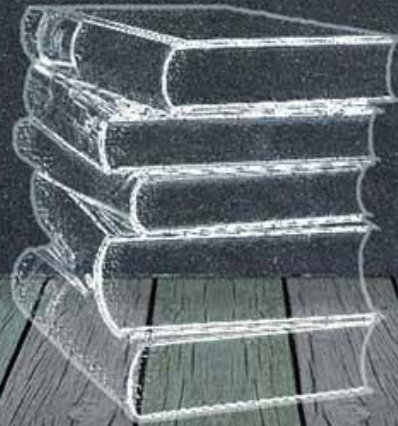


Vision Screening in 2023 Everything You Need to Know

Identifying vision problems when treatment and prevention are still feasible

Speaker: Tammy Johnson, MPH



Learning Objectives:

- 1) Understand the main vision problems in preschool children and the importance of detection and treatment
- 2) Identify methodologies of screening as determined by the AAP and AAPOS and local resources
- 3) Understand the importance of post-referral follow-up



01 Why conduct vision screening on young children

02 Amblyopia & Eye problems

03 Screening Types: Refraction and Acuity

04 Refractive screening checklist

05 Follow up and Treatment



Why screen children's vision?

5%

of preschool children have a vision problem



80%
of what a child learns is visual



Children and parents

are not always aware of vision problems.

25%

of school-age children have a vision problem.



Vision problems

are the leading handicap of childhood

Screening Purpose

A photograph of two young boys sitting on a grassy lawn. The boy on the left is wearing a light blue dress shirt and a black and white striped tie, and is holding an open book with a green cover. The boy on the right is wearing a light blue button-down shirt and a black and white checkered tie, and is also reading a book. In the background, there is a black metal railing, a body of water, and a modern building with large windows.

Age Dependent:

- 5 months to 6 years: Screening for problems that cause Amblyopia. Prevent Vision Loss.
- 6 years and older: Screening for problems that are refractive in nature and develop as the child ages.



The Importance of EARLY VISION SCREENING

Early screening is to detect vision disorders that may lead to **Amblyopia**, also called **lazy eye**. If not detected and treated, problems that cause amblyopia can lead to permanent vision loss, untreatable with glasses.

What is Amblyopia

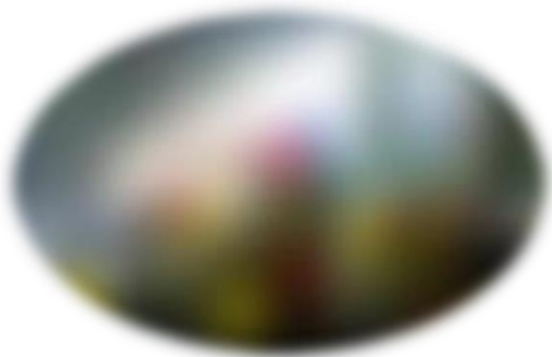
Amblyopia is a vision disorder due to the eye and brain not communicating. Amblyopia (dull vision): from the Greek words amblyos (dull) and opia (vision). Reduced vision in one eye from disuse. It is the **most common cause** of decreased vision in a single eye among children and younger adults. Incidence of 1% - 5% in the US.



Amblyopia

("Facts About Amblyopia" National Eye Institute, September 2013, Retrieved 27 July 2016)

Left eye



Right eye



Treating Amblyopia

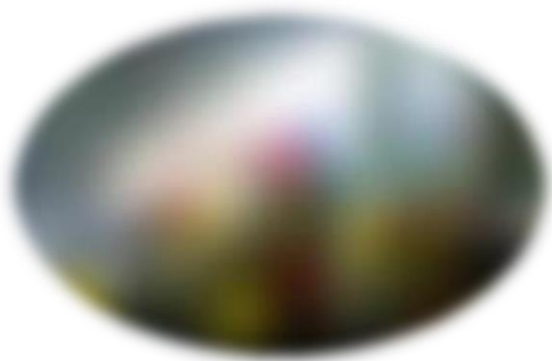
Early diagnosis is **CRITICAL!**

Treating amblyopia involves forcing the child to use the eye with weaker vision

1. Patching
2. Atropine drops

Stimulates vision in the weaker eye and forces brain to develop vision more completely

Left eye



Right eye



Amblyogenic Factors

can lead to loss of sight, learning difficulties or delayed development.



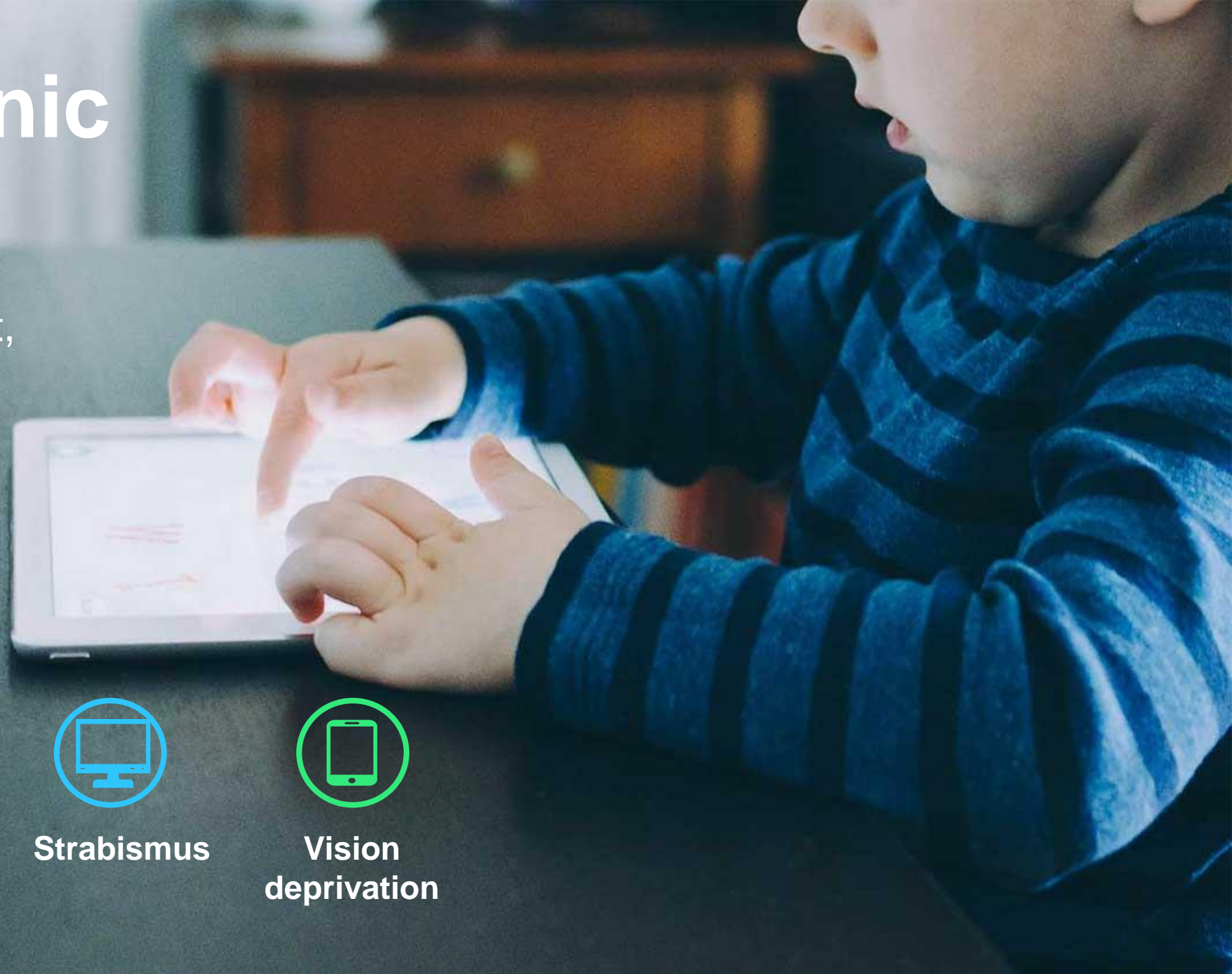
Refractive errors



Strabismus



Vision deprivation



Refractive Errors

Nearsightedness (Myopia):

- distant vision blurry (typically develops in older children)

Farsightedness (Hyperopia):

- near objects blurry

Astigmatism:

- results from unequal focusing of light rays as they enter the eye, causing a blurring of objects.

Anisometropia:

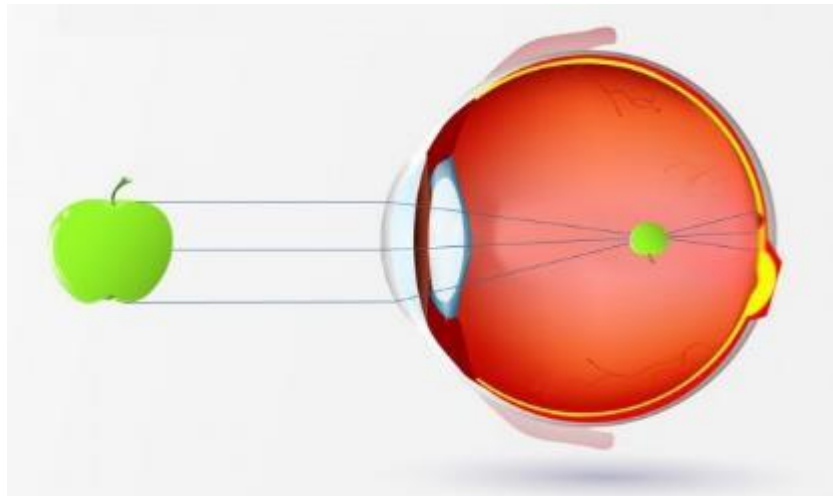
- Difference in refraction between the eyes.



Nearsightedness (Myopia)

Clear Vision

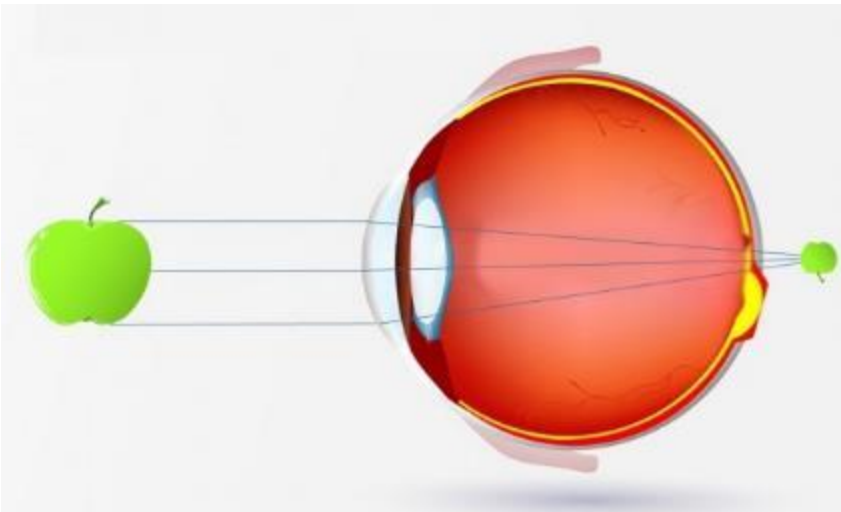
What myopia looks like



Farsightedness (Hyperopia)

Clear Vision

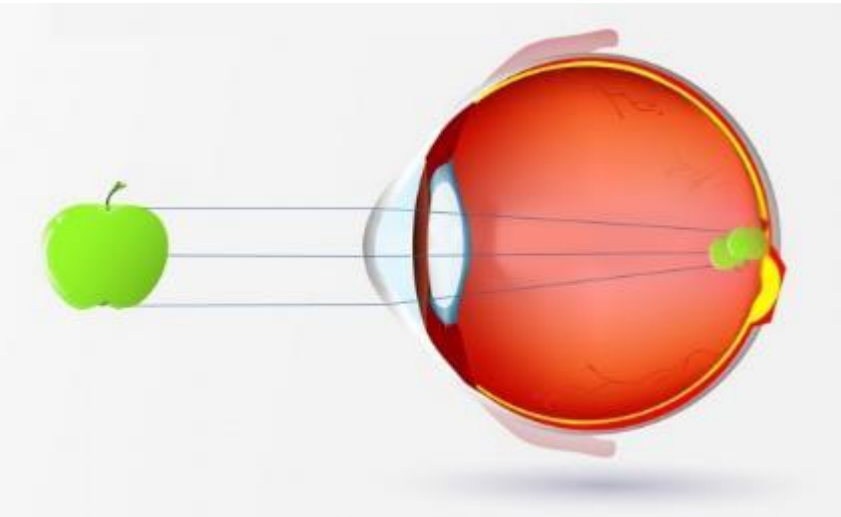
What hyperopia looks like



Astigmatism

Clear vision

What astigmatism looks like



Strabismus

- 👁️ Eyes that are misaligned or not straight
- 👁️ Affects one or both eyes
- 👁️ Constant, intermittent, or alternates eyes
- 👁️ Results in permanent vision loss, if left untreated



Different types of Strabismus



Esotropia: one or both eyes turns inward



Hypertropia: visual axis of one eye is higher than the fellow fixating eye



Exotropia: one or both eyes turn outward

Other eye problems – Vision Deprivation



Ptosis: drooping of an eyelid due to a weak lid muscle




Cataract: condition in which the lens of the eye becomes progressively cloudy, resulting in blurred vision



Cyst: A slow-growing, inflammatory lump in the oil gland of the eyelid

Signs and Symptoms of Vision Problems

A close-up photograph of a child's hands drawing on a piece of paper. The left hand holds a pencil, and the right hand rests on the paper. The drawing consists of several horizontal lines in red and green. The background is dark and out of focus.

Appearance

Behavior

Complaints

Signs

Signs and Symptoms Vision Problems

The **ABC**'s of **Detection** can lead to an automatic **Referral**



Apppearance of the
child's eyes



Behavior and body
language



Complaints made by
the child

Signs & Symptoms - Vision Problems

The **ABC's** of **Detection** can lead to an automatic **Referral**

01

Appearance Signs you can identify easily

- x **Eyes cross** or turn out or drift
- x Eyelids are red, crusted, swollen or continually watery
- x **Eyelid droops** or Sty or infection on eyelid
- x Unequal pupil sizes or **White pupil**
- x Eyes are in constant motion
- x One or both **eyes look cloudy**

03

Other Signs to Look for

- x Brings objects close to eyes or **Sits close to TV**
- x Moves head close to desk or screen when reading
- x Has poor eye-hand **coordination**
- x Uses finger to keep place while reading
- x **Reverses letters** and words or Has short attention span

02

Behavior Signs you can identify easily

- x **Tilts head** to one side most of the time
- x Squints or frowns when trying to focus
- x **Blinks excessively** or rarely blinks
- x Closes or covers one eye when doing near work
- x **Rubs eyes excessively**

04

Complaints to listen for easily

- x **Headaches**, nausea or dizziness
- x Letters blur or lines run together or jump
- x **Eyes itch**, burn or ache
- x Vision blurred after close work

Epidemic of Myopia

[JAMA Ophthalmol.](#) 2017 Jun 1;135(6):610-616. doi: 10.1001/jamaophthalmol.2017.1021.

Visual Impairment in Preschool Children in the United States: Demographic and Geographic Variations From 2015 to 2060.

[Varma R¹](#), [Tarczy-Hornoch K²](#), [Jiang X¹](#).

[+](#) Author information

Abstract

IMPORTANCE: Visual impairment (VI) in early childhood can significantly impair development.

OBJECTIVE: To determine demographic and geographic variations in VI in children aged 3 to 5 years in the United States in 2015 and to estimate projected prevalence through 2060.

DESIGN, SETTING, AND PARTICIPANTS: Descriptive study reporting statistics estimated based on prevalence data from 2 major population-based studies conducted in the United States between 2003 and 2011. Using US census projections, prevalence of VI and cause-specific VI in the better eye were reported by race/ethnicity, state and region, and per capita prevalence of VI by state. The study included preschool children in the United States. Analyses for this study were conducted between February 2016 and March 2017.

MAIN OUTCOMES AND MEASURES: Prevalence of VI among children aged 3 to 5 years in the United States.

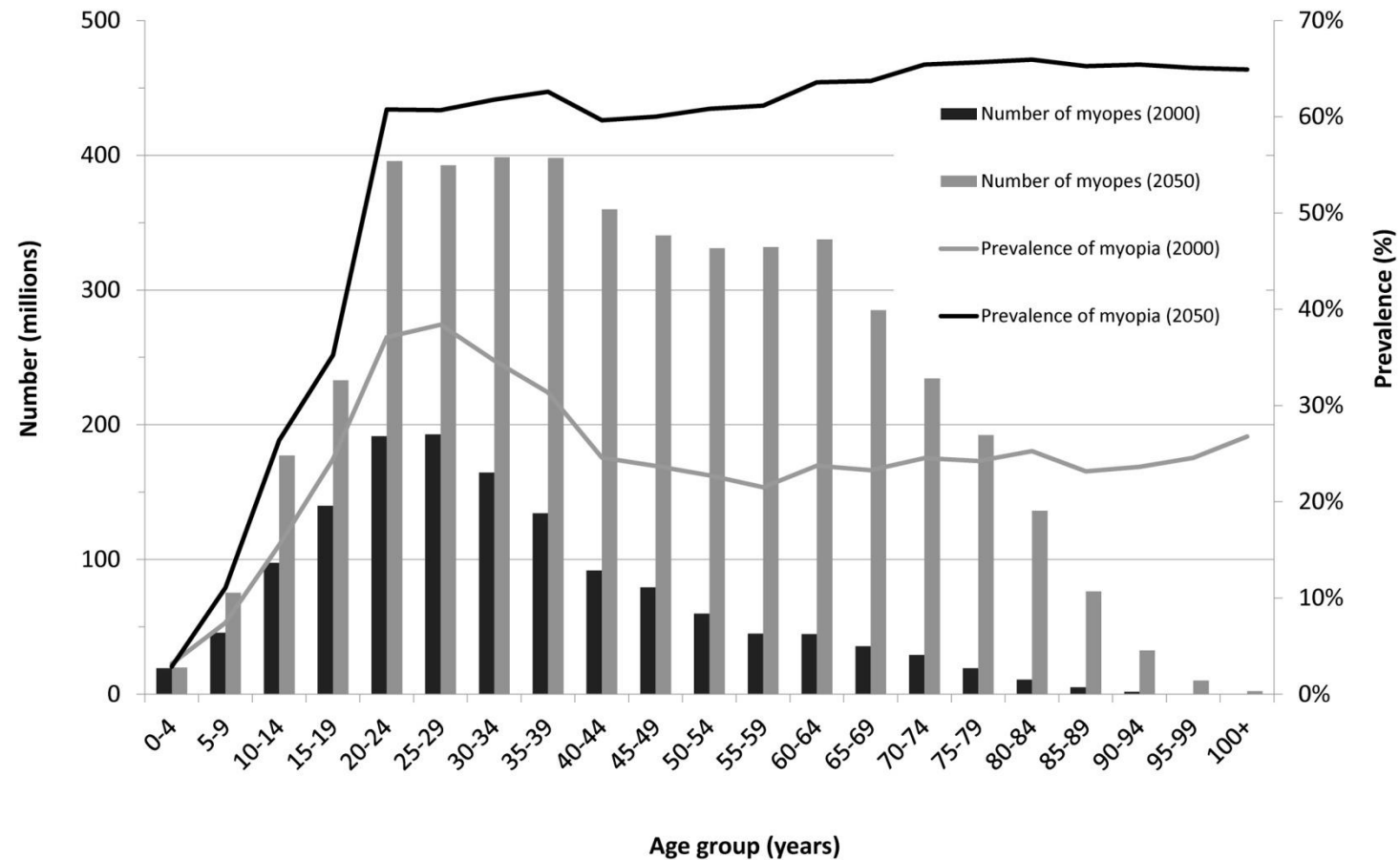
RESULTS: In 2015, more than 174 000 children aged 3 to 5 years in the United States were visually impaired. Almost 121 000 of these cases (69%) arose from simple uncorrected refractive error, and 43 000 (25%) from bilateral amblyopia. By 2060, the number of children aged 3 to 5 years with VI is projected to increase by 26%. In 2015, Hispanic white children accounted for the highest number of VI cases (66 000); this group will remain the most affected through 2060, with an increasingly large proportion of cases (37.7% in 2015 and 43.6% in 2060). The racial/ethnic group with the second most VI is projected to shift from non-Hispanic white children (26.3% in 2015 decreasing to 16.5% in 2060) to African American children (24.5% in 2015 and 22.0% in 2060). From 2015 to 2060, the states projected to have the most children with VI are California (26 600 in 2015 and 38 000 in 2060), Texas (21 500 in 2015 and 29 100 in 2060), and Florida (10 900 in 2015 and 13 900 in 2060).

CONCLUSIONS AND RELEVANCE: These data suggest that the number of preschool children with VI is projected to increase disproportionately, especially among minority populations. Vision screening for refractive error and related eye diseases may prevent a high proportion of preschool children from experiencing unnecessary VI and associated developmental delays.

Global Prevalence of Myopia and High Myopia and Temporal Trends from 2000 through 2050

Brien A. Holden, PhD, DSc, Timothy R. Fricke, MSc, David A. Wilson, PhD, Monica Jong, PhD, Kavin S. Naidoo, PhD, Padmaja Sankaridurg, PhD, Tien Y. Wong, MD, Thomas J. Naduvilath, PhD, Serge Resnikoff, MD

Ophthalmology
Volume 123, Issue 5, Pages 1036-1042 (May 2016)





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Examination vs. Screening

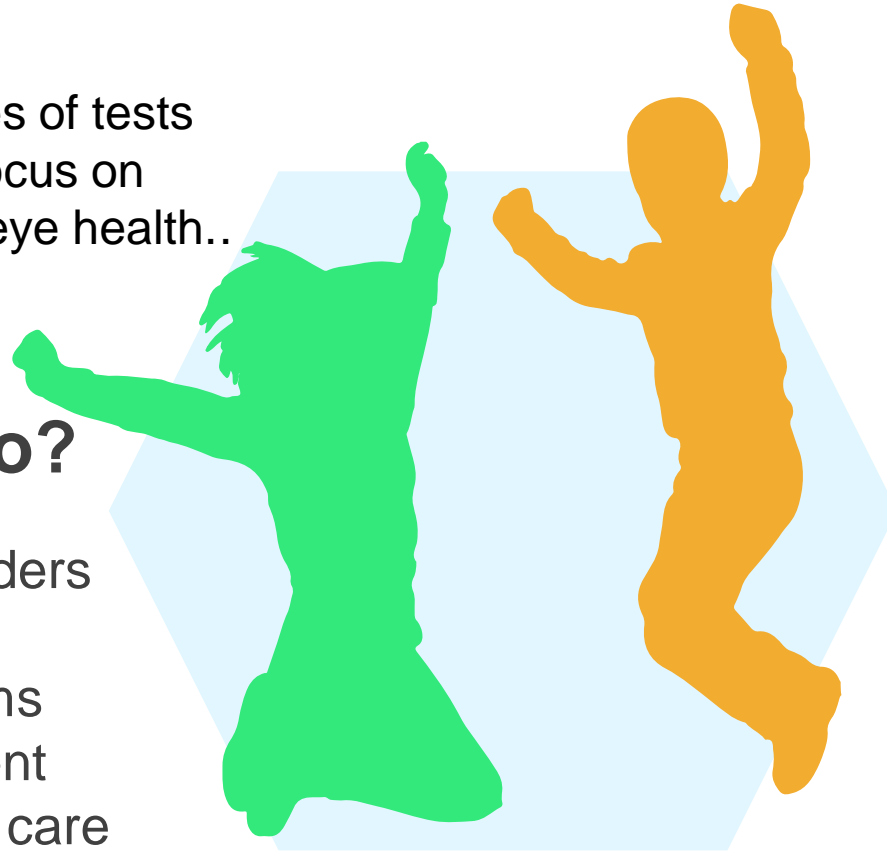
Examination

During an exam an eye care professional conducts a series of tests assessing vision and ability to focus on and discern objects, as well as eye health..



What does it Do?

- ❖ Tests for vision disorders and diseases
 - ❖ Diagnoses problems
 - ❖ Prescribes treatment
- ❖ Completed by an eye care professional



Screening

Refractive measurements and acuity screening help determine whether the eyes are developing appropriately. Pass/Refer results.

What does it Do?



- ❖ Identifies need for a comprehensive eye exam
- ❖ Refers at early / treatable stages
- ❖ Results in referral to an eye care professional

Vision Screening Guidelines are Provided by Many Organizations

Medical Professionals	Non-Profit Agencies	Government Agencies
AAP (Pediatricians) (Vis Scr Adv. Board)	Lions (LCI, Clubs, etc.)	NEI of the NIH
AOA (Optometrists)	Lions KidSight USA (Adv. Board)	State Legislative Policies
AAOPT (Optometrists)	Prevent Blindness America (Adv. Board : NCCVEH)	State: Public Health Departments
AAO (Ophthalmologists)	Prevent Blindness state affiliates	State: School Nurse Associations
AAPOS (Ped. Ophthalmol) (Vis Scr Adv. Board)	Essilor Foundation	
	Infant See	
	Eye Care America	
+ many more	+>100 more	+ many more

Head Start Internal Guidelines and Methods

NHSA	Ages of Screening	Evidence-based Screening
Screen within the first 45 days of a child's attendance	Developmental milestones checklist (for infants under 12 months of age)	
Follow State Legislative Policy	Instrument-based screening for refractive errors (over 12 months of age)	Young children and when optotype screening is challenging. Objective results.
	Optotype-based screening for visual acuity	HOTV letters and LEA Symbols meet best practice standards. Use a matching chart when appropriate.

Screening Refraction and Acuity

The Perfect Team for Early
D e t e c t i o n



Refractive Screening



Visual Acuity



Confirmation with
Exam



Visual Acuity Screening



What is It?

Visual Acuity determines the smallest readable optotypes on a standardized chart. (e.g. 20/20)

Visual acuity is a subjective value on the part of the child and tester.



American Association for Pediatric Ophthalmology and Strabismus (AAPOS) Vision Screening Kit

Who should be Screened?



In general the HOTV or LEA chart can be used for children aged 3 to 5 years.

How is it Done?



Visual acuity is measured one eye at a time at a specified distance. Children must pass the “critical line” by reading 3 of 5 (or the majority) of optotypes. *Check age requirements per chart.

Helpful Notes:

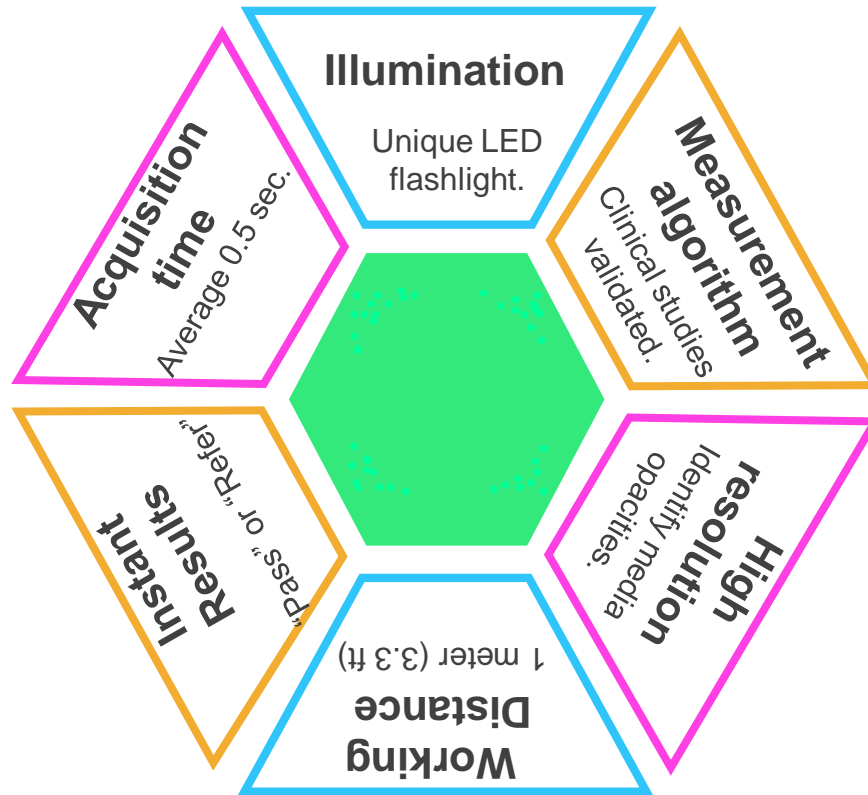


1. Children can play a matching game if unable to name the optotype on the chart. Prepare the child before screening.
2. If a child cannot name optotypes, instrument based screened can be conducted.
3. When used together, false negative referral can be reduced significantly.



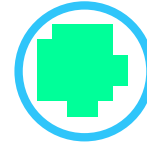
Refraction: Instrument-Based Screening

Pass/Refer results based on a child's "refraction"



What is It?

An instrument takes a "picture" of the eyes, providing an **objective** measurement of refraction, eye alignment, and the presence of obstructions.



How does it Work?

Child looks at the front of the screener from 1 meter. Result given within .5 sec.



Who should be Screened?

Children can be screened starting at 5 months when the eyes move together.



Is it Accurate?

Evidence based studies over the past two decades provide sensitivity and specificity with age based referral



plusoptix

Reliably perform instrument based screening on Children with neurodevelopmental disorders



Hearing impairment

Does not need to hear communication



Motor abnormalities (e.g. cerebral palsy)

Only eye contact is needed



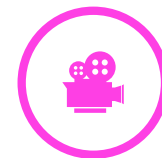
Down Syndrome

No puzzles or test to complete



Cognitive impairment

Does not need to remember or learn new things



Autism spectrum disorder

Does not need speech and nonverbal communication



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Fast

Acquisition time as low as 0.5 sec when conditions are met.
Photoscreeners can make screening efficient, screening more children in less time.

Safe

Will capture a measurement at a safe no-contact distance while the child feels like their picture is taken.

Validated

Peer-reviewed clinical studies validate the use of Instrument-based vision screening for children.





New Technology Features

- Acuity Screening - HOTV
- Smaller Pupils / Faster Measurement
- Zoom-in Feature (Transillumination)



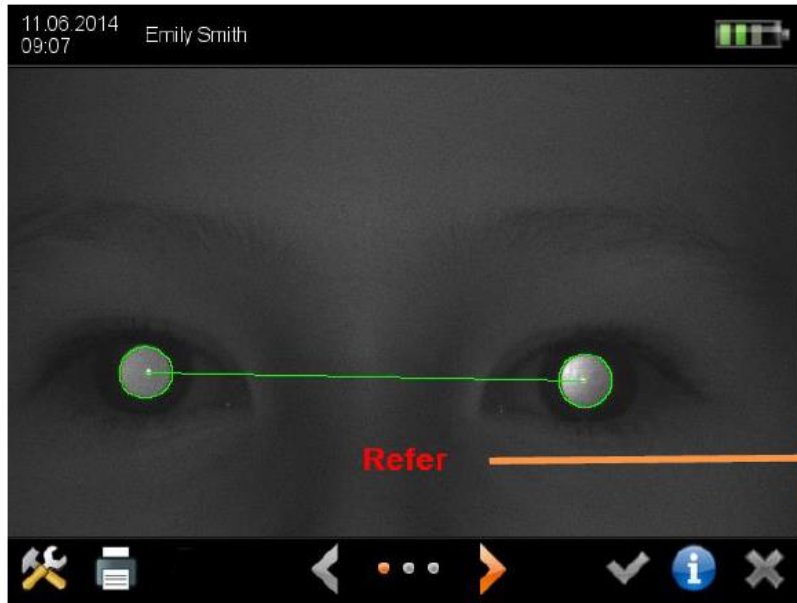
INSTRUMENT-BASED VISION SCREENING AND HOTV CRITICAL LINE SCREENING... IN ONE DEVICE



H  **TV**

- X Quick assessment of the 10/16 (20/32) distance visual acuity line
- X Assists in meeting state guidelines
- X Improves overall results by reducing false-negative results
- X Can be added to any available Plusoptix Vision Screener
- X Get the HOTV feature for free! (limited time only)

Faster and zoomier...

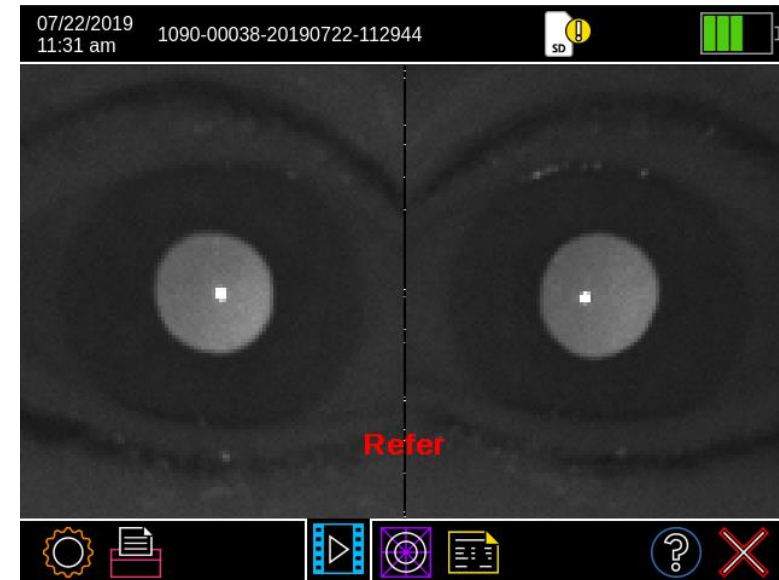


Upon completion of a measurement the results screen will appear.

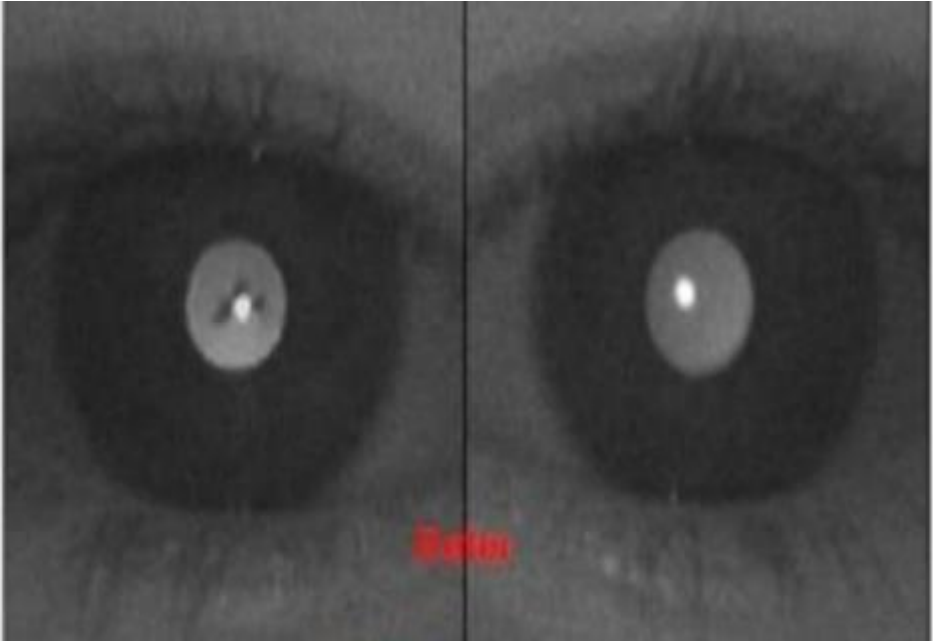
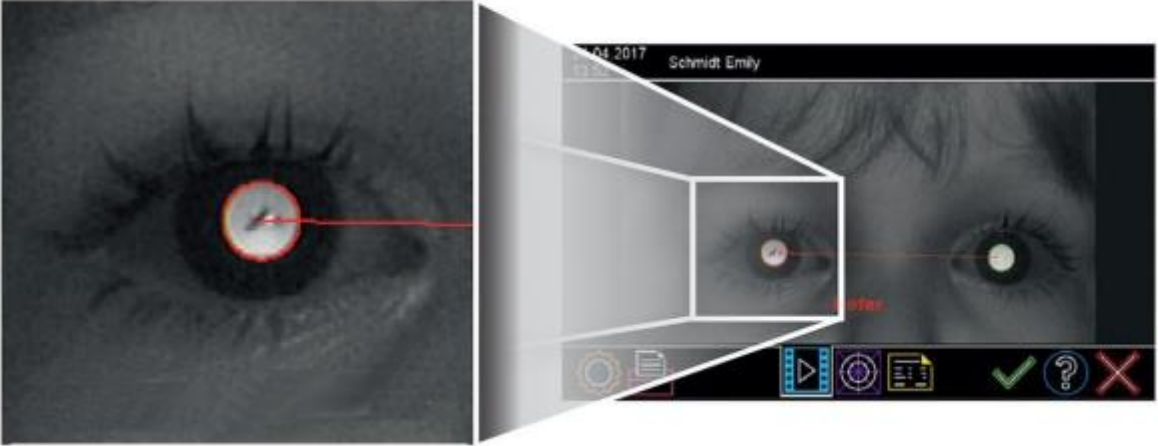
The Result shows: **Pass/Refer/Measurement Incomplete**

Touch the screen for the enlarged transillumination

Please Note: If you receive “Refer or Try again” three times in a row and the surrounding conditions for the measurement are correct, the child must be referred



Media opacity



Results – 3 tabs

06/26/2017 12:22 pm Emily Smith

07/22/2019 11:31 am 1090-00038-20190722-112944

06/26/2017 12:22 pm Emily Smith

Smith Emily 06 / 24 / 2014

ID Optional: Location Optional: Contact

Date	Time	OD	Refer	OS
06/26/2017	13:18:08	+3.75 dpt	Sphere	+0.75 dpt
04/18/2017	10:56:51	-1.75 dpt	Cylinder	-0.50 dpt
04/05/2017	10:33:36	15°	Axis	167°
04/05/2017	10:33:32	4.2 mm	Pupil Ø	4.2 mm
		Pupil distance		59 mm
		Gaze asymmetry		2.4°
		ROC 1 Version 7.0.1.0		06/26/2017

Camera image

Measurement values

Database




Documentation

Sunny Meadows		*07/15/2016
OD	Refer	OS
0.75 dpt	SE	1.25 dpt
+1.00 dpt	Sphere	+1.50 dpt
-0.50 dpt	Cylinder	-0.50 dpt
111 °	Axis	97 °
5.2 mm	Pupil Ø	5.3 mm
Gaze asymmetry		1.5 °
ROC1, Ver. 7.2.6.0		10/15/2021
www.plusoptix.com		

P12 Label Printout

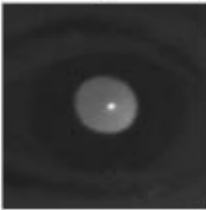

Patient information



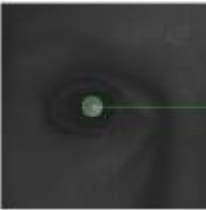

Vision screening report

Emily Smith, 06/24/2014
Date of measurement: 10/11/2021

OD

OS

Refraction	+1.25 -0.50 104°	+1.75 -0.75 102°	[dpt]
Spherical equivalents	+1.00	-1.50	[dpt]
Gaze asymmetry	2.7		[°]
Pupil diameter	5.1	5.3	[mm]
Pupil distance	57		[mm]

Anisometropia
Astigmatism (OS)
Hyperopia (OD,OS)
Myopia
Gaze asymmetry
Anisocoria






Screening result

Refer

ROC 1, Ver. 7.2.6.0

Vision screening does not replace a complete eye examination by an ophthalmologist or optometrist. Vision screening must be conducted regularly as eyes may change over time! Children with screening result "Refer" should be referred to an ophthalmologist or optometrist.

Refraction was measured with Plusoptix.
Check out our range of binocular autorefractors for your clinic.
www.plusoptix.com

info.png
2200 x 570 pixels



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Follow-Up

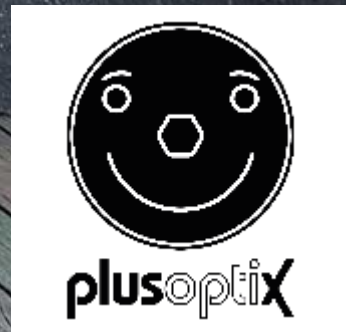
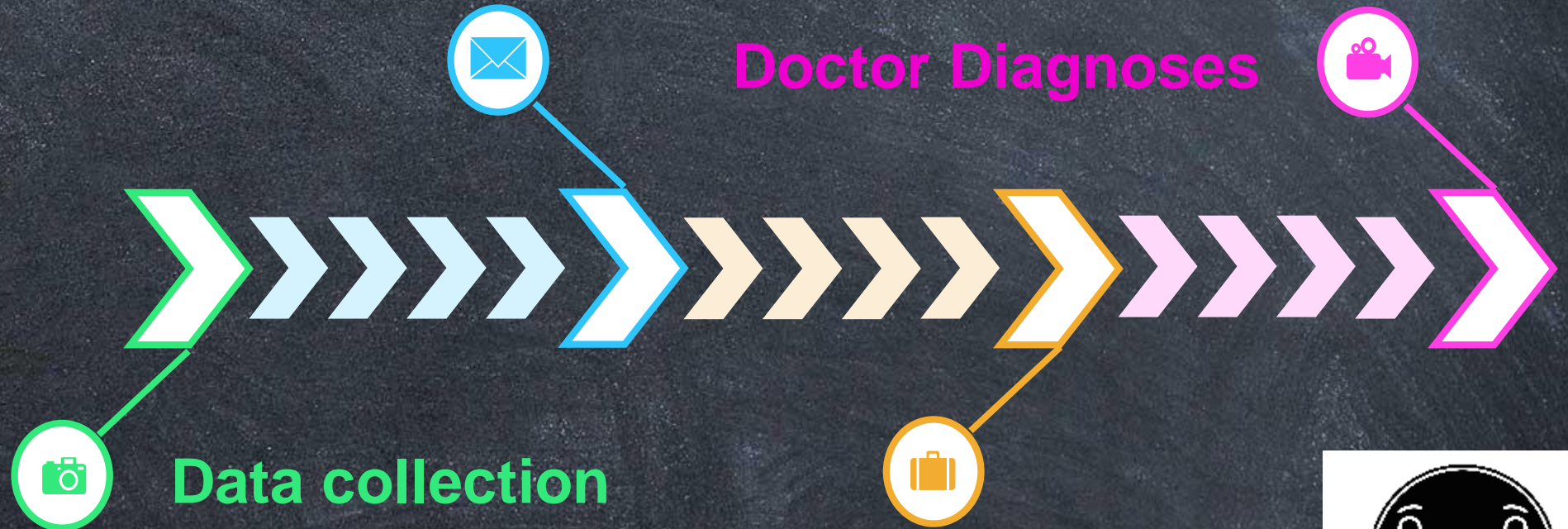
Is Follow-up important?
YES!

Identify Resources

Doctor Diagnoses

Data collection

Develop a System





THANK YOU

Early & Efficient Vision Screening *Can* Change Lives!



plusoptix