Diabetic Retinopathy Screening in Hong Kong

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- Dr. Welchie Ko
- Rita Sum
Diabetic Retinopathy

- Diabetic Retinopathy is a leading cause of blindness in individuals < 65 years of age
- Can be totally asymptomatic until there is significant visual loss
- Blindness can be prevented by timely laser treatment
Diabetic Retinopathy Screening

• Public health service - to identify individuals affected by disease or at risk

• Undergo tests or treatment to reduce risk of the disease or complications

• There has been no systematic screening for diabetic retinopathy (DR) in Hong Kong
Inverso Care Law

- Julian Tudor Hart (30 years ago) (Lancet)

- Perverse relationship between the need for health care and its actual utilization
- I.e. those who most need medical care are least likely to receive it

- Conversely, those with least need of health care tend to use health services more (and more effectively).
Objectives:

- Introduce effective and cost-effective screening programme to screen naïve patients with diabetes mellitus (DM) for retinopathy.

- To refer appropriate patients to SOPD (Ophthalmology &/or General medicine) and administer early treatment to prevent visual loss.

- To see whether paying a fee deterred patients from attending the screening programme.
Diabetic Retinopathy Screening

- A randomized controlled trial
- Phone-contacted 4619 patients with DM
- HK West cluster
- Two groups:
  - ‘PAY group’ (a fee of $60.00)
  - ‘FREE group’ (not required to pay any fees)

All patients underwent screening test and stereoscopic fundus photography.
The screening process:

1. Registration
2. Check visual acuity
3. Check A/C Depth
4. Dilate pupils
5. Take fundus photos
The Screening Process

1. Registration
   - explaining the consent forms
   - collecting the payments
   - issuing the receipts
The Screening Process

2. To check patients’ visual acuities
   - ETDRS chart
   - pinhole vision
3. To check patients’ A/C Depths & apply dilation eye drops
- no drops are applied if patients’ angles are narrow
The Screening Process

4. Taking fundus photographs
   - 2 fields in each eye (macula & optic disc)
The Screening Process
Grading Protocol

- Image Quality
- Artifacts
- Severity of the disease
- Other eye diseases
- Arbitration
- Quality Assurance
<table>
<thead>
<tr>
<th>Grade</th>
<th>International Term</th>
<th>Features</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0</td>
<td>No diabetic retinopathy</td>
<td>Normal retina</td>
<td>Annual screening</td>
</tr>
<tr>
<td>R1</td>
<td>Mild non-proliferative diabetic retinopathy</td>
<td>Hemorrhages and micro aneurysms only</td>
<td>Annual screening</td>
</tr>
<tr>
<td>R2</td>
<td>Moderate non-proliferative diabetic retinopathy</td>
<td>Extensive micro aneurysms (MAs), intraretinal hemorrhages, and hard exudates</td>
<td>Appt within 13 weeks</td>
</tr>
<tr>
<td>R2</td>
<td>Severe non-proliferative diabetic retinopathy</td>
<td>Venous abnormalities, large blot hemorrhages, cotton wool spots (small infarcts), venous beading, venous loop, venous reduplication, and IRMA</td>
<td>Appt within 13 weeks</td>
</tr>
<tr>
<td>R3</td>
<td>Proliferative diabetic retinopathy</td>
<td>New vessel formation either at the disc (NVD) or elsewhere (NVE).</td>
<td>Appt within 2 weeks</td>
</tr>
<tr>
<td>R3</td>
<td>Pre-retinal fibrosis ± tractional retinal detachment</td>
<td>Extensive fibro vascular proliferation, retinal detachment, pre-retinal or vitreous hemorrhage, glaucoma and subhyaloid hemorrhage</td>
<td>Appt within 2 weeks</td>
</tr>
<tr>
<td>M0</td>
<td>No maculopathy</td>
<td>No maculopathy</td>
<td>Annual screening</td>
</tr>
</tbody>
</table>
| M1    | Maculopathy | Exudative: leakage, retinal thickening, MAs,HEs
Ischemic: featureless macula with NVE and poor VA
Milder forms:
• exudate ≤1DD of centre of fovea
• circinate or group of exudates within macula
• any MAs or hemorrhage ≤1DD of centre of fovea only if associated with a best VA of ≤ 6/12
• retinal thickening ≤1DD of centre of fovea | Appt within 13 weeks |
| P     | Photocoagulation | Small retinal scars throughout the peripheral retina. | Appt < 2 weeks |
| U     | Un-gradable | Ungradable: cataract or other lesions-referred for assessment | Appt < 4 weeks |
Standard Photo 1

R1 - Mild non-proliferative diabetic retinopathy
R2 - Moderate non-proliferative diabetic retinopathy
R2- Severe non-proliferative diabetic retinopathy
Standard Photo 3

M1 - Diabetic maculopathy
Standard Photo 4

M1- Diabetic maculopathy
Standard Photo 5

R3- Proliferative diabetic retinopathy
Standard Photo 7

R3- Proliferative diabetic retinopathy
R3- Pre-retinal fibrosis ± tractional retinal detachment
Screening results:

<table>
<thead>
<tr>
<th>Level of Retinopathy</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0</td>
<td>1489</td>
<td>67.71%</td>
</tr>
<tr>
<td>R1</td>
<td>368</td>
<td>16.57%</td>
</tr>
<tr>
<td>R0 or R1, M</td>
<td>54</td>
<td>2.43%</td>
</tr>
<tr>
<td>R2</td>
<td>24</td>
<td>1.08%</td>
</tr>
<tr>
<td>R2, M</td>
<td>23</td>
<td>1.04%</td>
</tr>
<tr>
<td>R3</td>
<td>2</td>
<td>0.09%</td>
</tr>
<tr>
<td>U</td>
<td>248</td>
<td>11.17%</td>
</tr>
<tr>
<td>P</td>
<td>4</td>
<td>0.18%</td>
</tr>
<tr>
<td>Any Retinopathy</td>
<td>475</td>
<td>21.38%</td>
</tr>
<tr>
<td>Total</td>
<td>2221</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
Overall results

- One in 5 patients has some retinopathy
- One in 20 patients has SIGHT THREATENING diabetic retinopathy
Outcome

- Out of the 2221 patients screened, 475 (21%) were referred to hospitals, some to general ophthalmology clinic and some to retinal clinic.
Is there a difference between free group and the pay group?
### Screening results:

<table>
<thead>
<tr>
<th></th>
<th>FREE group</th>
<th>PAY group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total no. of phone calls</td>
<td>2312</td>
<td>2307</td>
<td>4619</td>
</tr>
<tr>
<td>No. of patients who took part in study</td>
<td>1300</td>
<td>1259</td>
<td>2559</td>
</tr>
<tr>
<td>% of patients who accepted invitation</td>
<td>94.6%</td>
<td>90.9%</td>
<td></td>
</tr>
<tr>
<td>% of patients who showed up</td>
<td>93.3%</td>
<td>90.1%</td>
<td></td>
</tr>
<tr>
<td>Response rate</td>
<td>88.3%</td>
<td>82.0%</td>
<td></td>
</tr>
</tbody>
</table>
## Screening results:

<table>
<thead>
<tr>
<th>Level of Retinopathy</th>
<th>Free Group</th>
<th>%</th>
<th>Pay Group</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0</td>
<td>740</td>
<td><strong>63.41%</strong></td>
<td>749</td>
<td><strong>71.06%</strong></td>
<td>1489</td>
<td><strong>67.71%</strong></td>
</tr>
<tr>
<td>R0, M**</td>
<td>2</td>
<td>0.17%</td>
<td>7</td>
<td>0.66%</td>
<td>9</td>
<td>0.41%</td>
</tr>
<tr>
<td>R1</td>
<td>212</td>
<td><strong>18.17%</strong></td>
<td>156</td>
<td><strong>14.80%</strong></td>
<td>368</td>
<td><strong>16.57%</strong></td>
</tr>
<tr>
<td>R1, M**</td>
<td>31</td>
<td>2.66%</td>
<td>14</td>
<td>1.33%</td>
<td>45</td>
<td>2.17%</td>
</tr>
<tr>
<td>R2</td>
<td>14</td>
<td>1.20%</td>
<td>10</td>
<td>0.95%</td>
<td>24</td>
<td>1.08%</td>
</tr>
<tr>
<td>R2, M**</td>
<td>13</td>
<td>1.11%</td>
<td>10</td>
<td>0.95%</td>
<td>23</td>
<td>1.04%</td>
</tr>
<tr>
<td>R3</td>
<td>1</td>
<td>0.09%</td>
<td>1</td>
<td>0.09%</td>
<td>2</td>
<td>0.09%</td>
</tr>
<tr>
<td>U*</td>
<td>147</td>
<td><strong>12.60%</strong></td>
<td>101</td>
<td><strong>9.58%</strong></td>
<td>248</td>
<td><strong>11.17%</strong></td>
</tr>
<tr>
<td>U*,M**</td>
<td>5</td>
<td>0.43%</td>
<td>4</td>
<td>0.38%</td>
<td>9</td>
<td>0.41%</td>
</tr>
<tr>
<td>P***</td>
<td>2</td>
<td>0.17%</td>
<td>2</td>
<td>0.19%</td>
<td>4</td>
<td>0.18%</td>
</tr>
<tr>
<td>Total</td>
<td><strong>1167</strong></td>
<td>100%</td>
<td><strong>1054</strong></td>
<td>100%</td>
<td><strong>2221</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>
## Screening results:

<table>
<thead>
<tr>
<th></th>
<th>FREE group</th>
<th>PAY group</th>
<th>Difference (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R0 retinopathy</strong></td>
<td>69.2%</td>
<td>75.8%</td>
<td>6.6% (2.8-10.3%)</td>
</tr>
<tr>
<td><strong>R1 retinopathy</strong></td>
<td>20.2%</td>
<td>15.7%</td>
<td>4.5% (1.2-7.7%)</td>
</tr>
<tr>
<td><strong>No. of patients who needed referral</strong></td>
<td>5.9%</td>
<td>4.9%</td>
<td>1.0%(-1.0-2.9%)</td>
</tr>
</tbody>
</table>
Summary

1. More patients in free group turned up for screening
2. Pay group has more patients with no retinopathy
3. Tendency of free group to have higher levels of retinopathy, therefore
   ‘Inverse care law’ seemed to apply
Acknowledgement

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• Christina Chan
• Tina Ian

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• Catherine Chan
Thank You