Screening for other retinal conditions in Singapore's diabetic screening programme (SIDRP)

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Introduction

In Singapore, we have established a national telemedicine diabetic retinopathy (DR) screening programme (SIDRP), using non-physician trained readers in centralised reading centres. Our primary aim is to detect referable DR but we also screen opportunistically for other eye diseases such as Age-Related Macular Degeneration (AMD) and Glaucoma Suspects (GS). We present our screening results for other eye diseases.

Methods

SIDRP is implemented at 20 polyclinics island-wide. The polyclinics are equipped with non-mydriatic retinal cameras, of which, 2-field retinal images are captured by the nurses and uploaded via Ophthlive, an online platform, equipped with customized grading functions for assessment of DR, AMD and GS.
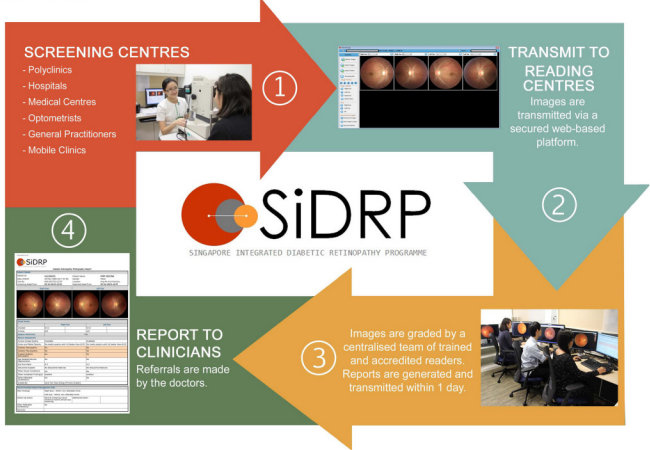

Figure A: SIDRP workflow

Referable DR is categorized as moderate non-proliferative DR and above or mild DR with the presence of diabetic maculopathy (DME).

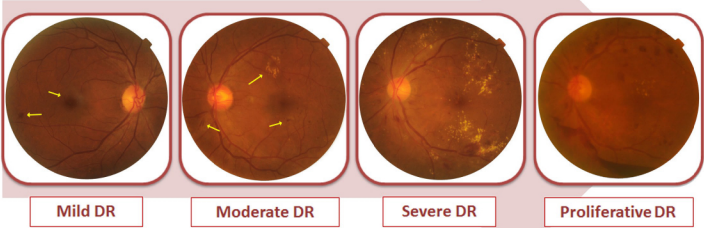Mild DR | Moderate DR | Severe DR | Proliferative DR

Figure B: DR Levels

Late AMD is defined as geographic atrophy, subretinal fibrovascular lesions, choroidal neovascular membrane. The optic disc is graded for the following GS features; cup-disc ratio of more than 0.65, disc asymmetry, haemorrhages, notching or rim thinning.
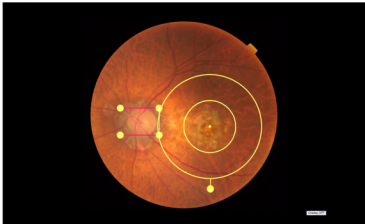

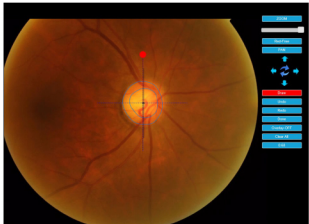Figure C: 2 Disc Diameter Measurement Tools

Figure D: Cup Disc Ratio Measurement Tools

Results

Since 2010, 162,380 cases have been assessed at our reading centre. 80% of them (n=129,618) required an annual screening and the remainder (n=28,832) were referred for further eye examination. We referred 3.7% of patients (n=5,948) for ungradable images. 7,299 (4.5%) patients were detected to have referable DR while 15,585 (10%) of the referrals were due to non DR-related diseases.

7,518 (4.6%) were classified as Glaucoma Suspect

1,344 (0.8%) were attributed to late AMD

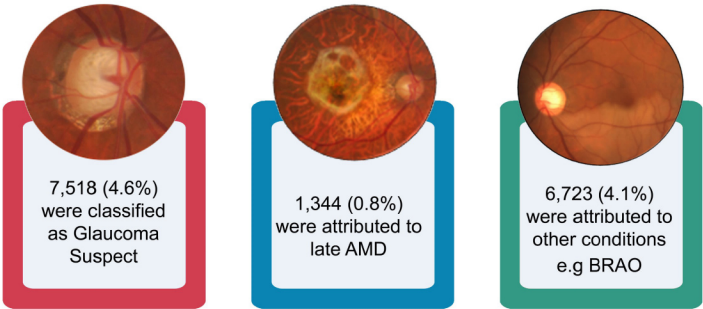6,723 (4.1%) were attributed to other conditions e.g BRAO

Figure E: Other eye conditions referred

On a quarterly basis, 400 patient images are selected on a random basis to be review by an ophthalmologist blinded to the graders results. Performance of the grader is compared against the ophthalmologist.

	DR	DME	Non-DR Referral
Sensitivity	94.6%	91.6%	92.1%
Specificity	97.2%	97.5%	92.7%

Figure F: Sensitivity and Specificity Table

In addition to our audit process, primary graders escalated 24,901 normal cases to the secondary graders. 21,785 (87%) agreed with the normal cases and 3,116 (13%) disagreed. 422 (2%) non-referable DR cases, 273 (1%) referable DR cases and 313 (1%) ungradable results.

Conclusion

SIDRP is an effective eye screening programme to detect DR and screen for other visible retina conditions during the same visit. There is a significant prevalence of non-DR diseases in patients with diabetes undergoing screening, and this has implications on the introduction of artificial intelligence in the near future. Glaucoma disc suspects are common in our population and resources are needed to evaluate if these patients have glaucoma.