ORBIS International & Lions
NAB Eye Hospital, Miraj
Operational Research Project, AED/USAID Cycle VI
July 25, 2011
ORBIS & Lions NAB Eye Hospital (LNEH) partnered under AED/USAID Child Blindness Fund Cycle VI to implement operational research project (November 2010 – July 2011)

- ‘Post-operative continued follow-up leads to better visual outcomes, which leads to better patient quality of life’

ORBIS direct partner of AED & LNEH the implementing sub-partner

- ORBIS India & HQ – responsible for technical assistance, monitoring & reporting
- LNEH implementing arm
  - Principal Investigator, Parikshit Gogate, MS DNB FRCSEd MSc IPS
  - Director, Research & Education, Shailbala Patil, Lions NAB Eye Hospital
Acknowledgement

- ORBIS International: Dr. Joan McLeod, Kerry Stalonas, Dr. G V Rao, Rishi Raj Bora
- AED/FDI Development 360: Kelly Josiah
- Lions NAB Eye Hospital, Miraj, India: Prof. A N Kulkarni, Dr. A H Mahadik, Dr. Mitali Shah, Dr. Mohini Sahasrabudhe, Rahin Tamboli, Rekha Mane,
Project Objectives

- To determine the causes of poor compliance to follow-up of eye care for children after cataract surgery
- To assess the visual acuity/outcomes of children who received pediatric cataract surgery
- To better understand the impact of pediatric cataract interventions on the quality of life and vision function of a child
320,000 children are blind; 9.2 million children are visually impaired \(^\text{1}\) (Gogate P, Gilbert CE. Blindness in children – a world wide perspective: *Journal of Community Eye Health* 2007; 20 (62): 32-33)

50% of pediatric eye conditions are treatable or preventable

Main causes: cataract, refractive errors, corneal ulcer/opacity, retinopathy of prematurity, glaucoma, trauma, strabismus


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ORBIS in coordination with the Government of India, identified a need for 100 pediatric eye care facilities by 2020.

The ORBIS Initiative intends to:

- Establish 50 well equipped & staffed pediatric eye care centers around the country by 2020.

Key Components of the model include:
- Introduce child-friendly pediatric eye care services
- Build institutional capacity
- Train pediatric eye care teams
- Conduct outreach in local communities to identify & refer children with eye problems
- Educate parents & caregivers
Before Initiation of ICBI: 4 pediatric centers for nearly 400 million children

- R P Centre, New Delhi
- L V Prasad Eye Institute, Hyderabad
- Aravind Eye Hospital, Madurai
- Sankara Nethralaya, Chennai
Current Partners: Pediatric Eye Care Centers Established & In Development

National Training and Research Partners

- Aravind Eye Hospital, Madurai, Tamil Nadu
- Sankara Nethralaya, Chennai, Tamil Nadu
- L. V. Prasad Eye Institute, Hyderabad, A. P.

Pediatric Eye Care Centers Established

1. Dr. Shroff’s Charity Eye Hospital, Delhi
2. Sadguru Netra Chikitsalaya, Chitrakoot, M. P.
3. H. V. Desai Eye Hospital, Pune, Maharashtra
4. Lions NAB Eye Hospital, Miraj, Maharashtra
5. Little Flower Hospital, Angamaly, Kerala
6. West Lions Eye Hospital, Bangalore, Karnataka
7. Lotus School of Optometry, Mumbai, Maharashtra
8. Sankara Eye Center, Guntur, Andhra Pradesh
9. Sri Kiran Institute of Ophthalmology, Kakinada, A. P.
10. Sri Sankaradeva Nethralaya, Guwahati, Assam
11. Drashti Netralaya, Dahod, Gujarat
12. Shri Ganapati Nethralaya, Jana, Maharashtra
13. Regional Institute of Ophthalmology (RIO) – R P Center, New Delhi
14. RIO – Kolkata, West Bengal
15. Global Hospital, Mount Abu, Rajasthan
16. Kalinga Eye Hospital, Dhenkanal, Orissa
17. Ramakrishna Mission Hospital, Itanagar, Arunachal
18. Medical College, Dehradun, Uttarakhand
19. Christian Medical College, Ludhiana, Punjab
20. MGM Eye Hospital, Raipur, Chhattisgarh
21. Khairabad Eye Hospital, Kanpur, Uttar Pradesh
22. Suraj Eye Institute, Nagpur, Maharashtra
23. MM Joshi Eye Hospital, Hubli, Karnataka
24. Shri Sadguru Sewa Sangh Trust, Anandpur, M. P.
25. Sahai Hospital and Research Center, Rajasthan
26. Alakh Nayan Mandir, Rajasthan
27. Choitram Nethralaya, Madhya Pradesh
28. Gandhi Eye Hospital, Aligarh, Uttar Pradesh
29. Netra Niramoy Niketan, Haldia, West Bengal

Pediatric Eye Care Centers in Development

30. Siliguri Greater Lions Eye Hospital, West Bengal
Future Locations of Pediatric Eye Care Centers

Pediatric Eye Care Centers to be Developed

31 Partner to be identified, Uttar Pradesh
32 Partner to be identified, Karnataka
33 Partner to be identified, Madhya Pradesh
34 Partner to be identified, Uttar Pradesh
35 Partner to be identified, Bihar
36 Partner to be identified, Bihar
37 Partner to be identified, Jharkhand
38 Partner to be identified, Orissa
39 Partner to be identified, Madhya Pradesh
40 Partner to be identified, Uttar Pradesh
41 Partner to be identified, West Bengal
42 Partner to be identified, West Bengal
43 Partner to be identified, Assam
44 Partner to be identified, Gujarat
45 Partner to be identified, Gujarat
46 Partner to be identified, Haryana
47 Partner to be identified, Himachal Pradesh
48 Partner to be identified, Uttar Pradesh
49 Partner to be identified, Kerala
50 Partner to be identified, Rajasthan

Focusing on central and northern India
ICBI Progress thru 2010

- 29 centres across 16 states have been established
- More than 5.5 million children screened
- More than 978,000 children treated medically or for glasses
- Over 81,500 pediatric surgeries have been performed (out of which approximately 40% were pediatric cataract)
As part of the ICBI, ORBIS partnered with LNEH to establish a pediatric eye care center from 2005 – 2008

More than 1,000 children operated on for various diseases, including 374 children (520 eyes) that received pediatric cataract surgery

Today the center fully functioning unit that serves child pop of 3.5 million in southern Maharashtra (southwest India)
Significance of Pediatric Cataract

- Pediatric cataract is the leading cause of avoidable or treatable blindness in most developing countries.
- Three large studies on causes of blindness and severe visual impairment in children across different Indian states has put un-operated cataract & uncorrected aphakia as a significant and increasing cause of visual impairment.

### Standard Follow-Up Protocol

<table>
<thead>
<tr>
<th>Follow-Up</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Follow-up</td>
<td>1 week after surgery</td>
</tr>
<tr>
<td>2nd Follow-up</td>
<td>Month after first follow-up (5 weeks after surgery) - Prescription of glasses, Patching to start</td>
</tr>
<tr>
<td>3rd Follow-up</td>
<td>3 Months (12 weeks) from surgery</td>
</tr>
<tr>
<td>Up to 16 years</td>
<td>follow-up every six months (bi-annual)</td>
</tr>
<tr>
<td>After 16 years till child</td>
<td>follow-up once a year (annual)</td>
</tr>
<tr>
<td>attains adulthood</td>
<td></td>
</tr>
</tbody>
</table>
Outcomes of Pediatric Cataract Surgery

• Very few reports of outcomes pediatric cataract surgery from India and Nepal

• Most focus on short term outcome 6 weeks to 3 month follow-up

• As the child grows, the eye too develops and changes; and a long term follow-up is recommended by experts to maintain and if needed restore vision

Assumptions/Rationale

- Pediatric cataract surgery is just one crucial step in the process to rehabilitate a cataract blind child.
- Proper post-operative follow-up, repeated checking of refraction and anti-amblyopia services are essential to restore and maintain the child’s vision.
- Studies from Africa shown follow-up rates of pediatric cataract surgery are poor and affect the child’s ultimate visual recovery.
- Unfortunately, no such studies exist from India or Asia (which houses the largest number of blind children globally).

To determine the impact that cataract intervention has on the quality of life of a child

- LNEH performed hundreds of sight restoring surgeries during ORBIS project period, unfortunately little data on how the intervention impacts a child’s life

- Assumption by many key blindness prevention players that the intervention doesn’t just improve the child’s vision but also assists in social and educational development

- Few studies available however to corroborate this
Project Objectives Summary

- Project studied long term outcomes of pediatric cataract surgery & evaluated the barriers to the child and his/her parents for not accessing follow-up eye care services.

- Study addressed the knowledge gap about the impact of pediatric cataract surgery on the child’s life, growth, mobility, education & general development.

- Results to assist in planning of future childhood blindness amelioration initiatives so future programs can be more effective by ensuring better follow-up.
Study Methodology & Planning

- Study was completed between Oct 2010-June 2011, but planning began in July 2011
- Approved by the ethical committee of Lions NAB Eye Hospital, Miraj (LNEH) was obtained in August 2011
- Case records of all 520 pediatric cataracts (on 374 children) operated on from 2005-2008 obtained from the medical records unit
- Addresses of each child, along with phone #s recorded
- Children grouped according to talukas (sub-districts in Indian administration) & villages
A mapping exercise conducted using various colour stickers to visualize location of the cases

Result was a clear idea of village-wise distribution of children, & minimized effort/time of community workers to find the children

Daily plans generated for community workers to visit the area & identify children
Barriers to Follow-Up Questionnaire - Design & Training on its Administration

- A questionnaire to record barriers to pediatric follow-up required for development
- Inputs taken from the RAAB India study [1] & additional questions added, considering pediatric population
- Questionnaire translated into local language, Marathi, by two independent translators
- Marathi translations translated back into English to verify if any content changed or lost during translation, & upon satisfaction printed
- Community workers were again oriented to questionnaire & trained on various methods to administer it (direct questioning, catching information during individual or group discussions)


Community workers also trained on administering the Kuppusamy scales which depended on fathers occupation, fathers education, mother’s education, mother’s occupation and family income. These 5 parameters were used to score and divide the family into 5 socio-economic classes.
L.V. Prasad’s Functional Vision Questionnaire for children was adopted for determining the impact of pediatric cataract surgery on the quality of life of the child.¹

Questionnaire was translated into local language by two independent translators, & back-translated to English to check for validity, & upon satisfaction was printed.

Children over 12 years answered questions on their own (and responses corroborated with parents); for younger children, parents were interviewed.

Training schedule developed & stressed:

- Importance of childhood blindness & pediatric cataract
- Training on use & completion of both questionnaires
- Potential problems & pitfalls in its completion discussed
- How to assist pediatric ophthalmologists in collecting patient history & capturing data
- Entering data to excel sheets & ways to maintain data accuracy & validity

- Following the training, a pilot study conducted in nearby Savli village with 37 children - sample size of 10% identified & counseled

- A fortified training later conducted with Pediatric Ophthalmologist & Principal Investigator
Development of Clinical Protocol

- Developed by Dr. Parikshit Gogate (principal investigator)
- Validated by Professor Clare Gilbert (London School of Hygiene and Tropical Medicine/International Centre for Eye Health (ICEH))
- Valuable inputs provided by: Dr. Joan McLeod (USA); Dr. Rupal Trivedi (USA); Dr. H. Kishore (Oman); Dr. Millind Killedar (India)
- Approved by Dr. G.V.Rao, Prof. A.N.Kulkarni, Rishi Raj Bora, Dr. Lutful Husain with Dr. Mitali Shah and Dr. Mohini Sahasrabudhe of LNEH
Data collection

• Daily program scheduled for community workers & counselors to go into the field & identify children

• ‘Barriers to follow-up’ questionnaire was completed; and children & parents counseled about importance of regular follow-up

• ‘Vision function questionnaire’ completed at time of clinical examination at the hospital & during the home visits
Clinical Examination

- Children identified were transported by vehicle to LNEH along (along with parents) for eye examination.

- Children underwent complete ocular examination – slit lamp examination, orthoptic evaluation, fundoscopy & cycloplegic refraction.

- Clinical data was recorded. If any treatment required, they were informed, & relevant treatment provided. Also counseled during the visit about importance of follow-up.
Patient Home Visit

- In spite of home visits & counseling, 74 children did not visit LNEH

- Developed schedule for home visits of these children by Pediatric Ophthalmologist along with optometrist & community workers

- Home visits were conducted with required equipments (portable visual acuity charts, portable slit lamp, Keratometer, A-Scan) & children were examined
374 children (520 eyes) were operated for pediatric cataract surgery at Lions NAB Eye Hospital, Miraj from 2005 to 2008. Out of these,

- 328 children (88%) were identified and completed the Barriers to Follow-Up Questionnaire
- 262 children -70% (393 eyes) were examined
  - All but 19 required some form of intervention
- 262 children/parents completed the Vision Function Questionnaire
### Result: Age Group

Demographic Data – Age wise Distribution

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 5</td>
<td>12</td>
<td>4.6</td>
</tr>
<tr>
<td>6 – 10</td>
<td>59</td>
<td>22.5</td>
</tr>
<tr>
<td>11 – 15</td>
<td>94</td>
<td>35.9</td>
</tr>
<tr>
<td>16 – 20</td>
<td>97</td>
<td>37.0</td>
</tr>
<tr>
<td>Total</td>
<td>262</td>
<td>100.0</td>
</tr>
</tbody>
</table>

![Bar chart showing age distribution]
# Result: Gender & Laterality

## Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>150</td>
<td>57.3</td>
</tr>
<tr>
<td>Female</td>
<td>112</td>
<td>42.7</td>
</tr>
<tr>
<td>Total</td>
<td>262</td>
<td>100.0</td>
</tr>
</tbody>
</table>

## Laterality

<table>
<thead>
<tr>
<th>Laterality</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both Eyes</td>
<td>131</td>
<td>50.0</td>
</tr>
<tr>
<td>Left Eye</td>
<td>64</td>
<td>24.4</td>
</tr>
<tr>
<td>Right Eye</td>
<td>67</td>
<td>25.6</td>
</tr>
<tr>
<td>Total</td>
<td>262</td>
<td>100.0</td>
</tr>
</tbody>
</table>
## Number of children in the family

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th></th>
<th></th>
<th>Girls</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
<td>Frequency</td>
<td></td>
<td>Percent</td>
</tr>
<tr>
<td>One</td>
<td>106</td>
<td>40.5</td>
<td>102</td>
<td>38.9</td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>118</td>
<td>45.0</td>
<td>60</td>
<td>22.9</td>
<td></td>
</tr>
<tr>
<td>Three</td>
<td>17</td>
<td>6.5</td>
<td>30</td>
<td>11.5</td>
<td></td>
</tr>
<tr>
<td>Four</td>
<td>4</td>
<td>1.5</td>
<td>11</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>Five</td>
<td>1</td>
<td>0.4</td>
<td>2</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>16</td>
<td>5.8</td>
<td>57</td>
<td>21.8</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>262</td>
<td>100.0</td>
<td>262</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
### Study Variables, Result: Ordinal Status of the child

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eldest</td>
<td>92</td>
<td>35.1</td>
</tr>
<tr>
<td>Middle</td>
<td>65</td>
<td>24.8</td>
</tr>
<tr>
<td>Youngest</td>
<td>105</td>
<td>40.1</td>
</tr>
<tr>
<td>Total</td>
<td>262</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Result: Any other similarly affected child in family

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>39</td>
<td>14.9</td>
</tr>
<tr>
<td>No</td>
<td>223</td>
<td>85.1</td>
</tr>
<tr>
<td>Total</td>
<td>262</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>223</td>
<td>85.1</td>
</tr>
<tr>
<td>Yes, one child</td>
<td>29</td>
<td>11.1</td>
</tr>
<tr>
<td>Yes-2 children</td>
<td>10</td>
<td>3.8</td>
</tr>
<tr>
<td>Total</td>
<td>262</td>
<td>100.0</td>
</tr>
</tbody>
</table>
### Result: Mother's Occupation

<table>
<thead>
<tr>
<th>Mother's occupation</th>
<th>Number of patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed 1</td>
<td>117</td>
<td>44.7</td>
</tr>
<tr>
<td>Unskilled worker/home maker 2</td>
<td>62</td>
<td>23.7</td>
</tr>
<tr>
<td>Semi-skilled 3</td>
<td>11</td>
<td>4.2</td>
</tr>
<tr>
<td>Skilled 4</td>
<td>6</td>
<td>2.3</td>
</tr>
<tr>
<td>Clerical/Shop owner/farmer 5</td>
<td>56</td>
<td>21.4</td>
</tr>
<tr>
<td>Semi-profession 6</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Profession 7</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>Missing</td>
<td>7</td>
<td>2.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>262</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
## Kuppusamy Score for Socio economic class

<table>
<thead>
<tr>
<th>Socio economic class</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (Highest)</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>II</td>
<td>13</td>
<td>5.0</td>
</tr>
<tr>
<td>III</td>
<td>75</td>
<td>28.6</td>
</tr>
<tr>
<td>IV</td>
<td>161</td>
<td>61.5</td>
</tr>
<tr>
<td>V (Lowest)</td>
<td>11</td>
<td>4.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>262</td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
## Compliance for Follow-up

<table>
<thead>
<tr>
<th></th>
<th>Number of patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance</td>
<td>53</td>
<td>20.2</td>
</tr>
<tr>
<td>Non compliance</td>
<td>209</td>
<td>79.8</td>
</tr>
<tr>
<td>Total</td>
<td>262</td>
<td>100.0</td>
</tr>
</tbody>
</table>
### Compliance to follow-up: Regular (compliant) or not regular (Non-compliant)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Follow-up</th>
<th>Total</th>
<th>p-value</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Comp.</td>
<td>Non-comp.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - 5</td>
<td>8</td>
<td>4</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>6 - 10</td>
<td>19</td>
<td>40</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>11 - 15</td>
<td>11</td>
<td>83</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td>≥ 16</td>
<td>15</td>
<td>82</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>209</td>
<td>262</td>
<td></td>
</tr>
</tbody>
</table>

*Percentage values are calculated based on the total number of individuals in each age group.*

**p-values**
- < 0.001
- 0.001
Barriers to Follow-Up

The most common barriers emerged as –

We cannot afford to travel, visit the hospital - 25.3%
The hospital is too far - 20.6%
Barriers to Follow-Up

Did not find time/ I had more urgent things to do - 26.9%
Barriers to Follow-Up

The child was seeing fine.- 24.5%
Did not feel the need - 14.8%
Barriers to Follow-Up

No one told to visit us again - 20.6%
I thought whatever I do will not improve the child’s vision - 0.4%
Some of the other reasons:

• The surgery made no difference to child’s vision – 3.9%
• Doctors or staff kept me waiting for a longtime - 1.2%
• I thought condition will improve by itself - 0.4%
• Unaware of complications & risk of cataracts – 0.8%
• Others - 2%
Summary Findings on Barrier to Follow-Up:

- 20.6% Children complied with regular follow-up
- Only 1.2% respondents felt that the doctors or staff in the pediatric unit kept them waiting for a long time. (So child friendly atmosphere worked & was maintained)

- 14.8% respondents did not feel the need for follow-up.
- 20.6% respondents cited that no one told them to visit the hospital again
- 26.9% respondents said that didn’t find time to take their children to the hospital 24.5% respondents felt that the child was seeing fine

- 20.6% respondents said that the hospital is too far
- 25.3% respondents said that they can not afford to travel to the hospital
## Compliance to follow-up

<table>
<thead>
<tr>
<th></th>
<th>P-value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group</td>
<td>&lt;0.001</td>
<td>Significant</td>
</tr>
<tr>
<td>Gender</td>
<td>0.676</td>
<td>Not significant</td>
</tr>
<tr>
<td>Ordinal status</td>
<td>0.818</td>
<td>Not significant</td>
</tr>
<tr>
<td>Number of boys in family</td>
<td>0.860</td>
<td>Not significant</td>
</tr>
<tr>
<td>Number of girls in family</td>
<td>0.391</td>
<td>Not significant</td>
</tr>
<tr>
<td>Any other affected child</td>
<td>0.365</td>
<td>Not significant</td>
</tr>
<tr>
<td>Mother’s education</td>
<td>0.012</td>
<td>Significant</td>
</tr>
<tr>
<td>Mother’s occupation</td>
<td>0.327</td>
<td>Not significant</td>
</tr>
<tr>
<td>Father’s education</td>
<td>0.256</td>
<td>Not significant</td>
</tr>
<tr>
<td>Father’s occupation</td>
<td>0.031</td>
<td>Significant</td>
</tr>
<tr>
<td>Social strata</td>
<td>0.492</td>
<td>Not significant</td>
</tr>
<tr>
<td>Accompanied by parent/ other</td>
<td>0.062</td>
<td>Not significant</td>
</tr>
<tr>
<td>Money spent on travel</td>
<td>0.033</td>
<td>Significant</td>
</tr>
<tr>
<td>Paid / Free</td>
<td>0.001</td>
<td>Significant</td>
</tr>
</tbody>
</table>
1. Do you have any difficulty in making out whether the person you are seeing across the room is a boy or a girl, during the day?
   Pre op Score Ave(SD)-2.62 (0.8)
   Post op Score Ave(SD)-0.95(1.0)

2. Do you have any difficulty in seeing whether somebody is calling you by waving his or her hand from across the road?
   Pre op Score Ave(SD)- 2.57 (0.9)
   Post op Score Ave(SD )-0.95 (1.0)
Vision Function: Before and After surgery

3. Do you have difficulty in walking alone in the corridor at school without bumping into objects or people?
   Pre op - 2.34 (1.0)
   Post op - 0.77 (1.2)

4. Do you have any difficulty in copying from the blackboard while sitting on the first bench in your class?
   Pre op - 2.44 (0.9)
   Post op - 0.96 (1.0)

5. Do you have any difficulty in reading your textbooks at an arm’s length?
   Pre op - 2.47 (0.8)
   Post op - 0.96 (1.1)
6. Do you have difficulty in reading the bus numbers?
Pre op - 2.57 (0.8)
Post op - 1.03 (1.0)

7. Do you have any difficulty in reading the other details on the bus (such as its destination?)
Pre op - 2.53 (0.8)
Post op - 0.99 (0.9)
Vision Function: Before and After surgery

8. Do you have any difficulty in writing along a straight line?
   Pre op - 2.32 (0.9)
   Post op - 0.70 (1.0)

9. Do you have any difficulty in finding the next line while reading when you take a break and then resume reading?
   Pre op - 2.40 (0.9)
   Post op - 0.94 (1.0)

10. Do you have any difficulty in locating dropped objects (pen, pencil, eraser) within the classroom?
    Pre op - 2.34 (1.0)
    Post op - 0.69 (1.0)
11. Do you have any difficulty in threading a needle?
Pre op - 2.55 (0.8)
Post op - 1.25 (1.2)

12. Do you have any difficulty in walking home at night (from tuition or a friend’s house) without assistance when there are streetlights?
Pre op - 2.41 (1.0)
Post op - 0.74 (1.0)

13. How much difficulty do you have in distinguishing between 1 rupee and 2 rupee coins (without touching)?
Pre op - 2.44 (0.9)
Post op - 0.80 (1.0)
14. Do you have difficulty in lacing your shoes?
Pre op - 2.13 (1.1)
Post op - 0.53 (1.0)

15. Do you have difficulty in locating a ball while playing in the daylight?
Pre op - 2.34 (0.9)
Post op - 0.68 (0.9)

16. Do you have difficulty in climbing up or down stairs?
Pre op - 2.22 (1.0)
Post op - 0.49 (0.9)
17. Do you have difficulty in applying paste on your toothbrush?
Pre op - 1.93 (1.2)
Post op - 0.27 (0.8)

18. Do you have difficulty in locating food on your plate while eating?
Pre op - 1.87 (1.2)
Post op - 0.32 (0.8)
19. Do you difficulty in identifying colours (e.g., while colouring)?
Pre op - 2.17 (1.0)
Post op - 0.54 (0.9)
20. Do you think your vision is as good as your friend,? A bit less? A lot less?
Pre op – 1.75 (0.5)
Post op - 0.81 (0.5)
Summary: Vision Function: Before and After surgery

- On every question, children fared better after the intervention than before
- Even if visual recovery was not dramatic by visual acuity measurement, it made an immense difference to the child’s functioning
- Children reported more confidence in negotiating with their environment, peers & community at large
- Intervention was worth it
Visual Acuity

Post-operative vision
>6/18 in 40.7%

Post-operative vision
>6/60 in 57.8%

%
### Visual Acuity

<table>
<thead>
<tr>
<th>Category</th>
<th>&gt;= 6/18</th>
<th>&lt;6/18</th>
<th>&gt;=6/60</th>
<th>&lt;6/60</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complicated</td>
<td>4 (36.4%)</td>
<td>7 (63.6%)</td>
<td>8 (72.7%)</td>
<td>3 (27.3%)</td>
<td>11</td>
</tr>
<tr>
<td>Congenital</td>
<td>7 (20.6%)</td>
<td>27 (79.4%)</td>
<td>15 (44.1%)</td>
<td>19 (55.9%)</td>
<td>34</td>
</tr>
<tr>
<td>Developmental</td>
<td>51 (45.5%)</td>
<td>61 (54.5%)</td>
<td>72 (64.3%)</td>
<td>40 (35.7%)</td>
<td>112</td>
</tr>
<tr>
<td>Subluxlated</td>
<td>4 (100%)</td>
<td>0.00</td>
<td>4 (100%)</td>
<td>0.00</td>
<td>4</td>
</tr>
<tr>
<td>Total cataract</td>
<td>55 (37.2%)</td>
<td>93 (62.8%)</td>
<td>76 (51.4%)</td>
<td>72 (48.7%)</td>
<td>148</td>
</tr>
<tr>
<td>Traumatic</td>
<td>38 (46.3%)</td>
<td>44 (53.7%)</td>
<td>51 (62.2%)</td>
<td>31 (37.8%)</td>
<td>82</td>
</tr>
</tbody>
</table>
### Visual Acuity

<table>
<thead>
<tr>
<th></th>
<th>P-value (&gt;6/18)</th>
<th>P-value (&gt;6/60)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.053</td>
<td>0.094</td>
<td>Not significant</td>
</tr>
<tr>
<td>Age-group</td>
<td>0.125</td>
<td>0.002</td>
<td>Significant</td>
</tr>
<tr>
<td>Type of surgeon</td>
<td>0.419</td>
<td>0.999</td>
<td>Not significant</td>
</tr>
<tr>
<td>Type of surgery</td>
<td></td>
<td>0.041</td>
<td>Significant</td>
</tr>
<tr>
<td>Type of cataract</td>
<td>0.011</td>
<td>0.042</td>
<td>Significant</td>
</tr>
<tr>
<td>Post-operative uveitis</td>
<td>0.097</td>
<td>0.013</td>
<td>Not significant</td>
</tr>
<tr>
<td>Secondary glaucoma</td>
<td>0.627</td>
<td>0.883</td>
<td>Not significant</td>
</tr>
<tr>
<td>Post cap opacification</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>Significant</td>
</tr>
<tr>
<td>Delay between diagnosis &amp; surgery</td>
<td></td>
<td>0.067</td>
<td>Not significant</td>
</tr>
<tr>
<td>Phaco used / not used</td>
<td></td>
<td>0.052</td>
<td>Not significant</td>
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</table>
## Secondary glaucoma

<table>
<thead>
<tr>
<th></th>
<th>P-value</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Type of cataract</td>
<td>0.001</td>
<td>Significant</td>
</tr>
<tr>
<td>Type of surgeon</td>
<td>0.99</td>
<td>Not significant</td>
</tr>
<tr>
<td>Gender</td>
<td>0.51</td>
<td>Not significant</td>
</tr>
<tr>
<td>Age</td>
<td>0.142</td>
<td>Not significant</td>
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</table>
## Posterior capsular opacification

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<tr>
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<th>P-value</th>
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<tbody>
<tr>
<td>Type of cataract</td>
<td>&lt;0.001</td>
<td>Significant</td>
</tr>
<tr>
<td>Type of surgeon</td>
<td>0.452</td>
<td>Not significant</td>
</tr>
<tr>
<td>Gender</td>
<td>0.742</td>
<td>Not significant</td>
</tr>
<tr>
<td>Age</td>
<td>&lt;0.001</td>
<td>Significant</td>
</tr>
</tbody>
</table>
Summary

- Study showed that of the 262 children examined, all except 19 needed some kind of intervention
- 103 needed Nd:YAG LASER capsulotomy and 22 required surgery. Most needed a change of spectacles, 5 needed contact lenses and 4 required low vision aids
- Demonstrates importance of regular follow-up as the child’s eye develops, grows & refraction may change
Visual outcomes were comparable to other studies worldwide (central India, Mexico, Nepal, China, Tanzania & Kenya), but were lesser than those from the developed world. While differences are small, results are poorer compared to visual outcomes of adult cataracts. As the vision function questionnaires shows however, children performed better on every activity graded after cataract surgery.
What gaps remain in this research or what new questions have been shown?

- We need more information on the causation of cataract & how much rubella contributes to it.

- Outcomes in pediatric cataract vary with time – we have a cross section of results after 3-5 years, perhaps for the first time in the developing world.

- More research is needed as to why less girls compared to boys.

- Vision function scores may be affected by recall - the questionnaire was completed by the children or parents and not the service providers.

- What is the best modality for pediatric cataract treatment depending on age.
## Cost of pediatric cataract surgery (in rupees)

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed facility</strong></td>
<td>3,270 ($83.85)</td>
<td>3,270 ($83.85)</td>
</tr>
<tr>
<td><strong>Consumables</strong></td>
<td>1,452 ($37.23)</td>
<td>15,267 ($391.46)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4,722 ($122)</td>
<td>18,537 ($475)</td>
</tr>
</tbody>
</table>

How can results inform planning for effective pediatric eye care services?

- Need for effective follow-up mechanism in the outreach strategy - to address issues of affordability & accessibility among beneficiaries

- Need for effective counseling - to increase awareness levels and motivate parents/guardians about the importance of timely examination, treatment & follow-up

- Need for encouragement to undergo surgical intervention irrespective of age, for improvement in quality of life post cataract surgery

- Need to encourage involvement of both parents during the course of the treatment of their child from identification to follow-up
How can results be used to change policies and/or programs?

- Combine case identification & post-operative follow-up in each of the outreach initiatives to enhance timely follow-up
- Sponsor an annual week for pediatric cataract follow-up if needed
- More effort to strengthen IEC & BCC to increase awareness levels, especially among parents/guardians on the importance of child eye care
- Continue development of child-friendly ambience of pediatric unit and child-friendly attitude of trained staff as enablers for greater acceptance of pediatric ophthalmology services
How can results be used to change policies and/or programs? – cont.

- Insist on anterior vitrectomy and primary posterior capsulotomy for all children till 7-8 years of age.

- Need to design, develop and use appropriate tools to record and monitor post-operative surgical outcomes & compliance to follow-up of all beneficiaries on a continuous basis.

- Design outcome guidelines for pediatric cataract, like WHO ones for adult cataract.

- Presenting study findings to larger audience including Government, V2020, IAPB, other global blindness prevention stakeholders, etc.
Thank you for a patient hearing

Any questions???