

## Clinical Topics

# Mobile orthoptic service for primary screening of visual disorder in young children

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### Summary and conclusions

A mobile orthoptic service was begun in 1976. General practitioners, clinic doctors, and health visitors referred 4544 preschool children to the service in 18 months. Of the children referred, no defect was detected in 3138 (69%), 927 (20%) were recalled for a second assessment within 12 months, and 479 (11%) were referred for treatment. Out of 261 who received treatment in Oxford, 24 (9%) received aftercare. Benefits of the service included a 25% decrease during 1976-7 in inappropriate referrals of preschool children to the specialist hospital. The chance of inappropriate referral was reduced by a factor of 30 if a child was referred to the mobile service instead of to the eye hospital.

A prevention programme such as the mobile orthoptic service can improve the rate of detection of visual disorder in young children, while providing the support needed by primary-care doctors and nurses for visual screening of preschool children easily and cheaply.

### Introduction

Early detection of squint or refractive error in preschool children will prevent amblyopia. The need for a preschool vision screening service employing orthoptists has been stated.<sup>1, 2</sup> This type of service has been introduced in Oxfordshire, where a preventive programme has been designed that comprises: a mobile orthoptic screening service to provide quick and easy access for children to specialised assessment in standard testing conditions; encouragement of preschool screening of vision for all children at 8 months and 3 years by health visitors or child health clinic doctors (general practitioners or medical officers); and regular demonstrations of vision screening to doctors and nurses, which are given by an orthoptist and a clinical medical officer.

We report on the first 18 months of the mobile orthoptic unit.

### Methods

After a pilot study in 1975, in which an orthoptist visited rural child health clinics, a converted motor caravan was purchased, a half-time orthoptist (who also drove the van) was appointed, and part-time clerical help was arranged. Funds were provided by the regional health authority and the Oxford Hospitals Services Develop-

ment Trust. The orthoptic van began a preplanned, publicised itinerary in September 1976. Appointments were made up to three months in advance. General practitioners agreed that health visitors might refer children directly to the mobile service, and that the orthoptist would refer selected children to an ophthalmologist, notifying the general practitioner of this action.

Examinations carried out by the orthoptist included: head posture; pen-torch test of visual attention and eye movements, pupil reaction and clarity, position of corneal reflections, and presence of obvious squint; near and distant cover test to fixation targets and test for binocular convergence; base-out 20° prism test (the prism is placed in front of each eye in turn, the covergent response established, and the ability to recover is noted when the prism is removed); tests for visual acuity with the Catford drum, rolling balls, hundreds and thousands, and matching pictures and toys; examination with ophthalmoscope specially adapted to measure fixation (visuscope); Sheridan Gardiner test and random stereopsis testing was also included for children aged 2 years and over. Family history of vision disorder and parental concern was noted routinely.

The geographical area of Oxfordshire covered by the service contained roughly 35 000 preschool children, of whom about one-fifth lived in Oxford, and one-quarter in 11 market towns. The initial cost of the van estimated in November 1978 was £6000. The total yearly service cost was £4300, and this comprised: orthoptist's salary (half time), £2000; secretary's salary (half time), £1750; sundries and equipment, £100; and petrol and maintenance, £450.

### Results

Altogether 4544 children were screened in the first 18 months. Table I lists the number of children seen by age, test result, and action taken. Although children aged under 1 year formed the largest single group of referrals, differences between other age groups up to

TABLE I—Number (%) of children screened by mobile orthoptic service, according to age and action taken

Age (years)	Total seen	No action	Recalled for further testing	Referred to ophthalmologist
<1	1065	673 (63)	359 (34)	33 (3)
1-	945	605 (64)	269 (28)	71 (8)
2-	666	445 (66)	152 (23)	69 (10)
3-	904	680 (75)	111 (12)	113 (12)
4-	747	582 (77)	32 (4)	133 (18)
5-	217	153 (70)	4 (2)	60 (27)
Total	4544	3138 (69)	927 (20)	479 (11)

TABLE II—Categories of visual defects detected in 261 children

Age (years)	Squint only	Refractive error only	Squint and refractive error	Total
<1	7	2	1	10
1-	10	8	12	30
2-	10	6	20	36
3-	18	29	28	75
4-	9	45	22	76
5-	12	14	8	34
Total (%)	66 (25)	104 (40)	91 (35)	261 (100)

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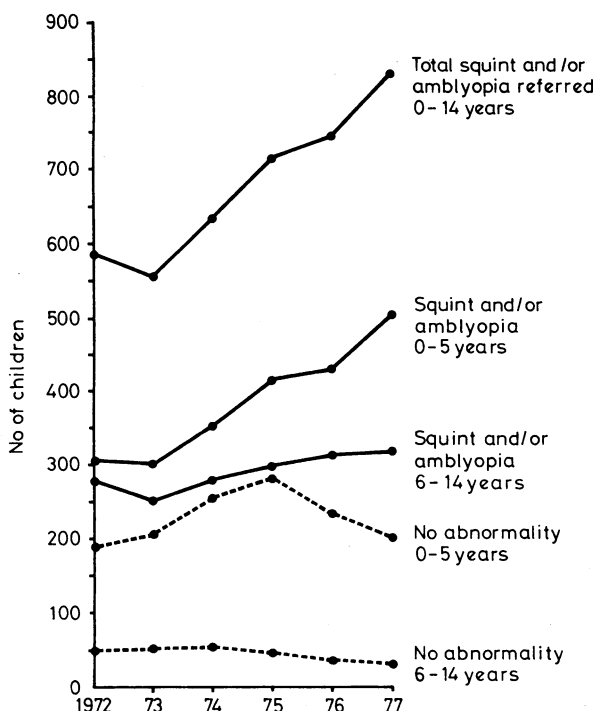
5 years were not substantial. Children aged 4 and 5 were often brought to the van by parents anxious because their child's sight had never been tested. Their anxiety was borne out by the high rate of subsequent referral to an ophthalmologist. Younger children tended to be recalled for review more often, which reflected the difficulties of assessing vision in young children. Altogether 479 children (11%) were subsequently referred to an ophthalmologist. Categories of visual defect were analysed for 261 of these 479 children (table II). Of the remaining 218, 49 were referred to hospitals outside the area, 31 failed to attend, and 138 were borderline referrals who were reassessed with full ophthalmic advice. Eighty-two of these were subsequently discharged, since no abnormality was detected. Defects were most commonly detected at 3 and 4 years. Few refractive errors without squint were detected before 4 years.

Table III lists the number of treatments at different ages. Eight of the 42 treatments under 2 years (19%) were surgical treatment to correct squint. The importance of early correction of refractive error as part of treatment for squint is emphasised by the fact that 197 of the treatments (58%) were prescriptions for spectacles. Orthoptic supervision of treatment showed good compliance. Twenty-four of the children (9%) received care in the mobile clinic after treatment.

TABLE III—Number of treatments prescribed according to type of treatment and age

Age (years)	Orthoptics/occlusion	Glasses	Squint surgery	Total
<1	2	3	3	8
1-	9	20	5	34
2-	20	28	10	58
3-	33	56	2	91
4-	31	68	7	106
5-	15	22	3	40
Total (%)	110 (32)	197 (58)	30 (9)	337 (100)

The figure shows numbers of preschool and school-age children referred to the orthoptic department at Oxford Eye Hospital from all sources during 1972-7, and the numbers in whom abnormality or no abnormality was detected. The number of preschool children in whom squint or amblyopia (or both) was detected increased substantially in the first full year of the mobile service (1977). The decrease in the number of young children with no abnormality, which had begun in



Numbers of preschool and school-age children referred to Oxford Eye Hospital during 1972-7 in whom visual abnormality was or was not detected.

1976, was maintained in 1977. A rise in the number of school-age children with squint or amblyopia (or both) appeared to be checked in 1977, and is expected to decrease. During 1972-7 the preschool population decreased by 20% and the school population increased by 5%. Hence the impact of preschool vision screening was even more impressive.

## Case reports

The following three case reports illustrate the type of problem discovered by the service.

**Case 1**—A 4½-year-old girl had twice been examined by her general practitioner at the parents' request. Visual acuity for distance was 6/6 for each eye, and no squint showed on fixation to a light. When tested for accommodative fixation she had a pronounced convergent squint, and her near visual acuity was seriously reduced. Accommodative squint was diagnosed and glasses with a moderately high hypermetropic correction were prescribed to restore binocular near vision and to enable her to distinguish small print.

**Case 2**—An 18-month-old girl had no apparent squint, but orthoptic screening showed poor responses of the left eye to all tests. She proved to have serious amblyopia, which required anisometric correction. With appropriate glasses and carefully monitored periods of occlusion of the right eye visual acuity was restored, and normal binocular vision developed with no further difficulties. Had this been untreated until she reached school age normal binocular vision and full visual acuity in the amblyopic eye could not have been restored.

**Case 3**—A 5½-year-old boy accompanied his baby sister to a child health clinic by chance. He had behavioural problems and his mother was anxious. Neither the general practitioner nor the health visitor elicited a response to simple eye tests. He was to be assessed for special schooling. His visual acuity proved to be 5/60 R and 3/60 L. After glasses had been prescribed to correct severe myopia he caught up with his age group at school and family anxiety was relieved.

## Discussion

Our results show that a prevention programme based on a mobile orthoptic service can improve the rate of early detection of visual disorder in young children, and that primary-care doctors and nurses need the special support for vision screening of preschool children that such a service can provide easily and cheaply. Many rural areas have no suitable facilities for testing, and parents and children may be discouraged by travelling several miles to a suitable centre for treatment and aftercare. The numbers of children dependent on hospital transport for treatment of visual defect has decreased from 160 to 76 since the scheme started, despite the increased number of children receiving treatment. Knowledge of the development of amblyopia and the duration and timing of the so-called critical period is incomplete.<sup>3,4</sup> A preliminary study of orthoptic records in Oxfordshire has shown that the optimum time for beginning treatment may be as late as 24 months, but no later than 27 months. Early referral and treatment may not only prevent secondary complications but achieve a higher percentage of good clinical results with binocular stereopsis.

Once doctors and nurses have become aware of the need, and understand the techniques of, simple screening methods for squint and visual disorder, and local access to the orthoptist is provided, certain principles should be followed for referral. We suggest the following guidelines. Firstly, if the squint is obvious refer directly to an ophthalmologist. Secondly, if the doctor is uncertain, or the parents are anxious, or there is a family history of squint or wearing glasses, refer to the orthoptist immediately, and before the child reaches 2 years. No child is too young for referral, and the "wait and see" attitude may be disastrous.

## References

- <sup>1</sup> *British Medical Journal*, 1977, **2**, 594.
- <sup>2</sup> Köhler, L, and Stigmar, E, *Acta Paediatrica Scandinavica*, 1973, **62**, 17.
- <sup>3</sup> Johnson, F, *British Orthoptic Journal*, 1978, **35**, 13.
- <sup>4</sup> Whitteridge, D, *Transactions of the Ophthalmic Society of the United Kingdom*, 1977, **97**, 39.

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