# Children's Vision Development & Eye Health: We are stronger together!


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# “You don’t know what you don’t know”

## EDUCATION

- VISION

- OCULAR ALIGNMENT

- RED FLAGS


- PROMOTING GOOD EYE HEALTH

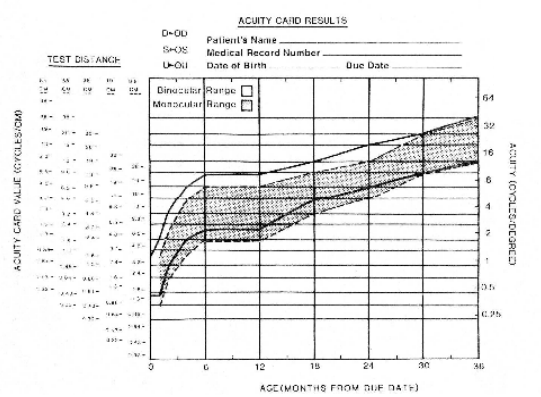

Nutrition


Vaccination


Screentime


Outdoor time

# VISION

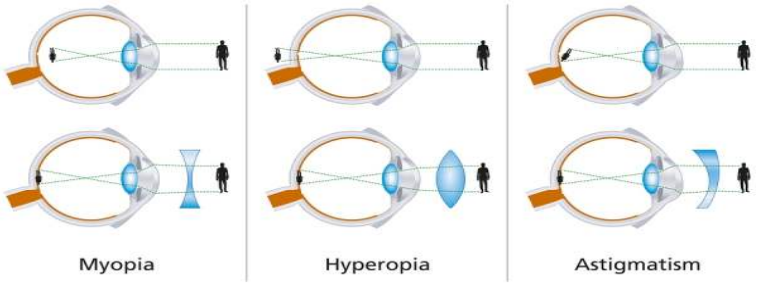



- Develops from birth to 7-8y
- Interruption to vision development – catastrophic
- Unilateral vision loss – may be undetectable without formal assessment

# Key message: “good visual behaviour does not mean good vision in both eyes”

# Pathologies that affect vision - COMMON

## Refractive error

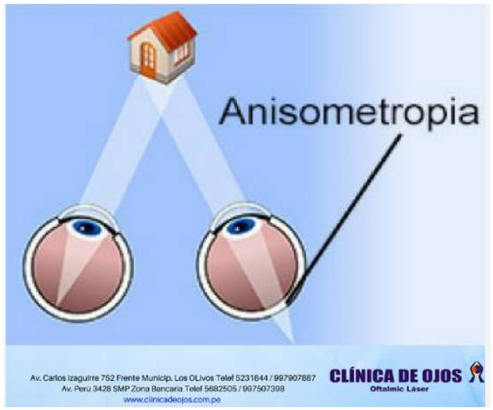



Short sighted

Long sighted

Asymmetrical cornea 'football'

**Strabismus/Squint**

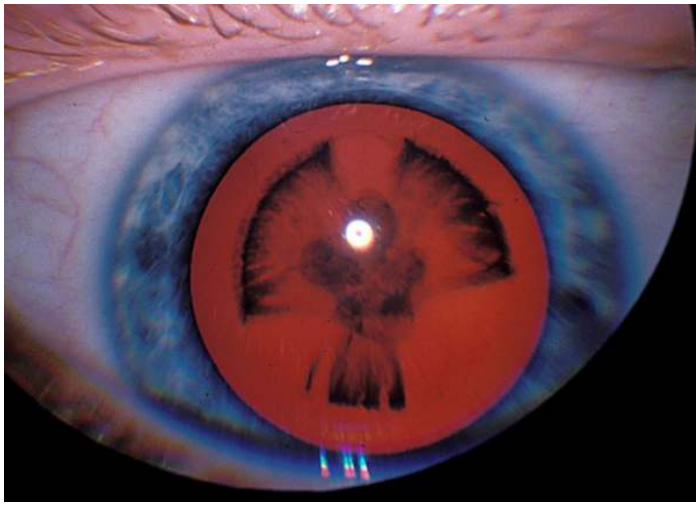



- Anisometropia = unequal refractive error
- Amblyopia

**Ptosis (droopy eyelid)**

# Pathologies that affect vision - UNCOMMON

Cataract



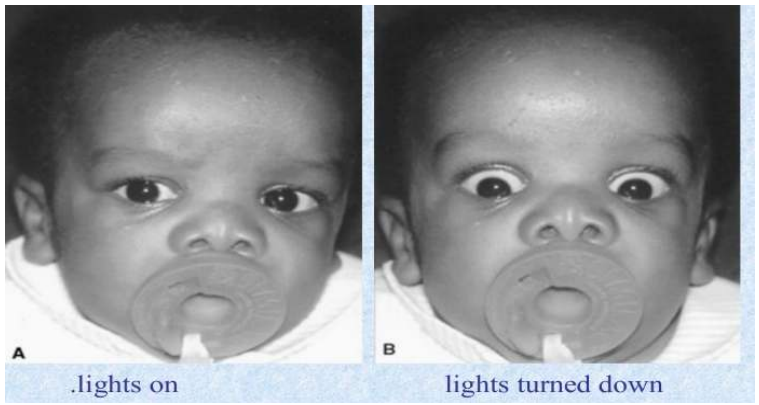
Retinoblastoma

# Can this child see?
# Do they have amblyopia?

| Milestone (without auditory stimulus) | Development |
|---|---|
| Fixing target | 3 weeks |
| Following target | 4 weeks |
| Smile to a smile | 5 weeks |

## Assessing Visual Acuity – 0-2yo

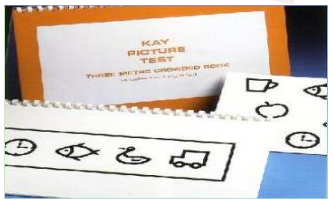
- Responds to light
- Preferential Looking
- 100s and 1000s
- Eye “popping” when lights turned off
- Objection to cover of either eye

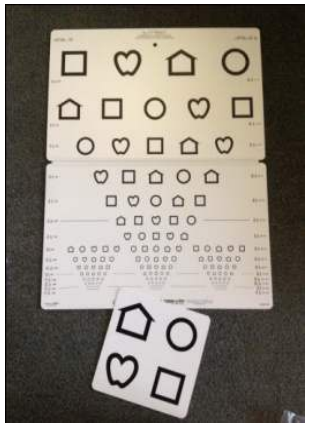


# Assessing Visual Acuity

## 2-4yrs:

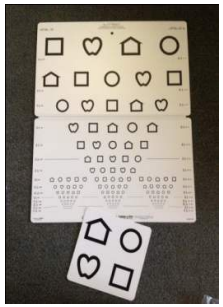
- Pictures, Matching symbols or letters using charts @ 3m.
- LogMar-style chart if possible, as "Crowding" effect on LogMar Chart required for detection of mild amblyopia



## ≥4 yrs:

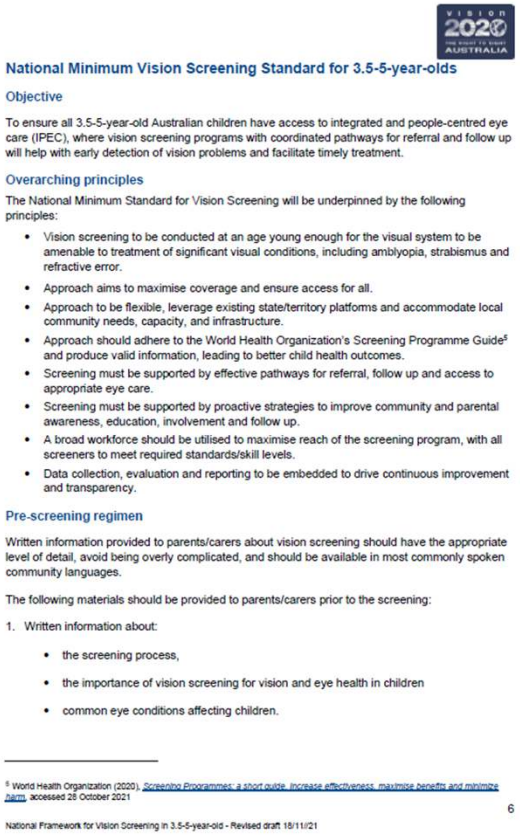
LogMar style charts with or without matching card @ 3m.

# VA – Letter Matching – SSG - MIST

- Occlude adequately
- Head turning – peeping
- Always say YES even when incorrect answer is given

# National Minimum Standard Framework for Vision Screening 3.5 - 5-year-olds



**National Minimum Vision Screening Standard for 3.5-5-year-olds**

**Objective**

To ensure all 3.5-5-year-old Australian children have access to integrated and people-centred eye care (IPEC), where vision screening programs with coordinated pathways for referral and follow up will help with early detection of vision problems and facilitate timely treatment.

**Overarching principles**

The National Minimum Standard for Vision Screening will be underpinned by the following principles:

- Vision screening to be conducted at an age young enough for the visual system to be amenable to treatment of significant visual conditions, including amblyopia, strabismus and refractive error.
- Approach aims to maximise coverage and ensure access for all.
- Approach to be flexible, leverage existing state/territory platforms and accommodate local community needs, capacity, and infrastructure.
- Approach should adhere to the World Health Organization's Screening Programme Guide[5] and produce valid information, leading to better child health outcomes.
- Screening must be supported by effective pathways for referral, follow up and access to appropriate eye care.
- Screening must be supported by proactive strategies to improve community and parental awareness, education, involvement and follow up.
- A broad workforce should be utilised to maximise reach of the screening program, with all screeners to meet required standards/skill levels.
- Data collection, evaluation and reporting to be embedded to drive continuous improvement and transparency.

**Pre-screening regimen**

Written information provided to parents/carers about vision screening should have the appropriate level of detail, avoid being overly complicated, and should be available in most commonly spoken community languages.

The following materials should be provided to parents/carers prior to the screening:

1. Written information about:
    - the screening process,
    - the importance of vision screening for vision and eye health in children
    - common eye conditions affecting children.

[5] World Health Organization (2020), *Screening Programmes: a short guide. Increase effectiveness, maximise benefits and minimize harm*, accessed 28 October 2021

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National Framework for Vision Screening in 3.5-5-year-old - Revised draft 18/11/21

## VISION2020 Preventive and Early Intervention Working Group - Children

- StEPS program – NSW – validated – recommend use LogMAR vision test from 3.5y
- Adequate and appropriate training of the workforce, including cultural safety
- Increased promotion to parents/caregivers to increase uptake of screening
- Robust referral follow-up

# VISION

**Educate parents:**

- Be alert to visual behaviour
- Remember unilateral vision loss may not be obvious to the parent
- Importance of **VISION SCREENING!**

# OCULAR ALIGNMENT

**Strabismus:**

- Is it real?
- Will it get better?
- Could it be a sign of something more serious?

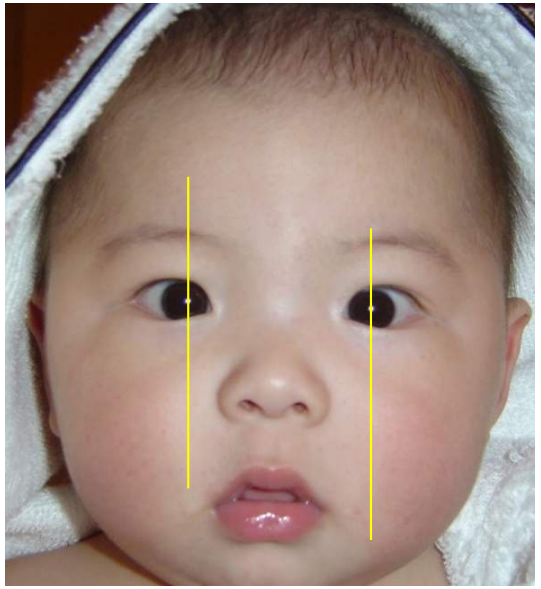
# Strabismus – “squint that goes away”

## Transient neonatal strabismus

- *NORMAL ocular alignment*
- intermittent
- ***Resolves by 2-4 months***[1,2]

[1]*Horwood A. 1993, JAAPOS;* [2]*Sondhi N. et al. 1988 JAAPOS*

## Pseudo-strabismus: Optical Illusion

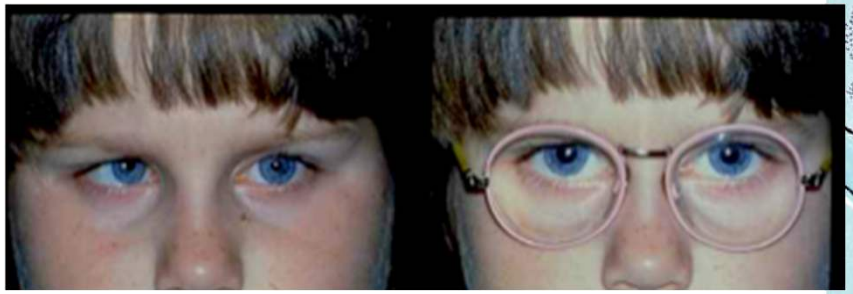


- Wide nasal fold/bridge of nose
- Intermittent – looking sideways
- “see both ears”
- Corneal light reflex - symmetry

# Straightforward squint…?

**Primary strabismus**

- 2-4% population[2,3]
- Multiple associations[1]
  - FHx strabismus/amblyopia
  - Hyperopia/anisometropia
  - Prematurity
  - Down's syndrome
  - Developmental delay
  - Cerebral palsy
  - Fetal Alcohol Syndrome
  - Craniofacial syndromes
- **83% amblyopia < 3 yo[2,3]**
- Stereopsis [3D vision][4]



**Treatment**

- Glasses – refractive error
- Occlusion - amblyopia
- Surgery

*1.Royal College of Ophthalmology UK: Guidelines for the Management of Strabismus in Childhood, March 2012 www.rcophth.ac.uk 2. Graham P.A. BJO 1974 3. Robaei et al. Ophth.2006 4. Birch et al. Optom.Vis.Sci.2009*

# OCULAR ALIGNMENT

**Educate parents:**

- Be alert to frequency and direction
- Inquire about FHx of strabismus or other risk factors
- Strabismus can significantly affect vision development – early diagnosis and treatment is essential
- If it's a new finding – are there any other concerns – signs or symptoms?
- Don't ignore! It could be the sign of something more serious

# RED FLAGS

Eye movement:

- Strabismus
- Nystagmus

Leukocoria – white pupil

Epiphora

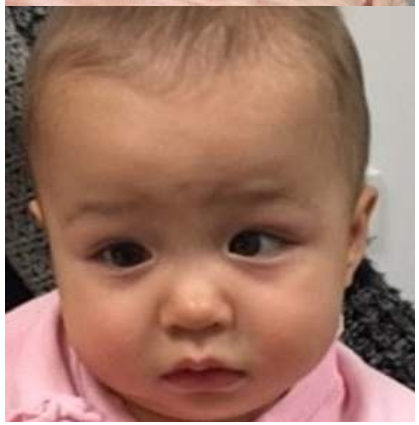
# “Something worse…?

## Primary Neurological Disorder

- Brain
  - **Tumour**
  - **Hydrocephalus**

## ➢ Additional symptoms

- ➢ **Vomiting/headache**
- ➢ **Unsettled**
- ➢ **Change in mobility**
- ➢ **Seizures**
- ➢ **“unwell”**



## Intraocular disease

- Eye
  - Cataract
  - Retinoblastoma
  - Other…

## ➢ Well child

- ➢ **Visual behaviour unchanged (one eye only affected)**

**Original paper**

Strabismus 0927-3972/00/US$ 15.00

*Strabismus – 2000, Vol. 8, No. 2, pp. 69-75*


Accepted 21 March 2000

# Underlying pathologies in secondary strabismus

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**Abstract**

PURPOSE In this prospective cross-sectional observational study, the distribution of organic pathologies in patients initially presenting with strabismus was evaluated.

METHODS Thirty-one of 243 patients examined between May 1997 and May 1998 had strabismus due to organic causes and 28 patients had posterior segment abnormalities.

RESULTS Toxoplasma chorioretinitis, morning glory anomaly, toxocara retinopathy, retinopathy of prematurity and Coats' disease were the most common diagnoses. Eighteen patients (58%) had esotropia and 13 (42%) had exotropia. The mean age of onset of deviation was significantly lower in the esotropic patients. There was no correlation between the degree of visual impairment and direction of deviation.

CONCLUSIONS Our study strongly underlines the importance of fundus examination in each strabismic patient.

**Key words** Esotropia; exotropia; sensory esotropia; strabismus

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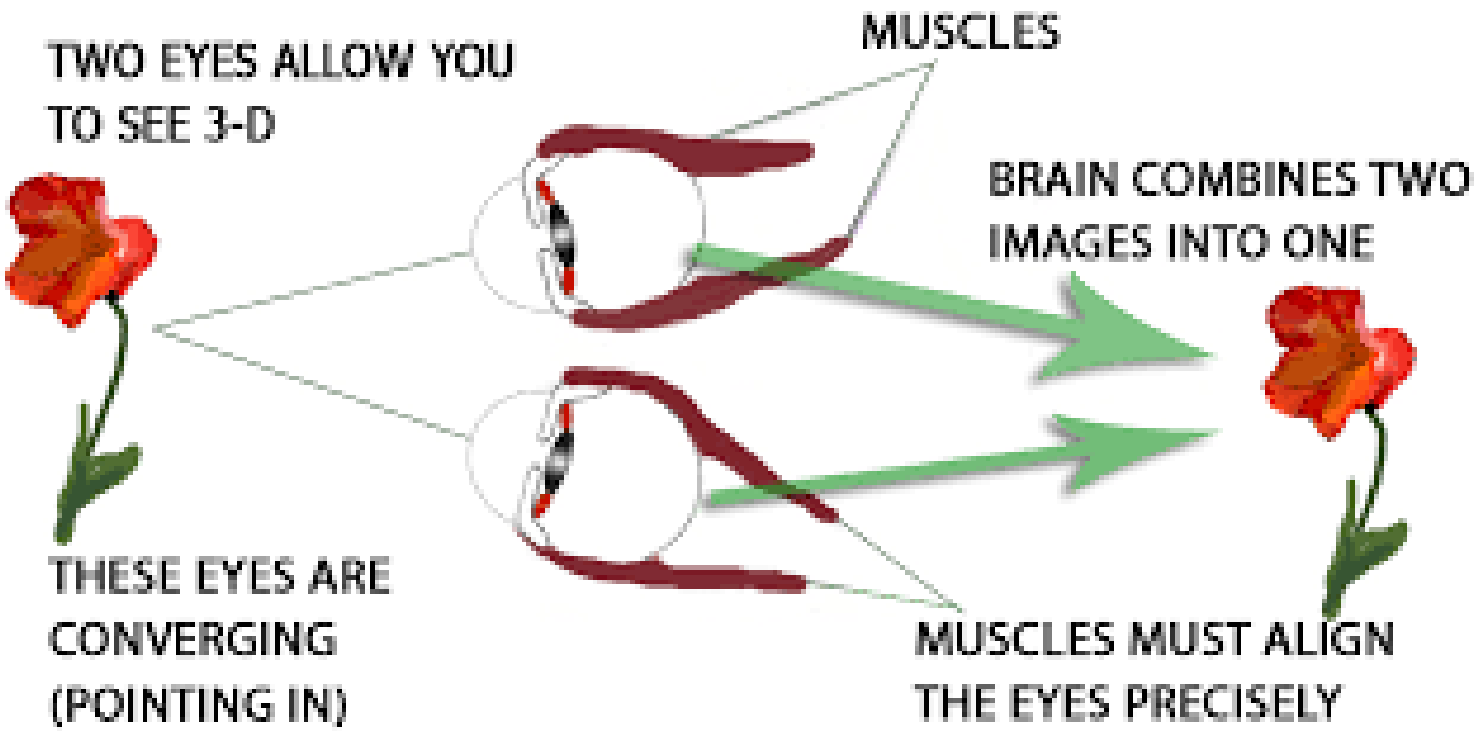
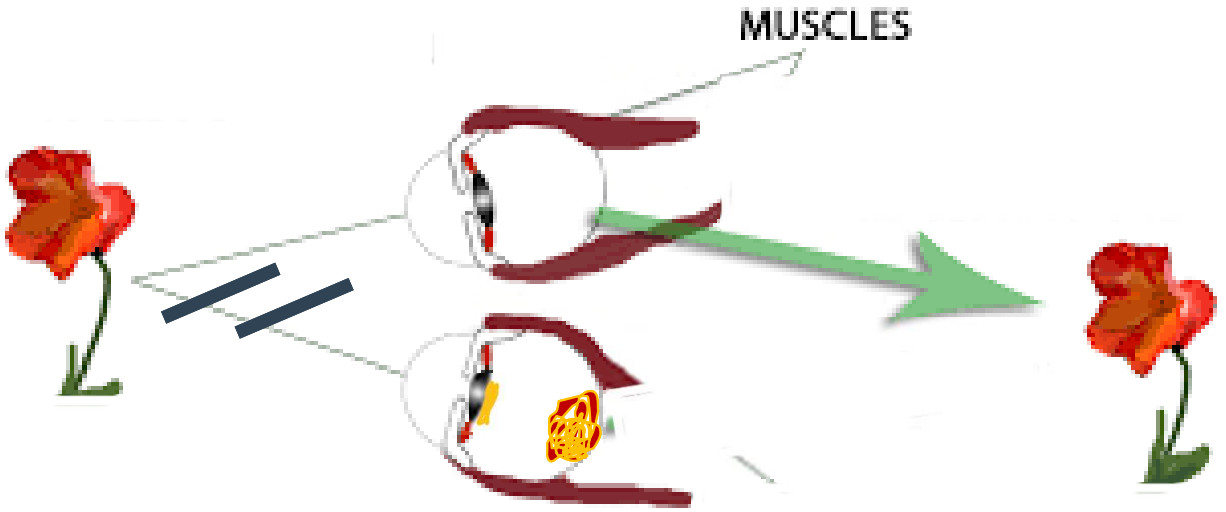
- 31/243 (12.7%) – strabismus
- 58% - esotropia (inward eye turn)
- 42% - exotropia (outward eye turn

| Nature of pathology | Number of patients |
|---|---|
| Toxoplasma chorioretinitis | 5 |
| Morning glory anomaly | 4 |
| Toxocara retinopathy | 3 |
| Retinopathy of prematurity | 3 |
| Coats' disease | 3 |
| Congenital cataract | 3 |
| Retinoblastoma | 2 |
| Toxocara endophthalmitis | 1 |
| X-linked juvenile retinoschisis | 1 |
| Optic disc hypoplasia | 1 |
| Tilted disc | 1 |
| Foveal scar | 1 |
| Best dystrophy | 1 |
| Optic atrophy | |
| Pseudoretinitis pigmentosa | 1 |
| Total | 31 |

# Binocular Vision – using 2 eyes together



# Disruption of vision in one eye causes strabismus…




- Central vision is disrupted
- No incentive for the eyes to remain straight
- Affected eye will ‘wander’ – in or out

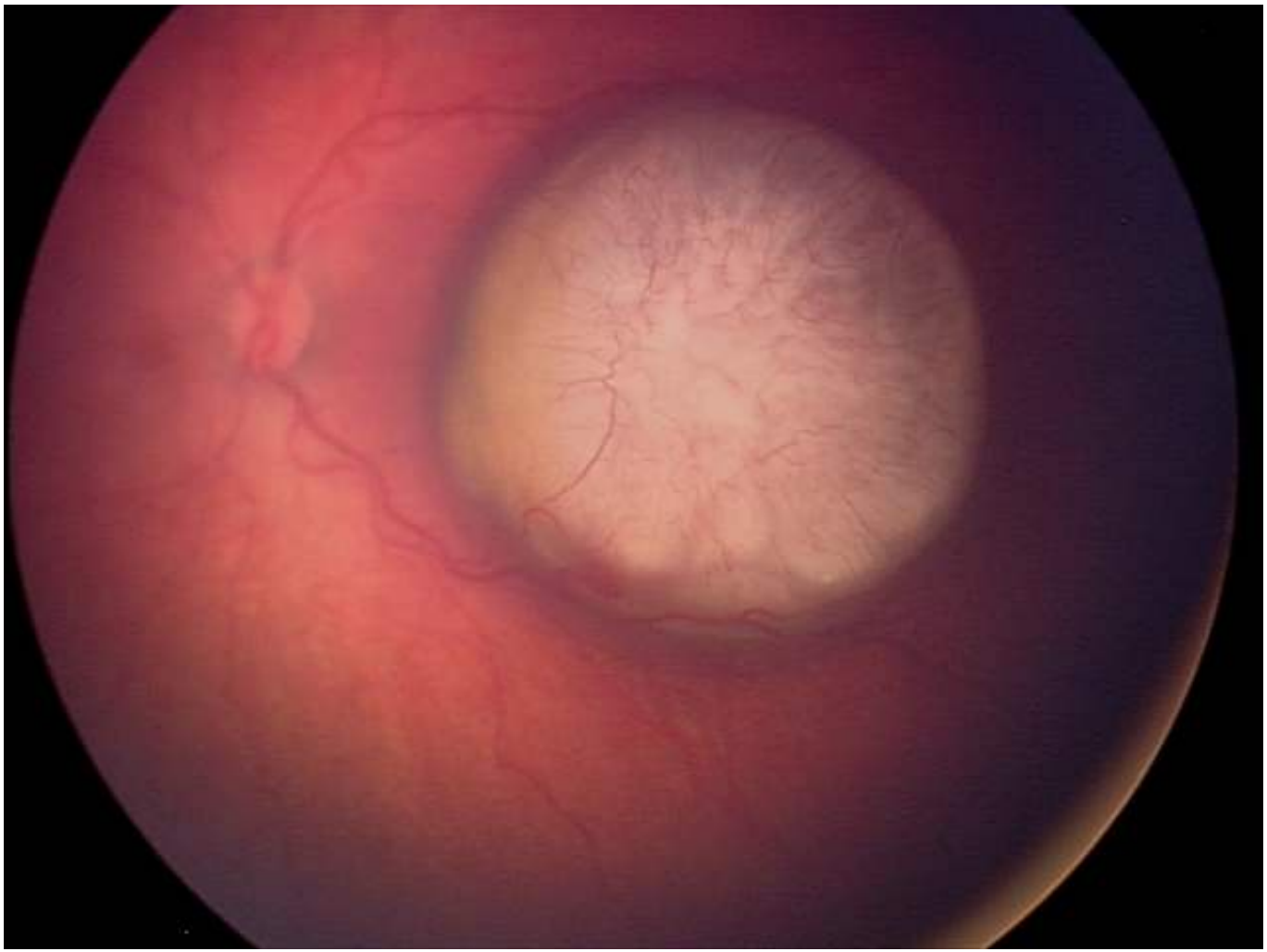
4.5/12 old baby; ex-33/40 (3/12 corrected)
Emerg. C-sect; nil complications post-delivery

c/o several weeks' Hx L intermit. Strabismus, becoming more frequent

Reassured by paediatrician

- "normal, she was premature"

- TV story about leukocoria
- Referred to her own photos

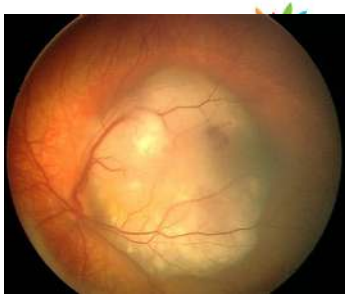


# Leukocoria

| Pathology | |
|---|---|
| Congenital cataract | 60% |
| Retinoblastoma | 18.2% |
| Retinal Detachment | 4.2% |
| PHPV (persistent hyperplastic primary vitreous/persistent fetal vasculature) | 4.2% |
| Coats' disease | 4.2% |
| Coloboma: iris/choroid/retinal | 2.8% |
| Infection:<br>Ocular toxocara/Endophthalmitis/<br>Panendophthalmitis/<br>Posterior Uveitis | 5.6% |

*Haider et al. JAAPOS, 2008*

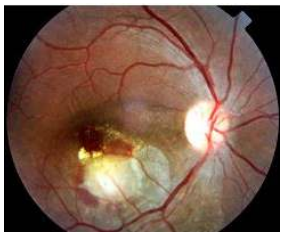
*Cataract*



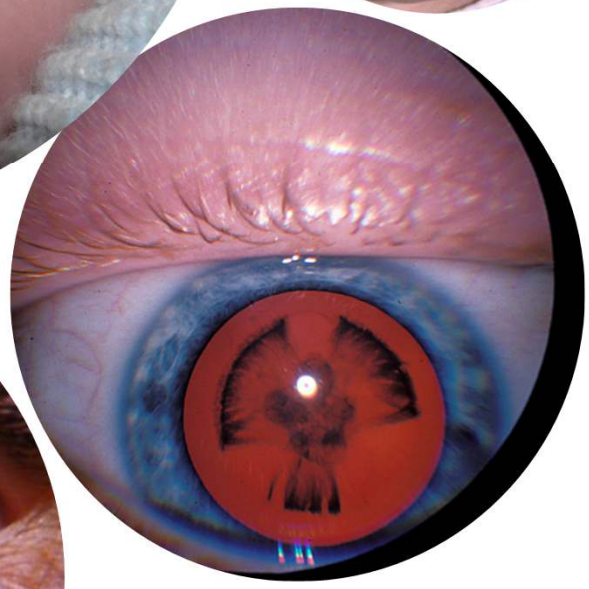
*Retinoblastoma*

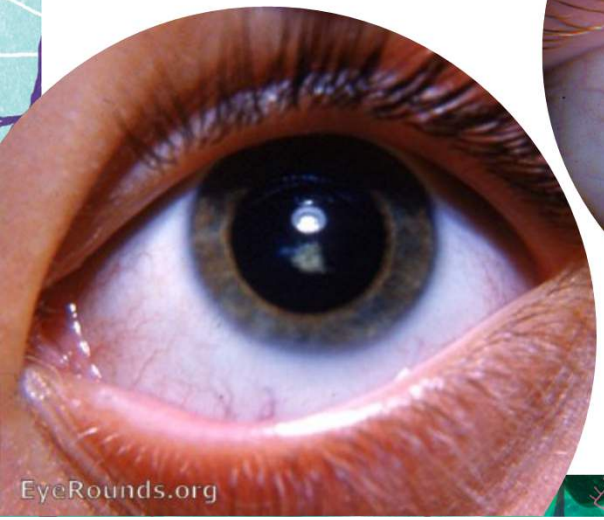
*PHPV*

*Coat's disease*



*Toxocara*






# Congenital cataract

- Leading cause of childhood blindness
- Congenital ***OR*** develops during early childhood
- Complete or partial
- <u>Familial</u>
- Unilateral or Bilateral
- Differential diagnosis – vital
- Early diagnosis – imperative

- **URGENT**

# Causes of cataract in children

***Inherited***

- AD/AR/X-linked

***Intrauterine infections***

- Rubella, Varicella, Toxoplasmosis, HSV

***Drug Induced***

- Corticosteroids, chlorpromazine

***Metabolic Disorders***

- IDDM, Galactosaemia,
- Hypocalcaemia, Hypoglycaemia

***Trauma***

- Blunt/penetrating injury,
- AI/NAI, laser photocoagulation

***Radiation induced***

***Chromosomal***

- Trisomy 13, 18, 21 (Down's), Turner &
- Cri-du Chat Syndrome

***Renal Disease***

- Lowe, Alport & Hallerman-Streff-Francois syndrome

***Skeletal Disease***

- Stickler, Rubenstien-Taybi, Bardet-Biedl,
- Conradi syndrome

***Neurometabolic Disease***

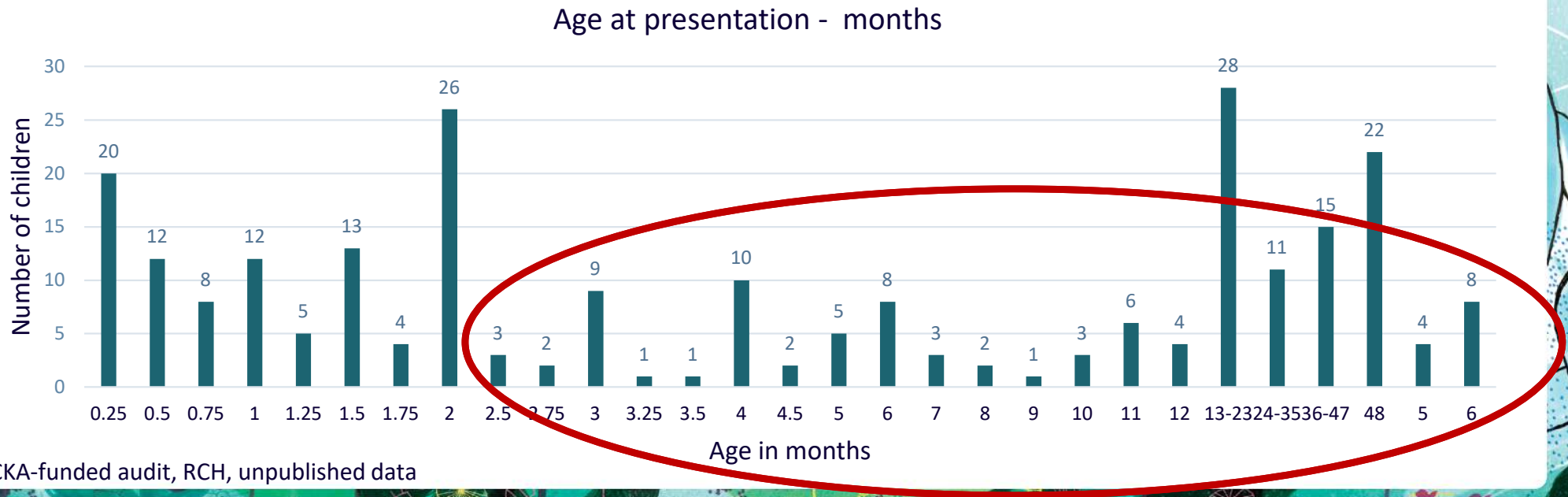
- Zellweger syndrome

***Muscular Disease***

***Dermatological***

- Cockayne syndrome, Incontinentia pigmenti, progeria
- Crystalline cataract & uncombable hair syndrome!

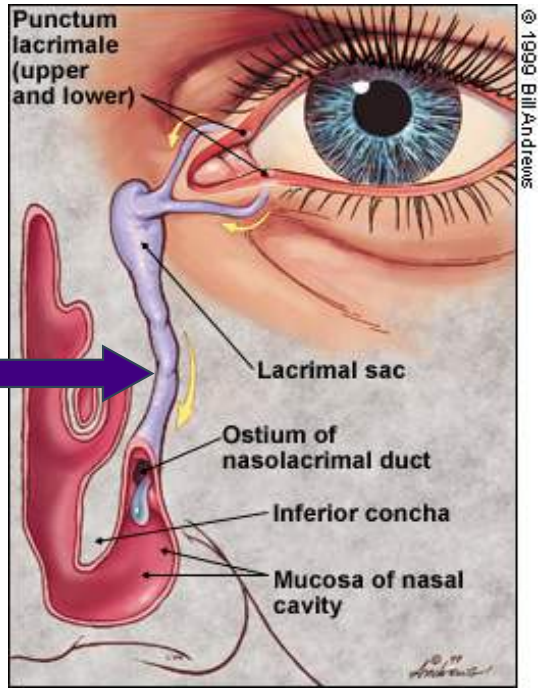
# Childhood Cataract Presentation - Victoria January 2014 – December 2019




CKA-funded audit, RCH, unpublished data

# Epiphora – watery eye

Blockage
In distal end
NLD



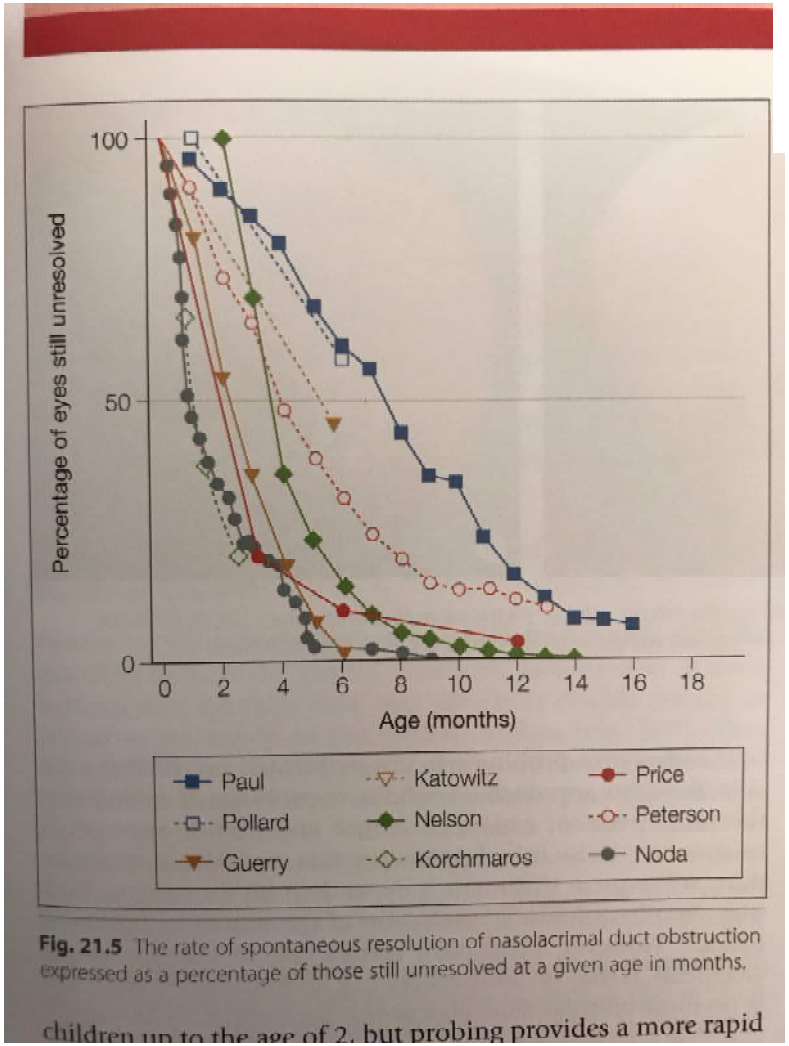




**Fig. 21.5** The rate of spontaneous resolution of nasolacrimal duct obstruction expressed as a percentage of those still unresolved at a given age in months.

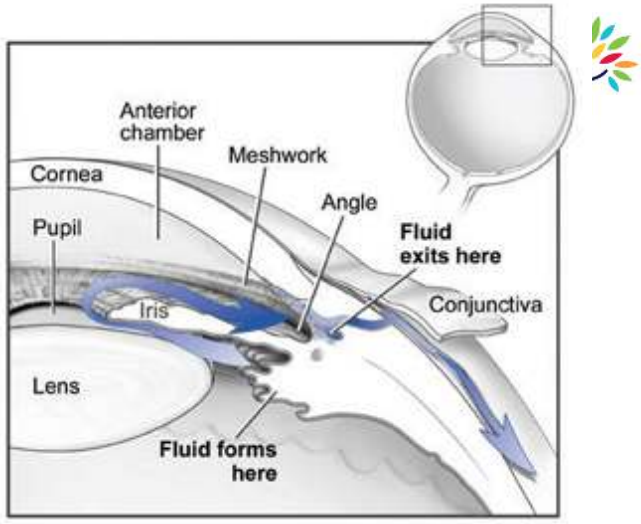
children up to the age of 2, but probing provides a more rapid

- Eye toilet make up remover pad
  - Make-up remover wipe
  - Dab – don’t wipe
  - Every feed – keep dry and clean
- Massage
  - Roll finger over infero-orbital bone
- Antibiotic drops/cream treat local infection only – not the cause – so massage is important

# When to be more concerned…

Amniotocele

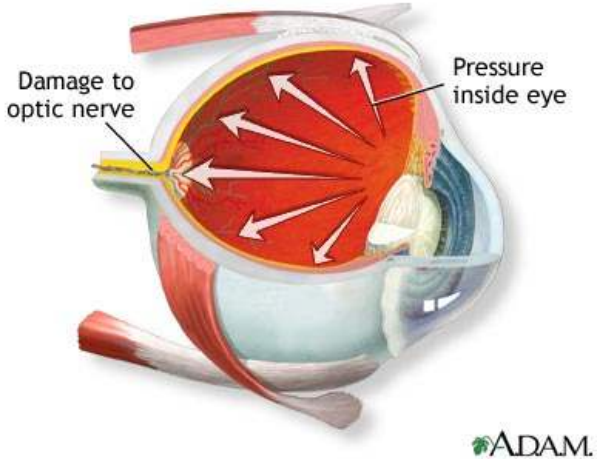
Epiblepharon



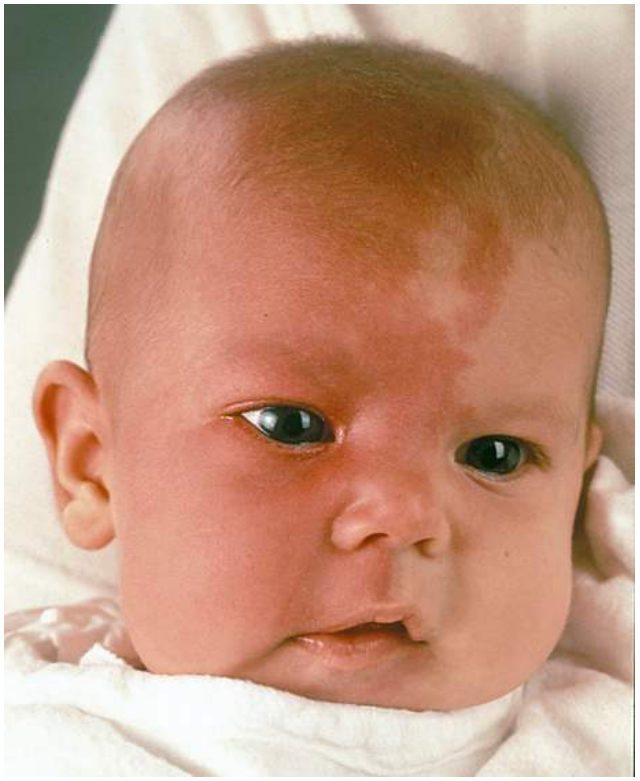

## Congenital/Infantile Glaucoma

Watery eye with ANY other signs – refer urgently to GP

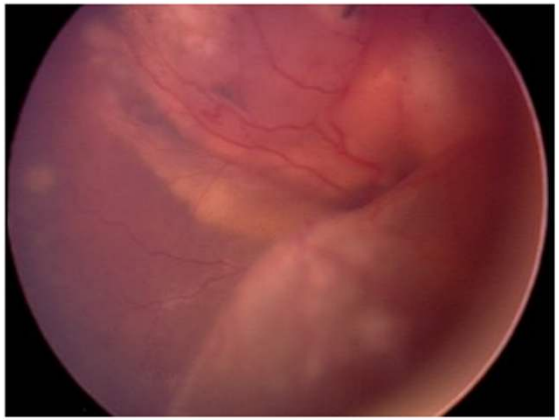
- Light sensitive
- Red eye
- Cloudy cornea
- Large eye - buphthalmos
- Unsettled baby – vomiting/malaise
- FHx childhood glaucoma – often missed/omitted



# Secondary Glaucoma



**Sturge-Weber Syndrome**



18/12 old – Hx intermittent squint
3/7 Hx – dilated pupil, painful LE eye
RVA 3/3 LVA NPL
RIOP 9mmHg  LIOP 55mmHg
LE – mild corneal haze and iris neovasc.
Total retinal detachment, large posterior mass

**Retinoblastoma - Masquerade**

# 2 main ‘signs’ ALL parents need to know!

**Leukocoria**

- White pupil
- ‘Glow’
- Cat’s eye
- Glint

**Strabismus**

- Turned eye
- Squint
- Wondering eye
- “Wall eye”

- Visible some or all the time
- Turned eye varies in size or “small”
- Any direction (in/out/up/down)
- Child otherwise well
- Child still “sees well” (aka “picks fluff up off the floor”

# Stronger together – referral pathways

## RCH OPHTHALMOLOGY DEPARTMENT REFERRAL PRIORITY GUIDELINES

(Updated July 2024)

### Under 16 years of age

| | |
|---|---|
| **Group 1 / Urgent**<br>• Cataract<br>• Corneal opacity<br>• Diplopia – new onset<br>• Glaucoma or Glaucoma Suspect<br>• Newborn Sticky eyes (up to 2 weeks age)<br>• Nystagmus-new or sudden onset<br>• Neurological Strabismus<br>• Non-accidental injury (suspected)<br>• Painful red eye with loss of vision<br>• Pale optic nerve head / optic atrophy<br>• Papilloedema/optic nerve head swelling<br>• Peri orbital and Orbital Cellulitis<br>• Proptosis<br>• Pupil defect – recent onset<br>• Retinopathy of prematurity<br>• Retinoblastoma<br>• Retinal tumors<br>• Retinal Detachment <2 years of age (will need co-management with Royal Victorian Eye and Ear Hospital) (Retinal Detachment >2years of age refer to Royal Victorian Eye and Ear Hospital).<br>• Sudden visual loss<br>• Trauma<br>• Uveitis | Phone the Ophthalmology Registrar on call on (03) 9345 5522 to obtain appropriate prioritization.<br><br>Fax referral with parent's phone contact details to (03) 9345 5034<br><br>Please send any images or scans to assist with triage to: eye.triage@rch.org.au |
| **Group 2 / Routine (3-12 months)**<br>• Amblyopia*<br>• Haemangioma – see Referral Guidelines by Diagnosis<br>• Chronic Chalazia (large)*<br>• Eyelids/malposition i.e. epiblepharon, ectropion, entropion, ptosis.<br>• Strabismus-Non Neurological*: Squint / esotropia / exotropia / hypertropia / hypotropia<br>• Nystagmus – longstanding*<br>• Pupil defect – longstanding* | May require follow up with local eye care provider in first instance.<br><br>Please send images or scans to assist with triage to eye.triage@rch.org.au<br><br>Age and other comorbidities will affect triage criteria.<br><br>* See referral guidelines by diagnosis. |
| • Dermoid*<br>• Sticky eyes/blocked tear ducts if symptoms >12 months* | See list of external eye care providers. |

1. See "Referral Priority Guidelines by Diagnosis"
2. Ophthalmology registrar on-call via RCH Switchboard: (03) 9345 5522
3. Fax referral to: (03) 9345 5034
4. Call Ophthalmology Department: (03) 9345 6347
5. Referral Triage Co-Ordinator: (03) 9345 4117 or email eye.triage@rch.org.au

Please send any images or scans to: eye.triage@rch.org.au to assist with triage

**Group 3 / Referral will be rejected**

- Routine vision check/screening
- Myopia (including myopia progression, & non-syndromic <8 Dioptres)
- Spectacle/glasses check
- Child older than 8 years old who requires glasses for any reason and has not required amblyopia treatment
- Child older than 10 years old who requires glasses for any reason and has had amblyopia treatment in the past
- Chalazia (Meibomian cyst, eyelid cyst – unless large and chronic) *
- All Itchy eyes/Hay fever/Blepharitis* (unless corneal involvement, or referred from internal source e.g. allergy/immunology)
- All new referrals for children >12years old for **longstanding** strabismus, blurred vision or headaches.
- Colour vision defect (isolated)*

These conditions are not routinely seen at the Royal Children's Hospital and the referral will be rejected.

Recommend referral to and follow up with external eye care provider.

See list of external eye care providers.

If patient has developmental delay and/or complex medical history and/or requires interpreter – consider referral to the Australian College of Optometry

* See referral guidelines by diagnosis.

# RCH COLLABORATIVE CARE MODEL

- Referral to GP…
- Referral to local optometrist for initial assessment
- RCH partners with Melbourne Eye Care Clinic – University of Melbourne College of Optometry

## Evaluating a collaborative paediatric eye-care model between optometry and ophthalmology: a clinical audit

Andrew Huhtanen[a], Anu Mathew[b], Catherine Lewis[b], Tim Martin[c], Marianne Piano[a]* and Flora Hui[a]*

[a]Department of Optometry and Vision Sciences, University of Melbourne, Melbourne, Australia; [b]Department of Ophthalmology, Royal Children's Hospital, Melbourne, Australia; [c]Melbourne Teaching Health Clinics, University of Melbourne, Melbourne, Australia

**ABSTRACT**

**Clinical relevance:** Collaborative care models between optometry and ophthalmology can be a safe and viable way to improve patient access to paediatric eye-care services and reduce hospital paediatric load.

**Background:** Long waiting lists exist for paediatric ophthalmology services Australia-wide, yet some patients who are referred to the hospital may not require hospital-based treatment and instead can be seen in primary care. This audit assessed the safety and standard of care provided in a paediatric collaborative care model between a student-led university optometry clinic and a public ophthalmology clinic. Supervising optometrists in the optometry clinic were experienced in the care of paediatric patients. Collaborative care was provided for children with juvenile idiopathic arthritis, craniosynostosis (without strabismus/amblyopia), nasolacrimal duct obstruction or chalazion, following a co-developed care protocol.

**Methods:** Outcome data (throughput, re-referrals, waiting list removals) were collected through both clinics. A retrospective case note audit (randomised record selection across the four included conditions) was undertaken, assessing percentage compliance against the co-developed care model protocol. Patient satisfaction with the collaborative care clinic was assessed by patient reported experience survey for clinic attendees in a one-month period.

**Results:** One hundred and fifty-seven of 169 children offered the care pathway received care through the collaborative model, with 209 patients being removed or prevented from being added to the Royal Children's Hospital Ophthalmology waiting list. Collaborative care protocol compliance was 95%. Twenty-nine children were re-referred for ophthalmological intervention. Parents/guardians of 11 children completed the survey, reporting 100% satisfaction.

**Conclusions:** Collaborative care between hospital-based ophthalmology and university-based optometry can be effectively implemented in a student-led clinic, resulting in reduced hospital wait times, high clinician adherence to protocols and high family satisfaction.

**ARTICLE HISTORY**
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**KEYWORDS**
Collaborative care; ophthalmology; optometry; paediatric eye-care

# Promoting Good Eye Health

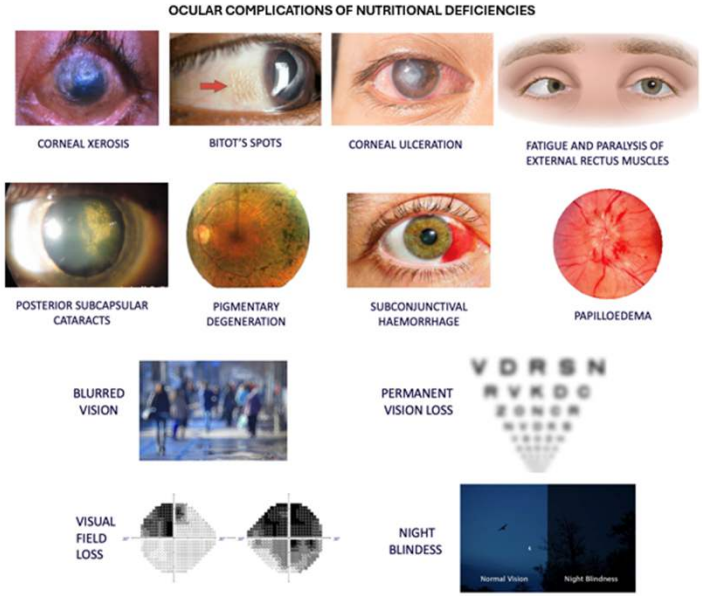
Nutrition

Vaccination

Screentime

Outdoor time

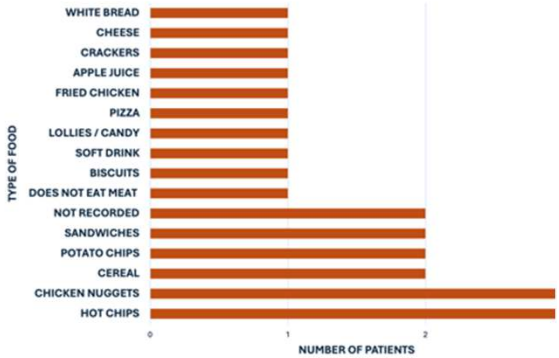
# NUTRITION




## RESULTS

- Average age at diagnosis: **9.1 years old.**
- 13 cases identified: 10 male, 3 female.

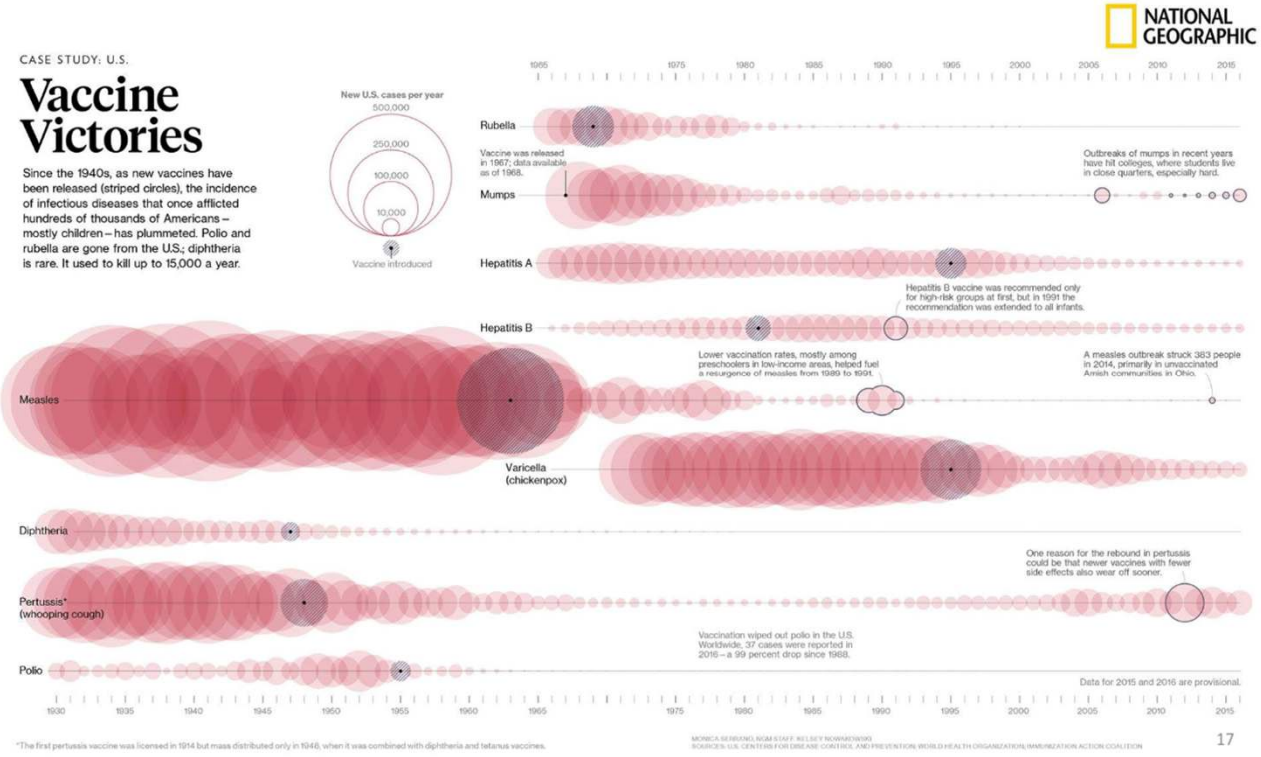
- 7 of 13 patients **(54%) had autism spectrum disorder** (ASD) as a comorbidity.
- Most patient diagnosed in **2024**, suggesting rising awareness and screening need.
- 46% referrals from ophthalmologists for vision concerns (blur, pain, night blindness).
- Dietary trend: highly processed, low-nutrient foods. The children in this cohort were found to be **consuming only a single food item** as their entire diet, including::




- Most common findings: optic atrophy & xerophthalmia, linked mainly to vitamin A & B12 deficiencies.
- 69% of patient with permanent unilateral/bilateral vision loss; 4/13 now legally blind.
- 46% assessments were not age-appropriate (e.g. ASD ), likely underestimating vision loss.

Acknowledgement: N Kaur

# VACCINATION




Acknowledgement: Prof. DA Mackey AO

# Blinding complications for vaccine-preventable disease

## 6 infections prevented by vaccines

- *haemophilus influenza* type B
- Measles
- Rubella
- Meningococcal meningitis
- Chickenpox
- Shingles

## Ocular complications

- Corneal scarring
- Cataract
- Uveitis
- Retinopathy
- Optic neuropathy
- Cortical blindness

Acknowledgement: Prof. DA Mackey AO

# OUTDOOR TIME

# Myopia in Children


Myopia or short-sightedness is where people need glasses to see in the distance

Normal Vision 6/6 metres or 20/20 feet

the Raine Study

Affects **25%** of 20-year-olds in Australia

Double → Predicted to affects **50%** of the world's population by 2050

World Health Organization

Halve → Affects only **12%** of people who spent a lot of time outdoors

bpmri Busselton HEALTH STUDY

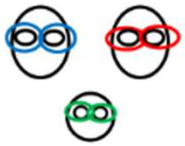
Holden BA et al. Ophthalmology 2016
Lee SS-Y et al. JAMA Ophthalmology 2022
Franchina M et al. Med J Aust 2014

Acknowledgement: Prof. DA Mackey AO

What causes Myopia?


**Genes**

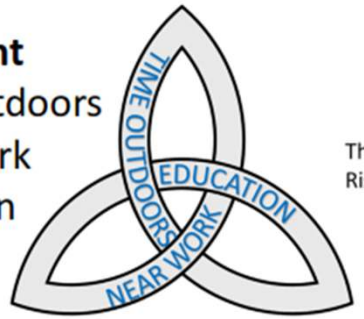
Mum & Dad with myopia



0 parents myopia risk = **20%**
1 parent myopia risk = **33%**
2 parents myopia risk = **44%**

**Environment**

↓ Time Outdoors
↑ Near Work
↑ Education




Three Intertwined Risk Factors

Hysi PG et al. Nat Genet. 2020
Lee SS-Y et al. JAMA Ophthalmology 2022
Lee SS-Y et al. Invet Ophthalmol Vis Sci 2023
Lingham G et al. Sci Rep 2021

Acknowledgement: Prof. DA Mackey AO

# Increased **Time Outdoors** Prevents Myopia

## Outdoor Activity Reduces the Prevalence of Myopia in Children

Kathryn A. Rose, PhD,[1] Ian G. Morgan, BSc, PhD,[2] Jenny Ip, MBBS,[3] Annette Kifley, MBBS, MAppStat,[3] Son Huynh, MBBS, MMed (ClinEpi),[3] Wayne Smith, BMed, PhD,[4] Paul Mitchell, MD, PhD[3]

**Objective:** To assess the relationship of near, midworking distance, and outdoor activities with prevalence of myopia in school-aged children.

**Design:** Cross-sectional study of 2 age samples from 51 Sydney schools, selected using a random cluster design.

**Participants:** One thousand seven hundred sixty-five 6-year-olds (year 1) and 2367 12-year-olds (year 7) participated in the Sydney Myopia Study from 2003 to 2005.

**Methods:** Children had a comprehensive eye examination, including cycloplegic refraction. Parents and children completed detailed questionnaires on activity.

**Main Outcome Measures:** Myopia prevalence and mean spherical equivalent (SE) in relation to patterns of near, midworking distance, and outdoor activities. Myopia was defined as SE refraction ≤ −0.5 diopters (D).

**Results:** Higher levels of outdoor activity (sport and leisure activities) were associated with more hyperopic refractions and lower myopia prevalence in the 12-year-old students. Students who combined high levels of near work with low levels of outdoor activity had the least hyperopic mean refraction (+0.27 D; 95% confidence interval [CI], 0.02–0.52), whereas students who combined low levels of near work with high levels of outdoor activity had the most hyperopic mean refraction (+0.56 D; 95% CI, 0.38–0.75). Significant protective associations with increased outdoor activity were seen for the lowest ($P = 0.04$) and middle ($P = 0.02$) tertiles of near-work activity. The lowest odds ratios for myopia, after adjusting for confounders, were found in groups reporting the highest levels of outdoor activity. There were no associations between indoor sport and myopia. No consistent associations between refraction and measures of activity were seen in the 6-year-old sample.

**Conclusions:** Higher levels of total time spent outdoors, rather than sport per se, were associated with less myopia and a more hyperopic mean refraction, after adjusting for near work, parental myopia, and ethnicity.

*Ophthalmology 2008;115:1279–1285 © 2008 by the American Academy of Ophthalmology.*

Myopia is an eye condition that poses significant costs for optical correction and costs due to associated cataract[1–3] and glaucoma[4–6] in the longer term. In the latter part of the 20th century in highly urbanized East Asian regions,[7–10] the prevalence of myopia has increased dramatically and, in some highly educated groups, now exceeds 80%.[10–12] In parallel with the increase in overall myopia, there has been a rise in the prevalence of high myopia (≤ −6 diopters [D]),[13] which is associated with increased levels of visual impairment and blindness,[14] primarily due to chorioretinal degeneration and retinal detachment. Furthermore, myopia is appearing with greater prevalence in young children,[15,16] which places these children at greater risk of developing high myopia, with its associated complications.

Due to these trends in the prevalence of myopia, there has been a research focus on factors that could increase the risk of myopia. It is well established that the prevalence of myopia in children is greater if their parents are myopic.[9,16–21] East Asian ethnicity has also been proposed as a possible risk factor. Although these 2 factors could indicate a genetic contribution, myopia is generally believed to have a multifactorial etiology, and the rapid rise in prevalent myopia suggests that rapidly changing environmental factors are predominant in determining the current patterns of myopia.[22]

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No conflicting relationship exists for any author.

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Review

## How does spending time outdoors protect against myopia? A review

Gareth Lingham,[1] David A Mackey,[1] Robyn Lucas,[1,2] Seyhan Yazar[1,3]

**ABSTRACT**

Myopia is an increasingly common condition that is associated with significant costs to individuals and society. Moreover, myopia is associated with increased risk of glaucoma, retinal detachment and myopic maculopathy, which in turn can lead to blindness. It is now well established that spending more time outdoors during childhood lowers the risk of developing myopia and may delay progression of myopia. There has been great interest in further exploring this relationship and exploiting it as a public health intervention aimed at preventing myopia in children. However, spending more time outdoors can have detrimental effects, such as possibly progression in children and adolescents.[4–6] Spending more time outdoors may reduce the risk of myopia by a number of pathways (figure 1). Identifying the factors behind this relationship might allow interventions to be targeted, thereby avoiding potentially detrimental effects associated with spending time outdoors, such as sunburn and an increased risk of skin cancers.[7] The means by which spending time outdoors might lower myopia risk have been briefly discussed in broader reviews, as well as comprehensively in reviews on individual elements (online supplementary table 1). However, the rapid expansion of studies warrants an updated

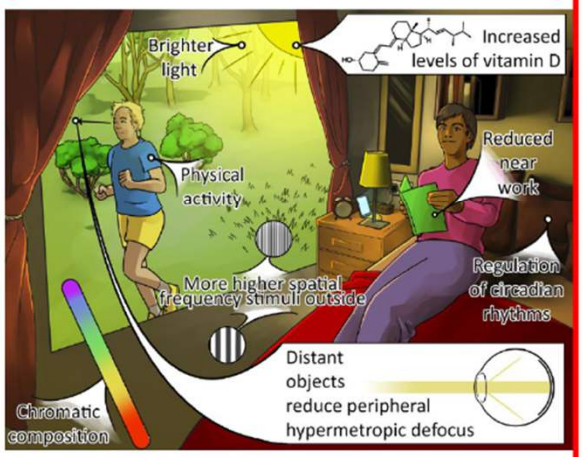


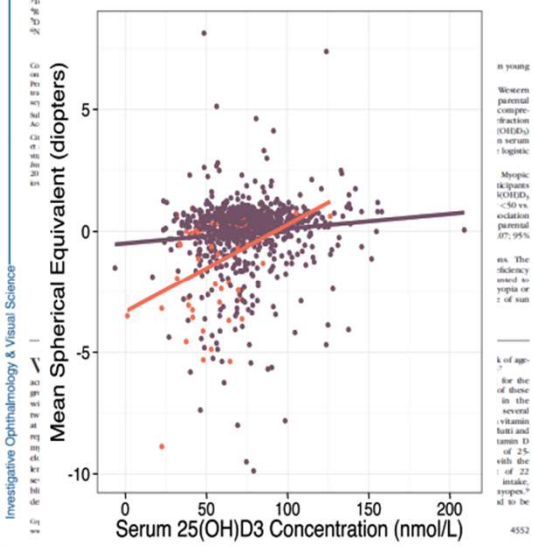

**Figure 1** Spending more time outdoors may reduce risk of myopia via multiple means.

Clinical and Epidemiologic Research

## Myopia Is Associated With Lower Vitamin D Status in Young Adults

Seyhan Yazar,[1] Alex W. Hewitt,[1,2] Lucinda J. Black,[3] Charlotte M. McKnight,[1] Jenny A. Mountain,[3] Justin C. Sherwin,[4] Wendy H. Oddy,[3] Minas T. Coroneo,[5] Robyn M. Lucas,[5,6] and David A. Mackey[1]

[1]Centre for Ophthalmology and Vision Science, University of Western Australia and the Lions Eye Institute, Perth, Western Australia, Australia




Investigative Ophthalmology & Visual Science



Acknowledgement: Prof. DA Mackey AO

# SCREEN TIME

Suitable for 2-5 years

## Screen time and digital technology use for children 2-5 years: tips for balance

SHARE

**Key points**

- Screen time and digital technology use can be part of a healthy lifestyle when balanced with other activities.
- Activities that are important for preschooler development include physical play, creative play, reading, sleep and socialising.
- Family rules can help balance screen time and other activities for preschoolers.

493 Found this helpful

**You might also like**

Healthy screen time and digital

https://raisingchildren.net.au/preschoolers/media-technology/screen-time-healthy-screen-use/healthy-screen-time-2-5-years

# “You don’t know what you don’t know…”




## Healthy Eyes Guide

https://www.cera.org.au/eye-health-resources/

https://www.cera.org.au/glint-or-squint/


- Prevention is better than a cure!
- Early diagnosis is the next best thing…