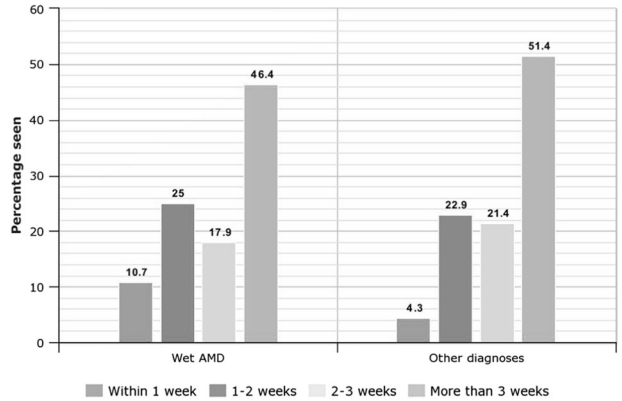

Fig. 2 Delay between referral and specialist review by diagnosis

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Compliance with ethical standards

Conflict of interest Susan Downes Disclosure: PI on relevant commercially sponsored trials in last 5 years: Novartis, Bayer, and Alcon. Prof Susan Downes has received honoraria in the past 15 years from Novartis and Bayer for speaking at educational meetings, as well as travel expenses from Ely Lilly as chair for diabetic retinopathy screening meetings, and Novartis to attend educational meetings in Medical Retina pre 2010. She is a PI on a number of commercial trials (Novartis, Roche, Bayer, Allergen, among others), and has received a bursary for a research nurse practitioner, and equipment (visudyne pump for photodynamic therapy) and funding to carry out genetic testing for a research project from Novartis. She also has has been a co-PI or Pl on grants from Wellcome, UK Fighting Blindness RP, Fight for Sight and UK NIHR/CRN funding. The remaining authors declare that they have no conflict of interest.

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Accuracy of pinhole visual acuity at an urban Indian hospital

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The World Health Organization-endorsed rapid assessment of avoidable blindness (RAAB) survey employs pinhole acuity to distinguish between refractive error versus conditions not correctable with eyeglasses, but few studies have validated this approach [1].

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Methods

Ethical committees at the University of California, San Francisco and Narayana Nethralya Eye Hospital approved this study. A consecutive series of patients aged ≥50 years visiting the refraction clinic at Narayana Nethralaya Eye Hospital (Bangalore, India) in September 2015 had presenting vision and pinhole vision assessed using an ETDRS chart in a fully illuminated room, and then had a manifest refraction by an experienced optometrist. Analyses are reported with bootstrapped 95% confidence intervals with resampling at the participant level to account for non-independence of eyes.

Results

We assessed 204 eyes from 104 individuals (mean age 63.4 ± 7.8 years, 51.9% female). Mean spherical equivalent after manifest refraction was –0.31 (95% confidence interval [CI]: –0.07 to –0.60). Mean uncorrected visual acuity was 0.43 logMAR units (95% CI: 0.38–0.49), mean best corrected visual acuity (BCVA) was 0.16 (95% CI: 0.13–0.19) and mean pinhole acuity was 0.15 (95% CI: 0.12–0.18). Pinhole acuity had high agreement with BCVA (intraclass correlation coefficient 0.97, 95% CI: 0.96–0.98; Fig. 1). On average, pinhole acuity was less than a letter different from BCVA (mean 0.4 letters better, 95% limits of agreement by Bland–Altman method: four letters worse to five letters better). The magnitude of improvement on pinhole testing was correlated with the magnitude of spherical equivalent from refraction (Spearman's rho = 0.68, $P < 0.001$; Fig. 2).

Of 204 eyes, 21 (10.3%) had visual impairment even after subjective refraction (BCVA worse than 20/60). When treated as a diagnostic test for visual impairment not correctable with eyeglasses, pinhole acuity provided high discriminative ability, with an area under the receiver operating characteristics (ROC) curve of 0.99 (95% CI: 0.97–1.0). Pinhole acuity worse than 20/60 was 85.7% sensitive (95% CI: 59.1–100%) and 100% specific (98.0–100%) for detecting visual impairment not correctable with glasses, and had a positive predictive value of 100% (95% CI: 81.4–100%).

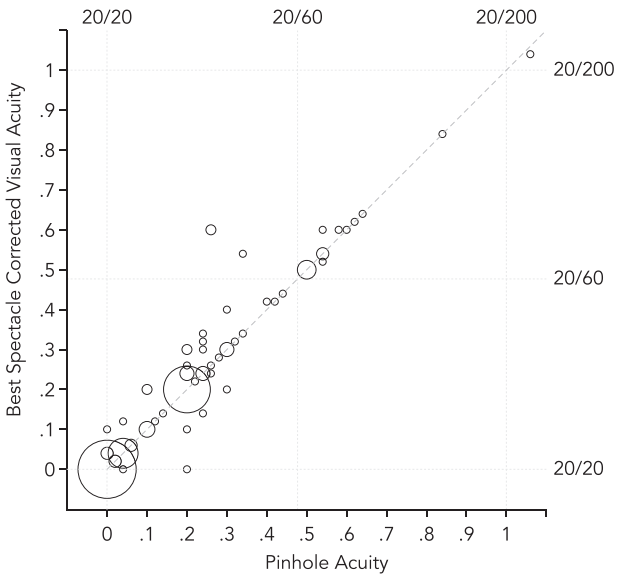

Fig. 1 Correlation between measurements of best spectacle corrected visual acuity and pinhole acuity. Points are weighted; the area of the circles represents the number of observations at each coordinate

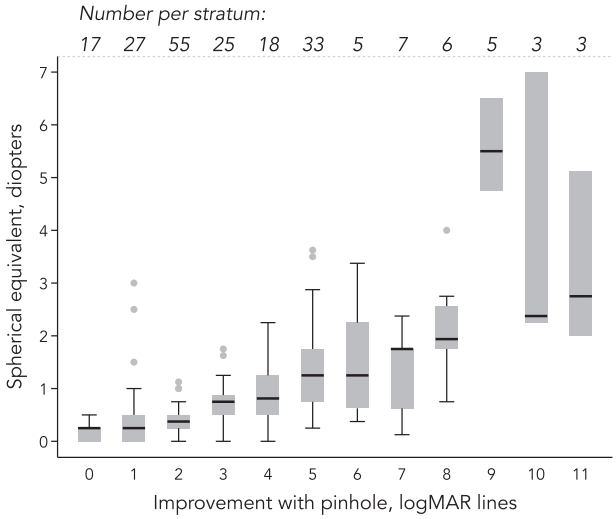

Fig. 2 Relationship between improvement with pinhole occlusion and refractive error. Eyes were stratified according to how many lines of improvement were achieved with pinhole occlusion. The distribution of spherical equivalent for each stratum is depicted as a box-and-whiskers plot

Conclusions

Previous studies of patients with diabetic retinopathy or low vision found that pinhole acuity was biased relative to BCVA, with pinhole acuity ~1 line worse than BCVA [2, 3]. In contrast, we found essentially no bias in this population from a refraction clinic in India. The reason for the discrepancy is unclear, but the pinhole occluder may cause more visual degradation in those with retinal pathology than in a general population like ours [2]. The estimates of sensitivity and specificity of pinhole acuity as a test for visual impairment are consistent with prior reports, and suggest that estimates of refractive error based on pinhole occlusion should not overestimate the prevalence of disease [4].

In summary, pinhole acuity agreed well with BCVA and was a specific test for visual impairment not correctable with eyeglasses. These results suggest that pinhole occlusion is a valid gauge of refractive error in the RAAB survey or other community-based surveys.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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Time to drop the phenylephrine from the paediatric cycloplegia protocol: informing practice through audit

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Cycloplegic retinoscopy is the gold standard refraction approach in children. Various protocols are in use to achieve cycloplegia during outpatient appointments. Many use not only the muscarinergic antagonist, cyclopentolate (CP), which paralyses the ciliary muscle, but also the alpha-adrenergic agonist, phenylephrine (PE), which as a mydriatic paralyses the iris constrictor, but has no effect on the ciliary muscle. Whilst mydriasis facilitates visualisation of the retinoscopy reflex, there is a risk of underestimating hypermetropia. Published evidence suggests that repeated instillation of CP only is effective even for brown and very dark irides [1–3].

To develop a Patient Group Directive (PGD) we carried out a two-cycle audit (CA18/PA/02). The first round evaluated our current protocol: blue iris, CP 1% once (0.5% if age < 3 months); brown iris, CP/PE 2.5% once; very dark iris, CP/PE twice, 10–15 min apart; repeated if pupils still constrict on pentorch illumination. As standard, we set full dilation in 90% within 30 min, i.e. the level expected for blue irides with a single CP drop [4].

In the second round, we only included children with brown or very dark iris, administering CP twice or three times, respectively, 10–15 min apart.

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Table 1 Ethnic background and iris colour of children assessed in this audit

	Round 1		Round 2	
	n	%	*n*	%
Ethnicity				
Afro-Caribbean	5	9	10	20
Asian	7	13	19	37
Caucasian	44	79	20	39
Chinese			1	2
Other			1	2
Iris colour				
Blue	32	57		
Brown	11	20	14	27
Very dark	13	23	37	73