the aids available, and 23 were uninterested or unfit to use aid. All patients using the aids were re-examined several times, at intervals of 1 to 2 months. Apart from noting the state of vision, these re-examinations served as an opportunity of finding out to what extent the aid helped the user in his work, study, or retirement. In all cases it was found that the aid had made a contribution to the user's mode of life, and in a few cases this assistance was exceptional, enabling the patient to study or increase his working efficiency.

Most of the visual aids supplied aimed at improving the reading vision, only two patients being supplied with visual aids for distance. Seventeen different pathological eye conditions were encountered, and some of these, such as optic atrophy, glaucoma, and sympathetic ophthalmitis, reacted unexpectedly well to the aids. The majority of patients belonged to the older age group.

The method of supplying the aids and the system of follow-up supervision is described. This has been an interesting study and it is hoped that it will serve to focus attention on the problem of partial sightedness and its relief by the provision of special aids.

The following conclusions have been drawn:

(1) Modern visual aids can restore useful vision to a considerable number of the partially sighted. Of the clinically non-selected partially sighted patients used in the survey, 43·2 per cent. were supplied with aids which gave them substantial help.

(2) Many pathological conditions respond to the use of visual aids.

(3) Criteria as a guide to the ordering of visual aids

(a) The patient must be willing to co-operate. A good light, mental fitness, and determination are essential for the achievement of good results.

(b) The pathological condition must be reasonably stable in order to make the visual aid worth while. In certain cases a re-examination should be carried out before the decision to supply the aid is taken.

(c) The use of a visual aid for one year may be regarded as justifying its ordering.

This investigation was made possible by a grant from the Ross Foundation for the Prevention of Blindness. Dr. Macaskill originated and supervised the investigation. Dr. Eleanor Petrie was responsible for socio-medical aspects of the work and for the systematic classification and registration of the cases. Mr. Alexander Cameron, F.A.D.O., was the optician in charge. The method used was the Keeler Low Visual Acuity Scheme for helping the partially sighted.