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Hindsight is 20/20: Evolving Vision Screening Practices Over the Last 50+ Years

NASN Annual Conference July 2, 2018

Today's Objectives

At the completion of this panel presentation you will be able to:

1. Describe 3 critical ways eye charts have changed in the last 50 years
2. Identify 2 areas where research and guidance is needed to shape future vision programs.
3. Access 4 new resources on the NASN web-based *Children's Vision and Eye Health* Toolkit.

Disclosure Statement

Kira Baldonado - Nothing to disclose or conflicts of interest to declare.

P. Kay Nottingham Chaplin, EdD – Works for NCCVEH, Good-Lite, and School Health Corporation as education consultant – but not in sales.

Martha Dewey Bergren - Nothing to disclose or conflicts of interest to declare.

Today's Presenters

Kira Baldonado

- Vice President of Public Health & Policy at Prevent Blindness
- Director of the National Center for Children's Vision and Eye Health at Prevent Blindness

Martha Dewey Bergren DNS RN NCSN APHN-BC FNASN FASHA FAAN

- Director, Advanced Population Health, Health Systems Leadership & Informatics, University of Illinois Chicago

P. Kay Nottingham Chaplin, Ed.D.

- Good-Lite and School Health Corporation: Director - Vision and Eye Health Initiatives
- National Center for Children's Vision and Eye Health at Prevent Blindness: Education and Outreach Coordinator and Member of Expert Advisory Committee
- American Association for Pediatric Ophthalmology and Strabismus (AAPOS): Consultant to AAPOS Vision Screening Committee

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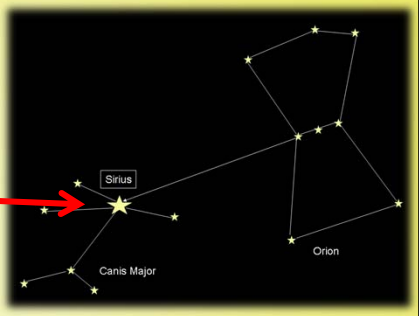
Early Vision Testing

- Egyptian wanted to hunt around 3000 BC?
- Pass "hunter's test"
- Recognize star Sirius (Dog Star)
  - Brightest star in heavens excluding sun
  - However . . . easily seen with visual acuity less than 20/20



Runge, P. (2000). Eduard Jaeger's test-types (Schrift-Scalen) and the historical development of vision tests. *Transactions of the American Ophthalmological Society,* 98, 375-438.

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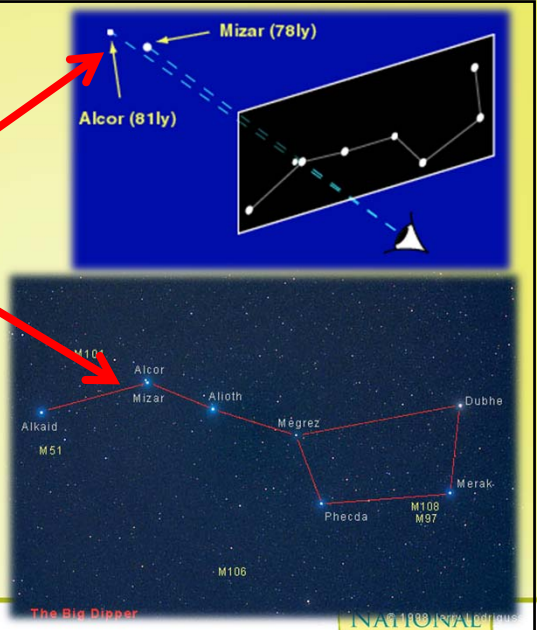
- Ancient Arabians assessed visual function on ability to perceive twin stars Mizar and Alkor in the Big Dipper (964 AD)
- Separated by 12 minutes of arc (approximately equal to 20/20)
- Known as Arab Eye Test



Bohigian, G. M. (2008). An ancient eye test-Using the stars. *Survey of Ophthalmology, 53*(5), 536-539.

Mustard Seeds

- 1623 – Daca de Valdes
  - Published book – *Uso De Los Antoios* (The Use of Eyeglasses) describing fitting of spectacles
- People in remote places unable see properly – appropriate glasses unavailable
- Devised method for individuals to determine own refractive errors and order correct spectacles
- Told merchants of pearls, precious stones, and linen to "be very careful" when checking their vision and glasses to prevent deception when buying and selling their wares

Runge, P. (2000). Eduard Jaeger's test-types (Schrift-Scalen) and the historical development of vision tests. *Transactions of the American Ophthalmological Society,* 98, 375-438.

Sometime Between 1843 and 1862

- Creative ways to measure vision
- Patients looked out window at selected objects of various sizes, including . . .
- 2-inch keyhole on a stable door
- Black iron spikes in a dovecote at 70 feet

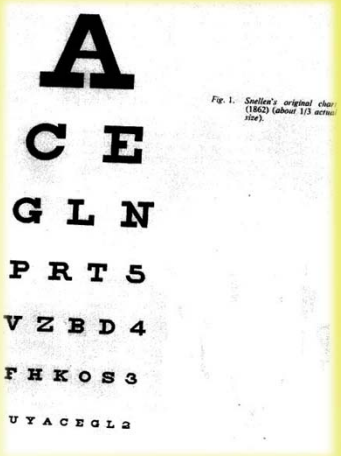
Rucker, C. W. (1962). Editorials. Test Types. *Archives of Ophthalmology, 68*(4), 439.

Fast-Forward to Snellen - 1862

". . . to Snellen belongs the credit of having introduced individual characters arranged on a definite scale, by means of which the vision of illiterates could be measured and compared by oculists in any part of the world."

Ewing, A. E. (1920). Test objects for the illiterate. *American Journal of Ophthalmology,* 3, 5-22.

- Snellen, drawing on work of Donders and his own experiments, published 1st edition of his "optotypi" in 1862.
- In 1862, Ezra Dyer of Philadelphia published advance version for US ophthalmologists.



Ewing, A. E. (1920). Test objects for the illiterate. *American Journal of Ophthalmology, 3*, 5-22.

Snyder, C. (1962). Herman Snellen and V=d/D. *Archives of Ophthalmology*, *64*(4), 571-573.

Bennett, A. G. (1965). A review of previous work and discussions on some controversial questions. *British Journal of Physiological Optics, 22*(4), 238-271.

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Fast Forward to the Present . . .

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2 Approaches to Vision Screening

1. Optotype-based screening

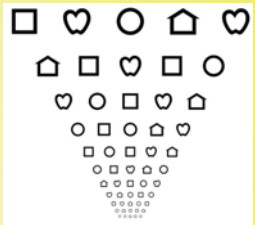
- Tests of visual acuity using optotypes to measure visual acuity as interpreted by the brain
  - *Quantifiable measurement of the sharpness or clearness of vision when identifying black optotypes on a white background using specific optotype sizes at a standardized distance*

2. Instrument-based screening

- Instruments do not measure visual acuity
- *Instruments analyze images of the eyes to provide information about amblyopia and reduced vision risk factors:*
  - Estimates of significant refractive error (hyperopia, myopia, astigmatism)
  - *Estimates of anisometropia*
  - Estimates of eye misalignment (some, not all)

Threshold & Critical Line Screening

- Threshold screening
  - ➢*Move down chart until child cannot correctly identify majority of optotypes*
- Critical line screening
  - ➢*Use only line child needs to pass according to child's age*



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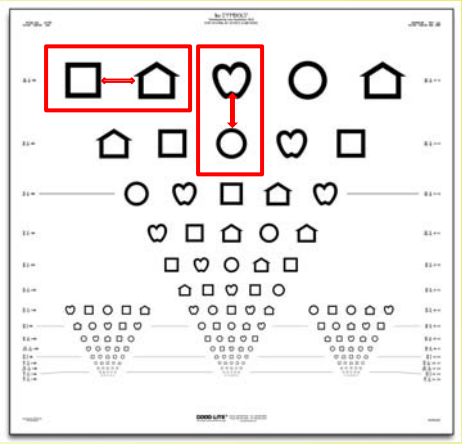
- Optotypes approximately equal in legibility
- Horizontal between-optotype spacing = 1 optotype width
- Vertical between-line spacing = height of next line down
- Geometric progression of optotype sizes of 0.1 log units (logMAR, ETDRS)
- 5 optotypes per line
- Optotypes black on white background with luminance between 80 cd/m² and 160 cd/m²

Similar recommendations across guidelines



Design guidelines = "ETDRS" or "logMAR" chart

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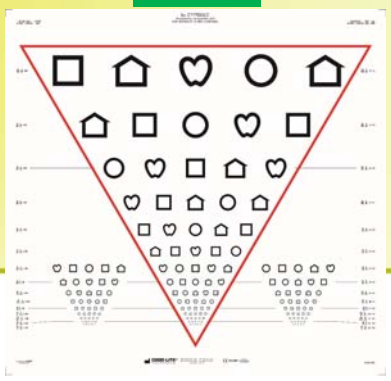
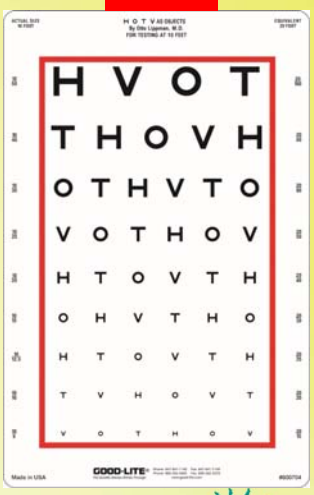
Tips:

- Line outside optotypes
- 20/32 vs. 20/30
- 10 feet vs. 20 feet

YES



NO



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Do the following eye charts fit national/international eye chart design guidelines?

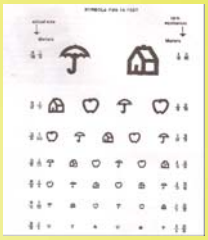
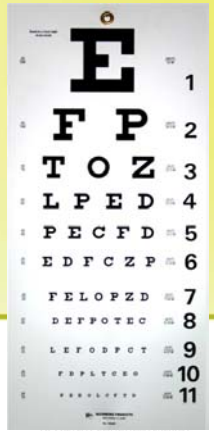
Yes or No?

✓No







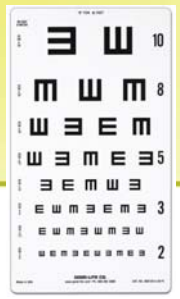



NOT Recommended by NCCVEH and/or AAP

"Sailboat"

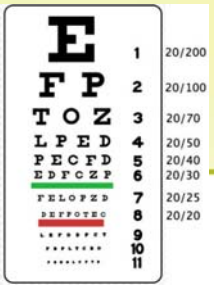
Allen Pictures

Lighthouse or "House, Apple, Umbrella"

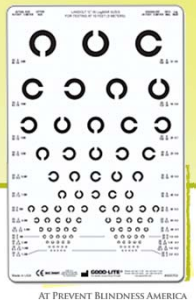


Tumbling E

Snellen

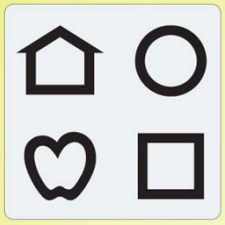


Landolt C



Preferred Optotypes for Ages 3 to 7 Years

- NCCVEH
- AAP



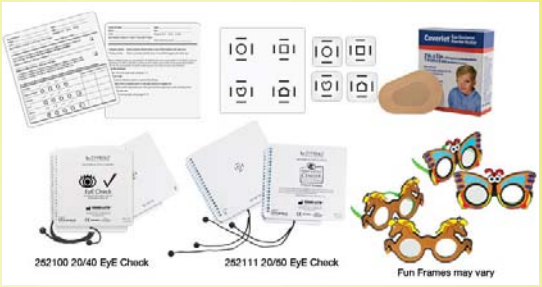
- Recommend LEA SYMBOLS® and HOTV letters as optotypes

Cotter, S. A., Cyert, L. A., Miller, J. M., & Quinn, G. E. for the National Expert Panel to the National Center for Children's Vision and Eye Health. (2015). Vision screening for children 36 to <72 months: Recommended practices. *Optometry and Vision Science, 92*(1), 6-16. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274336/pdf/opx-92-06.pdf

Donahue, S. P., Baker, C. N., AAP Committee on Practice and Ambulatory Medicine, AAP Section on Ophthalmology, American Association of Certified Orthoptists, American Association for Pediatric Ophthalmology and Strabismus, American Academy of Ophthalmology (2016). Procedures for the evaluation of the visual system by pediatricians. *Pediatrics, 137*(1), e20153597. Retrieved from http://pediatrics.aappublications.org/content/pediatrics/early/2015/12/07/peds.2015-3597.full.pdf

Preferred Optotype Format

NCCVEH national guidelines call for using single, LEA SYMBOLS® or HOTV letter optotypes surrounded with crowding bars for children ages 3, 4, and 5 years at 5 feet



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Options: Critical Line Screening at 10 feet

Sight Line Kit

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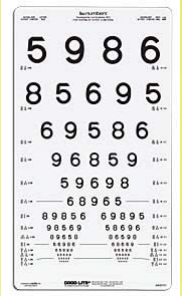
Preferred Optotypes for Ages 7 Years & Older

- AAP
  - *Recommends Sloan Letters*
- American Academy of Ophthalmology
  - *Recommends Sloan Letters and LEA NUMBERS®*



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American Academy of Ophthalmology Pediatric Ophthalmology/Strabismus Panel. (2012). Preferred Practice Pattern® Guidelines. Amblyopia. San Francisco, CA: American Academy of Ophthalmology. Retrieved from https://www.aao.org/preferred-practice-pattern/amblyopia-ppp--september-2012

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  - Estimates of eye misalignment

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Instruments "Approved" by NCCVEH

Welch Allyn® Spot™ Vision Screener

Welch Allyn® SureSight™ Vision Screener

Plusoptix S12C Vision Screener

Righton Retinomax

Disclaimer: These tools are examples of vision screening instruments for this age group. These are not shown for the purpose of sales or promotion.

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"We Have comE a long way baby"

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Additional research is needed to drive improvements in the system for children's vision

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Clinical research for children's vision

- Robust trials that allow the benefits of school vision screening to be measured
- The disadvantage of attending school with a visual acuity deficit
- Analyze the impact of screening programs on the prevalence of amblyopia
- Adverse effects of visual impairment on educational and social development, as well as limitations to career choice
- Use of photoscreening for children younger than 3 years old or older than 6 years old.

Vision screening in infants, children and youth. Paediatr Child Health. 2009 Apr; 14(4): 246–248.

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Children's vision and public health research

- Return on investment of vision screening for clinical and non-clinical settings
- Barriers to eye care for children
- Geographic disparities to provision of eye care|
- Vision care coordination among community partnerships
- Impact of state vision screening guidelines on vision preservation
- Disparities in receipt of eye care
- Impact of school-based vision clinics on eye health
- Vision assessment of children Birth to 3 YO by non-clinicians

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Research to drive treatment options

- Preventing development of myopia
- Effect of blue light from digital devices on children
- Alternatives to patching or drops for treatment of amblyopia
- Genetic treatments for rare eye diseases
- Low vision options

What are we waiting for?

- Little research funding for robust studies in pediatric vision
- Few drugs for pediatric vision issues that drive new science
- Most researchers address adult vision issues
- Need to educate funders about the role for vision as a part of the lifespan and the value of early detection and treatment

How can you help?

- Advocate for increased funding to NEI/CDC/HRSA vision programs
- Talk with schools of medicating, optometry, and public health about your desire for this research
- Encourage nursing graduate students to conduct research in these areas
- Promote the need for vision research with foundations

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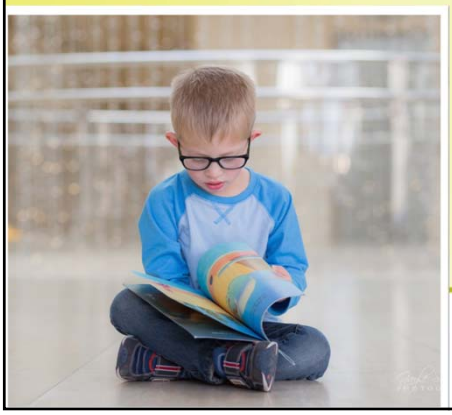
RESOURCES TO DRIVE EVIDENCE-BASED PRACTICES



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NASN
Vision & Eye Health Resources

https://www.nasn.org/nasn-resources/practice-topics/vision-health

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Family Education tools

- Fact Sheets in multiple languages
  - Signs of Eye Trouble
  - Affordable Care Act
- Focus on Eye Health & Culturally Diverse Populations
- Star Pupils Eye Health and Safety Curriculum.
- Vision Screening & Eye Health Safety Posters
- *Developing Eyes* Parents' video importance of screenin

Parent Education

Financial Assistance Programs

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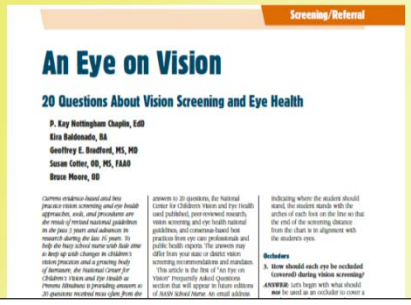
Evidence based screening tools and procedures

States, and even separate school districts within states, have varying vision screening procedures and protocols. The following information provides recommendations from currently available evidence-based sources, including the National Expert Panel to the National Center for Children's Vision and Eye Health, Prevent Blindness, and Bright Futures.

OPTOTYPE-BASED SCREENING APPROACH

TEST	AGES	TOOLS	OPTOTYPES	PASS	NOTES
Distance	3, 4, 5, and 6 years old	Tests of visual acuity: • Single, surrounded optotypes in wheels or flip charts at 5 feet. • Flip charts with crowded lines of 5 optotypes per page at 10 feet in critical line or full threshold formats. • Tests of visual acuity screening software with single, surrounded optotypes at 5 or 10 feet.	LEA SYMBOLS® or HOTV letters	3yo – 20/50 line 4 and 5yo – 20/40 line 6yo – 20/32 line	Screen annually. Screening distance is between chart and child's eyes. Place arch of the child's foot on the line when measuring proper distance. Screen one eye at a time. Rescreen – within 6 months with the same screening tool. Refer – to an eye care professional (pediatric optometrist, optometrist, pediatric ophthalmologist, or ophthalmologist) with training and experience examining young children.

NASN School Nurse Article and Column- March, May and (soon) July


Screening/Referral

An Eye on Vision

20 Questions About Vision Screening and Eye Health

P. Kay Nottingham Chaplin, EdD
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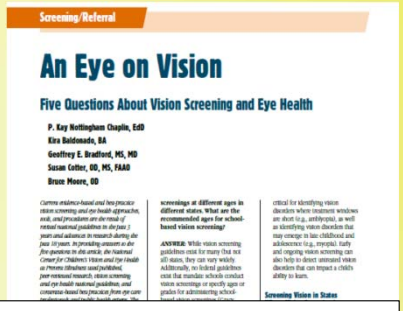
Screening/Referral

An Eye on Vision

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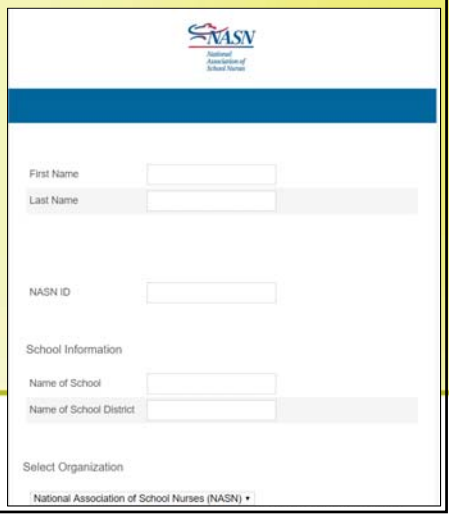
Nottingham Chaplin, P. K., Baldonado, K., Bradford, G. S., Cotter, S., & Moore, B. (2018). An eye on vision: Five questions about vision screening and eye health. *NASN School Nurse, 33*(3), 146-149.

Resources for Eye Care

Sight for Students

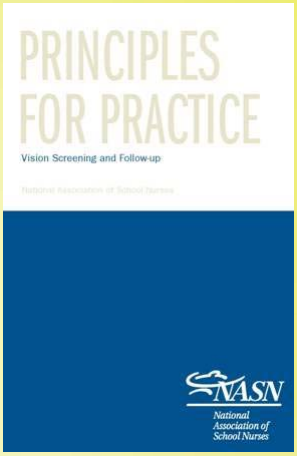
- NASN members
- Login
- Fill out form
- 25 certificates
  - Eye exam
  - Glasses



Principles for Practice

Vision Screening & Follow-up

- **Vision screening and the referral process**
- **Aligned with *NASN's Framework for 21st Century School Nursing Practice***
- **Practice component of key principle of Community/Public Health**



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Conclusion of Today's Presentation . . .

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