Guest Editorial

Diabetic retinopathy screening: Telemedicine, the way to go!

India is considered to be the diabetes capital of the world with a diabetic population which is predicted to hit 69.9 million by 2025.[1] All professional eye-care organizations advocate annual eye examinations for patients with diabetes.[2] Screening over 12% of India's population, distributed over a subcontinent is not easy. A nationwide cross-sectional study of diabetic patients by the AIOS for the first time in 2014 for diabetic retinopathy (DR), reiterated the findings of earlier regional studies, with a prevalence at 21.7% on a pan Indian scale.[3]

The United Kingdom runs the world's largest public health program for screening of DR.[4,5] There were 2.02 million people (aged 12 or over) who received diabetic screening, at an uptake rate of 82.5% out of which 67,001 were ungradeable and 56,913 needed further evaluation and treatment.[5] With a few assumptions, the annual running budget was £3.2 million without including the capital investment. Needless to say, this is not scalable to the Indian scenario which in comparison is gargantuan geographically and demographically. This compels us to look for other options, various models of which have been espoused in the recent years. All mass screening and awareness programs are a "trade off" between providing the gold standard for restricted numbers and doing something acceptably short of this for a much larger population.

The study published in this issue by Rani *et al*. throws light on a rural DR screening model using an indigenous camera.[6] This nonmydriatic fundus photography model was able to detect referable posterior segment abnormalities in a rural diabetes eye care program. All images were graded by a trained validated optometrist, 5% of random images being revalidated by the retina specialist. The optometrist and retina specialist had negligible interobserver variation (K = 0.932). Retinopathy was noted in almost 9% of the diabetics screened. Thirty-four percent were ungradeable images. This was mainly due to cataract and pupillary size.

Telemedicine using retinal photography and remote readers seems to be the mantra. Retinal photography allows permanent documentation of the retinopathy status and lends itself to remote reporting, quality control, and serial evaluation. Disruptive technologies in camera, software, and the cellular network have impacted the life of the common man through handheld devices; the spins offs of which have been a boon to diabetic screening models.[7] The large van with a regular Fundus camera, diesel generator, and an overhead dish antenna seems archaic in just over a decade. The components of a telemedicine model of DR screening are as follows: The camera and acquisition of gradable images, transmission of images securely to a reader, and finally reporting. The retinal camera should ideally be portable (in the true sense), battery operated, and take good quality retinal images. It should possess a system to archive and transmit data confidentially.[7,8] Image resolution and the field photographed are again important parameters. Which option: a single 45° field centered on fovea, two 45° fields (centered on disc and fovea), or 7 ETDRS fields should be preferred? More time is required to acquire more images per patient. The future lies in a single wide-field picture that covers a 90°–100° field. Better the resolution of the image heavier the file. Studies have shown a 100 kb image is acceptable. The gradeability of images is an important issue often hampered by a small mesopic pupillary size in the tropics along with nuclear sclerosis. In our model, we dilated all eyes except those with a white to the white diameter of <11 mm or one-eyed patients. The risk of mydriatic-induced angle closure is overestimated.[9] Once acquired, the images then need to be transmitted to a reading center and graded. Whether the reader should be an ophthalmologist or technician is a subject for debate. Training and regular protocol of revalidation of reporting skills of readers is the most important factor for ensuring reliable reporting. Medicolegal issues can surround the use of technicians unless they work under the supervision of an ophthalmologist. Artificial intelligence is likely to play an important role in the detection of retinopathy in acquired images. The other issue of grading revolves around how we plan to use the screening method. Do we merely classify as presence/absence of DR warranting examination by an ophthalmologist or do we plan to grade and follow-up patients with retinopathy with telemedicine till such time as annual checks show progression to a certain threshold of disease or poor visualization due to developing a cataract.

An indigenous palmtop size device with a nonmydriatic 90°–100° field which can link to cloud is expected to create a paradigm shift shortly. Telemedicine programs by individual practices, NGO and the national program for control of blindness hold the key to adequate uptake of DR screening in India.

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