

# THE ROLE OF OPTOMETRY IN CONCUSSION & TRAUMATIC BRAIN INJURY CARE



A RESOURCE FOR PATIENTS,  
PARENTS, PHYSICIANS AND  
POLICYMAKERS | MARCH 2019

# PREVALENCE OF TRAUMATIC BRAIN INJURIES

Traumatic brain injury (TBI) affects millions of Americans each year, Americans of all ages and from all walks of life. A TBI is the disruption of normal brain functioning, caused by a blow, bump, jolt, or penetrating injury to the head.<sup>i</sup> It can be classified as mild (often called concussion), moderate, or severe, based on clinical symptoms.<sup>ii</sup> Although a bump or jolt to the head may be the initial cause of the TBI, much of the brain injury occurs after the injury, not at the time of initial impact. The primary injury sets off a progression of biologic changes that can continue for up to weeks after the initial trauma.<sup>iii</sup>

According to the Centers for Disease Control and Prevention (CDC), in 2013, there were about 2.8 million TBI-related emergency department visits, hospitalizations, and deaths.<sup>iv</sup> This number doesn't include those who sought outpatient care or did not receive care for a TBI, and therefore likely underestimates the overall incidence of TBI in the American population.

## “UP TO 75% OF ALL PATIENTS WITH TBI SUFFER FROM VISUAL DYSFUNCTION.”

### THE BRAIN AND THE VISUAL SYSTEM

- Although sight might begin with the eyes, it actually occurs in the brain with over half of the brain dedicated to vision and visual processing.
- The brain carries visual input from the eyes to the back of the brain where the visual cortex is located.
- With so much of the brain involved in vision, even mild injuries to almost any part of the brain can significantly impact the multiple processes and pathways involved in vision.
- Patients with a diagnosis or suspicion of a TBI should be referred to an eye doctor for evaluation and appropriate vision rehabilitation.

### TRAUMATIC BRAIN INJURY AND CONCUSSION IMPACTS ON THE VISUAL SYSTEM

- Vision impairments are often the first signs/symptoms of TBI and can persist well into the rehabilitation process.
- Research shows that up to 75% of all patients with TBIs suffer from visual dysfunction.<sup>v</sup>
- Patients with TBIs can suffer from a range of visual symptoms and disorders, including problems with visual acuity, visual fields, oculomotor function, accommodative disorders, convergence insufficiency, and saccadic dysfunction.<sup>vi,vii</sup>

### THE ROLE OF OPTOMETRY IN TBI CARE

**Early Detection & Prevention** – Primary eye care, such as in-person comprehensive eye exams, can detect signs of undiagnosed TBI's as well as reduce vision related risk-factors for TBIs, such as addressing deterioration of visual function that increases the risk of falls.<sup>viii</sup>

**Vision Rehabilitation** – A vision rehabilitation plan that includes vision therapy can improve visual dysfunction secondary to TBI.<sup>ix</sup>



**ACCORDING TO THE CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC), IN 2013, THERE WERE ABOUT 2.8 MILLION TBI-RELATED EMERGENCY DEPARTMENT VISITS, HOSPITALIZATIONS, AND DEATHS**

**Co-management** – Coordination of care among doctors of optometry and other members of the TBI care team is critical. Care for the TBI patient that is not well coordinated or integrated increases risk for poor outcomes.<sup>x</sup>

In addition to helping create a vision rehabilitation plan, optometric evaluations can help the TBI care team determine the severity of the TBI, the progress / effectiveness of the patient's overall rehabilitation, and when it is safe for the patient to return to school, work, or athletic activities.

**VISUAL EVALUATIONS OF TBI PATIENTS PERFORMED BY DOCTORS OF OPTOMETRY OFTEN INCLUDE, BUT ARE NOT LIMITED TO:**

- Comprehensive eye and vision examination
- Extended sensorimotor evaluation
- Visual perceptual and cognitive evaluation
- Higher cerebral function assessment of visual information processing
- Low-vision evaluation
- Extended visual field evaluation
- Electrodiagnostic vision testing
- Baseline TBI testing
- Visual-Vestibular and balance testing

**OPTOMETRIC TREATMENT AND MANAGEMENT OF THE PATIENT WITH BRAIN INJURY MAY INCORPORATE ANY OF THE FOLLOWING:**

- Treatment of ocular disease or injury.
- Treatment of the visual dysfunction utilizing lenses, prisms, filters, occlusion, low-vision devices, optometric vision therapy, visual processing therapy and/or cognitive rehabilitation.

- Counseling and education of patient, family or caregiver about the patient's visual problems, functional implications, goals, prognosis and management options.
- Consultation and coordination of care with other professionals involved in the rehabilitation and health care of the patient.

**THE ROLE OF DOCTORS OF OPTOMETRY IN REDUCING TBI AND CONCUSSION RISK**

Ensuring optimal vision can help reduce vision-related risk-factors for TBIs, such as poor vision and reduced visual fields. The Centers for Disease Control and Prevention recommends that older adults receive annual comprehensive eye examinations as poor vision can increase falls risk.<sup>xi</sup>

In addition, doctors of optometry can tailor their care to help higher risk patients through education and baseline TBI testing. Doctors of optometry can educate patients on both the visual and non-visual warning signs of TBIs and when to seek care. This can help patients know when to seek timely treatment after an injury has occurred. Regular visits to the eye doctor can also provide baseline TBI testing to measure visual components that help the TBI care team more easily detect, treat, and manage future TBIs. For individuals involved in highly physical activities, such as athletes, first responders and military personnel, improving visual function and performance can further reduce the risks of TBIs, even if no visual impairments exist.<sup>xii</sup>

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**EARLY DETECTION  
& PREVENTION**

**PRIMARY EYE CARE**

SERVICES CAN DETECT SIGNS OF  
UNDIAGNOSED TBI'S AS WELL AS  
REDUCE VISION RISK-FACTORS FOR TBI.



**VISION  
REHABILITATION**

**A VISION REHABILITATION**

PLAN THAT INCLUDES VISION THERAPY  
CAN IMPROVE VISUAL DYSFUNCTION  
SECONDARY TO TBI.



**CO-MANAGEMENT**

**COORDINATION OF CARE**

AMONG DOCTORS OF  
OPTOMETRY AND OTHER MEMBERS OF  
THE TBI CARE TEAM IS CRITICAL.

**“PATIENTS WITH TBI CAN SUFFER FROM A RANGE OF VISUAL SYMPTOMS AND DISORDERS, INCLUDING PROBLEMS WITH VISUAL ACUITY, VISUAL FIELDS, OCULOMOTOR FUNCTION, ACCOMMODATIVE DISORDERS, CONVERGENCE INSUFFICIENCY, AND SACCADIC DYSFUNCTION.”**

The frequency of eye examinations should be consistent with the needs of the patient and evidence-based guidelines.<sup>xiii</sup> Individuals who are at a high risk of TBIs including but not limited to individuals involved in sports or the military, are children or older adults, have previously experienced a TBI, or experienced an accident or fall, should consult their doctor of optometry and primary care physician to determine if more frequent examinations are needed.

## THE ROLE OF THE TBI CARE TEAM AND STAKEHOLDER ENGAGEMENT

To maximize the efficiency and effectiveness of rehabilitation, an eye doctor should always be a part of the TBI care team. All medical professionals who treat TBI patients should coordinate with doctors of optometry and refer for appropriate care.

Coaches, parents, physical therapists and others involved in the care of athletes should ensure that athletes visit a doctor of optometry, especially when there is diagnoses of a TBI if there are any indications of brain injury, or if the athlete has experienced falls, blows or accidents. It is imperative that patients and their care team make the treating doctor of optometry aware of any head injury, no matter the level of severity.

Stakeholders and organizations that work with high-risk populations, such as athletic organizations, schools, medical professionals and retirement homes, should collaborate with doctors of optometry to reduce the vision related risks of TBI and ensure that comprehensive eye exams are conducted regularly.

## EYE AND VISION HEALTH: AN ESSENTIAL PART OF IMPROVING TBI CARE

Traumatic brain injury is a serious public health problem in the United States.<sup>xiv</sup> Some individuals experience the after effects of TBI for extended periods of time. New research also points to the concerning associations between TBI and adverse mental health outcomes, such as posttraumatic stress disorder (PTSD) and major depressive disorder.<sup>xv</sup> When fully engaged as part of the health care team, doctors of optometry can help prevent, detect, treat and reduce the overall impact of TBIs. The National Academies of Sciences, Engineering, and Medicine report on eye health concluded that avoidable vision impairments occur “too frequently in the United States and is the logical result of a series of outdated assumptions, missed opportunities, and manifold shortfalls in public health policy and health care delivery.”<sup>xvi</sup> The American Optometric Association (AOA) is committed to helping patients, caregivers, and stakeholders fully utilize doctors of optometry in TBI care and prevention.

**“DOCTORS OF OPTOMETRY CAN TAILOR THEIR CARE TO HELP HIGHER RISK PATIENTS THROUGH EDUCATION AND BASELINE TBI TESTING.”**

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v Stelmack JA, Frith T, Van Koeveering D, Rinne S, Stelmack TR. Visual function in patients followed at a Veterans Affairs polytrauma network site: an electronic medical record review. Optometry vi Ciuffreda, K. J., Kapoor, N., Rutner, D., Suchoff, I. B., Han, M., & Craig, S. (2007). Occurrence of oculomotor dysfunctions in acquired brain injury: A retrospective analysis. Optometry -Journal of the American Optometric Association, 78(4), 155-161.

vii National Academies of Sciences, Engineering, and Medicine. 2016. Making Eye Health a Population Health Imperative: Vision for Tomorrow. Washington, DC: The National Academies Press.

viii <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5913798/>

ix <https://www.ncbi.nlm.nih.gov/pubmed/30470420>

x <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6027591/>

xi <https://www.cdc.gov/features/older-adult-falls/index.html>

xii AOA Brain Injury Electronic Resource Manual: Volume 1A: Traumatic Brain Injury Visual Dysfunction Diagnosis. P. 125. See also AOA Focus. Eye on head injuries: Can football pass the eye test? September 2016

xiii <https://www.aoa.org/optometrists/tools-and-resources/evidence-based-optometry/evidence-based-clinical-practice-guidelines>

xiv <https://www.cdc.gov/traumaticbraininjury/basics.html>

xv <https://jamanetwork.com/journals/jamapsychiatry/article-abstract/2722564>

xvi National Academies of Sciences, Engineering, and Medicine. 2016. Making Eye Health a Population Health Imperative: Vision for Tomorrow.