The use of non-cycloplegic autorefraction data in general studies of children's development

C Williams, L Miller, K Northstone and J M Sparrow

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would track changing thresholds for referral for cataract surgery and, importantly, consider outcomes for patients at a national level. Such an initiative is technically possible, is strongly supported by the Royal College of Ophthalmologists and now requires government support. With the UK government's commitment to developing an electronic patient care record, the deployment of a national electronic cataract dataset would greatly assist in our better understanding of these questions.

Care of NHS cataract patients has improved as a result of better technology and improved access to care, much of which followed the Action on Cataract (AoC) initiative.[2] A recent quality-improvement report in relation to NHS cataract care in Scotland has been compelling.[3] However, ophthalmologists and commissioners of ophthalmic care should not become complacent. Pressures on eye-care services for the future are likely to be significant; as a result of the ageing population, lower clinical thresholds for safe treatment for cataract, the introduction of new treatments for patients with age-related maculopathy and other conditions.

Cataract surgery is a highly effective procedure which provides rapid improvement in vision-related as well as non-vision-related outcomes as well as being very cost effective.[4] Benefits to patients are lifelong. The principal causal factor of adult cataract is ageing, and demand for services for cataract and other diseases of the ageing eye is expected to increase as the UK population ages. The indications for surgery as recommended in the consensus guidelines from the College, simply stated, are: failing vision attributable to lens opacity despite optimal optical correction or ocular comorbidity and patient willingness and fitness to undergo cataract surgery. The last issue is not problematic, as surgery is almost always carried out under day care and local anaesthesia. There is no evidence, that we are aware of, to suggest that patients are having "inappropriate" cataract surgery in the UK.

We are aware that some Primary Care Trusts are attempting to "demand manage" cataract surgery to certain thresholds of patient visual impairment. Such decisions, if simply based on Snellen visual acuity levels, are likely to disadvantage elderly patients.[5] Attempts to include chronological age as a factor in healthcare policy are likely to be insensitive.[6] Some have suggested that access to surgery could be determined by an assessment of a range of a patient's visual symptoms and disability, rather than a simple measurement of monocular visual acuity.[7] We support the concept that decision to operate for cataract remains a matter of balanced clinical judgment and consensus reaching with the individual patient. The World Health Organization recommended 3000 cataract operations per million residents as the minimum to eliminate blindness from cataract and recommended 3500 per million for established market economics for the year 2000.[8] This latter target is being attained across the English NHS.

S P Kelly,[1] B Billington[2]

[1] Bolton Hospitals NHS Trust, Bolton, UK;
[2] The Royal College of Ophthalmologists, London, UK

Correspondence to: S P Kelly, Bolton Hospitals NHS Trust, Minerva Road, Bolton BL4 0JR, UK; simon.kelly@rbh.nhs.uk

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The use of non-cycloplegic autorefraction data in general studies of children's development

We were interested to read the paper by Fotouhi and colleagues, on the prevalence of refractive errors in schoolchildren in Iran,[1] in which the authors used cycloplegic autorefraction for children aged 7–15 years and non-cycloplegic autorefraction for children aged 15–18 years. This paper illustrates the well-recognised need for cycloplegia in order to obtain accurate refractive estimates in children up to at least age 12.[2] However, the use of cycloplegia may reduce compliance and may not be possible in some situations—for example, studies of general child development such as the 1958 and 1970 national cohort studies in the UK. In such situations, other measures such as visual acuity may be used to infer the presence, but not the type of refractive error.[3]

We have faced this problem when participating with a birth cohort study (Avon Longitudinal Study of Parents and Children; ALSPAC[4]). Rather than collect no refractive data, we have examined the children with an autorefractor (a Cannon R50) without cycloplegia and conducted a nested comparison with refraction under cycloplegia, to assess the most appropriate interpretation and uses for the non-cycloplegic data. We included 7-year old children with acuity worse than 0.2 logMAR (6/9), despite the use of a pinhole ($n = 414$), and we compared the non-cycloplegic autorefractions with cycloplegic retinoscopy by an experienced optometrist in the 345 (83.3%) who agreed to the use of cycloplegic drops. Cycloplegia was induced using 1–2 drops of 1% cyclopentolate in each eye. After 20 min, the optometrist carried out the examination if the reflex was stable or added more drops if needed.

We assessed the data for the right eyes, with Bland–Altman plots and Receiver Operator Characteristic (ROC) curves (where different cut-off points are used to predict the presence or absence of particular refractive errors). The Bland–Altman analyses confirmed the expected bias towards "over-minussing" the spherical refractive error, increasing as the amount of hypermetropia increased ($p<0.001$). Estimation of astigmatic error showed no such bias, and was on average moderately accurate, but with large differences between methods for some individuals: the mean (SD) difference between methods was –0.13 (0.53) D, with the range of differences –3.00 to +1.00 D.

Table 1 illustrates the results obtained from ROC curves, with sensitivities shown for two arbitrarily set levels of specificity: ⩾95% and ⩾99%. The sensitivities of the autorefractor are best when screening for hypermetropia. If the target level of mean spherical equivalent (MSE) hypermetropia +2.00 is used as a cut-off point to identify affected children, then nearly all children identified will have hypermetropia at least that severe (⩾99% specificity), and 71% true cases will be detected. The sensitivities for myopia, astigmatism and anisometropia are worse, particularly at 99% specificity. Repeatability data are shown in table 2 and are comparable with other devices in the literature.

From these analyses, we suggest that these autorefractor data can be used to identify hypermetropic children with reasonable accuracy, although any prevalence data will underestimate the true value. The data for myopia, astigmatism and anisometropia are not accurate enough to use for prevalence estimates. Instead they could be better used to identify subgroups of children "enriched" with children who truly have the refractive error in question, as well as some who do not, eg, myopes and pseudomyopes, in risk-factor analyses.

Table 1 Characteristics of autorefractor as a screening device in 345 children aged 7 years, where the specificity is set at least 0.95 or 0.99

Target refractive error	n	Area under curve	Cut-point (>0.95 specificity)	Sensitivity (>0.95 specificity)	Cut-point (>0.99 specificity)	Sensitivity (>0.99 specificity)
Hypermetropia (sphere)						
+0.5	217	0.918	0.0	0.70	0.50	0.56
+1.0	167	0.921	0.50	0.71	1.00	0.58
+2.0	114	0.955	0.75	0.85	1.75	0.67
+4.0	49	0.946	2.75	0.63	3.75	0.53
Hypermetropia (MSE)						
+0.5	233	0.927	0.5	0.63	0.75	0.57
+1.0	190	0.918	0.75	0.67	1.25	0.56
+2.0	122	0.961	1.00	0.88	2.00	0.71
+4.0	70	0.950	3.00	0.63	4.00	0.48
Myopia (sphere)						
−0.5	77	0.929	−1.50	0.47	−1.75	0.39
−0.75	64	0.933	−1.50	0.53	−2.00	0.31
−1.0	52	0.950	−1.50	0.54	−2.00	0.29
−1.25	45	0.950	−1.50	0.60	−2.00	0.33
−1.50	31	0.975	−1.75	0.55	−2.25	0.36
Myopia (MSE)						
−0.5	62	0.946	−1.00	0.61	−1.50	0.38
−0.75	54	0.948	−1.00	0.67	−2.00	0.22
−1.0	43	0.953	−1.00	0.74	−2.00	0.28
−1.25	34	0.946	−1.25	0.68	−2.00	0.28
−1.50	26	0.965	−1.50	0.65	−2.00	0.42
Cylinder						
0.5	186	0.759	1.25	0.29	1.75	0.20
0.75	132	0.824	1.50	0.29	2.50	0.12
1.0	103	0.856	1.25	0.48	2.50	0.15
1.25	74	0.924	1.25	0.64	2.50	0.22
1.50	57	0.952	1.50	0.60	2.50	0.28
Anisometropia						
0.75	105	0.819	1.75	0.44	2.50	0.30
1.0	83	0.853	1.75	0.52	2.50	0.37
1.25	68	0.894	1.75	0.62	2.50	0.43
1.50	51	0.919	2.00	0.65	2.50	0.57

Table 2 Repeatability of non-cycloplegic autorefractor data in 345 children aged 7 years, for two visits, 4–6 weeks apart

Refractive component	Mean difference dioptres (SD)	Repeatability coefficient (1.96*SD)	Percentage within ±0.25 D	Percentage within ±0.50 D	Percentage within ±1.0 D
Mean spherical equivalent (MSE)	−0.07 (0.86)	±1.69 D	52.4	70.5	85.9
Sphere	−0.05 (0.86)	±1.69 D	59.3	74.7	87.5
Cylinder	−0.02 (0.32)	±0.63 D	82.4	97.4	99.7
Anisometropia (MSE)	0.003 (0.50)	±0.98 D	74.8	89.0	96.4

Thus, with appropriate use, non-cycloplegic data may help the vision science community to gain useful information from general developmental studies such as ALSPAC and thus facilitate wider perspectives on how visual development and function impact on (and are impacted by) other aspects of a child's life, as an adjunct to dedicated eye studies such as that by Fotouhi *et al*.[1]

C Williams[1], L Miller[1], K Northstone[1], J M Sparrow[2]

[1] University of Bristol, Bristol, UK; [2] Bristol Eye Hospital, Bristol, UK

Correspondence to: C Williams, Bristol Eye Hospital, Lower Maudlin Street, Bristol BS1 2LX, UK; cathy.williams@bristol.ac.uk

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Epidemiology of giant cell arteritis in an Arab population: a 22-year study. Ethnic variation in incidence of giant cell arteritis

We read with interest the editorial by Miller which comments on the paper, "Epidemiology of giant-cell arteritis in an Arab population: a 22-year study."[1] The author of the editorial comments on geographical variation in the incidence of giant cell arteritis and cites evidence supporting both genetic and environmental aetiologies.

We re-examined the data from our 5-year study,[2] looking at biopsy proven giant cell