BACKGROUND

- Diabetic retinopathy is increasing in prevalence globally, especially in under-served regions. 1,2
- The success of telemedicine based diabetic retinopathy screening programs depends on the ability to attain quality images.

PURPOSE

- To evaluate how photographer experience impacts the quality of fundus photographs taken with a non-mydriatic, handheld fundus camera in a low-resource setting.

METHODS

- An ophthalmic photographer at the Aravind Eye Hospital (Pondicherry, India) obtained non-mydriatic images using the Smartscope (Smartscope, Optomed, Tempe, AZ) from 3 fields on 275 eyes of 155 participants over 13 months.
- Images were graded for quality by two masked retina specialists as excellent, acceptable, or ungradable. Images with an excellent or acceptable grade from both specialists were considered gradable.
- Images were divided into quintiles to assess gradability over time.
- Multivariable logistic regression was used to investigate factors associated with the probability of an image being gradable, including effects for cataract, quintile of experience, and the interaction between cataract and quintile.

RESULTS

Table 1: Patient characteristics by quintiles

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Quintile 1</th>
<th>Quintile 2</th>
<th>Quintile 3</th>
<th>Quintile 4</th>
<th>Quintile 5</th>
<th>Total (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any cataract, n (column %)</td>
<td>18 (99)</td>
<td>15 (79)</td>
<td>14 (70)</td>
<td>17 (85)</td>
<td>17 (85)</td>
<td>75 (100)</td>
</tr>
<tr>
<td>Any retinopathy, n (column %)</td>
<td>44 (60)</td>
<td>33 (60)</td>
<td>17 (33)</td>
<td>15 (40)</td>
<td>35 (42)</td>
<td>140 (200)</td>
</tr>
<tr>
<td>Vitreous Hemorrhage, n (column %)</td>
<td>14 (4)</td>
<td>13 (4)</td>
<td>7 (2)</td>
<td>7 (2)</td>
<td>15 (5)</td>
<td>54 (150)</td>
</tr>
</tbody>
</table>

Figures 2a-c. Locally weighted scatterplot smoothing curves of image gradability for eyes without cataract or vitreous hemorrhage. 1 = gradable, 0 = ungradable; dots represent individual image grades.

- Macular images in Q4 showed significantly increased odds of being gradable compared to images from the Q1 (OR=5.87, p=0.0296).
- In eyes with cataract (not shown), there was no clear trend with respect to macular image gradability by quintile.
- Superotemporal images from Q4 or Q5 had a increased odds of being gradable compared with Q2 (OR=1.12, p=0.0046; OR=4.35, p=0.0182).
- In eyes with cataract (not shown), there was no clear trend for gradability of superotemporal images by quintile.

DISCUSSION

- Among all fields, 87% of images were gradable by the end of the study.
- Overall, vitreous hemorrhage and cataracts were associated with decreased image gradability.
- In eyes without cataract or vitreous hemorrhage, there was a trend of improvement over time in both macular and superotemporal fields.
- In eyes with cataract, there was no consistent improvement in image quality over time.
- The non-mydriatic Smartscope could be a useful tool in screening for diabetic retinopathy in underserved areas in eyes without significant media opacities.

REFERENCES


SUPPORT

PANC is supported by K12EY022299. None of the authors has any conflicts of interest to disclose.