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Financial interest - None
Eye Banking in India # History

- 1940 – First Eye Bank in India started in Regional Institute of Ophthalmology in Madras (now Chennai) - 75 Years

- 1965 – Established National Eye Bank, AIIMS, New Delhi - 50 years

- 1990 – Eye Bank Association of India (EBAI) - 25 Years
This Year we are …

CELEBRATING 25 Years of EBAI

Let Your Eyes Change Someone’s Life
Diseases affecting the cornea are a major cause of blindness worldwide, second only to cataract in overall importance. The epidemiology of corneal blindness is complicated and encompasses a wide variety of infectious and inflammatory eye diseases that cause corneal scarring, which ultimately leads to functional blindness. In addition, the prevalence of corneal disease varies from country to country and even from one population to another. While cataract is responsible for nearly 20 million of the 45 million blind people in the world, the next major cause is trachoma which blinds 4.9 million individuals, mainly as a result of corneal scarring and vascularization. Ocular trauma and corneal ulceration are significant causes of corneal blindness that are often underreported but may be responsible for 1.5–2.0 million new cases of monocular blindness every year. Causes of childhood blindness (about 1.5 million worldwide with 5 million visually disabled) include xerophthalmia (350 000 cases annually), ophthalmia neonatorum, and less frequently seen ocular diseases such as herpes simplex virus infections and vernal keratoconjunctivitis.

Even though the control of onchocerciasis and leprosy are public health success stories, these diseases are still significant causes of blindness — affecting a quarter of a million individuals each. Traditional eye medicines have also been implicated as a major risk factor in the current epidemic of corneal ulceration in developing countries. Because of the difficulty of treating corneal blindness once it has occurred, public health prevention programmes are the most cost-effective means of decreasing the global burden of corneal blindness.

**Keywords:** Corneal diseases/epidemiology; Blindness/etiology; Eye injuries/epidemiology; Ocular/prevention and control; Trachoma/drug therapy; Onchocerciasis; Leprosy/prevention and control (source: MeSH)
Corneal Blindness: India

- 6.8 million people (vision <6/60)
  - 1 million = Bilateral
  - Curable by Keratoplasty = Approx. 10%
- This figure will be 10.6 million in 2020

  - “RAAB study - 2007” = Corneal blindness= 1% of total blindness.

  - New patients/year = 40,000 – 50,000 (??)

2. NPCB-2012; *News Letter*, NPCB; Govt of India.
Corneal Blind Estimates and Corneal Transplantation Readiness

Size of countries reflects the population of corneal blind. Colors represent readiness for eye banking and corneal transplantation.

Why we need ROBUST Eye Banking in INDIA?

Corneal Blindness:

Major causes in INDIA

- Infectious Keratitis (Corneal Ulcer)
- Pseudophakic Bullous keratopathy
- Hereditary Dystrophies/ Corneal Ectasia
- Corneal Injury: open globe/chemical/thermal
- Trachoma
- Vitamin A deficiency
Infective keratitis: in India

Madurai: 113/100,000 person/yr

India: 1.31 million ulcers/year

Gonzales CA et al. Incidence of corneal ulceration in Madurai District, South India. Ophthalmic Epidemiology, 1996;3:156-66
Pseudophakic Bullous Keratopathy (PBK)

- Exact data not available
- Incidence = 0.1-1.0%
  - PBK occurs both from Masters and Learner
- In 2012-13 = 6.4 million Cataract Sx performed by us
- In Simple Math: @ 0.2% = the FIGURE of PBK/edema = ?
Hereditary Dystrophies

- Granular
- Lattice
- Avellino
- RB Dyst
- CHED
- Macular
- Fuchs’
Corneal Ectasia: More detection
KCN: Global and Indian data

- **Prevalence** = 50 to 130 per 100,000 population.
- Overall **Annual incidence** = 2.0 per 100,000

- **In last decade** – More newly diagnosis of KCN
  - Better diagnostic sensitivity - especially with increase topography use
  - Newly identified KCN cases during Screening for LASIK

**India** = 2,300 per 100,000 population !!

**References**


Injury: Open globe and Chemical

- Everyday we see such cases
- Open globe and Alkali burns more common in children
- Gen-X ophthalmologists
  - are not interested –
  - not learning good suturing
- Complacence attitude ..... 
- Delayed intervention leads to permanent visual loss
Trachoma: Coming Back!

- In 1984-87 NPCB-WHO Survey = 3%
- In 2001-2005 = No active Trachoma
- In 2010-11: New areas
  - Uttarakhand = 15.2%
  - Haryana
  - Gujarat
  - Punjab
  - Rajasthan = 7.6%
  - UP = 5.9%

RAAB Study NPCB < 10 years age

Eye Seeking Flies
Musca Sorbens
Vitamin A deficiency

- **Now:** not a problem
- Good coverage with Mass Immunisation
- **Cluster problem is still there** along with PEM
Keratoplasty: 23,000+ in INDIA

Surgery-wise Types – Top 10 Eye Banks # Compiled data (2013-14)

PKP = 47%
Th PK = 32%

We do perform around 70-75% Penetrating Keratoplasty
Indications for Tx: Top 10 Eye Banks # 2013-14

Active keratitis = 33.23%
Healed Keratitis = 13.52%

N = 4372
Eye Banking in India
Eye Banking: All INDIA (Last 10 yrs) 2003-13/14

- Our collection has improved from = 20,451 to 50,000 +
- And Utilization from = 8,014 to 23,015
- Utilization percentage improved from 34% to 48%

As per Vision2020 India:

We Need to perform = 100,000 Keratoplasty/Year in the year 2020

@ 50% utilization
We need Collection = 200,000 Cornea/year
Eye Banking scenario: INDIA

- Eye Bank Training Centre (EBTC) = 8
- Eye Bank (EB) = 223
- Eye Donation Centre (EDC) = 477

Total: 708

- No. of Active Eye Bank/EDC (>50/year) = 240
- Eye Banks/EDCs collect > 100 eyes/year = 58
- Eye Banks collect >1000 eyes/year = 15
What we have achieved so far

- Based on 10.2 million deaths in 2013-14:
  - In 2013-14, Total collections = approx. 0.5% of all deaths

✓ With a goal of 100,000 transplants and utilization of 50% - Target of consenting donors = 100,000/year

We need cornea from = 1% of Total deaths
Eye Donation Education is satisfactory in India

Celebrity’s campaign and Pledge for eye donation

Prior Pledge for Eye Donation after death - Plenty
Previously -

Only source of Eye Donation: India
from home death = Voluntary

99 %
Voluntary Donation
without prior pledge

01 %
Voluntary Donation
after prior pledge

Nothing like – “Presumed consent” law
The Key: Direct Motivation of the family members of the deceased actively by Professionally-trained counselor, called Eye Donation Counselor (EDC) in a Hospital setting where the death rate is high.

They approach family members in the Hospital immediately after death of the family’s loved one; brief them about eye donation and then request for giving consent for donation.
HCRP is typically a **Public Private Partnership (PPP) Model** between the eye bank (an NGO) and a large Government hospital.

- With the help and support of all level hospital-staff - the **Consent rate is between = 5 - 65 %**

- Currently, >25 eye banks in the country have adopted this concept

- With the help of Central and State Government, **more than 50 HCRP centres across the country.**
Model HCRP: Needs Professional approach

SightLife partner EBs (12) : HCRP Vs Voluntary

<table>
<thead>
<tr>
<th>Year</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HCRP = Collection Vs Utilization</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HCRP Collection</td>
<td>4212</td>
<td>5058</td>
<td>7502</td>
</tr>
<tr>
<td>HCRP Utilization</td>
<td>2900 (69%)</td>
<td>3688 (73%)</td>
<td>5710 (76%)</td>
</tr>
<tr>
<td><strong>Voluntary = Collection Vs Utilization</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voluntary Collection</td>
<td>8082</td>
<td>8891</td>
<td>8076</td>
</tr>
<tr>
<td>Voluntary Utilization</td>
<td>4441 (55%)</td>
<td>4623 (52%)</td>
<td>4135 (51%)</td>
</tr>
</tbody>
</table>
Perfect Example of PPP Model

PEB H C R P: in Govt Medical College & Hospital

A Paradigm Shift

HCRP = 75-80%
Voluntary = 20-25%
### Consent Rate
- 2005 = 7.8%
- 2010 = 22.7%
- 2014 = 36.6%

### Number of EDC
- 2005 = 4
- 2010 = 5
- 2014 = 8

### Table: Cornea
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Cornea</td>
<td>34</td>
<td>164</td>
<td>410</td>
<td>492</td>
<td>402</td>
<td>493</td>
<td>585</td>
<td>890</td>
<td>980</td>
<td>1087</td>
<td>1202</td>
<td>6726</td>
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</tbody>
</table>
HCRP Transplants – Delhi, India

2008: 11% Growth
2009: 8% Growth
2010: -16% Growth
2011: 105% Growth
2012: 108% Growth
2013: 105% Growth

HCRP: Another Success Story # Delhi Model
<table>
<thead>
<tr>
<th>Cornea Grading</th>
<th>No of Cornea</th>
<th>Percentage</th>
<th>p value</th>
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<tbody>
<tr>
<td></td>
<td>Voln</td>
<td>HCRP</td>
<td>Voln</td>
</tr>
<tr>
<td>Excellent</td>
<td>64</td>
<td>518</td>
<td>5.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very Good</td>
<td>115</td>
<td>894</td>
<td>10.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Good</td>
<td>272</td>
<td>746</td>
<td>25%</td>
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<tr>
<td>Fair</td>
<td>255</td>
<td>729</td>
<td>23.4%</td>
</tr>
<tr>
<td>NSFS*</td>
<td>353</td>
<td>470</td>
<td>32.5%</td>
</tr>
<tr>
<td>Sero +ve</td>
<td>28</td>
<td>104</td>
<td>2.6%</td>
</tr>
<tr>
<td>Total</td>
<td>1087</td>
<td>3461</td>
<td>100%</td>
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</tbody>
</table>

*NSFS = Not Suitable For Surgery
<table>
<thead>
<tr>
<th>Year</th>
<th>0-20 yrs</th>
<th>21-40 yrs</th>
<th>41-65 yrs</th>
<th>&gt;65 yrs</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>2004</td>
<td>Nil</td>
<td>Nil</td>
<td>12</td>
<td>144</td>
<td>156</td>
</tr>
<tr>
<td></td>
<td>VOL</td>
<td>HCRP</td>
<td>VOL</td>
<td>HCRP</td>
<td>VOL</td>
</tr>
<tr>
<td>2005</td>
<td>Nil</td>
<td>Nil</td>
<td>6</td>
<td>10</td>
<td>14</td>
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<tr>
<td>2006</td>
<td>0</td>
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<td>46</td>
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<tr>
<td>2009</td>
<td>0</td>
<td>8</td>
<td>2</td>
<td>54</td>
<td>12</td>
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<tr>
<td>2010</td>
<td>0</td>
<td>12</td>
<td>4</td>
<td>68</td>
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</tr>
<tr>
<td>2013</td>
<td>0</td>
<td>14</td>
<td>2</td>
<td>114</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>52</td>
<td>32</td>
<td>376</td>
<td>112</td>
</tr>
</tbody>
</table>

Last 9 Years:
≤65 Yrs = 2490
Volun = 213 (8.7%)
HCRP = 2273 (91.3%)

Utilization increased from 52% to 84%

More HCRP = More younger donor
Efficient HCRP
Maximum Utilization
More Revenue for the Eye Bank
Self sustainable
Scope for Growth
Some other Key issues with Indian Eye Banking
Some Key issues

- Legal issues, some favourable changes in Tissue ACTs – happened
- Collection/utilization-data related issues, – we are trying
- Quality, Monitoring, Accreditation – on the process
- Uniform Cornea distribution system – EBAI-SightLife project is on...
- Government Sector Eye Banking and Transplants – issues are there.
- State-related issues – (No Eye Bank; No surgeon, No keratoplasty)
- More Corneal Surgeon, Corneal Surgery and Follow/Up issues
We need 3-tier Eye Banking & Networking

One Eye Bank per 20 million population

5 EBTC + 45 EB = 50

4000 corneas /EB/year

= 200,000 cornea/year

40 EDC per EB (2000)
Each EDC = 50 cornea/yr

2000x50 = 100,000/year

10 HCRP’s per EB (500)
Our Optimistic (Magic) Figures in 2020

- 200,000 cornea
- = 100,000 utilization
- By the year 2020
- 1000 Corneal surgeon
- Each Surgeon =
- 100 transplant/year
Highly possible to reach our GOAL by 2020!