The Global Impact of Diabetic Retinopathy and Why a Team Approach is Needed

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Marriott Conference Center.

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Treasurer ICO
Outline

• Diabetes is a huge and growing global problem
• Everyone with diabetes is at risk of developing retinopathy
• Good control is critical but regular screening is important
• Appropriately timed treatment can prevent most blindness
• The demand will continue to increase
• Ophthalmologists cannot possibly do it on their own
  - We must work in teams
Obesity in Asia Pacific -1980-2008

Lancet Feb 2011
### Prevalence of Diabetes - Asian Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong (adults)</td>
<td>10%</td>
</tr>
<tr>
<td>China</td>
<td>9.7%</td>
</tr>
<tr>
<td>Taiwan</td>
<td>9.2%</td>
</tr>
<tr>
<td>Singapore (adults)</td>
<td>9%</td>
</tr>
<tr>
<td>Korea</td>
<td>6.9%</td>
</tr>
<tr>
<td>India</td>
<td>4.3%</td>
</tr>
<tr>
<td>Australia</td>
<td>3.6%</td>
</tr>
<tr>
<td>USA</td>
<td>7.8%</td>
</tr>
</tbody>
</table>

There are 100 million people with diabetes in Asia!

Cheng, Lancet 2010
### Prevalence of Diabetes - Pacific Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Samoa</td>
<td>47%</td>
</tr>
<tr>
<td>Tokelau</td>
<td>44%</td>
</tr>
<tr>
<td>Micronesia</td>
<td>33%</td>
</tr>
<tr>
<td>Marshall Islands</td>
<td>28%</td>
</tr>
<tr>
<td>Kiribati</td>
<td>28%</td>
</tr>
<tr>
<td>Nauru</td>
<td>23%</td>
</tr>
<tr>
<td>Solomon Island</td>
<td>14%</td>
</tr>
<tr>
<td>Australia</td>
<td>3.6%</td>
</tr>
<tr>
<td>USA</td>
<td>7.8%</td>
</tr>
</tbody>
</table>

But the prevalence is 4-5 times higher in the Pacific!

Cheng, Lancet 2010
Number of Persons with Diabetes

WHO, Wild & Roglic, 2004

Millions

- Est market
- Former soc.ec Eur
- India
- China
- Latin Amer&Car
- Middle East
- Other Asia&Isl
- Sub-Saharan Afr

2000
2030
Incidence of Diabetic Retinopathy

Klein et al 1985

- Background
- Proliferative
- Macular Edema

Incidence of Diabetic Retinopathy
Prevention of Diabetic Retinopathy

- **Prevent Diabetes**
  - Weight loss, exercise

- **Prevent Retinopathy**
  - Control blood sugar
  - Control of serum lipids
    - High cholesterol (>6.2mmol/L) doubles risk of hard exudates and vision loss
  - Control of hypertension
    - Blood pressure < 130/85 halves risk of vision loss
Progression of Retinopathy the DCCT

HbA1C

Percent Progressing

0 1 2 3 4 5 6 7 8 9 10 11

0 10 20 30

Years

0 1 2 3 4 5
Hypertension Control
UKPDS BP & DR Progression

Event Rate

Years

Less Tight BP Control

More Tight BP Control

P=0.38
P=0.02
P=0.004
## Accord Study

<table>
<thead>
<tr>
<th></th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c &lt;6.0</td>
<td>0.67 (0.51-0.87)</td>
</tr>
<tr>
<td>Systolic BP &lt;120*</td>
<td>1.23 (0.84-1.79)</td>
</tr>
<tr>
<td>Lipid Control#</td>
<td>0.60 (0.42-0.87)</td>
</tr>
</tbody>
</table>

* versus <140

# fenofibrate plus simvastatin

Chew et al NEJM 2010
Blindness, North America, High Income in 2010

Number of Estimated Cases

Age

- 0-6 days
- 7-27 days
- 28-364 days
- 1-4 years
- 5-9 years
- 10-14 years
- 15-19 years
- 20-24 years
- 25-29 years
- 30-34 years
- 35-39 years
- 40-44 years
- 45-49 years
- 50-54 years
- 55-59 years
- 60-64 years
- 65-69 years
- 70-74 years
- 75-79 years
- 80+ years

Legend:
- Trachoma
- Vitamin A Deficiency
- Diabetes Mellitus
- Glaucoma
- Cataracts
- Macular Degeneration
- Other Vision Loss
- Refractive Error
- Onchocerciasis
## Population Growth, Aging and Age-Specific Rates for Blindness; 1990-2010

<table>
<thead>
<tr>
<th>Cause</th>
<th>1990 Actual</th>
<th>Population growth</th>
<th>Population aging</th>
<th>2010 Actual</th>
<th>% Growth</th>
<th>% Aging</th>
<th>% Rates</th>
<th>% Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataracts</td>
<td>4,222,320</td>
<td>5,978,255</td>
<td>7,149,752</td>
<td>4,730,101</td>
<td>41.6%</td>
<td>27.7%</td>
<td>-57.3%</td>
<td>12.0%</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>225,951</td>
<td>264,083</td>
<td>295,429</td>
<td>1,058,970</td>
<td>16.9%</td>
<td>13.9%</td>
<td>337.9%</td>
<td>368.7%</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>442,904</td>
<td>606,622</td>
<td>740,696</td>
<td>942,030</td>
<td>37.0%</td>
<td>30.3%</td>
<td>45.5%</td>
<td>112.7%</td>
</tr>
<tr>
<td>Macular degeneration</td>
<td>512,489</td>
<td>657,070</td>
<td>843,127</td>
<td>1,328,105</td>
<td>28.2%</td>
<td>36.3%</td>
<td>94.6%</td>
<td>159.1%</td>
</tr>
<tr>
<td>Refraction and accommodation disorders</td>
<td>3,606,635</td>
<td>5,212,938</td>
<td>5,868,315</td>
<td>5,591,505</td>
<td>44.5%</td>
<td>18.2%</td>
<td>-7.7%</td>
<td>55.0%</td>
</tr>
</tbody>
</table>

Chris Murray GBD 2013
Prevalence of Diabetic Retinopathy ~30%

BDES, Beaver Dam Eye Study; BMES, Blue Mountains Eye Study; VIP, Visual Impairment Project; VER, Vision Evaluation Research; SAHS, San Antonio Heart Study; SLVDS, San Luis Valley Diabetes Study; WESDR, Wisconsin Epidemiologic Study of Diabetic Retinopathy;
Vision Threatening Retinopathy ~10%

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The Effect of Good Control

Good Control reduces Annual Incidence and lengthens Life, BUT may not alter Lifetime Risk.
Timely Laser Treatment can Prevent 98% of Blindness

- DRS Untreated Eyes
- ETDRS by Eye
- ETDRS by Patient

Ferris JAMA 1993
Our Challenge...

Whole population

All diabetes

Diagnosed diabetes

Retinopathy

Need to treat

50% 30% 30%
Screening for Diabetic Retinopathy

- Regular eye examinations
  - At least once a year
  - Visual acuity
  - Retina—dilated/fundus exam
    - non-mydriatic photo
How Many Ophthalmologists Are There?

- 2010 ICO surveyed 193 countries
- 192 responded (covers 99.99% of the global population)
- Total number of ophthalmologists in the world

204,909

- Ranging from 28,338 in China to 0 in some Small Pacific Islands
## DR Screening Workload (2011)

<table>
<thead>
<tr>
<th>Country</th>
<th>No. with Diabetes</th>
<th>No. of Ophthalmologists</th>
<th>No. to be screened per per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>61 million</td>
<td>11,000</td>
<td>18</td>
</tr>
<tr>
<td>Mexico</td>
<td>10.3 million</td>
<td>3,500</td>
<td>10</td>
</tr>
<tr>
<td>China</td>
<td>90 million</td>
<td>28,340</td>
<td>11</td>
</tr>
<tr>
<td>Brazil</td>
<td>12.4 million</td>
<td>11,350</td>
<td>4</td>
</tr>
<tr>
<td>Indonesia</td>
<td>7.3 million</td>
<td>1,240</td>
<td>20</td>
</tr>
<tr>
<td>Pakistan</td>
<td>6.3 million</td>
<td>1,860</td>
<td>11</td>
</tr>
</tbody>
</table>
Eye Care Personnel Needed

Teams of:

- Ophthalmologists (surgeons and “eye doctors”)
- Subspecialists (pediatric, retina, etc.)
- Primary physicians trained in eye care
- Mid level eye personnel (MLEP) and nurses
- Optometrists or refractionists and opticians
- Managers and community eye health workers
ICO Diabetic Retinopathy Initiative

To engage ophthalmologic societies and ophthalmologists
• To reduce vision loss due to diabetes worldwide
• By establishing integrated systems of eye care for people with diabetes
• Through education and training
• Working in collaboration with other organizations and health professionals
ICO Diabetic Retinopathy Initiative

1. Explore collaborations
2. Constitute an ICO Task Force
3. Collate existing guidelines and identify gaps
4. Develop Guidelines for screening, assessment and treatment that allow for available resources
5. Gain consensus
6. Promulgate through primary care and specialist networks
7. Incorporate into ICO Education Spectrum
   - Curricula, Exams, Fellowships, WOC program, CPD, Teach the Teachers etc
8. Participate in global meetings, this workshop, WDC etc
9. Develop a framework for program evaluation and monitoring.
Summary

- Diabetes and retinopathy is a tsunami
- We need all the help we can get to handle it
- Working in teams and engaging primary care is essential