Assessment Pearls and Childhood Development Milestones in Young Children

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Wave 2026 + Optical Dispensers Australia

The University of Melbourne

Learning Outcomes

By the end of this lecture, attendees will be better equipped to

- Conduct thorough assessments with young children
- Make informed decisions about when to refer for additional evaluation or intervention with young children

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Why Early Visual Assessment Matters

- Vision underpins motor, cognitive, and social development
- Visual delays are often subtle and overlooked in infancy
- Optometrists are often first professionals to detect concerns

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From Seeing to Understanding Vision Development (0–12 months)

Age Range	What Changes
0–2 months	Detects contrast & faces
2–4 months	Tracks movement & eye contact
4–6 months	Colour vision & coordination
6–9 months	Stereopsis & oculomotor control
9–12 months	Object recognition & visually guided interpretation

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Developmental Stages for Children

Gross Motor:

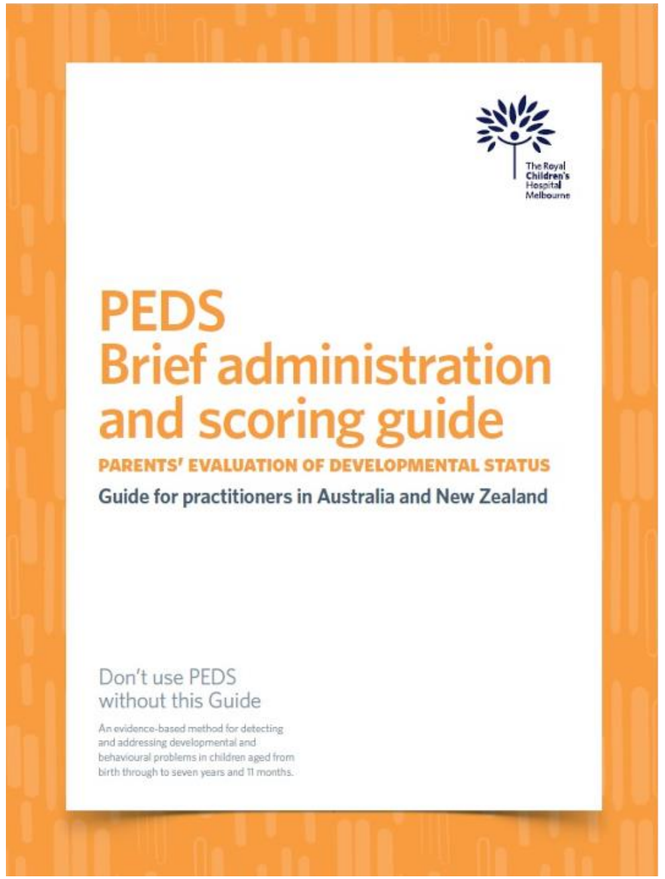
- 3 months - push up
- 6 months - sit up
- 9 months - stand up (crawl, cruise)
- 12 months - walk

Speech Language:

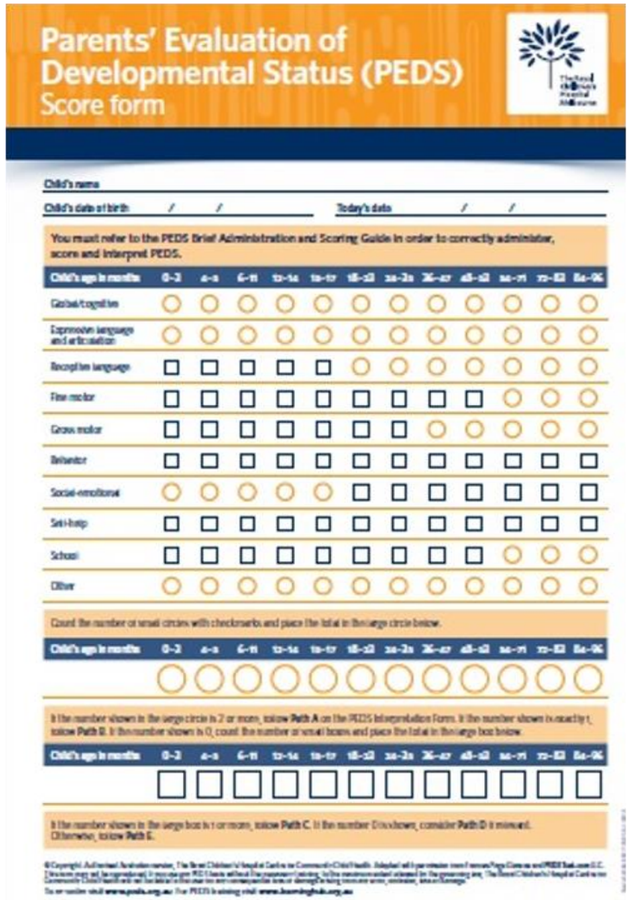
- Birth - vocalisations, crying. Startles to noise
- 6 weeks - quieting to mum's voice
- 4 months - laughter / squeals
- 6 months - babble, turns to voice
- 9 months - "mama" and "dada" non-specifically
- 1 year - mama and dada specifically PLUS few words

Social Emotional:

- Birth - face regard
- 6 weeks - smiles responsively
- 3 months - smiles spontaneously
- 6 months - feeds self crackers, shy with strangers
- 9 months - indicates wants (not crying)
- 12 months - waves bye-bye



Developmental milestones (tasks)	Average age
Follows eyes past the midline	6 weeks
Smiles	6 weeks
Bears weight on legs with support	3–7 months
Sits with support	4–6 months
Sits without support	5–8 months
Crawls	6–9 months
Puts everything into mouth	4–8 months
Pulls to standing position	6–10 months
First tooth	6–9 months
Walks holding on	7–13 months
Drinks from cup	10–15 months
Waves goodbye	8–12 months
Climb stairs	14–20 months
Turns pages	2 years
Scribbles	1–2 years
Uses a spoon	14–24 months
Puts on clothing	21–26 months
Buttons up	30–42 months
Jumps on spot	20–30 months
Rides a tricycle	21–36 months
Bowel control	18 months – 4 years
Bladder control (day)	8 months – 4 years
Clear hand preference	2–5 years
Adapted with permission Oberklaid F, Kaminsky L. Your child's health. Revised 4th edn. Melbourne: Hardie Grant Books, 2006	



Prof F Oberklaid Royal Children's Hospital Is my child normal? Developmental Milestones Aust Family Physician Sept 2011 https://www.rch.org.au/ccch/peds/About_PEDS/

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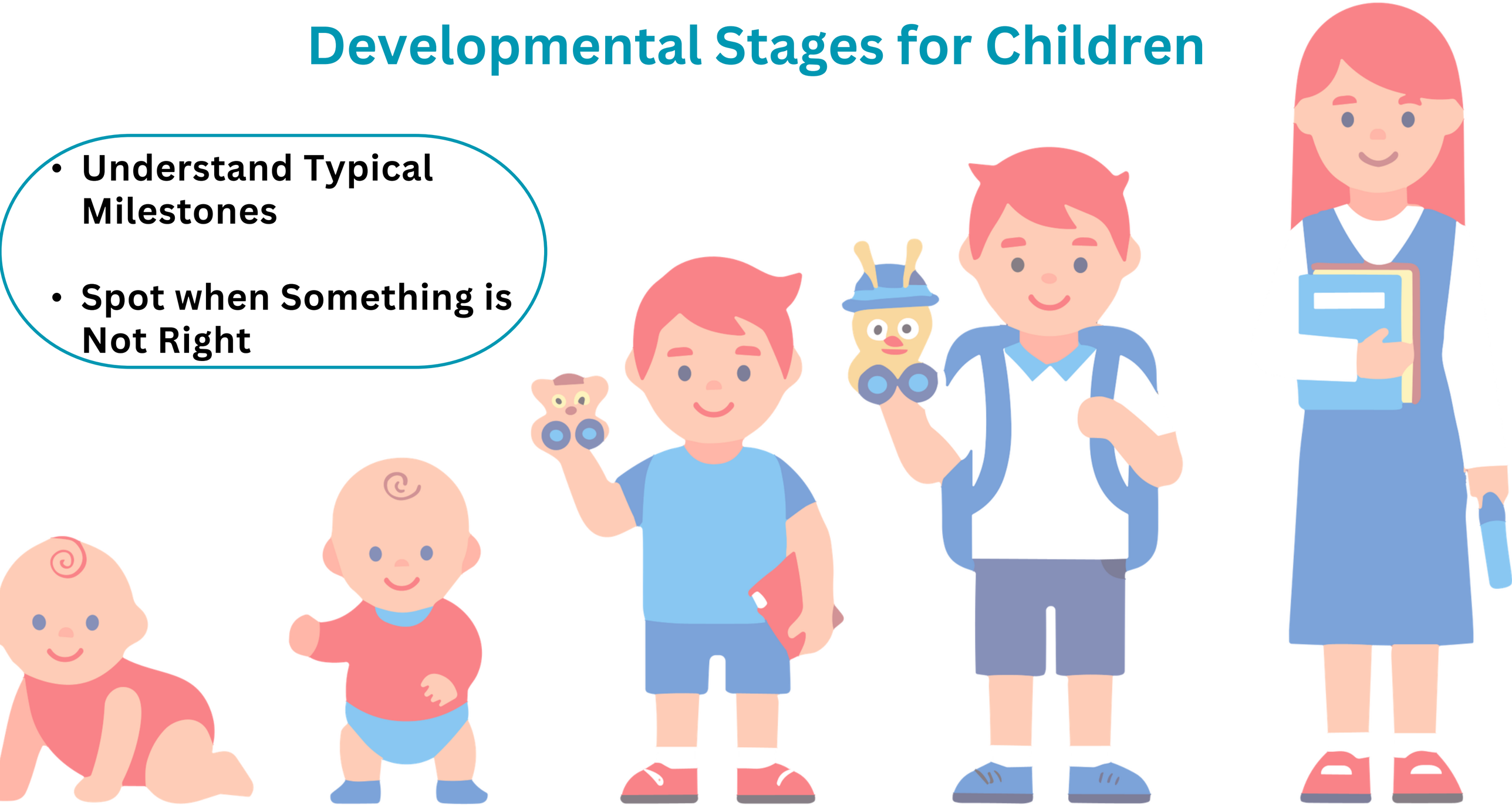
Developmental Stages for Children

- **Understand Typical Milestones**
- **Spot when Something is Not Right**



0 - 6 Months

Physical	Intellectual	Emotional	Social
Suck and grasp reflex. Needs to be held Rapid growth Can follow and focus Lots of sleep	Vocalises Understands that can cry for a response	Attached to parents/caregiver Comforts self with thumb/pacifier	Recognises parents/caregiver Smiles when they arrive

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6 - 18 Months

Physical	Intellectual	Emotional	Social
Feeding self Sitting Stands Walks Stacks 2+ blocks	1-2 words - Mama Dada Points Curious about environment	Hugs parents Separation anxiety Shows emotions but can't identify/regulate	Games - Peek a boo Extends attachment to others Some independence

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18 Months – 3 Years

Physical	Intellectual	Emotional	Social
Bladder & bowel control develops Climbing stairs Holds crayons, can draw circle Increased eye- hand co-ordination	Drawing develops Sentences begin – can be understood ½ the time	Expresses feelings verbally Separation anxiety better	Plays with children Tests boundaries

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3 Years – 6 Years

Physical	Intellectual	Emotional	Social
Can hop on one foot Can skip and dance Can draw a square and some letters	Can complete a puzzle Completely understandable when speaking Develops likes and dislikes Engages in discussion	Can identify happy and sad Imitates parents and caregiver Can feel overwhelmed by emotions	Dresses and undresses self Enjoys role play games Follows rules

What Does “Normal” Really Mean?

Birth to 6 Months

- Brief fixation and alerting to faces
- Improving contrast sensitivity
- Early tracking (horizontal before vertical)
- Detects contrast & faces
- Tracks movement & eye contact
- Colour vision & coordination

6 Months to 3 Years

- Visual attention and scanning
- Spatial awareness in play
- Eye–hand coordination
- Stereopsis & oculomotor control
- Object recognition & visually guided interpretation

3 - 6 Years

- Matching Games
- Better Visual attention and scanning
- Better Spatial awareness in play
- Better Eye–hand coordination

Wide range of visual development milestones

Patterns of clinical findings better than single clinical data points

Best to monitor over time

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Principles of Assessing Young Children

- **Observe before formal testing**
- **Match task to developmental level**
- **Short, flexible, and playful approach**

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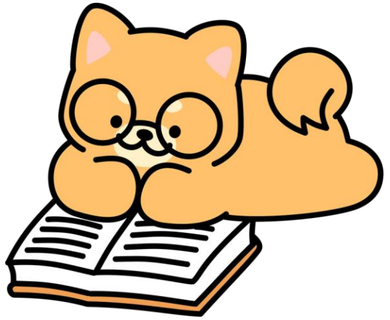
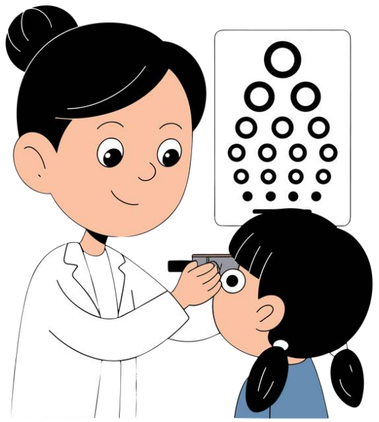
Preparation Tips



- **PRE- READ** any relevant information gathered prior to the appointment (Questionnaire, Referrals)
- **OBSERVE** everything
- **DEMEANOUR** friendly, calm, confident manner
- **SMILE**
- **HISTORY** – brief, relevant, targeted
- **AVOID** appearance of tension or dread in your body language



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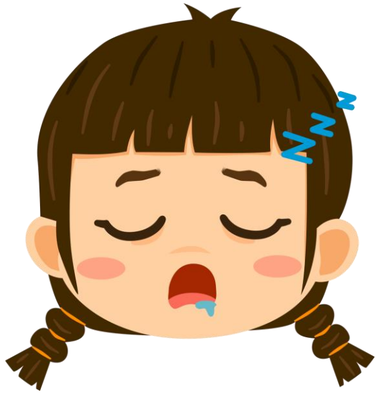
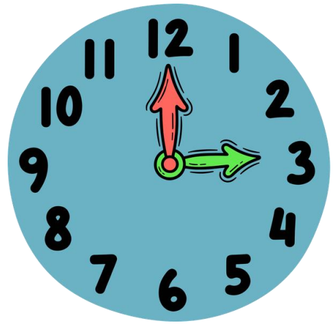
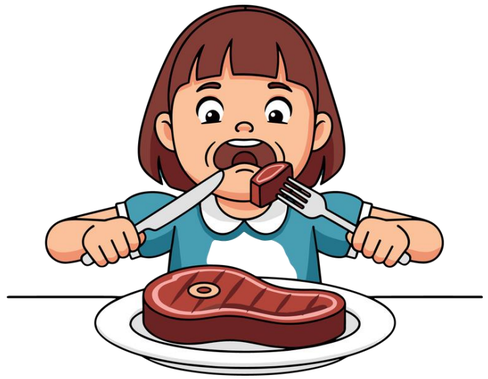




Comfort?

- Are they tired?
- Have they had a nap before appointment? (0-4 years)
- Morning or afternoon appt?
- Hungry/Thirsty?
- Waiting room experience?



Enhances CO-OPERATION and WIDENS your Window of Opportunity

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Listen Observe Learn (LOL)

- To communicate effectively with children and their parents/guardians, it is essential to listen carefully and observe closely.

- Since some children may have limited verbal communication, body language can provide valuable insights into their feelings and needs.

- Successful communication is key to obtaining an accurate history when examining a child.

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Use Your Time Wisely

- Once a child is in the consulting room chair an attention timer starts ticking away
- Chair time is precious
- No need to get child in chair straight away
- Allow child to stay with family or play close by quietly when gathering info or chatting to parents
- Focus the exam – relevant to individual case – check what you need early

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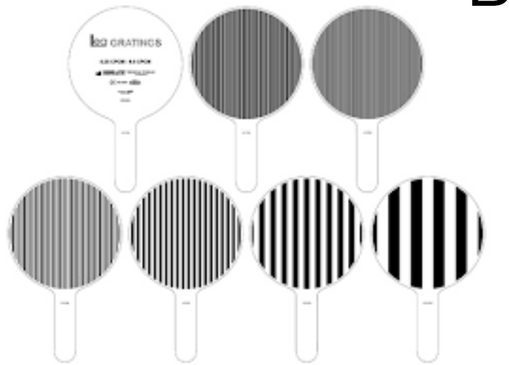
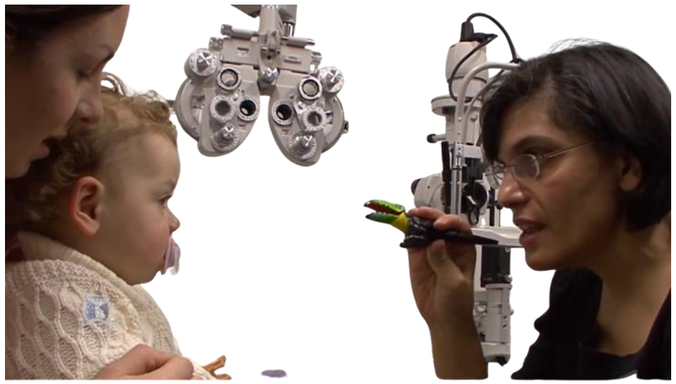
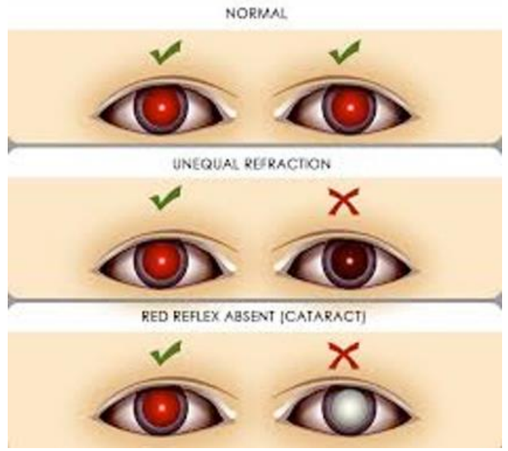
Assessing Infants (0–12 Months)

- Preferential Viewing Charts
- Observation - Fixation and Following
- Ocular Motility and Symmetry
- Bruckner’s







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Assessing Toddlers (1–3 Years)

- Matching and pointing tasks
- Use of toys (multi-sensory) | Books
- Observation during free play
- Corneal Reflex - Hirschberg

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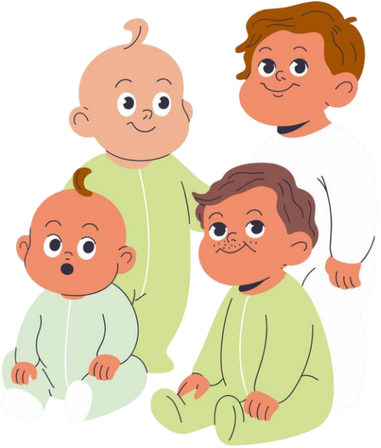

Birth - 3 Years

Vision - Unlikely to get reliable response under 2 years

- Preferential viewing charts (can be big and clumsy)
- OKN (optokinetic nystagmus)
- **Qualitative, observation of fixation and follow**
- **Watch behaviour with play**
- VEP (Visual Evoked Potentials) especially when concerned about eyesight. (most reliable).
- Consider matching games 2-3 years if child is bright.

Cover test, Hirschberg, Bruckner's

- Photodocumentation
- Red Reflex

Ocular motility

- excursions- fun, noisy, bright targets…plenty of them!!!
- Doll's eye reflex. Observation of tracking following you/mum/dad/toys/eye hand coordination.

Retinoscopy

- Dry and Wet cyclopentolate (1%, 0.5%).
- Near retinoscopy before cycloplegia
- Pupil examination.

Anterior & Posterior examination

- Parent to cradle infant in their arms right eye right shoulder, left eye left shoulder.
- Retinal photos?
- Auto refraction?

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3 Years - 6 Years

Vision

- Can start attempting matching tests - lea symbols flip cards, patti pics flip cards, patti pics near vision chart. By school age can start using standard testing charts in most children.

Colour Vision, Stereopsis

- not likely in pre school, but can try. Should be able to do by school age.

BV Tests

- worth 4 dot, prism doubling, phorias can do by school age.

Accommodation-convergence evaluation

- can do from school age depends on cognitive skills of child.

Slit lamp, tonometry (on indication)

- can be managed in this age group.

6 + Years

More input from child subjectively

More **comprehensive** evaluation of accommodation convergence skills

- limited by cognition skills of child

Conventional Subjective Refraction

- can be attempted in older children from **8+**.

Blur function technique

- Requires some **subjective input**

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Managing Behaviour and Attention
Two Patients - Child & Caregiver

- Tune into body language and non-verbal cues
- Speak with the child, not just about them
- Use creativity, play, humour and humility
- Be flexible
  - Switch tasks when attention drops
  - Test in short bursts
  - Recognise when they've hit their "fun limit"
- Keep frustration or disappointment to yourself
- Show authentic interest — connection drives cooperation

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The Dreaded Eye Drop!!
Cycloplegia - Dilation

- 0-6 months
  - 0.5% cyclopentolate
  - Cyclomydril (0.2% cyclo 1% phenylepherine)[1]
  - Cyclomydril Plus 1% tropicamide (very dark irides)
- 6mths onwards
  - **1% Cyclopentolate**
  - 1% Cyclopentolate Plus 1% tropicamide or 2.5% phenylepherine (very dark irides)
- Beware
  - Pale irides, Albinoid, Down syndrome – minimal dosage (0.5% cyclopentolate) recommended

Christoff A, 2015

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The Dreaded Eye Drop!!

- “Blink them in” technique
- “Lie down or on side”
- “Look up and drop into lower inner lid pocket”
- “Spray dispensers”
- “Consent”

The Rachel Green Approach?

[1] Christoff A, 2015

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Common Assessment Pitfalls

- **Over-reliance on single measures | Inaccurate clinical data**
- **Ignoring parental concerns** - listen observe learn
- **Unwelcome Restraining**
  - Avoid where possible - It can lead to negative perceptions/reactions and future heartache
  - If restraint is necessary, involve parents & restrain briefly for essential procedures.
- **Screaming children** - not a good vibe for the clinic
- **Sleeping child**
  - Consult with parents who know their child best
  - Gently check eyelids
  - Consider rescheduling for a more cooperative time

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Key Considerations - VA

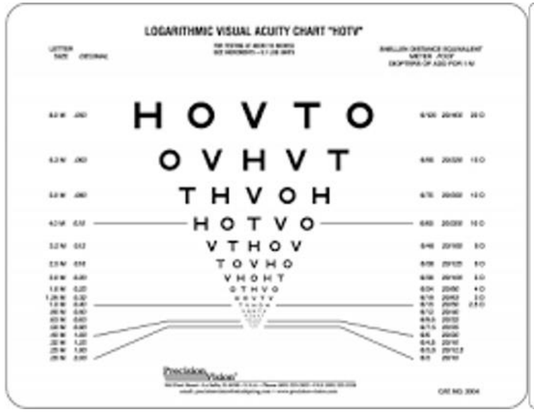
Age of Child | 3+ Matching Charts

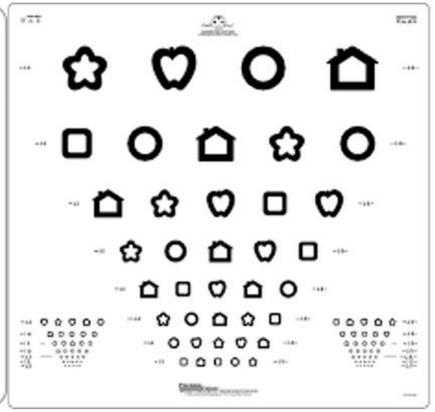
Child Demeanour

- Apprehensive | Relaxed | Confused
- Reassure | Gamify | Pitch Easy | Slow

Optotypes/Chart

- Crowding Bars/LogMAR
- Big Optotype Matching Near Test
- Binocular Then Monocular
- Occlude - Parent | Child | Clinican





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What Level of VA is Normal or Not?

VA in 1722 African American and Hispanic pre-school children (2-5 yrs)

Used HOTV chart

VA progressively improves with age

AGE 4-5 Years

VA 6/9 (0.2 LogMAR)

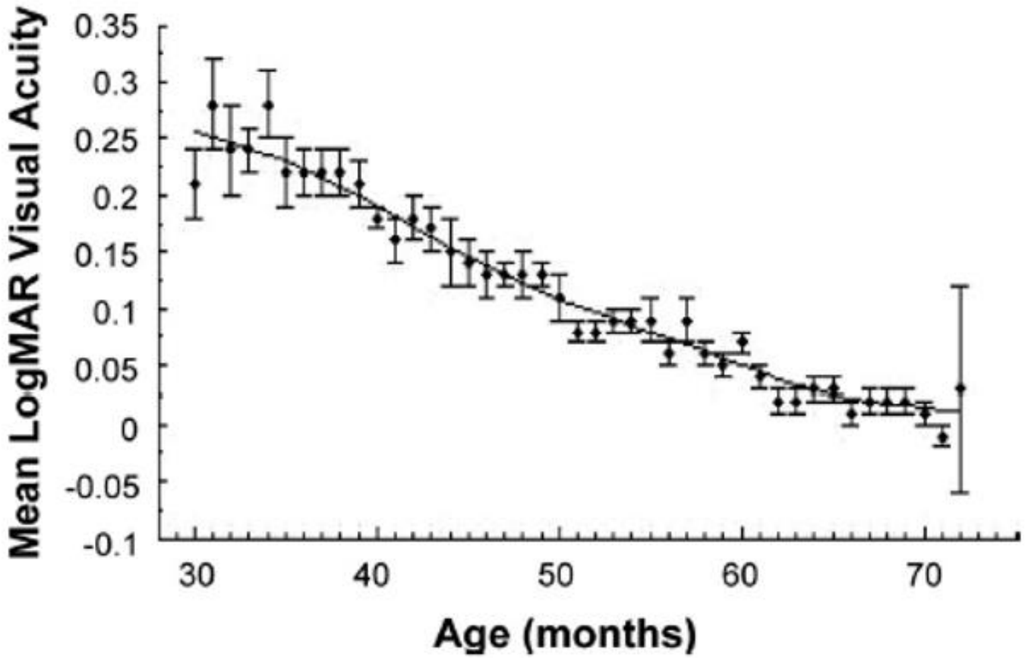

FIGURE 1.

Mean logMAR VA for children for every month of age, with Lowess fit line. The error bars correspond to ±one standard error of the mean.

Pan, Cotter et al, OVS Vol 86, 6, 2009

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Ophthalmoscopy

Explain first what you are doing to both parent and child. Ensure that you have warned child and parent that lights are to be dimmed Don't just jump into this.

You may end up with a screaming, terrified child. If child is on parents lap have **the parent sit child on same side** of lap as the eye you are looking at or **cradle baby**. That way you don't end up sitting on parent and minimize intrusion to child.

Have child interested in a target or another person (acting like a clown to attract attention). You **need to work efficiently here** as most children will not tolerate more than 30 seconds of ophthalmoscopy

Slit lamp examination

Challenging, so be creative and efficient.

Can also do this with child on parents lap.

Lift chair high, even **get child to kneel** on chair to reach chin rest. Can even **get child to stand** if need to.

Have **mum/dad help** by holding the child's back of head upright for slit lamp.

Bruckner Test

Dim room

Use about **1 mtr test distance**

Performed **without pupil dilation**

Shine **direct ophthalmoscope at bridge of nose**, illuminating both pupils simultaneously

Compare brightness & whiteness of fundus (red) reflexes through pupils

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Mohindra Retinoscopy
1977 | Dr I Mohindra

Ret @ 50 cm In dark Monocularly

Adjust Finding by

- -0.75 for infants
- -1.25 after 2 yo

Shown to work well at several distances

Correlates well with cycloplegic retinoscopy in determining refractive error

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To Prescribe or Not to Prescribe?

American Association for Paediatric Ophthalmology and Strabisums (AAPOS)

CONDITION	AGE 0-1	AGE 1-2	AGE 2-3	AGE 3-4	
MYOPIA	>=-5.00	>=-4.00	>=-3.00	>=-2.50	Full correction
HYPEROPIA (no strabismus)	>=+6.00	>=+5.00	>=+4.50	>=+3.50	Partial Rx reduced by up to 50%
HYPEROPIA (esotropia)	>=+2.00	>=+2.00	>=+1.50	>=+1.50	Full correction that can be tolerated
ASTIGMATISM	>=3.00	>=2.50	>=2.00	>=1.50	Full correction
ANISOMETROPIA	>=2.50	>=2.00	>=1.50	>=1.50	Overall guideline

Any previous history of amblyopia or strabismus

Visual acuity

Tolerance to spectacle wear

Accommodative esotropia

Developmental delay

https://www.aao.org/preferred-practice-pattern/pediatric-eye-evaluations-ppp-2017

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Benchmarks That Matter
Simple Observations

- Presence vs Absence of Key Skills?
- Symmetry B/W Eyes?
- Eyes - clear, clean, sticky, watery?
- Eyes - Aligned?
- Eyes - Size of eyes - microphthalmos, buphthalmos?
- Red reflex - bright, red ,equal?
- Eyelids - Ptosis - deprivation, amblyopia risk?
- Pupils - Reactions, symmetry?
- Irides - Present, symmetry?

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Red Flags in Infancy

Eye Contact - Limited visual engagement | Poor fixation
Red Flag No eye contact if over 6 months

Light Tests - Pupil reactions | Red reflex | Corneal reflex
Red Flag No red reflex | Leukocoria | Assymmetry |Pupil Defect

Eye Alignment - Persistent misalignment | Fixate and follow
Red Flag Poor or absent fixation

Reflex Eye Movements - VOR | OKN
Red Flag Large or Slow roving nystagmus

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Red Flags in Toddlers

Excessive clumsiness - Frequently bumping into objects or people

Red Flag Unusual Difficulty navigating space

Visual avoidance - Limited social interaction or play with other children

Red Flag Unusual Sensitivity to sensory inputs, bright lights

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Referral Pathways - Interprofessional

Optometry Colleagues - Paediatric Experts

Orthoptics

Ophthalmology

Paediatrics

Allied health

(Audiology, OT, SP, Psychology, Education Specialists)

Interprofessional Collaboration is in the best interests of your patient and places them at the centre of all decision-making

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Paediatric Assessment Pearls

Listen Observe Learn

Trust patterns over single test results.

Act early when unsure.

Use a flexible, age-appropriate approach for children.

In Practice

Child comfort is paramount

Use engaging visual targets and family support

Objective testing + careful observation

Time and attention are limited adapt as needed

Communicate warmly and clearly tailor language

Mindset Preparation

Two patients: child and parent/carer

“One part science, two parts art” (Christoff, 2015)

Preparation, patience, and attitude matter

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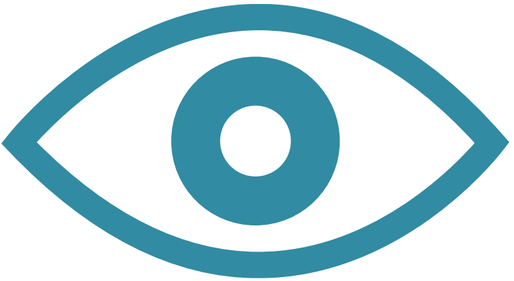

Vision Screening

- 1. Early vision screening for children aged **0-3 years is crucial to prevent lifelong visual impairment** - Best strategies and timing are still debated
- 2. Congenital eye conditions like **cataracts and retinoblastoma need early detection.**
- 3. **Amblyopia, affecting up to 5% of children,** can be effectively addressed with **vision screening between ages 3-5**, improving visual acuity outcomes
- 4. Children from **disadvantaged backgrounds,** miss timely screenings - **highlights disparities in access** and outcomes
- 5. Recent research recommends **need to improve policy and practice** with a **focus on equitable access** and better integration into primary care settings

Perez, A. (2026). A Window of Opportunity: Vision Screening in Infants and Toddlers for the Prevention of Visual Impairment.

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Thank you

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