

Binocular Vision Refresher for the Primary Care Optometrist

Binocular Vision Refresher for the Primary Care Optometrist

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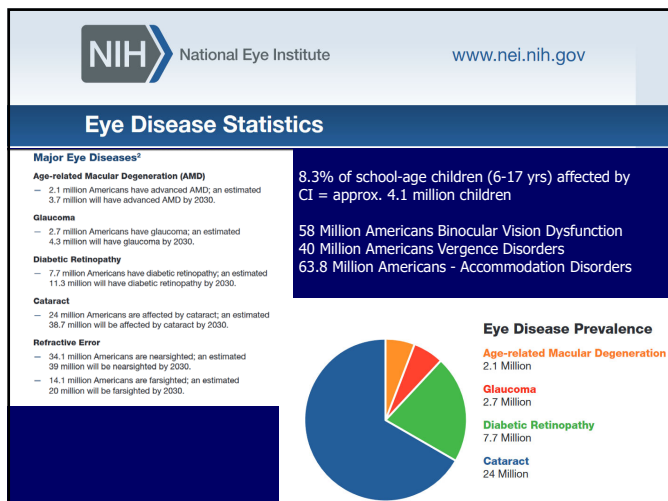
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Financial Disclosure

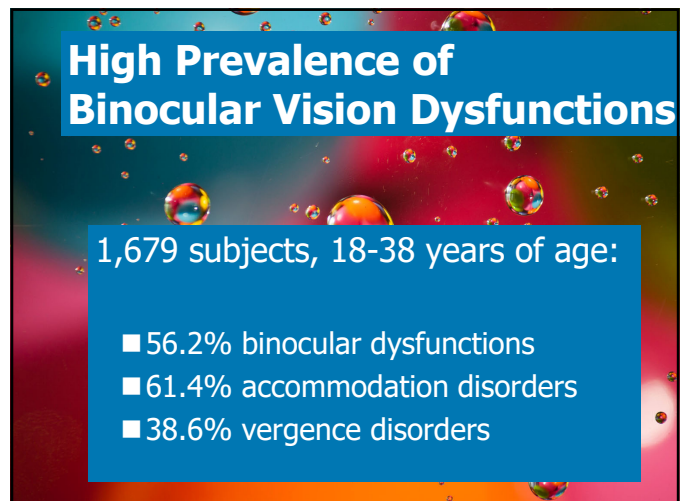
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Binocular Vision Refresher for the Primary Care Optometrist

High Prevalence of Binocular Vision Dysfunctions

- Convergence insufficiency (CI) is a binocular vision disorder that affects up to 8.3% of school-age children
- 13% of fifth and sixth grade children had clinically significant CI and/or exophoria at near

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High Prevalence of Binocular Vision Dysfunctions

- The most common binocular vision disorder occurring in post concussion syndrome is convergence insufficiency (CI) with a prevalence of 49% in children.
- Other common problems are accommodative insufficiency and saccadic dysfunction.

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High Prevalence of Binocular Vision Dysfunctions

Long-term consequences can lead to:

- significant vision loss
- decreased educational & occupational opportunities
- reduced quality of life

AOA Evidence Based Clinical Practice Guidelines 2017

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WHAT DO BINOCULAR VISION PROBLEMS LOOK LIKE TO YOUR PATIENT?

There once was a little girl who could not read very well. She complained that the print was blurry and moving. She could not keep her place on the page. She went to her optometrist to get help. Her optometrist recommended vision therapy and told the girl that there was a solution to her vision problems. The girl began vision therapy and saw dramatic improvements in her reading, writing, and most of all how she saw the world. The vision therapy made a huge difference in her life!

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How easily can you read the following passage?

Henry looked to the right. He looked to the left. He looked up, and he looked down. Where had Frog gone? Henry did not like being alone in the forest. "Frog, where are you?" Henry called. "Please come back!"

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Now you try:

The consumption of soft drinks by American youth is increasing. National dietary surveys show that carbonated soft drink consumption more than doubled in youths aged 6 to 17 from about 5 ounces per day in 1977-78 to 12 ounces in 1994-98, the most recent years for which national data is available. Adolescent boys' soft drink consumption more than tripled during those years.

There are at least two negative results to this soft drink explosion. First, the use of soft drinks is likely related to the rise in childhood obesity. A variety of studies suggest that we don't eat fewer calories from other sources when we increase calories from beverages. If a child drinks 9 to 10 ounces of a soft drink, that's equivalent to almost 120 calories.

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Focusing Problem:

Failing to clean off your desk before lunch not only raises the risk of salad dressing spilling onto your work, but it could also increase your chances of getting sick. A new report shows that close to half of Americans don't clean their desks before eating at them, and a third don't wash their hands, which may foster the spread of infectious diseases like colds and flu.

Due to a shortage of the flu vaccine this year, health officials have urged the public to take measures to reduce their risk, and researchers say improving at-work hygiene and hand washing habits could have a major impact in reducing sick days. "Desks, phones, door knobs, conference tables, fax machines and other common workplace areas can be breeding grounds for bacteria-spreading germs," says Brian Sansoni, spokesman for the Soap and Detergent Association, in a news release.

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Saccadic Dysfunction/ Oculomotility disorder

Henry looked to the right. He looked to the left. He looked up, and he looked down. Where had Frog gone? Henry did not like being alone in the forest. "Frog, where are you?" Henry called. "Please come back!"

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Now you try:

Bal

17 Visual Skills Critical to Reading and Learning

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Classroom Tasks and Required Vision Skills

Skills Required for Effective Performance

[illegible]

**"For the first 12 years of life,
nearly 80% of learning is
accomplished through the eyes!"**

American Optometric Association

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"1 out of 4 children have an undiagnosed vision problem that interferes with their ability to read and learn."

College of Optometrists in Vision Development
American Optometric Association

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"Vision disorders are the fourth most common disability in the United States and the most prevalent handicapping condition in children."

Current Ophthalmology, Vol. 43, No. 5, March-April 1999

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"25% of students in grades K-6 have visual problems that are serious enough to impede learning."

Better Vision Institute

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- Eye and vision problems in children are a significant public health concern.
- Eye and vision disorders can lead to problems in a child's normal development, school performance, social interactions, and self-esteem.

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- Vision disorders that occur in childhood may manifest as problems well into adulthood, affecting an individual's level of education, employment opportunities, and social interactions.

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Diagnosing Binocular Vision Dysfunction

Symptoms Checklist:
CITT Study -
scoreable symptom survey

Convergence Insufficiency Symptom Survey
Name _____ DATE ____/____/____

Clinician Instructions: Read the following subject instructions and then each item exactly as written. If subject responds with "yes" - please qualify with frequency choices. Do not give examples.

Subject Instructions: Please answer the following questions about how your eyes feel when reading or doing close work.

	Never	Most days every difficulty	Sometimes	Fairly often	Always
1. Do your eyes feel tired when reading or doing close work?					
2. Do your eyes feel uncomfortable when reading or doing close work?					
3. Do you have headaches when reading or doing close work?					
4. Do you feel sleepy when reading or doing close work?					
5. Do you lose concentration when reading or doing close work?					
6. Do you have trouble remembering what you have read?					
7. Do you have double vision when reading or doing close work?					
8. Do you see the words move, jump, swim or appear to float on the page when reading or doing close work?					
9. Do you feel like you read slowly?					
10. Do your eyes ever hurt when reading or doing close work?					
11. Do your eyes ever feel sore when reading or doing close work?					
12. Do you feel a "pulling" feeling around your eyes when reading or doing close work?					
13. Do you notice the words blurring or coming in and out of focus when reading or doing close work?					
14. Do you lose your place while reading or doing close work?					
15. Do you have to re-read the same line of words when reading?					
TOTAL SCORE _____	x 0	x 1	x 2	x 3	x 4

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Kid needs "eyes checked"

- Parents don't explain why and don't know what to tell you – **they don't know the signs**
- They think their kid "just wants glasses"
- Kids don't complain – no idea how they are supposed to see – **they think it is normal**
- Your first question needs to be "how are they doing in school?"

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Questions to Ask Parents

- How is your child doing in school?
- Does your child like to read?
- Does your child avoid reading?
- Prefer to be read to?
- How is your child's reading comprehension?

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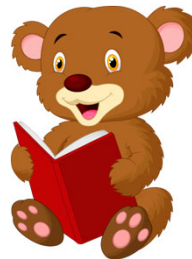
6 Questions to Ask Parents – Typical Answers

- How is your child doing in school? **POOR**
- Does your child like to read? **NO**
- Does your child avoid reading? **YES**
- Prefer to be read to? **YES**
- How is your child's reading comprehension? **POOR**

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The Bear that Loves to Read

Story written by:
Toni Christel



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For more information about this transparency,
please contact 818-248-3823

Bobby the Bear loves to read. He would stay awake for hours reading his favorite books. One day as he was reading, he learned about a duck that lived in the same forest. The duck loved to play in the woods. Sometimes the duck would wander far away from his home in the lake.



When the duck got lost, he would cry. The bear felt sorry for this duck and decided to wander into the forest to see if he could find him so he could help him find his way back home to the lake.

Unfortunately now the bear was lost too. But the bear had read so many stories about people wandering in the woods, he had an idea. First he listened to see if he could hear the duck crying. He could hear him!

Next he figured out what direction he needed to walk to find him.



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Primary Care Examples of Binocular Vision Problems

Child Presents with:

- 20/20 acuity complains about seeing the board in school
- No sign of a refractive error or pathology

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Primary Care Examples of Binocular Vision Problems

What this could be:

- Accommodative Disorder
- Not malingering

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Primary Care Examples of Binocular Vision Problems

Child Presents with:

Inconsistent results during the testing, including misnaming the letters

What this could be:

Possible binocular vision disorder

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Primary Care Examples of Binocular Vision Problems

Child Presents with:

a 'habit' of rubbing his eyes a lot

What this could be:

may indicate an accommodative or binocular vision problem

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Primary Care Examples of Binocular Vision Problems

Child Presents with:

School-aged child has difficulty sitting still for the seconds required to look at the image in the auto-refractor

OR

History shows patient has Dyslexia, ADHD or a learning disability

What this could be:

There could be underlying problems with fixation and tracking or binocular vision problems

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Primary Care Examples of Binocular Vision Problems

Child Presents with:

Testing doesn't reveal a problem that explains the patient's chief complaint

No reason to doubt that the patient's concern is real

What this could be:

There could be an underlying binocular vision, accommodative or oculomotor problem.

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Additional Questions

Symptoms for Patient History Form:

- How is child doing in school?
- Special Ed or Reading Resource classes?
- Avoid reading?

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■ Binocular Vision, Ocular Motility, and Accommodation

- Ocular alignment assessment - distance + near
(e.g., cover test, Hirschberg test, Krimsky test, Von Graefe phoria, Modified Thorington, Maddox Rod)
- Ocular motility assessment
(e.g., fixation, saccades, pursuits)

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■ Binocular Vision, Ocular Motility, and Accommodation (continued)

- Near point of convergence
- Stereopsis
(e.g., Random dot stereopsis test)
- Positive and negative fusional vergence ranges
- Accommodative testing
(e.g., amplitude, facility, and response)

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Current Research

Symptoms in Children with Convergence Insufficiency: Before and After Treatment

"Because of a high frequency of both performance- and eye-related symptoms, clinicians should perform a targeted history that addresses both types of symptoms to help identify children with symptomatic CI."

Optometry and Vision Science

Vol. 89, No. 10, October 2012

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How to Explain BVD

Tracking/Ocular motor Dysfunction

"I am finding that there is a problem with how your child's eyes move when he/she is trying to read."

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How to Explain BVD

Accommodation problem

"It looks like your child has a problem with how his/her eyes re-focus when shifting from looking at work on his desk and then trying to look at the board in the classroom. "

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How to Explain BVD

Convergence problem:

"I am finding a problem with how your child's two eyes are working together. This can cause difficulty with reading, comprehension and remembering what was read."

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The Relationship between Convergence Insufficiency and ADHD

We report an apparent three-fold greater incidence of ADHD among patients with Convergence Insufficiency when compared with the incidence of ADHD in the general US population (1.8–3.3%) (Leslie et al., 2004).

David B. Granet, MD, FAAO, FACS, FAAP
Strabismus, 13:163–168, 2005

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The Relationship between Convergence Insufficiency and ADHD

We also note a seeming three-fold greater incidence of Convergence Insufficiency in the ADHD population.

David B. Granet, MD, FAAO, FACS, FAAP
Strabismus, 13:163–168, 2005

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The Relationship between Convergence Insufficiency and ADHD

Until further studies are performed, however, patients diagnosed with ADHD should be evaluated to identify the small subset that may have Convergence Insufficiency – a condition that responds well to treatment...

David B. Granet, MD, FAAO, FACS, FAAP
Strabismus, 13:163–168, 2005

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Visual Factors That Significantly Impact Academic Performance

A total of 2,659 examinations were performed on 540 children over the course of six examination periods, which were administered over three consecutive school years.

Optometry Vol 74/No. 1/Jan 2003

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Visual Factors That Significantly Impact Academic Performance

- Socio-economic, racial, and standardized academic performance data (Iowa Test of Basic Skills—ITBS) were furnished by the families and the school system.
- The visual and demographic data from the examinations were then compared to performance on the 21 subtests of the ITBS.

Optometry Vol 74/No. 1/Jan 2003

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Visual Factors That Significantly Impact Academic Performance

Visual factors are significantly better predictors of academic success as measured by the ITBS than is race or socio-economics.

Optometry Vol 74/No. 1/Jan 2003

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Improvement in Academic Behaviors After Successful Treatment of Convergence Insufficiency

A successful or improved outcome after Convergence Insufficiency treatment was associated with a reduction in the frequency of adverse academic behaviors and parental concern associated with reading and school work as reported by parents.

Optom Vis Sci, 2012 Jan;89(1):12-8. doi: 10.1097/OPX.0b013e318238ffc3.

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The screenshot shows a CNN news article. The headline is "Youth concussions on the rise since 2010, peaking in fall". Below the headline, it says "By Tyler Burton, CNN" and "Updated 7:22 AM ET, Tue October 11, 2016". The main image shows Dr. Sanjay Gupta, CNN Chief Medical Correspondent, speaking. To the right of the image, there is text: "Concussions have been on the rise for American youth since 2010... 71% increase in rough-sports-related concussions for patients ages 10 to 19". Below this, it says "Patients ages 10 to 19 are five times more likely to be diagnosed with a concussion than all other age groups combined". At the bottom, there is a "Story highlights" section with a bullet point: "[CNN] — Concussions have been on the rise for American youth since 2010, according to the Health of America Report recently released by Blue Cross Blue Shield of Michigan." It also mentions "Medical claims data showed a 71% increase".

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The screenshot shows a CNN news article. The headline is "Soccer: Heading the ball linked to concussion symptoms". Below the headline, it says "By Susan Scotti, CNN" and "Updated 5:00 PM ET, Wed February 1, 2017". The main image shows a close-up of a soccer ball being headed by a player. To the right of the image, there is text: "Whether in practice games or competition, soccer players who frequently head the ball are three times more likely to have concussion symptoms than players who don't rack up high numbers of headers, according to a study published in the journal Neurology." Below this, there is a "Story highlights" section with a bullet point: "[CNN] — Whether in practice games or competition, soccer players who frequently head the ball are three times more likely to have concussion symptoms than players who don't rack up high numbers of headers, according to a study published in the journal Neurology." It also mentions "Soccer players who frequently head the ball are three times more likely to have concussion symptoms than players who don't rack up high numbers of headers, according to a study published in the journal Neurology."

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Clinical Pediatrics – July 2015 Vision Diagnoses Are Common After Concussion in Adolescents

- A total of 100 adolescents were examined, with a mean age of 14.5 years.
- Overall, 69% had one or more of the following vision diagnoses:
 - accommodative disorders (51%),
 - convergence insufficiency (49%), and
 - saccadic dysfunction (29%)
- In all, 46% of patients had more than one vision diagnosis.

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Vision Therapy for Post-Concussion Vision Disorders

Conclusions:

- In this case series, post-concussion vision problems were prevalent and CI and AI were the most common diagnoses.
- **Vision therapy had a successful or improved outcome in the vast majority of cases that completed treatment.**

Gallaway, Michael; Scheiman, Mitchell; Mitchell, G. Lynn
Optometry & Vision Science. 94(1):68-73, Jan 2017

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Vision Therapy for Post-Concussion Vision Disorders

Conclusions:

- Evaluation of patients with a history of concussion should include testing of vergence, accommodative, and eye movement function.

Gallaway, Michael; Scheiman, Mitchell; Mitchell, G. Lynn
Optometry & Vision Science. 94(1):68-73, Jan 2017

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Brain Injury Vision Symptom Survey (BIVSS) Questionnaire

Patient Name: _____ Date: _____

INSTRUCTIONS: Please check the most appropriate box, or circle the item number that best matches your symptoms today.

Please rate each symptom. How often does each occur? (circle a number)

	1	2	3	4	5	6	7	8	9	10
EYESIGHT CLARITY										
Distance vision blurred and not clear – even with lenses										
Near vision blurred and not clear – even with lenses										
Clarity of vision changes or fluctuates during the day										
Don't need vision / I can't see well to drive at night										
VISUAL COMFORT										
Eye discomfort / sore eyes / eye strain										
Headaches or dizziness after using eyes										
Eye fatigue / very tired after using eyes all day										
Red, itchy, or watery eyes										
DOUBLING										
Double vision – especially when tired										
Lines to blur or close are seen to join closely										
Print moves in and out of focus when reading										
LIGHT SENSITIVITY										
Normal indoor lighting is uncomfortable – too much glare										
Outdoor light too bright – have to use sunglasses										
Indoor fluorescent lighting is bothersome or annoying										
DRY EYES										
Eyes feel "dry" and sting										
"Stare" into space without blinking										
Have to rub the eyes a lot										
DEPTH PERCEPTION										
Clumsiness / misjudge where objects really are										
Lack of confidence walking / missing steps / stumbling										
Poor handwriting (spacing, size, legibility)										
PERIPHERAL VISION										
Side vision distorted / objects move or change position										
What looks straight ahead – isn't straight ahead										
Find crowds / can't tolerate "visually busy" places										
READING										
Short attention span / easily distracted when reading										
Difficulty / slowness with reading and writing										
Slow reading comprehension / can't remember what was										
Confusion of words / skip words during reading										
Lost place / have to use finger not to lose place when										

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Hidden Concussions

- Multiple blows to the head can be comparable to a concussion (i.e., heading the ball in soccer).
- After the first concussion the threshold for consecutive concussions is lowered, exacerbating the initial concussion or visual symptoms.
- Head injury patients often don't make a connection between the head injury and their visual symptoms, so they may not even report these injuries to you when they present for an exam.

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Hidden Concussions

Not always an obvious vision problem:

- Patient with concussion and convergence insufficiency may experience chronic headaches and difficulty with concentration thereby avoiding reading
- Never notices the intermittent blur and diplopia from CI

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Hidden Concussions

- Sometimes it can take several weeks before the vision problem will surface which is why it is often missed.
- Once the underlying vision problems are addressed, patients can begin to regain their pre-concussion workload.

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The image shows a screenshot of a WebMD article titled "OFF the CHARTS". The title is in large, bold, white letters on a yellow background. Below the title, there is a red oval highlighting a paragraph of text. The text inside the oval reads: "If your child aces the eye chart at the pediatrician's office, you might assume her vision is just fine. **But some common vision disorders** can't be detected by a standard eye exam—and **could be holding your child back in school.**" Below this, the byline reads "BY Gina Shaw REVIEWED BY Hansa Bhargava, MD, WebMD Senior Medical Director". The main body of the article starts with a large "W" and describes how a child named Ethan, who was in first grade, was having trouble with reading. His mother, Jennifer Stone Hopp, noticed that he was skipping words everywhere and couldn't focus. She negotiated with him, saying, "You read a line, then I'll read a line." It was brutal, she says. The article continues to describe how Ethan's vision problems were not detected by a standard eye exam and how they were holding him back in school. The article is written by Gina Shaw and reviewed by Hansa Bhargava, MD, WebMD Senior Medical Director.

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AOA Evidence-Based Clinical Practice Guidelines 2017 – Comprehensive Pediatric Eye and Vision Examination

Coordination and Frequency of Care

The diagnosis of a wide array of eye and vision anomalies, diseases, disorders, and related systemic conditions may result from a comprehensive pediatric eye and vision examination.

The nature and severity of the problem(s) diagnosed determine the need for:

- Optical correction
- **[Optometric] Vision therapy**
- **[Optometric] Vision rehabilitation services**
- Prescription or nonprescription medications
- Surgery
- Follow-up for additional evaluation and/or treatment.

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AOA Evidence-Based Clinical Practice Guidelines 2017 – Comprehensive Pediatric Eye and Vision Examination

Coordination and Frequency of Care (continued)

Based on the examination, it may be determined that the patient needs additional services. These may include:

- Intraprofessional consultation with another doctor of optometry for treatment and management of ocular disease, **[Optometric] vision rehabilitation, vision therapy, and/or specialty contact lenses.**
- Some vision problems can interfere with learning. Children at risk for learning-related vision problems should be evaluated by a doctor of optometry.

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Summary

1. History is key to identification

- Difficulty with reading
- Strabismus/Amblyopia
- Concussion or other head injury

2. Binocular/oculomotor tests are indicated

3. When binocular/oculomotor deficits are identified – lenses, prisms, and/or optometric vision therapy is indicated

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Summary

4. Important to remember:

You are diagnosing and treating vision problems you are not diagnosing and treating learning problems.

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Summary

5. Vision problems often contribute to reading problems but vision problems are not the only cause of reading problems.

These should be referred appropriately after ruling out vision problems.

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Binocular Vision Disorders

- A. Convergence Insufficiency
- B. Convergence Excess
- C. Inefficient Binocular Vision
- D. Divergence Excess
- E. Divergence Insufficiency
- F. Strabismus
- G. Amblyopia

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Treatment Options

Optometric Vision Therapy

- A. Convergence Insufficiency
- B. Convergence Excess
- C. Inefficient Binocular Vision
- D. Divergence Excess
- E. Divergence Insufficiency

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Treatment Options

F. Strabismus

Surgery
Surgery + Vision Therapy
Vision Therapy

G. Amblyopia

Lenses
Patching
No patching – Optometric VT

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Strabismus

Surgery
Surgery + Vision Therapy
Vision Therapy

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Amblyopia

Lenses
Patching
No patching – Optometric VT

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Pediatric Exam History

- Full term birth – any complications
- Developmental milestones achieved on time
- School performance/IEPs
- Like/Dislike Reading
- Double vision
- Headaches

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Pediatric Exam History

- Family history or signs of strabismus/amblyopia
- Issues with eye-hand coordination/sports performance

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Pediatric Exam Elements

- Stereo
- NPC
 - Multiple times
- Worth 4 Dot
- NRA/PRA
- EOM – Pursuits
- EOM - Saccades

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Typical Questions at Exam

- Is it OK if I ask your mom some questions?

For the parent:

- Was your child full term at birth? Were there any complications?
- Did your child meet their developmental milestones on time? Crawling? Walking? Talking? Did they require intervention?

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Typical Questions at Exam

For the parent:

- How is your child doing in school?
- Do they have an IEP?
- Do they get any special help in school?

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Typical Questions at Exam

For the parent:

- Does your child like reading?
 - Read independently or prefer to be read to?
 - Do they avoid reading?
 - How is comprehension if they read to themselves?

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Ask the child

- What grade are you in?
 - What's the best part of school?
 - What's the worst part of school?
- Do you get headaches?
- DO YOU SEE DOUBLE?

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Unstable or Insufficient Binocular Vision Diagnosis

Symptoms:

- possible diplopia
- headaches; general visual fatigue
- loses place in reading, re-reads material, reduction in comprehension in reading
- occasional blurriness
- asthenopia

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Unstable or Insufficient Binocular Vision Diagnostic Findings

- **small amounts of esophoria or exophoria at distance and/or near**
- **intermittent suppressions**
- **reduced stereoacuity**

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Unstable or Insufficient Binocular Vision Diagnostic Findings

- **Sluggish accommodative flexibility and/or ability**
- **Unstable and/or restricted positive and negative fusional ranges, especially recovery findings**
- **Unstable and inconsistent oculomotor skills**

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Unstable or Insufficient Binocular Vision Treatment

Treatment is designed to develop smoothness and efficiency in the basic visual functions of oculomotility, accommodation, and fusion without suppressions

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Unstable or Insufficient Binocular Vision Treatment

- **At times, called "General Skills" case**
- **No significant quantitative deficiencies in skills or clinical findings.**
- **They lack quality and consistency in maintaining a stable binocular system.**

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Unstable or Insufficient Binocular Vision Treatment

GOAL:

To obtain "automatic" level functioning and stability in all visual skills, over a sustained period of time.

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Unstable or Insufficient Binocular Vision Treatment

- **Computerized Home Therapy - HTS**
- **In-office Therapy**

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AOA Clinical Practice Guidelines: Examination

First Exam

- Routine comprehensive evaluation
- Is there a binocular vision problem?
- Is it a sudden onset that indicates the need for urgent medical care?
- Should the patient come back for additional testing?

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AOA Clinical Practice Guidelines: Examination

Second Exam

- Ocular Motor Deviation
- Monocular Fixation
- Extraocular Muscle Function
- Sensory Motor Fusion
- Accommodation

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Second Visit Coding

- Office Visit: 92012
- Sensory Motor Evaluation: 92060
- Not always completely covered



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Additional Resources

AOA Evidence Based Clinical Practice
Guideline: Comprehensive Pediatric Eye
and Vision Examination

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Additional Resources

www.concussionproject.com
www.amblyopiaproject.com
www.stereosue.com
www.covd.org

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