Universal Newborn Eye Screening

Nil financial disclosure

Samantha Simkin
Paediatric visual impairment

19 million children worldwide are visually impaired

1.4 million children are blind

Social, economic and emotional impacts

The majority of cases can be treated or prevented
Red reflex screening?

Red reflex test is mandatory in NZ and many other countries

X Congenital cataracts $^2,^3$
X Retinoblastoma $^4,^5$
X 4/5 screeners have not had any formal training for red reflex screening.$^3$

X Sensitivity of $4\%$ for posterior disease $^6$
Telemedicine

Universal Newborn Eye Screening

**China**

(Li et al 2013)

3573 infants

24.4% abnormalities

**India**

(Vinekar et al 2015)

1021 infants

4.7% abnormalities
**Aim:** To identify the prevalence of ocular abnormalities, including retinal haemorrhages, in a New Zealand newborn population.
Prospective observational study \( n = 350 \)

Exclusion criteria

- \( \leq 30 \) weeks gestational age
- \( \leq 1250 \)g birth weight

Images captured include

- Anterior eye with red reflex
- Posterior pole and peripheral retina
NZ-UNES Method

Ophthalmology review of all images

Detected abnormalities:

- Retinal haemorrhages were re-imaged at 6 weeks \(^{12}\)
- Other detected abnormalities were appropriately referred
NZ-UNES Results

N = 346

Median age at screening 2 days

51.5% 48.5%

NZ European 50%

Pacific Peoples 6%

Māori 7%

Indian 9%

Chinese 12%

Other 16%
NZ-UNES Results

N = 346

Median age at screening 2 days

51.5% 48.5%

Delivery Modality

Normal vaginal delivery 39%
Elective C-section 26%
Emergency C-section 26%
Ventouse 9%
Forceps 4%
Ocular Abnormalities

Incidence 57/346 (16.5%)

Haemorrhage 53/346 (15.3%)
Other abnormalities 5/346 (1.4%)
- Congenital cataract
- Optic nerve hypoplasia
- Choroidal haemangioma
- CHRPE
Haemorrhages

Presentation

Bilateral  n = 35
Unilateral  n = 16
Optic nerve  49.0%
Macular  30.4%
Extensive  67.6%

Retinal haemorrhages were associated with delivery modality \( p<0.0005 \)
Retinal Haemorrhages

- Forty-two infants attended follow up
- Mean follow up time was 51 ± 15 days
- Of the cohort two infants did not have complete resolution
Ocular abnormality rates varied between NZ, China and India

<table>
<thead>
<tr>
<th>Location</th>
<th>Abnormality Rate</th>
<th>Excluding Haemorrhages</th>
<th>Haemorrhages</th>
</tr>
</thead>
<tbody>
<tr>
<td>China – Li et al (n = 3573)</td>
<td>24.4%</td>
<td>2.8%</td>
<td>21.6%</td>
</tr>
<tr>
<td>India – Vinekar et al (n = 1021)</td>
<td>4.7%</td>
<td>2.3%</td>
<td>2.4%</td>
</tr>
<tr>
<td>NZ-UNES (n = 346)</td>
<td>16.5%</td>
<td>1.4%</td>
<td>15.3%</td>
</tr>
<tr>
<td>USA – Callaway et al (n = 202)</td>
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<td>20.3%</td>
</tr>
</tbody>
</table>

Retinal haemorrhages were associated with delivery modality \(^{12-14}\)

Birth-related retinal haemorrhages, in particular macular haemorrhages, have unknown long-term outcomes \(^{15}\)
Newborn screening in NZ

Ocular abnormalities were identified at a significantly higher rate than other established screenings in New Zealand (16.5%) 

Cost estimate of $2 million per year for New Zealand
UNES Conclusions

- Our data shows that wide-field digital imaging of the anterior and posterior eye is an effective tool for universal newborn eye screening.

- UNES detected significant ocular abnormalities including retinal haemorrhage, congenital cataract and optic nerve hypoplasia.

- Further research into the long-term affect of birth-related retinal haemorrhages is required.
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References


