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# Vision Therapy Promotional Packet: Through the Eyes of Traumatic Brain Injury/Acquired Brain Injury: An informational Resource on the Role of OT

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Vision Therapy Promotional Packet:  
Through the Eyes of Traumatic Brain Injury/Acquired Brain Injury:  
An Informational Resource on the Role of OT

by

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Submitted to the Occupational Therapy Department

of the

University of North Dakota

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for the degree of

Master's of Occupational Therapy

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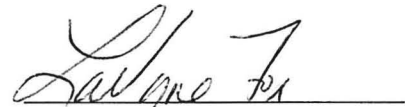




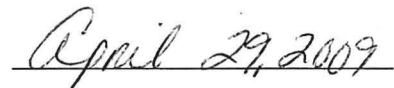


Approval Page

This Scholarly Project Paper, submitted by Sarah Cooper and Whitney Schilling and in partial fulfillment of the requirement for the Degree of Master's of Occupational Therapy from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

A handwritten signature in cursive script, appearing to read "L. Lane F.", is written above a horizontal line.

Faculty Advisor

A handwritten date in cursive script, "April 29, 2009", is written above a horizontal line.

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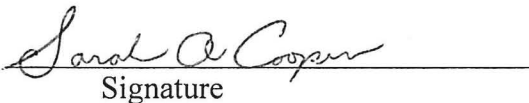
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A special thanks to our family, classmates, and instructors for their continuous support.

## ABSTRACT

Vision Therapy Promotional Packet: Through the Eyes of Traumatic Brain Injury/Acquired Brain Injury: An Informational Resource on the Role of OT

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“Very few in the health care professions, including head trauma rehabilitation centers, are adequately aware of visual problems resulting from Traumatic Brain Injury (TBI)/Acquired Brain Injury (ABI) and the visual-perception consequences. These visual deficits may lead to impaired functioning in the person’s daily activities and roles because vision affects all other functions” (braininjuries.org, ¶ 1). A few examples of activities of daily living (ADL’s) and instrumental activities of daily living (IADL’s) that may be impacted by visual deficits include but are not limited to: driving, eating, dressing, leisure participation (movies, reading, sports), and employment. “Unfortunately, this creates a gap in rehabilitative services, resulting in incomplete treatment and frustration for the patient, family and treatment team” (braininjuries.org, ¶ 1).

Occupational Therapy’s basic premise is to increase the independence of an individual in their daily activities and roles. An occupational therapist’s (OT’s) training in the assessment, design and provision of effective interventions can be instrumental in the rehabilitation process of vision deficits and their impact on daily living. OT’s are trained in the evaluation and treatment design specific to individuals diagnosed with TBI/ABI including; cognitive, visual perceptual, physical, and psychological in relation to activities

of daily living. Occupational Therapy can be an important member of the multi-disciplinary team who is serving this population. Unfortunately, often both occupational therapists and members of a multi-disciplinary team are not always clear on the role and protocol of OT's in the provision of treatment intervention specific to TBI/ABI and visual deficits.

A concentrated literature review was conducted to identify current standard best practices and protocols and the potential role of OT identified. TBI/ABI visual perceptual deficits were identified and compared to OT training to ensure OT's are qualified to meet the unique needs of this population. The other roles of multi-disciplinary team members were explored to see the possible areas OT could address or where an OT's specialized training could strengthen the rehabilitative treatment intervention. The findings from this review demonstrate that occupational therapists have the proficiency and competence to evaluate and depict the functional disability or ability of the acquired or traumatic brain injured client as a whole.

The outcome of the project is a promotional packet, *The Role of Occupational Therapy in Vision Therapy*, which includes an:

1. Educational brochure, *Through the Eyes of Traumatic Brain Injury / Acquired Brain Injury: The Role of Occupational Therapy in Vision Therapy* as well as,
2. A more in depth educational packet entitled, *Through the Eyes of Traumatic Brain Injury/Acquired Brain Injury: An Informational Resource on the Role of OT*

This promotional packet is intended as a means for occupational therapists to use in educating others further on the use of the role of occupational therapy in the provision of vision therapy with the acquired and traumatic brain injured populace.

## CHAPTER I

### INTRODUCTION

Acquired brain injury is a broadly used term due to the numerous ways a person may acquire a brain injury. The definition of acquired brain injury (ABI) can include both traumatic brain injury (TBI) which results from an external insult to the brain and cerebrovascular accident (CVA), also referred to as stroke, resulting from an internal insult to the brain (Ciuffreda, Kapoor, Rutner, Suchoff, Han, Craig. 2007). For purposes of this scholarly project the acronyms of TBI/ABI will be used interchangeably as both are referred to as such in the literature.

“Very few in the health care professions, including head trauma rehabilitation centers, are adequately aware of visual problems resulting from Traumatic Brain Injury (TBI) /Acquired Brain Injury (ABI) and the visual-perceptual consequences. These visual deficits may lead to impaired functioning in the person’s daily activities and roles because vision affects all other functions” ([http://www.braininjuries.org/traumatic\\_brain\\_injury.html](http://www.braininjuries.org/traumatic_brain_injury.html) ¶ 1). A few examples of activities of daily living (ADL’s) and instrumental activities of daily living (IADL’s) that may be impacted by visual deficits include but are not limited to: driving, eating, dressing, leisure participation (movies, reading, sports), and employment. This limited awareness of visual perceptual problems “...creates a gap in rehabilitative services, resulting in incomplete treatment and frustration for the patient, family, and treatment team” (braininjuries.org, ¶ 1).



Occupational Therapy's basic premise is to increase the independence of an individual in their daily activities and roles. An occupational therapists (OT's) training in the assessment, design, and provision of effective interventions can be instrumental in the rehabilitation process of vision deficits and their impact on daily living. Occupational therapists are trained in the evaluation and treatment design specific to individuals diagnosed with TBI/ABI including; cognitive, visual perceptual, physical, and psychological in relation to activities of daily living. Occupational therapy can be an important member of the multi-disciplinary team who is serving this population. Unfortunately, often both occupational therapists and members of a multi-disciplinary team are not always clear on the role and protocol of the occupational therapist in the provision of treatment interventions specific to TBI/ABI and visual deficits.

**MODEL:**

This product, *The Role of Occupational Therapy in Vision Therapy*, was developed based upon the Adult Learning Theory, developed by Malcom Knowles. The application of this theory was essential since this product is an educational resource for practicing occupational therapists and other medical professionals, who are the targeted adult learners in this process. Knowles' Concept of Andragogy describes and conceptualizes the way in which adults learn, which is different from the way in which children learn. It describes five characteristics of adult learning as:

1. Self-concept: As a person matures his or her self concept moves from one of being a dependant personality towards one of being a self-directed human being. This self-direction is essential if the person wishes to be a life-long learner who wants to continue to build and expand on their competency in this field of practice. This is pertinent to the OT who wishes to practice in vision therapy as well as other members of the health care team who wish to expand their knowledge and services for the good of the client.

2. Experience: As a person matures he or she accumulates a growing reservoir of experience that becomes an increasing resource for learning; therefore, prior experiences may support the interest, motivation and need to explore the role of OT in visual rehabilitation.
3. Readiness to learn: As a person matures his or her readiness to learn becomes oriented increasingly to the developmental tasks of his social roles.
4. Orientation to learning: As a person matures his or her time perspective changes from one postponed application of knowledge to immediacy of application, and accordingly his or her orientation toward learning shifts from one of subject-centeredness to one of problem centeredness.
5. Motivation to Learn: As a person matures the motivation to learn is internal.

### **Key Concepts and Terms**

The following section presents the key concepts and terms presented throughout this scholarly project, as obtained from the following main sources:

Gillen, G., & Burkhardt, A. (2004). *Stroke Rehabilitation: A Function-Based Approach* (2<sup>nd</sup> ed.). St. Louis, MO: Mosby.

Scheiman, M. (2002). *Understanding and Managing Vision Deficits: A Guide for Occupational Therapists* (2<sup>nd</sup> ed.). Thorofare NJ: SLACK, Inc.

Zoltan, B. (2007). *Vision, Perception, and Cognition: A Manual for the Evaluation and Treatment of the Adult with Acquired Brain Injury* (4<sup>th</sup> ed.). Thorofare, NJ: SLACK, Inc.

**Accommodation:** In medicine, the ability of the eye to change its focus from distant to near objects (and vice versa). This process is achieved by the lens changing its shape.

**Accommodative dysfunction:** the inability of the eye to change its focus from objects of different distances.

**Accommodative excess:** A condition in which the amplitude of accommodation is normal but the ciliary muscle has a tendency to spasm. Typically the problem is intermittent and variable. The individual reports that after reading for a period of time, he or she experiences blurred vision when looking at a distant object.

**Accommodative infacility:** A condition in which the amplitude of accommodation is normal, but the speed of the response is reduced. The most common complaint associated with accommodative facility is blurred vision when looking from near to far or far to near.

**Accommodative insufficiency:** A condition in which the amplitude of accommodation available (amplitude of accommodation) is less than expected for the individual's age.

**Agnosia:** The inability to recognize and identify objects or persons despite having knowledge of the characteristics of those objects or persons. Agnosia can be limited to one sensory modality such as vision or hearing.

**Ambient vision:** Initially organizes and stabilizes the visual field; peripheral vision.

**Amblyopia:** Loss of acuity in one eye.

**Binocularity:** The ability to focus upon an object with both eyes and create a single stereoscopic image.

**Bottom-up assessment:** Specific assessments that are designed to measure component skills such as attention or constructional praxis.

**Convergence:** Increase in the angle of the visual axes.

**Convergence excess:** A condition in which the eyes have a tendency to turn inward rather than outward. Convergence excess has been found to be slightly more prevalent than convergence insufficiency in a clinical population.

**Depth perception:** The ability to judge depth and distances.

**Diplopia:** Double vision

**Divergence:** Decrease in the angle of the visual axes.

**Divergence excess:** A condition in which the eyes drift outward when looking at a distance, and function normally when looking at near objects.

**Emmetropia:** Absence of refractive error.

**Esotropia:** The eyes turn in.

**Exotropia:** The eyes turn out.

**Field of fixation:** The area within which central fixation can be accomplished by moving the eyes and not the head.

**Figure ground perception:** The ability to distinguish the foreground from the background.

**Focal vision:** Provides attention to important features of an object for perception and discrimination.

**Form discrimination:** The ability to distinguish different types of forms

**Hyperopia:** Farsightedness; vision is blurred at near but not at a distance

**Hypertropia:** One eye turns up.

**Hypophoria:** One eye turns down.

**Lagophthalmos:** Defective closure of the lid.

**Myopia:** Nearsightedness; vision is blurred at a distance but not at near.

**Nystagmus:** Rapid rhythmic repetitious involuntary (unwilled) eye movements. Nystagmus can be horizontal, vertical or rotary

**Ocular dysmetria:** Difficulty controlling the range of voluntary movement of the eyes.

**Optokinetic reflex:** Activated during sustained movement and takes over the function of the vestibular ocular reflex (VOR).

**Oscillopsia:** Sensation that the world is moving.

**Optometrist:** A health care professional who is licensed to provide primary eye care services. An optometrist is a Doctor of Optometry, an O.D. (not to be confused with a Doctor of Medicine, an M.D.). To become an optometrist, one must complete pre-professional undergraduate college education followed by 4 years of professional education in a college of optometry. Some optometrists also do a residency.

**Ophthalmologist:** An eye doctor. A physician practicing ophthalmology. An ophthalmologist is an M.D.

**Pattern recognition:** Ability to identify shape, contour, general, and specific features of an object.

**Ptosis:** Drooping of the upper eyelid.

**Refraction:** Evaluation of the optical system of the eye.

**Refractive error:** Deviation from emmetropia.

**Retinopathy:** Pathology related to the retina.

**Saccade:** Abrupt rapid small movements of both eyes, such as when the eyes scan a line of print. The saccades can be divided into two distinct groups: the major saccades that are easily observed with the naked eye and the minor saccades that are virtually unobservable without special instrumentation.

**Scotoma:** Blind spot in the field of vision.

**Simultagnosia:** Inability to recognize a compound visual array.

**Smooth pursuit eye movement:** Those movements that keep an image steady on the retina; visual scanning.

**Spatial relations:** The ability to perceive the position of two or more objects in relation to the self and to each other.

**Stereopsis:** Three-dimensional vision.

**Strabismus:** Misalignment of the eyes.

**Top-down assessment:** Examines the client's performance in a particular occupational performance task as a way to understand possible underlying causes of poor performance.

**Topographagnosia:** Impairment in the interpretation of maps, house plans, etc.

**Topographical disorientation:** The inability to follow a familiar route or a new route once it has become familiar.

**Vergence:** Change in the relative position of the visual axes.

**Vergence system:** Aligns the eye to maintain binocular fixation and binocular vision.

**Visual acuity:** The clarity or clearness of the vision, a measure of how well a person sees. The ability to distinguish details and shapes of objects; also called central vision.

**Visual agnosia:** Inability to recognize visual stimuli despite adequate primary visual function such as acuity, oculomotor function, and visual fields.

**Visual analysis skills:** These skills contribute to the individual's ability to analyze and discriminate visually presented information, to determine the whole without seeing all of the parts, to identify more important features and ignore extraneous detail, and to use visual imagery to recall past visual information. It includes the ability of the individual to be aware of the distinctive features of visual forms including shape, size, color, and orientation.

**Visual cognition:** Highest level of visual skills integration within the nervous system; serves as the basis for academic activities; ability to mentally manipulate and integrate visual information to solve problems, plan, etc.

**Visual efficiency:** Refers to the effectiveness of the visual system to clearly, efficiently, and comfortably allow an individual to gather visual information at school, work, or play. The various component skills that are important in this process are called visual efficiency skills and include the subcategories of accommodation, binocular vision and ocular motility

**Visual extinction:** Inability or severe limitation in perceiving two objects displayed at once with an ability to process a single visual stimuli.

**Visual field:** Area of the visual system that allows an individual to orient to specific spatial areas.

**Visual inattention:** Decreased awareness of the body and spatial environment on the side contralateral to the cerebral lesion despite the absence of a specific sensory deficit; visual neglect.

**Visual spatial skills:** These skills allow the individual to develop normal internal and external spatial concepts and are used to interact with and organize the environment. They allow the individual to make judgments about the location of objects in visual space in reference to other objects and to the individual's own body.

**Visual motor skills:** These skills are related to the individual's ability to integrate visual information processing skills with fine motor movement. Another term for visual motor integration is eye-hand coordination.

**Visual spatial agnosia:** Inability to perceive spatial relationships between objects or between objects and self, independently of visual agnosia.

**Yoked prisms:** Prism that is used to affect the client's spatial and midline awareness.

## **Conclusion**

Chapter II is a review of literature, which is divided into the following sections: a) prevalence and statistics, deficits; b) multidisciplinary team; c) current standards of practice; d) proposed role of OT, evaluation, treatment, and; e) promotional packet.

Chapter II concludes by summarizing the literature and current research, presenting the literature in regard to the need and support for the role of occupational therapists with vision therapy for populations with ABI. Chapter III presents the methodology utilized for the research and development of *The Role of Occupational Therapy in Vision Therapy*. Chapter IV presents the introduction to the product and the product in its entirety. Chapter V is a summary of the literary sources and a proposition for the exploration of further evidence-based research for occupational therapists.

## CHAPTER II

### LITERATURE REVIEW

Acquired brain injury is a broadly used term due to the numerous ways a person may acquire a brain injury. The definition of acquired brain injury (ABI) can include both traumatic brain injury (TBI) which results from an external insult to the brain and cerebrovascular accident (CVA), also referred to as stroke, resulting from an internal insult to the brain (Ciuffreda, Kapoor, Rutner, Suchoff, Han, Craig. 2007). For purposes of this scholarly project the acronyms of TBI/ABI will be used interchangeably as both are referred to as such in the literature.

A brain injury can be caused at birth, in a traumatic experience such as a motor vehicle accident, from diseases and infections, and/or by other various etiologies. For many individuals, who sustain a TBI /ABI, the rehabilitation process typically consists of: 1) learning to use the body again such as with walking; 2) improving overall body strength and balance; 3) improving memory; 4) learning to use speech again; 5) re-learning appropriate behaviors and; 6) safety precautions. These are just a few of the typical interventions seen in the rehabilitation process for individual's diagnosed with brain injury. However, one significant aspect of rehabilitation seems to be overlooked quite often, which is vision.

Very few in the health care professions, including head trauma rehabilitation centers, are adequately aware of visual problems resulting from TBI/ABI and the visual-perception consequences. These visual deficits may lead to impaired

functioning in the person's daily activities and roles because vision affects all other functions. ([http://www.braininjuries.org/traumatic\\_brain\\_injury.html](http://www.braininjuries.org/traumatic_brain_injury.html) ¶ 1)

This limited awareness of visual perceptual problems "... creates a gap in rehabilitative services, resulting in incomplete treatment and frustration for the patient, family, and treatment team" ([http://www.braininjuries.org/traumatic\\_brain\\_injury.html](http://www.braininjuries.org/traumatic_brain_injury.html) ¶ 1).

Occupational Therapy's basic premise is to increase the independence of an individual in their daily activities and roles. An occupational therapists (OT's) training in the assessment, design and provision of effective interventions can be instrumental in the rehabilitation process of vision deficits and their impact on daily living. A few examples of activities of daily living (ADL's) and instrumental activities of daily living (IADL's) that may be impacted by visual deficits include but are not limited to: driving, eating, dressing, leisure participation (movies, reading, sports), and employment.

OT's are trained in the evaluation and treatment design specific to individuals diagnosed with TBI/ABI including; cognitive, visual perceptual, physical, and psychological in relation to activities of daily living. Occupational Therapy can be an important member of the multi-disciplinary team who is serving this population. Unfortunately, often both occupational therapists and members of a multi-disciplinary team are not always clear on the role and protocol of OT's in the provision of treatment interventions specific to TBI/ABI and visual deficits. The purpose of this review of literature is to:

1. Identify and present the relationship between TBI/ABI and vision,
2. Identify and present the general protocols and best practice guidelines for this specific population for vision therapy.
3. Present the members of a comprehensive treatment team



4. Clarify and present the role of OT in a multidisciplinary team for the visual rehabilitation process for this population.
5. Present general OT treatment and interventions for visual deficits involved with this population.

The result of this is the development of an education resource to be used to inform other team members and other OT's about occupational therapy's potential role on the team and in service provision.

## **Traumatic Brain Injury/Acquired Brain Injury**

### **Prevalence and Statistics**

Approximately 8 million people per year suffer a TBI in the United States (Ciuffreda, Kapoor, Rutner, Suchoff, Han, & Craig, 2007). In the general population, 2 in 1000 people obtain a TBI with an even greater frequency resulting from the recent war in Iraq, and only 50% of these individuals will return to the workforce (Rutner, Kapoor, Ciuffreda, Craig, Han, & Suschoff, 2006). Similar results were found concerning the CVA population with approximately only 50% of these individuals returning to the workforce with slight, if any remaining disabilities (Ciuffreda, et al., 2007). With a rise in the occurrence of TBI/ABI, it is significant for healthcare providers to become more aware of the related economic and social effects and rehabilitative needs of this population in order to produce increased independence and function in daily living.

According to Mckenna, Cooke, Flemming, Jefferson, & Ogden (2006), statistical findings related to numbers of individuals diagnosed with TBI in the United States is in accordance with that of other Westernized countries, with TBI being one of the major sources of moderate-to-severe disability in western society. Around 500,000 people sustain a stroke in the United States per year (Ciuffreda, et al., 2007). Many of these stroke

survivors necessitate long-term care for months and even possibly years of rehabilitation and health services.

Due to consequences of a TBI, individuals are unable to return to the workforce resulting in a national economic loss estimated at \$4 billion in lost productivity (Ciuffreda, et al., 2007). The resulting estimated annual economic loss due to a CVA is between \$30 and \$40 billion in combined cost of productivity loss and medical care expenses (Kapoor, Ciuffreda, & Han, 2002). There are various reasons for the significant costs to the individual, their families and to society in general. The majority of these reasons can be placed under one umbrella term, deficits.

### **Deficits**

Vision is one of the most significant senses for humans because vision alone can affect all other functional activities of daily life. According to Ciuffreda, et al., (2007), half of the cranial nerves relate to vision. The skills of visual processing involve the assimilation and organization of visual data and include analysis and integration of the visual context. This ability to analyze and integrate the environmental context is predominately important when the environment contains unknown, abstract and complex visual data, or circumstances resulting from partial obscured vision.

The number of incidences of TBI/ABI is increasing, and many of these individuals are not being treated for visual dysfunctions (Ciuffreda, et al., 2007). For those who have a TBI, it is common to have vision disturbances with prevalence varying from 30% to 85% depending on the condition (Kapoor, Ciuffreda, & Han, 2002). The majority of vision problems associated with individuals, diagnosed within this population, are related to

oculomotor dysfunction. Occurrence of oculomotor dysfunction varies from 40% to 85% of those affected with acquired brain injury (Kapoor, Ciuffreda, & Han, 2002).

The oculomotor system comprises of the accommodative, vergence, and versional systems. Indications of oculomotor dysfunction are often times varied and may consist of difficulty following targets, vision blur, diplopia, asthenopia, and oculomotor-based reading issues (Ciuffreda, et al., 2007). Kapoor, Ciuffreda, & Han, (2002) indicate that insufficiencies in oculomotor function may also “include jerk and pendular nystagmus, increased fixational drift, saccadic dysmetria, increased saccadic latency, and reduced pursuit gain, as well as others” (p. 1667). The findings according to a recent retrospective analysis report that the incidence of oculomotor dysfunctions in the acquired brain injury populace is considerably greater than found in that of their non-ABI cohort (Ciuffreda, et al., 2007). Ciuffreda, et al., (2007) stated that, “if some type of an oculomotor dysfunction is not found after careful and comprehensive testing, it is unexpected and represents an exception to the rule” (p. 158).

All aspects of daily life can be influenced when visual perceptual deficits are found in conjunction with cognitive impairments. This combination also presents serious safety concerns for the individual and may affect the individual’s ability to participate in and gain from the rehabilitative process (William, 1995). According to Boyd and Dawson (2000) “Patients with visual perceptual impairments demonstrate higher emotional distress and increased risk of injury than patients without these impairments” (p. 16).

The deficits add considerable complexity to the needs of the individuals. It is important to note that visual perceptual problems may take place in conjunction with motor planning impairments and attentional problems (Mckenna, et al., 2006). Their ability to

regain independence and function is dependent on the design and implementation of effective standards of practice by an effective multi-disciplinary team.

### **Multi-disciplinary Team**

The goal of restoring and maintaining functional independence, in individuals with vision loss, is an involved process that entails the use of a multi-disciplinary team. The composition of the treatment teams will vary and is dependent on the needs of the individual client. In this section, the common team members will be identified and described in regard to their role and contribution.

Ophthalmologists are medical doctors with a specialization in the functioning of the eye and eye diseases. They can diagnose eye conditions and perform eye surgery. Ophthalmologists perform formal low vision evaluations that assess areas such as contrast sensitivity function, visual acuity, and macular perimetry (Warren, 1995). An ophthalmologist's initial education is similar to that of any other medical doctor; however, the study of disease is emphasized further for the ophthalmologist. Rehabilitative approaches for visual deficits using lenses, prisms and other devices is not considered a pertinent aspect in the training of an ophthalmologist (Scheiman, 2002).

Optometrists are not medical doctors. They are eye care professionals that specialize in diagnosis and management of eye conditions that do not require surgery. Schieman (2002), defines an optometrist as a

primary health care provider who specializes in the examination, diagnosis, treatment, and management of diseases and disorders of the visual system, the eye, and associated structures, as well as the diagnosis of related systemic conditions (p. 3).

The educational programs for optometrists include education on disease with a larger emphasis on the concept of vision and its relationship to contexts such as play,

school, work, and leisure activities (Scheiman, 2002). These professionals are taught to evaluate and diagnose visual conditions that interfere with performance which can affect the quality of life and how the visual system is directly related to the environment as well as rehabilitation using lenses, prisms, low vision devices, and vision therapy (Schieman, 2002). Scheiman (2002) indicates that optometrists who provide vision rehabilitation services in practice have frequently completed additional residency training or passed a comprehensive examination that assesses their level of expertise.

Other professionals involved in the rehabilitation medicine field of persons with ABI vision disturbances are neuro-ophthalmologists and neuro-optometrists. According to Zelinsky (2007)

the neuro-ophthalmologist specializes in locating a disease or disruption of a structure in the visual pathways. The neuro-optometrist works with brain function, such as sensory, motor, and information processing, and specifically, with the perception of external and internal stimuli. Both structure and function can have a role in rehabilitation following TBI (p. 88).

Formal low vision evaluations, performed by an ophthalmology professional, consist of assessments of contrast sensitivity function, visual acuity, and macular perimetry (Warren, 1995). Gianutsos, Ramsey, and Perlin (1988) state that

rehabilitative optometric examination should be a standard part of diagnostic evaluation and treatment for most survivors of severe brain injury. We now believe that the issue which arises should be not whether but when to begin this process (p. 578).

Once the referral for Vision Therapy has been received, the implementation of the therapeutic interventions, including or excluding devices, is the responsibility of a multi-disciplinary team. The recommendation and prescribing of vision therapy training is the responsibility of an ophthalmologist, optometrist, or low vision practitioner (Markowitz,

2006). Scheiman (2002) advises that direct supervision and guidance by the optometrist is essential, and it is recommended that vision therapy techniques should be attempted by therapists who are under direct supervision of an optometrist, which includes occupational therapy. Mitchell Scheiman, who is an optometrist and author, specializes in vision therapy and is the founder of Vision Education Seminars, a company devoted to developing and presenting continuing education programs about vision to occupational therapists.

### **Current Standards of Practice**

For many patients who have sustained a brain injury, vision therapy is a pertinent part of the rehabilitation process (Scheiman, 2002). Scheiman (2002) defines vision therapy as;

...an organized therapeutic regimen utilized to treat a number of neuromuscular, neurophysiological, and neurosensory conditions that interfere with visual function. Vision therapy encompasses a wide variety of procedures to improve a diagnosed neuromuscular or neurophysiological visual dysfunction (p. 352).

Vision therapy contains different levels of rehabilitation and techniques that can be administered and modified to meet the specific needs of the individual client. Vision therapy procedures are organized and presented in a sequential order, beginning with gross motor movements moving into fine motor movements, which is the foundation in which visual skills develop. This therapy technique also provides a basis of body schema and laterality to the patient (Scheiman, 2002). There are specific types of therapy within the broad scope of vision therapy. One example of a specific type of vision therapy is ocular motor therapy, which emphasizes difficulties in visual attention, saccadic fixations, and scanning as well as smooth and efficient pursuit movements (Scheiman, 2002).

Optometrist, Scheiman (2002) presents the following important guidelines when using vision therapy to treat patients with acquired brain injury:

1. Obtain visual attention before initiating the therapy procedure
2. All techniques should provide feedback to the patient
3. Work at the level of the patient's current performance
4. Progressively increase the demand of the technique
5. Integrate the visual skill into activities of daily living (p. 192)

There are many aspects, skills and techniques to be utilized within the realms of vision therapy. It is an expansive therapeutic technique that requires knowledge, time and understanding to be able to apply in practice and make unique to each patient. Adaptations and compensatory techniques may also be necessary depending on the severity and type of neurologic injury and recovery. Scheiman (2002) states

the sequence of therapy techniques is based on clinical judgment but needs to begin at the level which the patient can succeed. The key to success is to work at the level of the patient's current performance and gradually increase the demands of the tasks (p. 193).

Often times, clinicians do not start the vision therapy process or visual evaluations until 6 to 12 months post-injury due to the belief that "vision changes over time" (Scheiman, 2002). Although vision can change over a period of time, it is pertinent to administer vision therapy techniques early in the rehabilitation process to address current visual concerns and adjust the rehabilitation as the vision changes, such as beginning with the use of lenses, prisms, occlusion and consultations (Scheiman, 2002).

### **Optical Devices**

Corrective vision therapy efforts usually make use of lenses, patching, prisms, and other therapeutic interventions to increase vision functions (Riggs, Andrew, Roberts, & Gilewski, 2007). Treatment may also include preparation and instruction in the use of optical devices (Warren, 1995). According to Markowitz (2006) low vision devices used to enhance remaining visual function or used in vision therapy include: "magnifying

spectacles, telemicroscopes, hand magnifiers, stand magnifiers, electro-optical magnifiers such as closed-circuit televisions (CCTV) and telescopes, and nonoptical devices such as color filters or illumination devices” (p. 341).

The proper magnifier is decided by the eye physician, client, and occupational therapist. The occupational therapist then helps to train the client in the use of the vision aides in functional performance areas such as reading books, prescriptions, and bills. The therapists may also provide training with the use of a closed circuit television (CCTV) which offers a wide range of magnification (Wolter & Preda, 2006).

Recommendations may be made by the clinician concerning the use of prisms on certain conditions such as visual field loss, binocular vision deficits, and visual inattention (Wolter & Preda, 2006). According to Padula, (1992)

Detailed notes should be made with regard to motor capabilities or other functions so that the therapist can report back to the clinician. The end result will be a more detailed understanding of the effects of lenses and prisms and how behaviors may be changed (p.7).

Fusional prism spectacles may be used to lessen the symptoms of diplopia and yoked prism spectacles may be prescribed for visual-spatial or hemispheric inattention, with or without a manifest visual field defect, as appropriate (Kapoor & Ciuffreda, 2002).

Ocular exercises are used to aid the client with enhancing function and increasing residual vision as well as increasing perception of the client’s visual deficits (Schlageter, Gray, Hallk, Shaw, & Sammet, 1993). Schlageter, et al., (1993) stated that

vision exercises are most frequently recommended to address oculomotor disorders, diplopia and partial vision loss. Various exercises are designed to specifically target paretic muscles or to incorporate the use of lenses or prisms into an activity to encourage the interaction between the sensory and motor systems (p. 440).



Pursuits and saccades exercises may be performed by tracking a moving target and alternating gaze between two objects or with both eyes from a distance of 14-16 inches from the face (Wolter & Preda, 2006). A few of these emerging programs and technologies are presented in the following sections.

### **Emerging Programs**

There are programs emerging and it is predicted that within the next few years there will be significant growth in this practice area. Much of this can be contributed to the significant complex injuries that have occurred with our service men and women who are returning injured from war. Zolton (2007) states that,

until recently, rehabilitation focused on restoration of motion and compensation for lost functional skills, Visual, perceptual, and cognitive deficits, noted for many years to exist as a result of ABI, have only recently been acknowledged as a cause of continued confusion and lack of rehabilitation progress in many clients even though motor skills have returned (p. 1).

**SmartSight:** Markowitz (2006) indicated that “a recent initiative from the American Academy of Ophthalmology called SmartSight is an attempt to define a standard of practice in this area for all ophthalmologists” (p. 309). Optometric vision therapy can impart a positive impact on the individuals overall quality of life who have a TBI/ABI, in addition to improving related symptoms and oculomotor deficits through vision therapy (Ciuffreda, Rutner, Kapoor, Suchoff, Craig, & Han, 2008). According to Sabel and Kastner (2000);

through a complex neuronal network of lateral interactions and feedback connections, visual information can reach many areas of the brain through alternative routes, thus providing a structural basis of reorganization and plasticity. Therefore, the visual system, previously considered to be hard-wired, possess a remarkable plasticity to adapt to short-term as well as long-term demands (p. 431).

***Vision Restoration Therapy:*** Vision Restoration Therapy (VRT) is a novel computer-based technology that reduces vision loss caused by stroke and brain trauma that is coming on the horizon. NovaVision promotes VRT and collaborates with leading neurologists, neuro-ophthalmologists and ophthalmologists at leading institutions (<http://www.novavision.com>). Clinical results of VRT are positive: 65 percent of more than 500 patients who underwent VRT for an initial six month treatment period showed measurable improvements in their vision (<http://www.novavision.com>). VRT is based on the principle of neuro-plasticity—the ability of partially damaged neurons in the brain to compensate for injury and adjust their activity in response to stimulation from the environment.

Efforts are being made at this time to address the limited practice guidelines for eye care practitioners in regard to visual perceptual skills. A review of the literature indicates there are no clear standards of practice for the individuals who have experienced a traumatic brain injury in correlation with visual disturbances. There are recommended approaches and emerging interventions that have yet to be formulated into a comprehensive, consistent standard of practice. This results in the need for professionals to look to their professional standards of practice and academic preparation to add clarity to the roles and skills they can bring to this practice area.

### **Proposed Role of OT**

Occupational therapists (OTs) and Occupational therapy assistants (OTAs), involved in vision rehabilitation therapy, assist individuals in developing improved performance of specific activities of daily living by enhancing skills, environmental assessments, promoting safety awareness, orientation and functional mobility. Individuals

with visual perceptual deficits due to a brain injury can display decreased independence with self-care and functional independence (Cate & Richards, 2000). According to Pazell (1998, p. 38 ) treatment interventions/modalities that may be appropriate for occupational therapy in the visual rehabilitation setting includes:

- Visual screening and skills training
- Activities of daily living (ADL) (re)training
- Compensatory techniques for ADLs
- Visual scanning training in ADLs
- Visual skills training in ADLs
- Cognitive-behavioral training
- Adaptive equipment provision/modification/training
- Functional mobility training during ADL self-care
- Activity tolerance training
- Biofeedback training during ADLs
- Training in activity analysis
- Ergonomic modifications
- Training in postural awareness in ADLs
- Balance training in ADLs
- Fall safety training
- Patient/caregiver safety training
- Upper body range of motion training
- Therapeutic exercise training
- Home program provision and training

Scheiman (2002) states:

occupational therapists generally use activities of daily living to improve function, while optometrists work directly with the affected function. Optometrists test and treat disorders of the peripheral visual system, such as eye movements, accommodation, and binocular vision. Occupational therapists may screen for these disorders but do not generally treat them, with the exception of some work with eye movements. Optometrists stress the predominance of the visual system in treatment, while occupational therapists stress the importance of the vestibular system and proprioceptive system and how they are organized and processed (p. 4).

After the ophthalmology evaluation is completed, a medical prescription for occupational therapy services is written by the attending ophthalmologist. Warren (1995) states that,

The prescription includes the level of visual impairment, the diagnosis, a description of services to be provided by the therapist, the patient's rehabilitation potential, medical precautions, frequency and duration of therapy, and any additional information needed to enable the therapists to establish and carry out treatment. The physician may provide additional information regarding the required magnification level based on acuity measurements and advise on the correct optical devices for treatment (p. 879).

Because of the multiple body systems affected by a brain injury and the strong likelihood of secondary impairments, an occupational therapist must be proficient in a wide variety of evaluation procedures and intervention techniques.

### **Evaluation**

A wide array of assessment tools and screening procedures are utilized by occupational therapists to measure functional impairment and visual capabilities in individuals with acquired brain injury (Cooke, Mckenna, & Fleming, 2005). The evaluation also determines how the individual will use the remaining or residual vision to the best of their capabilities in the participation of their daily activities (Warren, 1995).

Warren (1993) affirms that traditional test methods that measure visual acuity do not fully describe the visual capability of a person. Furthermore, traditional tests do not necessarily correspond to the person's visual experiences with the environment. According to Warren (1993)

a standard acuity test only measures the ability to see a black car against a white snowbank at midday. It does not measure the ability to see a gray care against a concrete building under cloudy conditions or to pick a face out of a crowd of people who are the same race (p. 45).

An assortment of available standardized assessment batteries that test visual perceptual skills include:

1. The Ontario Society of Occupational Therapists Perceptual Evaluation (OSOT);
2. The Rivermead Perceptual Assessment Battery (RPAB);
3. The Cerebral Vascular Accident (CVA) evaluation battery of St. Marys Hospital;
4. The Chessington Occupational Therapy Neurological Assessment Battery (COTNAB);
5. The Loewenstein Occupational Therapy Cognitive Assessment (LOTCA);
6. The Baylor Adult Visual Perceptual Assessment;
7. The LOTCA-G (Geriatric version of the LOTCA)  
(Cooke, Mckenna, & Flemming, 2005)

According to Cooke, Mckenna, and Flemming (2005) significant advancements have been achieved in the standardization, validation, and development of tools for assessment and documentation of visual perceptual capacity for the occupational therapy profession utilizing the functional task observation method and tabletop methods.

### **Functional Capabilities**

There are several areas that the occupational therapists will assess to determine the clients functional capabilities, these areas include but are not limited to: 1) visual-perception; 2) motor planning and processing; 3) psychological; 4) safety; 5) cognitive skills and; 6) functional independence.

**Visual Perception:** “Visual perception is viewed on an information-processing continuum involving the reception, organization, and assimilation of visual information” (Pascale-Toglia, Golisz, & Goverover, 2008, p.759). According to Pascale-Toglie, et al., (2008) visual perceptual problems can have a devastating effect on the individual’s ability to participate and independently complete self care skills. They can often experience:

1. unstable orientation in space, so objects, the walls and floors can be perceived to be moving and/or shifting.
2. difficulty with object localization and visual judgments in space
3. inability to sustain visual attention
4. poor visual memory
5. problems with depth perception which affects the ability to judge the position of objects.
6. functional tasks such as finding items in a crowded closet, drawer, or supermarket shelf and locating information on a bill, map or schedule may present difficulty (Pascale-Toglia, et al., 2008, p. 760).

As stated prior:

Very few in the health care professions, including head trauma rehabilitation centers, are adequately aware of visual problems resulting from TBI/ABI and the visual-perception consequences. These visual deficits may lead to impaired functioning in the person's daily activities and roles because vision affects all other functions. ([http://www.braininjuries.org/traumatic\\_brain\\_injury.html](http://www.braininjuries.org/traumatic_brain_injury.html), ¶ 1)

This limited awareness of visual perceptual problems "... creates a gap in rehabilitative services, resulting in incomplete treatment and frustration for the patient, family, and treatment team" ([http://www.braininjuries.org/traumatic\\_brain\\_injury.html](http://www.braininjuries.org/traumatic_brain_injury.html) ¶ 1).

***Motor Planning and Processing:*** Motor planning and processing is the ability of individuals to figure out how to get their body to do what they want it to do (Pascale-Toglia & Golisz, 2003, p. 407). It involves a number of different processes such as; vision and perception, cognition and language.

***Psychological:*** Personality and behavioral changes often occur following a TBI/ABI. The individual's behavior is observed during functional tasks to assess his or her behavioral, emotional and personality changes. The psychological changes are also a contributor to caregiver stress and definitely have a negative impact on the client's ability

to maximize independence in functional tasks and occupations. The possible psychological issues could include, but are not limited to:

1. attention and concentration problems, low frustration tolerance, and fatigue (Iverson, Woodward, & Smith-Seemiller, 2000),
2. lack of awareness of deficits/denial causing safety issues,
3. disinhibition of inappropriate behavior,
4. depression
5. change in family and societal roles
6. management of agitation
7. difficulty with community reintegration and adaptation

Identification of any of these behaviors will consequently be addressed in treatment.

Owing to behavioral difficulties, the occupational therapist must also possess strong interpersonal skills, be able to react quickly and effectively to suddenly changing situations, and have keen observation skills.

***Safety:*** When combined with visual perceptual deficits serious safety concerns emerge for the individual and may affect the individual's ability to participate in and gain from the rehabilitative process (William, 1995). This becomes an issue in regard to home assessment and functional mobility. According to Boyd and Dawson (2000, p.7), "patients with visual perceptual impairments demonstrate higher emotional distress and increased risk of injury than patients without these impairments."

***Cognitive:*** All aspects of daily life can be influenced when visual perceptual deficits are found in conjunction with cognitive impairments.

***Functional Independence:*** OT's look at the client's functional capabilities in each individual area presented prior but also holistically to see how the person is impacted in their daily living skills and instrumental activities of daily living. The evaluation information must also include how the person functions in areas such as:

1. bathing, grooming, oral hygiene and showering
2. toileting
3. dressing
4. eating
5. medication management
6. functional mobility

This multifaceted approach covers assessments of the home setting, school, and workplace to further improve environmental factors, such as glare, that may be problematic for the individual. The initial evaluation determines the route of occupational therapy intervention. Scheiman (2002) indicates that:

Occupational therapists may perform daily therapy techniques prescribed by the optometrist and, most importantly, can help the patient generalize visual skills into daily living activities as well as assist in adaptations (p. 192).

### **Treatment**

A treatment plan is developed by the occupational therapist when rehabilitation potential is determined to be present. Careful consideration is given to the location of treatment sessions and the most contextually pertinent environment is utilized for the client. The treatment environment may include the community, clinic, or the client's home. The patient, in addition to being taught how to use optical devices, is educated by the OT on how to manipulate environmental features including background contrast, lighting, arrangement of furniture, modifying of tools, utensils, food, and writing materials in order to maximize independence and use of remaining vision (Warren, 1995).

The OT works with the client to develop, organize and implement plans to enhance visual performance (Markowitz, 2006). This process begins with the selection of a rehabilitation task that is most important to the client at that time. The therapist and the client establish functional and attainable goals for improving limitations as well as



determining the procedure and time frame for treatment (Warren, 1995). Goal focus areas may include but are not limited to:

1. Community reintegration,
2. Maximizing cognitive abilities in natural environments by teaching compensatory and adaptive cognitive strategies that optimize the areas of orientation, attention and memory,
3. Optimize visual-perceptual functioning and abilities through environmental adaptations, compensatory techniques and assistive devices,
4. Restore competence in ADL and IADLs,
5. Participation in previous or new leisure activities,
6. Patient and family education and support

The focus of occupational therapy is on training individuals how to use their residual vision as efficiently and effectively as possible. The ultimate goal is independence in activities of daily living and instrumental activities of daily living. Warren (1995) affirms six areas concerning activities of daily living and instrumental activities of daily living are usually attended to in the treatment plan (p. 881):

1. Efficient and effective use of optical devices to read materials needed for daily living
2. Ability to write legibly to complete communications needed for daily living
3. Ability to complete financial transactions and manage financial affairs independently
4. Ability to complete self-care and homemaking activities with optimum efficiency, independence, and safety
5. Ability to engage in leisure and community activities
6. Functional adaptations and modifications

Multiple-treatment approaches from the use of optical devices and ADL training to home modifications are being applied to individuals with an acquired brain injury as awareness of visual issues grows.

#### Functional Adaptations & Modifications

Therapeutic options often include environmental adaptations, which may include:

1. Making functional adaptations to the home that include replacing heavily patterned tablecloths and floor rugs with solid colors to aid in the identification of objects and decreasing fall risk.
2. Using memory aids
3. Organizing the environment
4. Developing routines
5. Visual acuity deficits may be aided with the use of marking and labeling switches, dials, or keyholes with low-cost items such as paint, colored tape, and Velcro.
6. A therapist may also aid a client in arranging the living space for accessibility purposes and ease of task performance (Wolter & Preda, 2006).
7. Lighting is an important consideration and an OT can provide training for the individual on different lighting options for a variety of tasks.
8. A therapist may also suggest the use of enlarged text items and large button phones as well as talking clocks to aid in independence and safety (Wolter & Preda, 2006).
9. Coping strategies

With occupational therapists extensive training and knowledge of the cognitive, sensory, psychological, and physical aspects of disability it is fitting that occupational therapists be a member of the vision rehabilitation team to improve or maintain independent function in daily life (Kapoor & Ciuffreda, 2002).

### **Promotional Packet: The Role of OT in Vision Therapy**

There are two parts to this promotional packet which includes an:

1. Educational brochure, *Through the Eyes of Traumatic Brain Injury / Acquired Brain Injury: The Role of Occupational Therapy in Vision Therapy*. The brochure is designed to provide very basic information primarily to the other members of the vision team as well as occupational therapists who wish to enter this practice area. It is a method to introduce the information in a quick and concise manner.
2. The second is a more in depth educational packet entitled, *Through the Eyes of Traumatic Brain Injury/Acquired Brain Injury: An Informational*

*Resource on the Role of OT.* This packet expands on the information if a member of the vision team would like to learn more or an OT. The

Promotional Packet includes information on the following:

- The potential role of the occupational therapist in visual rehabilitation of individuals with an ABI.
- Visual deficits commonly treated by occupational therapists
- OT screenings, evaluations and treatments for visual deficits for clients with ABI.
- Information on the American Occupational Therapy's Association Certification Program in Low Vision. The certification outlines the standards for professional competency that OT practitioners seeking to practice in the field of low vision rehabilitation will need to demonstrate" (Markowitz, 2006).
- Additional education preparation information for Occupational therapists need to have additional postgraduate preparation on ocular pathology, treatment, and the application of optical devices to practice in the specific area of low vision rehabilitation. This additional expertise may be gained by directly working with an ophthalmologist or optometrist that specializes in vision therapy. Further knowledge may be acquired by reading books on vision therapy and attending education courses (Warren, 1995).

The occupational therapists role, as a member of the rehabilitation team is versatile, due to being skilled in the execution and development of treatment plans that aid in the functional independence of individuals in all areas including self-care, leisure activities, and work (Markowitz, 2006).

## **Theory**

*The Role of Occupational Therapy in Vision Therapy*, was developed based upon the Adult Learning Theory, developed by Malcom Knowles. The application of this theory was essential since this product is an educational resource for practicing occupational therapists and other medical professionals, who are the targeted adult learners in this process. Knowles' Concept of Andragogy describes and conceptualizes the way in which

adults learn, which is different from the way in which children learn. It describes five characteristics of adult learning as:

1. **Self-concept:** As a person matures his or her self concept moves from one of being a dependant personality towards one of being a self-directed human being. This self-direction is essential if the person wishes to be a life-long learner who wants to continue to build and expand on their competency in this field of practice. This is pertinent to the OT who wishes to practice in vision therapy as well as the other members of the health care team who wish to expand their knowledge and services for the good of the client.
2. **Experience:** As a person matures he or she accumulates a growing reservoir of experience that becomes an increasing resource for learning; therefore, prior experiences may support the interest and motivation to explore the role of OT in visual rehabilitation.
3. **Readiness to learn:** As a person matures his or her readiness to learn becomes oriented increasingly to the developmental tasks of his social roles. Focus and interest to learn additional methods increases, which ultimately benefits the client.
4. **Orientation to learning:** As a person matures his or her time perspective changes from one postponed application of knowledge to immediacy of application, and accordingly his or her orientation toward learning shifts from one of subject-centeredness to one of problem centeredness. The professional becomes aware of problems not being addressed or incompletely addressed by current treatment and can see the need to expand treatment options for the clients benefit.
5. **Motivation to Learn:** As a person matures the motivation to learn is internal. There is a personal drive to add to his or her level of knowledge, which includes obtaining information from other professionals.

## **Conclusion**

***Through the Eyes of Traumatic Brain Injury/Acquired Brain Injury: An Informational Resource on the Role of OT*** is the result of a concentrated literature review on visual/perceptual deficits in the role of vision therapy in relation to occupational therapy. “Visual disability does not refer to the condition of the eye but to the ability of the person as a whole” (Colenbrander & Fletcher, 1995, p. 866). This means that with a visual disability, the client may present with deficits in motor planning, physical deficits, sensory disturbances, cognitive impairments, problem solving, language/communication, and

emotional disturbances. These areas cannot be treated solely by a vision therapy specialist and may require other rehabilitation professionals such as occupational therapists, physical therapists and speech therapists.

Occupational therapists are specifically trained in all the areas as they impact functional skills and abilities in the client's daily functioning. Occupational therapists have the proficiency and competence to evaluate and depict the functional disability or ability of the ABI client as a whole. Occupational therapists have the proficiency and competence to evaluate and depict the functional disability or ability of the ABI client as a whole. This resource is a means that occupational therapists can use to educate others further on the use of the role of occupational therapy in the provision of vision therapy with the ABI populace. The methods used in the development of the product *Through the Eyes of Traumatic Brain Injury/Acquired Brain Injury: An Informational Resource on the Role of OT* are presented in Chapter III.

## CHAPTER III

### METHODOLOGY

The intent of this *Promotional Packet: The Role of OT in Vision Therapy* is to notify and educate occupational therapists and clinicians of the role occupational therapy has in optometric rehabilitation for visual conditions related to acquired and traumatic brain injury. The research literature confirms that rehabilitative optometric intervention should be offered as a probable option for evaluation and treatment in a multi-disciplinary setting that offers occupational therapies skilled services as part of the treatment team.

#### **Overview**

The literature review has determined that the number of incidences of traumatic or acquired brain injury is increasing, and many of these individuals are not being treated for the resulting visual dysfunctions (Ciuffreda, Kapoor, Rutner, Suchoff, Han, Craig, 2007). For those who have a traumatic brain injury, it is common to have vision disturbances with prevalence varying from 30% to 85% depending on the condition (Kapoor, Ciuffreda, & Han, 2002).

A review of the literature also indicates there are no clear standards of practice for the individuals who have experienced a traumatic brain injury in correlation with visual disturbances. There are recommended approaches and emerging interventions that have yet to be formulated into a comprehensive, consistent standard of practice. The literature

review specified that all aspects of daily life including vision, arousal, attention, language, memory, abstract thinking, information processing, judgment, sensory abilities, perceptual abilities, and psychosocial behavior can be influenced when visual perceptual deficits are found in conjunction with a brain injury (Scheiman, 2002).

Research also supported that occupational therapists are trained in the evaluation and treatment design specific to individuals diagnosed with TBI/ABI including; cognitive, visual perceptual, physical, and psychological in relation to activities of daily living. Occupational Therapy was found to be an important member of the multi-disciplinary team who is serving this population. Unfortunately, it has been determined that often both occupational therapists and members of a multi-disciplinary team are not always clear on the role and protocol of OT's in the provision of treatment interventions specific to TBI/ABI and visual deficits.

## **Methodology**

This topic became an area of interest due to an assignment in a prior course. The assignment was to develop a beneficial program plan for an existing business located in the area. The program plan initially began as a treatment program for children with brain injuries. A main issues with the initial program plan designed was that it was not supported by the population in the area. The program plan was then changed to treatment for all individuals with brain injuries, regardless of their age. This was still not enough to develop an entire rehabilitation program plan. The brain injury population was then researched further, and a significant need for this population was discovered. It became relevant that individuals with brain injuries often have concurring visual deficits that are not addressed in the rehabilitation process. It was then, this program plan developed into a

visual rehabilitation program for individuals with brain injury. Because of this program plan assignment, an increased interest in visual rehabilitation individuals with brain injury became apparent. The questions was then asked, how occupational therapy can become more involved in the treatment and rehabilitation of this unique population.

After an initial review of the topic, the occupational therapy students realized the importance of vision and its impact in functional daily living skills and activities. Speculation began on how occupational therapy services correlate with the needs of individuals with visual deficits. Both students also had an interest in the patient population of individuals with brain injury.

The process began by determining if there was a relationship between persons with brain injury and visual deficits, and if there was a large enough population to support the need for this product. The methods used to gather the information for the construction of the Promotional Packet: The Role of OT in Vision Therapy consisted of a concentrated literature review. This review examined the role of occupational therapy with regard to vision therapy in the acquired and traumatic brain injury populace. It was also necessary to identify current standard best practices and protocols and the potential role of OT identified. TBI/ABI visual perceptual deficits were identified and compared to OT training to ensure OT's are qualified to meet the unique needs of this population. The other roles of multi-disciplinary team members were explored to see the possible areas OT could address or where an OT's specialized training could strengthen the rehabilitative treatment intervention. The literature review conducted attained information from professional literary sources, professional journal articles, and professional websites.



The purpose of this literature review was to:

1. Gain a greater understanding of the relationship between TBI/ABI and vision
2. Present the members of a comprehensive treatment team as well as current Standards of Practice for evaluation and intervention used with this population.
3. Establish the role of OT in a multidisciplinary team for the visual rehabilitation process for this population.
4. Present OT treatment and interventions for visual deficits involved with this population.
5. Develop a product that can be used to inform OT's and other team members of OT's potential role on the team and in service provision.

Occupational therapy frames of references and theories were then reviewed to determine application to this topic. Several theoretical models were chosen to assist in development of the product. The use of the adult learning theory and Malcolm Knowles' theory of andragogy helped to build the product, along with the use of constructivism. The adult learning theory is based on five principles being: 1) self-concept, 2) experience, 3) readiness to learn, 4) orientation to learning, 5) motivation to learn. The theory of andragogy is used to support adult learning, due to Knowles' Theory of andragogy determining adults and children learn differently. The 'experience' portion of the adult learning theory is expanded on with use of constructivism, as it focuses on experience as a way of learning.

The determination to design two separate pieces of this project was based on the need to provide awareness of the topic and basic information in a quick and concise manner to inform health care professionals, including occupational therapists, involved with patients with visual deficits.

The informational packet was developed because it is necessary to provide occupational therapists and other healthcare professionals information on the role of

occupational therapy in visual rehabilitation for individuals with brain injury. To provide occupational therapists with basic information about the population, assessments, evaluations, treatment options, continued education and other resources for additional information. The complementary informational packet was developed from the significant information and findings in the literature review. The determination to develop a brochure was to promote the informational packet. It highlights the broad topics of information that can be found in the informational packet, which contains all the pertinent details displayed on the brochure.

The outcome of this review was the development of the product *Through the Eyes of Traumatic Brain Injury/Acquired Brain Injury: An Informational Resource on the Role of OT*. The product also includes of a brochure entitled; *Through the Eyes of Traumatic Brain Injury / Acquired Brain Injury: The Role of Occupational Therapy in Vision Therapy*. The brochure provides basic information to include common visual deficits associated with TBI and professional literary and expert resources. It also provides information on medical professionals included on the visual rehabilitation team, and how occupational therapy can play a significant role in the rehabilitation process.

The result is the product, *Through the Eyes of Traumatic Brain Injury/Acquired Brain Injury: An Informational Resource on the Role of OT* was developed from the review of literature and is proposed to be used as a resource that occupational therapists can use to:

1. Educate others further on the use of the role of occupational therapy in the provision of vision therapy with the ABI populace.
2. Provide information on visual deficits commonly treated by occupational therapists.
3. Provide information on available OT screenings, evaluations and treatments for visual deficits for clients with ABI.
4. Provide information on the American Occupational Therapy's Association Certification Program in Low Vision and,

5. Offer additional education preparation information for Occupational therapists need to have additional postgraduate preparation on ocular pathology, treatment, and the application of optical devices to practice in the specific area of low vision rehabilitation.

## CHAPTER IV

### INTRODUCTION

After years of training to become occupational therapists, these occupational therapy students realized the importance of vision and its impact in functional daily living skills and activities. The occupational therapy students began speculating how occupational therapy services correlate with the needs of individuals with visual deficits. Both students also had an interest in the patient population of individuals with brain injury.

Research began by finding if there was a relationship between persons with brain injury and visual deficits, and if there was a large enough population to support this product. Through extensive research, the students found there is a large population of individuals with brain injury in the United States, which has increased due to the current war in Iraq. Common research results also showed a significant relationship between brain injury and visual deficits, and many persons with brain injury obtain rehabilitation services which often do not include treatment for vision.

The purpose of the product, *Vision Therapy Promotional Packet: Through the Eyes of Traumatic Brain Injury/Acquired Brain Injury: An Informational Resource on the Role of OT*, is to define the role of the occupational therapist in the realm of vision therapy for clients with acquired brain injury (ABI) or traumatic brain injury (TBI). This small handbook is aimed toward the use of occupational therapists; however, it is not limited specifically to the profession. This product will allow the user to understand the visual deficits commonly associated with this particular diagnoses and population, the

potential role of the occupational therapist in visual rehabilitation of individuals with ABI, specific screening, assessments and interventions, low vision certification information according to the American Occupational Therapy Association, and additional educational preparation information for treatment of visual deficits.

### **Product Description**

The Role of Occupational Therapy in Vision Therapy Promotional Packet was developed after a thorough literature review on the prevalence of ABI in the United States and the relationship between brain injury and visual deficits and the potential role of occupational therapy in this setting. It consists of:

1. The theoretical model used in the development of this product
2. Terminology section: this section defines many of the common terms that are used in the health care professions involved in the treatment of individuals with brain injury and associated visual deficits.
3. Vision Therapy: This section defines vision therapy and gives information on what treatments can be included in the definition of vision therapy. It gives a clearer picture as to what encompasses vision therapy.
4. Treatment Team: This section will include a variety of medical professionals that are likely to be a part of the treatment team of a client with ABI and associated visual deficits. It is noted that, although the client is the most important aspect of any treatment team, they are not included in this section as each client has individual needs as a client and cannot be defined. This section will list possible medical professionals on the team, their job title and description. This will allow

the user to understand the qualifications and responsibilities of each profession.

The treatment team in this product will include:

- a. Occupational Therapist
  - b. Ophthalmologist
  - c. Optometrist
  - d. Low Vision Practitioner
  - e. Neuro-ophthalmologist & Neuro-optometrist
5. The Client: The client is the most important part of the treatment team, therefore, this section is dedicated to the client, representing the specific population of persons with brain injury and associated visual deficits. The most common visual deficits associated with ABI will be listed and defined to provide accurate information and to allow for distinction between the various deficits. Because no two clients are the same, this will be an all inclusive section consisting of:
- a. Common visual deficits associated with ABI
  - b. Evaluations & Assessments
  - c. Treatment
  - d. Adaptations / Modifications
6. Resources: This resource section provides the user with tools to use for rehabilitation services. There are three sub-sections to the resource section which will provide the user with specific resources to use for providing services to individuals with brain injury and visual deficits. Each resource provided in this product will include a description so the user can best determine which tools will be

most efficient for treatment. This section is the most “usable” section in this product as it provides resources for:

- a. Continuing Education
- b. Optometric Vision Therapy Experts
- c. Professional Literary Resources

7. Appendices: This section includes the brochure that was designed as a promotional tool for The Role of Occupational Therapy in Vision Therapy Promotional Packet. It highlights the general information that is included in the promotional packet containing more detailed information.

### **Theoretical Design**

This product, The Role of Occupational Therapy in Vision Therapy Promotional Packet, was developed using the Adult Learning Theory, as it is an educational resource for practicing occupational therapists and other medical professionals involved in the area of vision. It is a significant learning tool for occupational therapists and other medical professionals who are seeking further knowledge about occupational therapy services provided to persons with brain injury and associated visual deficits.

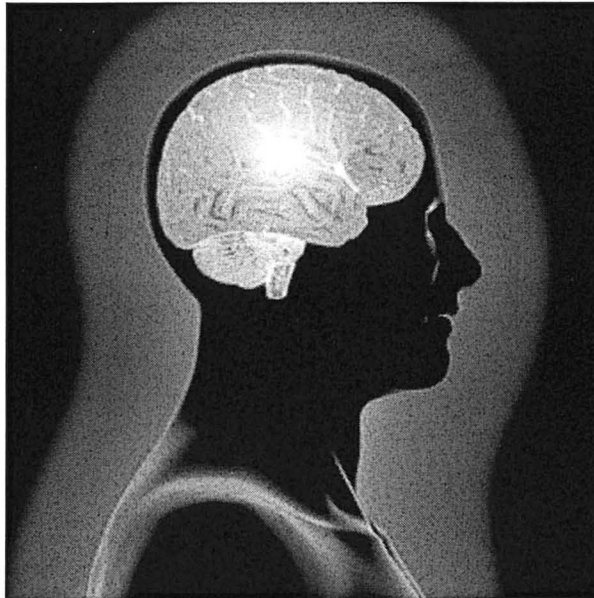
### **Conclusion**

The Role of Occupational Therapy in Vision Therapy Promotional Packet is an exceptional educational resource for occupational therapists and other medical professionals who want to obtain further information about occupational therapy services for persons with visual deficits associated with brain injury. It was designed using extensive research of literature in the area of brain injury and visual deficits, and how occupational therapy services can be provided in this setting. The problem is visual

deficits of persons with brain injury are commonly not addressed in typical rehabilitation, and how occupational therapy can be involved in treating this specific population. This product is intended to be used as an informational packet to promote occupational therapy as a part of the visual rehabilitation team for individuals with brain injury and associated visual deficits. It should be used as a resource of basic information as it provides other resources for additional information on the treatment of this population. The Role of Occupational Therapy in Vision Therapy Promotional Packet will now be presented in its entirety.



# The Role of Occupational Therapy in Vision Therapy Promotional Packet



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## INTRODUCTION

There are two parts to *The Role of Occupational Therapy in Vision Therapy Promotional Packet*.

The first is a brochure, which is designed to provide very basic information to occupational therapists and other members of the treatment team. The brochure is located on pg. 39-40 and can be photocopied for professional purposes.

The second is this supplemental packet, *Through The Eyes of Traumatic Brain Injury/Acquired Brain Injury: An Informational Resource on The Role of OT*, that expands on the information, from the brochure, if an occupational therapist (OT) or vision team member would like to learn more. The Promotional Packet includes the following information:

1. The potential role of the occupational therapist in visual rehabilitation of individuals with an ABI.
2. The theoretical model chosen in the design of this product.
3. Visual deficits commonly treated by occupational therapists
4. OT screenings, evaluations and treatments for visual deficits for clients with ABI
5. Information on the American Occupational Therapy's Association Certification Program in Low Vision. The certification outlines the standards for professional competency that OT practitioners seeking to practice in the field of low vision rehabilitation will need to demonstrate (Markowitz, 2006).
6. Additional education preparation information for Occupational therapists includes additional postgraduate preparation on ocular pathology, treatment, and the application of optical devices to practice in the specific area of low vision rehabilitation. This additional expertise may be gained by directly working with an ophthalmologist or optometrist that specializes in vision therapy. Further knowledge may be acquired by reading books on vision therapy and attending education courses (Warren, 1995).

*The Role of Occupational Therapy in Vision Therapy Promotional Packet* is the result of a concentrated literature review on the relationship of vision therapy and occupational therapy.

“Visual disability does not refer to the condition of the eye, but to the ability of the person as a whole” (Colenbrander & Fletcher, 1995, p. 866). This means that with visual disability, the client may present with deficits in motor planning, physical deficits, sensory disturbances, cognitive impairments, problem solving, language/communication, and emotions. These areas cannot be

treated solely by a vision therapy specialist and may require other rehabilitation professionals such as occupational therapists, physical therapists and speech therapists. Occupational therapists are specifically trained in all the areas as they impact functional skills and abilities in the client's daily functioning. Occupational therapists have the proficiency and competence to evaluate and depict the functional disability or ability of the ABI client as a whole.

The occupational therapist's role, as a member of the rehabilitation team, is versatile due to the profession of occupational therapy being skilled in the evaluation and development of treatment plans that aid in the functional independence of individuals in all areas including self-care, leisure activities, and work (Markowitz, 2006). This multifaceted approach covers assessments of the home setting, school, and workplace to further improve environmental factors, such as glare, that may be problematic for the individual.

This information is one way occupational therapists can use to further educate others on the role of occupational therapy in the provision of vision therapy with the ABI populace. Along with providing information concerning available community resources the occupational therapist may also train persons in residual vision-related skills that will aid in the completion and performance of exact daily activities and provide information on the use of adaptive approaches (Markowitz, 2006).

*The Role of Occupational Therapy in Vision Therapy*, was developed based upon the Adult Learning Theory, developed by Malcom Knowles. The application of this theory was essential since this product is an educational resource for practicing occupational therapists and other medical professionals, who are the targeted adult learners in this process. Knowles' Concept of Andragogy describes and conceptualizes the way in which adults learn, which is different from the way in which children learn. It describes five characteristics of adult learning as:

1. Self-concept: As a person matures his or her self concept moves from one of being a dependant personality towards one of being a self-directed human being. This self-direction is essential if the person wishes to be a life-long learner who wants to continue to build and expand on their competency in this field of practice. This is pertinent to the OT who wishes to practice in vision therapy as well as the other members of the health care team who wish to expand their knowledge and services for the good of the client.
2. Experience: As a person matures he or she accumulates a growing reservoir of experience that becomes an increasing resource for learning; therefore, prior experiences may support the interest and motivation to explore the role of OT in visual rehabilitation.
3. Readiness to learn: As a person matures his or her readiness to learn becomes oriented increasingly to the developmental tasks of his social roles. Focus and interest to learn additional methods increases, which ultimately benefits the client.
4. Orientation to learning: As a person matures his or her time perspective changes from one postponed application of knowledge to immediacy of application, and accordingly his or her orientation toward learning shifts from one of subject-centeredness to one of problem centeredness. The professional becomes aware of problems not being addressed or incompletely addressed by current treatment and can see the need to expand treatment options for the clients benefit.
5. Motivation to Learn: As a person matures the motivation to learn is internal. There is a personal drive to add to his or her level of knowledge, which includes obtaining information from other professionals.

## TERMINOLOGY

The following section presents the key concepts and terms presented throughout this scholarly project as obtained from the following main sources:

Gillen, G., & Burkhardt, A. (2004). *Stroke Rehabilitation: A Function-Based Approach* (2<sup>nd</sup> ed.). St. Louis, MO: Mosby.

Scheiman, M. (2002). *Understanding and Managing Vision Deficits: A Guide for Occupational Therapists* (2<sup>nd</sup> ed.). Thorofare NJ: SLACK, Inc.

Zoltan, B. (2007). *Vision, Perception, and Cognition: A Manual for the Evaluation and Treatment of the Adult with Acquired Brain Injury* (4<sup>th</sup> ed.). Thorofare, NJ: SLACK, Inc.

**Accommodation:** In medicine, the ability of the eye to change its focus from distant to near objects (and vice versa). This process is achieved by the lens changing its shape.

**Accommodative dysfunction:** the inability of the eye to change its focus from objects of different distances.

**Accommodative excess:** A condition in which the amplitude of accommodation is normal but the ciliary muscle has a tendency to spasm. Typically the problem is intermittent and variable. The individual reports that after reading for a period of time, he or she experiences blurred vision when looking at a distant object.

**Accommodative infacility:** A condition in which the amplitude of accommodation is normal, but the speed of the response is reduced. The most common complaint associated with accommodative facility is blurred vision when looking from near to far or far to near.

**Accommodative insufficiency:** A condition in which the amplitude of accommodation available (amplitude of accommodation) is less than expected for the individual's age.

**Agnosia:** The inability to recognize and identify objects or persons despite having knowledge of the characteristics of those objects or persons. Agnosia can be limited to one sensory modality such as vision or hearing.

**Ambient vision:** Initially organizes and stabilizes the visual field; peripheral vision.

**Amblyopia:** Loss of acuity in one eye.

**Binocularity:** The ability to focus upon an object with both eyes and create a single stereoscopic image.

**Bottom-up assessment:** Specific assessments that are designed to measure component skills such as attention or constructional praxis.

**Convergence:** Increase in the angle of the visual axes.

**Convergence excess:** A condition in which the eyes have a tendency to turn inward rather than outward. Convergence excess has been found to be slightly more prevalent than convergence insufficiency in a clinical population.

**Depth perception:** The ability to judge depth and distances.

**Diplopia:** Double vision

**Divergence:** Decrease in the angle of the visual axes.

**Divergence excess:** A condition in which the eyes drift outward when looking at a distance, and function normally when looking at near objects.

**Emmetropia:** Absence of refractive error.

**Esotropia:** The eyes turn in.

**Exotropia:** The eyes turn out.

**Field of fixation:** The area within which central fixation can be accomplished by moving the eyes and not the head.

**Figure ground perception:** The ability to distinguish the foreground from the background.

**Focal vision:** Provides attention to important features of an object for perception and discrimination.

**Form discrimination:** The ability to distinguish different types of forms

**Hyperopia:** Farsightedness; vision is blurred at near but not at a distance

**Hypertropia:** One eye turns up.

**Hypophoria:** One eye turns down.

**Lagophthalmos:** Defective closure of the lid.

**Myopia:** Nearsightedness; vision is blurred at a distance but not at near.

**Nystagmus:** Rapid rhythmic repetitious involuntary (unwilled) eye movements. Nystagmus can be horizontal, vertical or rotary

**Occupational Therapy:** The therapeutic use of purposeful and meaningful occupations (goal-directed activities) to evaluate and treat individuals who have a disease or disorder, impairment, activity limitation, or participation restriction which interferes with their ability to function independently in daily life roles, and to promote health and wellness

**Ocular dysmetria:** Difficulty controlling the range of voluntary movement of the eyes.



**Optokinetic reflex:** Activated during sustained movement and takes over the function of the vestibular ocular reflex (VOR).

**Oscillopsia:** Sensation that the world is moving.

**Optometrist:** A health care professional who is licensed to provide primary eye care services. An optometrist is a Doctor of Optometry, an O.D. (not to be confused with a Doctor of Medicine, an M.D.). To become an optometrist, one must complete pre-professional undergraduate college education followed by 4 years of professional education in a college of optometry. Some optometrists also do a residency.

**Ophthalmologist:** An eye doctor. A physician practicing ophthalmology. An ophthalmologist is an M.D.

**Pattern recognition:** Ability to identify shape, contour, general, and specific features of an object.

**Ptosis:** Drooping of the upper eyelid.

**Refraction:** Evaluation of the optical system of the eye.

**Refractive error:** Deviation from emmetropia.

**Retinopathy:** Pathology related to the retina.

**Saccade:** Abrupt rapid small movements of both eyes, such as when the eyes scan a line of print. The saccades can be divided into two distinct groups: the major saccades that are easily observed with the naked eye and the minor saccades that are virtually unobservable without special instrumentation.

**Scotoma:** Blind spot in the field of vision.

**Simultagnosia:** Inability to recognize a compound visual array.

**Smooth pursuit eye movement:** Those movements that keep an image steady on the retina; visual scanning.

**Spatial relations:** The ability to perceive the position of two or more objects in relation to the self and to each other.

**Stereopsis:** Three-dimensional vision.

**Strabismus:** Misalignment of the eyes.

**Top-down assessment:** Examines the client's performance in a particular occupational performance task as a way to understand possible underlying causes of poor performance.

**Topographagnosia:** Impairment in the interpretation of maps, house plans, etc.

**Topographical disorientation:** The inability to follow a familiar route or a new route once it has become familiar.



**Vergence:** Change in the relative position of the visual axes.

**Vergence system:** Aligns the eye to maintain binocular fixation and binocular vision.

**Visual acuity:** The clarity or clearness of the vision, a measure of how well a person sees. The ability to distinguish details and shapes of objects; also called central vision.

**Visual agnosia:** Inability to recognize visual stimuli despite adequate primary visual function such as acuity, oculomotor function, and visual fields.

**Visual analysis skills:** These skills contribute to the individual's ability to analyze and discriminate visually presented information, to determine the whole without seeing all of the parts, to identify more important features and ignore extraneous detail, and to use visual imagery to recall past visual information. It includes the ability of the individual to be aware of the distinctive features of visual forms including shape, size, color, and orientation.

**Visual cognition:** Highest level of visual skills integration within the nervous system; serves as the basis for academic activities; ability to mentally manipulate and integrate visual information to solve problems, plan, etc.

**Visual efficiency:** Refers to the effectiveness of the visual system to clearly, efficiently, and comfortably allow an individual to gather visual information at school, work, or play. The various component skills that are important in this process are called visual efficiency skills and include the subcategories of accommodation, binocular vision and ocular motility

**Visual extinction:** Inability or severe limitation in perceiving two objects displayed at once with an ability to process a single visual stimuli.

**Visual field:** Area of the visual system that allows an individual to orient to specific spatial areas.

**Visual inattention:** Decreased awareness of the body and spatial environment on the side contralateral to the cerebral lesion despite the absence of a specific sensory deficit; visual neglect.

**Visual spatial skills:** These skills allow the individual to develop normal internal and external spatial concepts and are used to interact with and organize the environment. They allow the individual to make judgments about the location of objects in visual space in reference to other objects and to the individual's own body.

**Visual motor skills:** These skills are related to the individual's ability to integrate visual information processing skills with fine motor movement. Another term for visual motor integration is eye-hand coordination.

**Visual spatial agnosia:** Inability to perceive spatial relationships between objects or between objects and self, independently of visual agnosia.

**Yoked prisms:** Prism that is used to affect the client's spatial and midline awareness.

## VISION THERAPY

For those who have a TBI, it is common to have vision disturbances with prevalence varying from 30% to 85% depending on the condition (Kapoor, Ciuffreda, & Han, 2002). For many patients who have sustained a brain injury, vision therapy is a pertinent part of the rehabilitation process (Scheiman, 2002). There are many practicing clinicians and other medical professionals who have not been educated as to what vision therapy consists of and/or how to apply it in practice. Scheiman (2002) defines vision therapy as:

An organized therapeutic regimen utilized to treat a number of neuromuscular, neurophysiological, and neurosensory conditions that interfere with visual function. Vision therapy encompasses a wide variety of procedures to improve a diagnosed neuromuscular or neurophysiological visual dysfunction (p. 352).

### TBI/ABI Prevalence & Statistics

Approximately 8 million people per year suffer a TBI in the United States (Ciuffreda, Kapoor, Rutner, Suchoff, Han, & Craig, 2007). In the general population, 2 in 1000 people obtain a TBI with an even greater frequency resulting from the recent war in Iraq, and only 50% of these individuals will return to the workforce (Rutner, Kapoor, Ciuffreda, Craig, Han, & Suschoff, 2006). Similar results were found concerning the CVA population with approximately only 50% of these individuals returning to the workforce with slight, if any remaining disabilities (Ciuffreda, et al., 2007). With a rise in the occurrence of TBI/ABI, it is significant for healthcare providers to become more aware of the related economic and social effects and rehabilitative needs of this population in order to produce increased independence and function in daily living.

According to Mckenna, Cooke, Flemming, Jefferson, & Ogden (2006), statistical findings related to numbers of individuals diagnosed with TBI in the United States is in accordance with that of other Westernized countries, with TBI being one of the major sources of moderate-to-severe disability in western society. Around 500,000 people sustain a stroke in the United States per year (Ciuffreda, et al., 2007). Many of these stroke survivors necessitate long-term care for months and even possibly years of rehabilitation and health services.

Due to consequences of a TBI, individuals are unable to return to the workforce resulting in a national economic loss estimated at \$4 billion in lost productivity (Ciuffreda, et al., 2007). The resulting estimated annual economic loss due to a CVA is between \$30 and \$40 billion in combined cost of productivity loss and medical care expenses (Kapoor, Ciuffreda, & Han, 2002). There are various reasons for the significant costs to the individual, their families and to society in general. The majority of these reasons can be placed under one umbrella term, deficits.

### **Deficits**

Vision is one of the most significant senses for humans because vision alone can affect all other functional activities of daily life. According to Ciuffreda, et al., (2007), half of the cranial nerves relate to vision. The skills of visual processing involve the assimilation and organization of visual data and include analysis and integration of the visual context. This ability to analyze and integrate the environmental context is predominately important when the environment contains unknown, abstract and complex visual data, or circumstances resulting from partial obscured vision.

The number of incidences of TBI/ABI is increasing, and many of these individuals are not being treated for visual dysfunctions (Ciuffreda, et al., 2007). For those who have a TBI, it is common to have vision disturbances with prevalence varying from 30% to 85% depending on

the condition (Kapoor, Ciuffreda, & Han, 2002). The majority of vision problems associated with individuals, diagnosed within this population, are related to oculomotor dysfunction. Occurrence of oculomotor dysfunction varies from 40% to 85% of those affected with acquired brain injury (Kapoor, Ciuffreda, & Han, 2002).

### **Current Standards of Practice**

For many patients who have sustained a brain injury, vision therapy is a pertinent part of the rehabilitation process (Scheiman, 2002). Scheiman (2002) defines vision therapy as;

...an organized therapeutic regimen utilized to treat a number of neuromuscular, neurophysiological, and neurosensory conditions that interfere with visual function. Vision therapy encompasses a wide variety of procedures to improve a diagnosed neuromuscular or neurophysiological visual dysfunction (p. 352).

Vision therapy contains different levels of rehabilitation and techniques that can be administered and modified to meet the specific needs of the individual client. Vision therapy procedures are organized and presented in a sequential order, beginning with gross motor movements moving into fine motor movements, which is the foundation in which visual skills develop. This therapy technique also provides a basis of body schema and laterality to the patient (Scheiman, 2002). There are specific types of therapy within the broad scope of vision therapy. One example of a specific type of vision therapy is ocular motor therapy, which emphasizes difficulties in visual attention, saccadic fixations, and scanning as well as smooth and efficient pursuit movements (Scheiman, 2002).

Optometrist, Scheiman (2002) presents the following important guidelines when using vision therapy to treat patients with acquired brain injury:

1. Obtain visual attention before initiating the therapy procedure
2. All techniques should provide feedback to the patient
3. Work at the level of the patient's current performance

4. Progressively increase the demand of the technique
5. Integrate the visual skill into activities of daily living (p. 192)

There are many aspects, skills and techniques to be utilized within the realms of vision therapy. It is an expansive therapeutic technique that requires knowledge, time and understanding to be able to apply in practice and make unique to each patient. Adaptations and compensatory techniques may also be necessary depending on the severity and type of neurologic injury and recovery. Scheiman (2002) states

the sequence of therapy techniques is based on clinical judgment but needs to begin at the level which the patient can succeed. The key to success is to work at the level of the patient's current performance and gradually increase the demands of the tasks (p. 193).

Often times, clinicians do not start the vision therapy process or visual evaluations until 6 to 12 months post-injury due to the belief that "vision changes over time" (Scheiman, 2002). Although vision can change over a period of time, it is pertinent to administer vision therapy techniques early in the rehabilitation process to address current visual concerns and adjust the rehabilitation as the vision changes, such as beginning with the use of lenses, prisms, occlusion and consultations (Scheiman, 2002).

Author and optometrist Mitchell Scheiman (2002) states that direct supervision and guidance by the optometrist is essential, and it is recommended that vision therapy techniques should be attempted by therapists who are under direct supervision of an optometrist. Scheiman (2002) states

Occupational therapists may perform daily therapy techniques prescribed by the optometrist and, most importantly, can help the patient generalize visual skills into daily living activities as well as assist in adaptations (p. 192).

Vision therapy contains different levels of rehabilitation and techniques that can be administered and modified to meet the specific needs of the individual client. Vision therapy

procedures are organized and presented in a sequential order, beginning with gross motor movements moving into fine motor movements, which is the foundation in which visual skills develop. This therapy technique also provides a basis of body schema and laterality to the patient (Scheiman, 2002). There are specific types of therapy within the broad scope of vision therapy. One example of a specific type of vision therapy is strategy training, which emphasizes difficulties in visual searching, neglect, and scanning (Scheiman, 2002).

### **Emerging Programs**

There are programs emerging and it is predicted that within the next few years there will be significant growth in this practice area. Much of this can be contributed to the significant complex injuries that have occurred with our service men and women who are returning injured from war. Zolton (2007) states that,

until recently, rehabilitation focused on restoration of motion and compensation for lost functional skills, Visual, perceptual, and cognitive deficits, noted for many years to exist as a result of ABI, have only recently been acknowledged as a cause of continued confusion and lack of rehabilitation progress in many clients even though motor skills have returned (p. 1).

**SmartSight:** Markowitz (2006) indicated that “a recent initiative from the American Academy of Ophthalmology called SmartSight is an attempt to define a standard of practice in this area for all ophthalmologists” (p. 309). Optometric vision therapy can impart a positive impact on the individuals overall quality of life who have a TBI/ABI, in addition to improving related symptoms and oculomotor deficits through vision therapy (Ciuffreda, Rutner, Kapoor, Suchoff, Craig, & Han, 2008). According to Sabel and Kasten (2000);

through a complex neuronal network of lateral interactions and feedback connections, visual information can reach many areas of the brain through alternative routes, thus providing a structural basis of reorganization and plasticity. Therefore, the visual system, previously considered to be hard-wired, possess a remarkable plasticity to adapt to short-term as well as long-term demands (p. 431).

*Vision Restoration Therapy:* Vision Restoration Therapy (VRT) is a novel computer-based technology that reduces vision loss caused by stroke and brain trauma that is coming on the horizon. NovaVision promotes VRT and collaborates with leading neurologists, neuro-ophthalmologists and ophthalmologists at leading institutions (<http://www.novavision.com>). Clinical results of VRT are positive: 65 percent of more than 500 patients who underwent VRT for an initial six month treatment period showed measurable improvements in their vision (<http://www.novavision.com>). VRT is based on the principle of neuro-plasticity—the ability of partially damaged neurons in the brain to compensate for injury and adjust their activity in response to stimulation from the environment.

Efforts are being made at this time to address the limited practice guidelines for eye care practitioners in regard to visual perceptual skills. A review of the literature indicates there are no clear standards of practice for the individuals who have experienced a traumatic brain injury in correlation with visual disturbances. There are recommended approaches and emerging interventions that have yet to be formulated into a comprehensive, consistent standard of practice. This results in the need for professionals to look to their professional standards of practice and academic preparation to add clarity to the roles and skills they can bring to this practice area.



## VISUAL REHABILITATION TEAM

When working in a therapeutic setting, it is pertinent to understand the roles of each professional included as part of the visual rehabilitation team. The requirements to restore and maintain functional independence in individuals with vision loss is an involved process that entails the use of a multidisciplinary team. Not all treatment teams will be comprised of the same professionals, as the treatment team depends on the needs of the individual client.

This section will include medical professionals that may be part of the treatment team for individuals who have acquired a brain injury and have associated visual deficits. Medical professions will be listed and given a description to ensure understanding of roles and responsibilities of each profession.

### Occupational Therapist

Occupational therapists (OTs) and Occupational therapy assistants (OTAs), involved in vision rehabilitation therapy, assist individuals in developing improved performance of specific activities of daily living by enhancing skills, environmental assessments, promoting safety awareness, orientation and functional mobility. Individuals with visual perceptual deficits due to a brain injury can display decreased independence with self-care and functional independence (Cate & Richards, 2000). According to Pazell (1998, p 38) interventions and modalities that may be appropriate for occupational therapy in the visual rehabilitation setting includes:

- Visual screening and skills training
- Activities of daily living (ADL) (re)training
- Compensatory techniques for ADLs
- Visual scanning training in ADLs
- Visual skills training in ADLs
- Cognitive-behavioral training



- Adaptive equipment provision/modification/training
- Functional mobility training during ADL self-care
- Activity tolerance training
- Biofeedback training during ADLs
- Training in activity analysis
- Ergonomic modifications
- Training in postural awareness in ADLs
- Balance training in ADLs
- Fall safety training
- Patient/caregiver safety training
- Upper body range of motion training
- Therapeutic exercise training
- Home program provision and training

Scheiman (2002) states:

occupational therapists generally use activities of daily living to improve function, while optometrists work directly with the affected function. Optometrists test and treat disorders of the peripheral visual system, such as eye movements, accommodation, and binocular vision. Occupational therapists may screen for these disorders but do not generally treat them, with the exception of some work with eye movements. Optometrists stress the predominance of the visual system in treatment, while occupational therapists stress the importance of the vestibular system and proprioceptive system and how they are organized and processed (p. 4).

After the ophthalmology evaluation is completed, a medical prescription for occupational therapy services is written by the attending ophthalmologist. Warren (1995) states that,

The prescription includes the level of visual impairment, the diagnosis, a description of services to be provided by the therapist, the patient's rehabilitation potential, medical precautions, frequency and duration of therapy, and any additional information needed to enable the therapists to establish and carry out treatment. The physician may provide additional information regarding the required magnification level based on acuity measurements and advise on the correct optical devices for treatment (p. 879).

Because of the multiple body systems affected by a brain injury and the strong likelihood of secondary impairments, an occupational therapist must be proficient in a wide variety of evaluation procedures and intervention techniques.

An occupational therapists (OT) training in the assessment, design and provision of effective interventions can be instrumental in the rehabilitation process of vision deficits and their impact on daily living. Occupational Therapy's basic premise is to increase the independence of an individual in their daily activities and roles. Occupational therapists and occupational therapy assistants (OTAs) involved in vision therapy, assist individuals in developing improved performance of specific activities of daily living by enhancing skills, environmental assessments, promoting safety awareness, orientation and functional mobility.

Occupational therapists in particular are eminently suited to work with ABI clients and the visual issues that affect their activities of daily living due in particular to the development of definite theoretical frameworks and strategies for evaluation and intervention. Mckenna, et al. (2006) stated that occupational therapists may begin with an accelerated screening assessment to establish occurrence of visual impairments and then, if needed, proceed to more complex and thorough assessments. After the completion of assessment and evaluation, a treatment plan is initiated by the occupational therapist when medical necessary and rehabilitation potential are deemed adequate. Occupational therapists may also suggest making functional adaptations to the client's home and other environments.

According to Padula (1992), "Detailed notes should be made with regard to motor capabilities or other functions so that the therapist can report back to the clinician" (p. 7). With occupational therapists extensive training and knowledge of the cognitive, sensory, psychological and physical aspects of disability, it is fitting that occupational therapists be a

member of the vision rehabilitation team to improve or maintain independent function in daily life (Kapoor & Ciuffreda, 2002).

### **Ophthalmologist**

Ophthalmologists are medical doctors with a specialization in the functioning of the eye and eye diseases. They can diagnose eye conditions and perform eye surgery. Ophthalmologists perform formal low vision evaluations that assess areas such as contrast sensitivity function, visual acuity, and macular perimetry (Warren, 1995). According to Scheiman (2002), “an ophthalmologist is a medical doctor who specializes in diseases of the eye and eye surgery” (p. 3). An ophthalmologist’s initial education is similar to that of any other medical doctor; however, the study of disease is emphasized further for the ophthalmologist. Rehabilitative approaches for visual deficits using lenses, prisms and other devices is not considered a pertinent aspect in the training of an ophthalmologist (Scheiman, 2002).

### **Optometrist**

Optometrists are not medical doctors. They are eye care professionals that specialize in diagnosis and management of eye conditions that do not require surgery. Author and optometrist, Mitchell Schieman (2002), defines an optometrist as

a primary health care provider who specializes in the examination, diagnosis, treatment, and management of diseases and disorders of the visual system, the eye, and associated structures, as well as the diagnosis of related systemic conditions (p. 3).

The educational programs for optometrists include education on disease; however, there is a larger emphasis on the concept of vision and its relationship to contexts such as play, school, work, and leisure activities (Scheiman, 2002). These professionals are taught to evaluate and

diagnose visual conditions that interfere with performance which can affect the quality of life and how the visual system is directly related to the environment as well as rehabilitation using lenses, prisms, low vision devices, and vision therapy (Schieman, 2002). Scheiman (2002) indicates that optometrists who provide vision rehabilitation services in practice have frequently completed additional residency training or passed a comprehensive examination that assesses their level of expertise.

### **Low Vision Practitioner**

There are many professionals that can be qualified as a low vision practitioner. A low vision practitioner can be any professional who has specialized in the area of low vision. Both optometrists and ophthalmologists can be considered a low vision practitioner as they are already trained specifically in the diagnoses and treatment of individuals with visual concerns. An occupational therapist can also be considered a low vision practitioner as long as he/she has had specialized training in low vision.

### **Neuro-ophthalmologist & Neuro-optometrist**

Other professionals involved in the rehabilitation medicine field of persons with ABI vision disturbances are neuro-ophthalmologists and neuro-optometrists. According to Zelinsky (2007)

the neuro-ophthalmologist specializes in locating a disease or disruption of a structure in the visual pathways. The neuro-optometrist works with brain function, such as sensory, motor, and information processing, and specifically, with the perception of external and internal stimuli. Both structure and function can have a role in rehabilitation following TBI (p. 88).

## Common Visual Deficits in ABI

The definition of acquired brain injury (ABI) can include both traumatic brain injury (TBI) which results from an external insult to the brain and cerebrovascular accident (CVA), also referred to as stroke, resulting from an internal insult to the brain (Ciuffreda, Kapoor, Rutner, Suchoff, Han, Craig, 2007). No two individuals will have the same brain injury, symptoms, or deficits. There are a variety of visual deficits associated with brain injuries which are presented in Table 1 and Table 2.

All aspects of daily life can be influenced when visual perceptual deficits are found in conjunction with cognitive impairments. This combination also presents serious safety concerns for the individual and may affect the individual's ability to participate in and gain from the rehabilitative process (William, 1995). According to Boyd and Dawson (2000)

“Patients with visual perceptual impairments demonstrate higher emotional distress and increased risk of injury than patients without these impairments” (p. 16).

The deficits add considerable complexity to the needs of the individuals. It is important to note that visual perceptual problems may take place in conjunction with motor planning impairments and attentional problems (Mckenna, et al., 2006).

Visual perception deficits can include:

1. *Agnosia*: inability to recognize an object by sight despite adequate cognition, language skills, and visual acuity/field
2. *Alexia*: inability to recognize or comprehend written or printed words
3. *Apraxia*: inability to execute purposeful movement
4. *Ataxia*: inability to visually guide limbs
5. *Constructional Apraxia*: inability to copy or build simple design
6. *Depth perception*: inability to judge depths and distances
7. *Figure ground*: inability to distinguish foreground from background
8. *Form perception/constancy*: inability to judge variations in form
9. *Spatial relations*: inability to perceive the position of two or more objects in relation to self and each other
10. *Unilateral spatial neglect*: inability to attend to or respond to meaningful sensory stimuli presented in the affected hemisphere

The oculomotor system comprises of the accommodative, vergence, and versional systems. Indications of oculomotor dysfunction are often times varied and may consist of difficulty following targets, vision blur, diplopia, asthenopia, and oculomotor-based reading issues (Ciuffreda, et al., 2007). Kapoor, Ciuffreda, & Han, (2002) indicate that insufficiencies in oculomotor function may also “include jerk and pendular nystagmus, increased fixational drift, saccadic dysmetria, increased saccadic latency, and reduced pursuit gain, as well as others” (p. 1667). The findings according to a recent retrospective analysis report that the incidence of oculomotor dysfunctions in the acquired brain injury populace is considerably greater than found in that of their non-ABI cohort (Ciuffreda, et al., 2007). Ciuffreda, et al., (2007) stated that, “if some type of an oculomotor dysfunction is not found after careful and comprehensive testing, it is unexpected and represents an exception to the rule” (p. 158).

**Table 2: Oculomotor Dysfunctions**

Oculomotor dysfunction: ocular dysfunctions are often time varied and may result in the following areas of difficulty:

1. Tracking: ability of the eye to move smoothly across a printed page or while following a moving object.
2. Fixation: ability to quickly and accurately locate and inspect a series of stationary objects such as words while reading.
3. Diplopia: double vision; seeing two images of a single object
4. Asthenopia: weakness and/or fatigue of the eye commonly causing headaches
5. Nystagmus: involuntary rhythmic oscillation of one or both eyes
6. Saccadic eye movements: sequenced rapid eye movements that change the line of sight
7. Strabismus: misalignment of the eyes.
8. Nystagmus: Involuntary rhythmic oscillation of one or both eyes.

## Evaluations & Assessments

Medical necessity for occupational therapy intervention is determined by the occupational therapist during the completion of the primary evaluation. A wide array of screening procedures and assessment tools are utilized by occupational therapists to measure functional impairment and visual capabilities in individuals with acquired brain injury (Cooke, Mckenna, & Fleming, 2005). The evaluation determines how the individual will use the remaining or residual vision to the best of their capabilities in the participation of their daily activities (Warren, 1995).

Warren (1993) affirms that traditional test methods that measure visual acuity do not fully describe the visual capability of a person. Furthermore, traditional tests do not necessarily correspond to the person's visual experiences with the environment. According to Warren (1993):

a standard acuity test only measures the ability to see a black car against a white snowbank at midday. It does not measure the ability to see a gray car against a concrete building under cloudy conditions or to pick a face out of a crowd of people who are the same race (p. 45).

The assessment process varies from observations during functional tasks to short tabletop tasks such as writing, matching items, and copying. Extended and complex tabletop assessments may also be used by an occupational therapist during the assessment process (Cooke, Mckenna, & Flemming, 2005). According to Cooke, Mckenna, & Flemming (2005), significant advancements have been achieved in standardization, validation, and development of tools for assessment and documentation of visual perceptual capacity for the occupational therapy profession utilizing the functional task observation method and tabletop methods. An assortment of available standardized assessments batteries that test visual perceptual skills include:



1. **The Baylor Adult Visual Perceptual Assessment:** 1987 the Adult Visual-Perceptual Assessment compiled by Baylor's occupational therapy department to evaluate adult perceptual dysfunction became accepted as the worldwide standard.
2. **The Cerebral Vascular Accident (CVA) evaluation battery of St. Mary's Hospital:** The occupational therapy Cerebral Vascular Accident (CVA) evaluation was developed at St. Mary's Hospital Medical Center in Madison, Wisconsin. The evaluation assesses body scheme, figure ground, position in space, spatial relations, and stereognosis.
3. **The Chessington Occupational Therapy Neurological Assessment Battery (COTNAB):** Assessment of patients with brain injury and strokes. COTNAB is a fully validated battery of tests for the assessment of functional and perceptual dysfunction with neurological patients aged 16 upwards. It tests four functional areas of:
  - a. Visual Perception
  - b. Constructional Ability
  - c. Sensory-Motor Ability
  - d. Ability to Follow Instructions
4. **Lowenstein Occupational Therapy Cognitive Assessment (LOTCA):** a series of cognitive tests for primary assessment and ongoing evaluation in the treatment of brain injured individuals. Various subtests related to the rehab process are divided into 4 areas: Orientation, Visual and Spatial Perception, Visual Motor Organization and Thinking Operations.
5. **LOTCA-G (Geriatric version of the LOTCA):** LOTCA™-G is a revised version of LOTCA™ (First Edition) geared specifically towards the ongoing evaluation and treatment plans for geriatric clients with brain injury. This version addresses physical and mental factors that can accompany aging by offering larger components, reduced pictorial detail, multiple choice questions, and shorter administration time.
6. **The Ontario Society of Occupational Therapists Perceptual Evaluation (OSOT):** designed to assist in the detection of perceptual impairment in adults who have experienced brain damage caused by traumatic brain injury or stroke. The OSOT assesses perceptual dysfunction in areas related to basic living skills. The measure is also used to determine the degree of impairment, to monitor change, and to measure the effects of treatment and/or spontaneous recovery. The OSOT has been standardized for use with individuals aged 40-69 years.
7. **The Occupational Therapy Adult Perceptual Screening Test (OT-APST):** The OT-APST is a standardised tool that enables occupational therapists to screen for visual perception across each of the major constructs of visual perception and praxis, including the problems most frequently occurring after stroke. OT-APST Subscales include:
  - Agnosia
  - Visuospatial Relations
  - Body Scheme



- Unilateral Neglect
- Constructional Skills
- Apraxia
- Acalculia, and
- Functional Skills

8. **The Rivermead Perceptual Assessment Battery (RPAB):** The Rivermead Perceptual Assessment Battery is a collection of tests for initial assessment before therapy or treatment. This battery provides the therapist with a profile of a person's visual perception and facilitates the therapist in planning treatment. The test includes tasks such as picture/colour matching, sequencing pictures, missing articles and cube copying. The test comes with a range of data for the age groups 16 - 97.

### Functional Capabilities

There are several areas that the occupational therapists will assess to determine the clients functional capabilities, these areas include but are not limited to: 1) visual-perception; 2) motor planning and processing; 3) psychological; 4) safety; 5) cognitive skills and; 6) functional independence.

**Visual Perception:** “Visual perception is viewed on an information-processing continuum involving the reception, organization, and assimilation of visual information” (Pascale-Toglia, Golisz, & Goverover, 2008, p.759). According to Pascale-Toglie, et al., (2008) visual perceptual problems can have a devastating effect on the individual’s ability to participate and independently complete self care skills. They can often experience:

1. unstable orientation in space, so objects, the walls and floors can be perceived to be moving and/or shifting.
2. difficulty with object localization and visual judgments in space
3. inability to sustain visual attention
4. poor visual memory
5. problems with depth perception which affects the ability to judge the position of objects.
6. functional tasks such as finding items in a crowded closet, drawer, or supermarket shelf and locating information on a bill, map or schedule may present difficulty (p. 760).

As stated prior:

Very few in the health care professions, including head trauma rehabilitation centers, are adequately aware of visual problems resulting from TBI/ABI and the visual-perception consequences. These visual deficits may lead to impaired functioning in the person's daily activities and roles because vision affects all other functions. ([http://www.braininjuries.org/traumatic\\_brain\\_injury.html](http://www.braininjuries.org/traumatic_brain_injury.html), ¶ 1)

This limited awareness of visual perceptual problems "... creates a gap in rehabilitative services, resulting in incomplete treatment and frustration for the patient, family, and treatment team" ([http://www.braininjuries.org/traumatic\\_brain\\_injury.html](http://www.braininjuries.org/traumatic_brain_injury.html) ¶ 1).

***Motor Planning and Processing:*** Motor planning and processing is the ability of individuals to figure out how to get their body to do what they want it to do (PascaleToglia & Golisz, 2003, p. 407). It involves a number of different processes such as; vision and perception, cognition and language.

***Psychological:*** Personality and behavioral changes often occur following a TBI/ABI. The individual's behavior is observed during functional tasks to assess his or her behavioral, emotional and personality changes. The psychological changes are also a contributor to caregiver stress and definitely have a negative impact on the client's ability to maximize independence in functional tasks and occupations. The possible psychological issues could include, but are not limited to:

1. attention and concentration problems, low frustration tolerance, and fatigue (Iverson, Woodward, & Smith-Seemiller, 2000),
2. lack of awareness of deficits/denial causing safety issues,
3. disinhibition of inappropriate behavior,
4. depression
5. change in family and societal roles
6. management of agitation
7. difficulty with community reintegration and adaptation

Identification of any of these behaviors will consequently be addressed in treatment. Owing to behavioral difficulties, the occupational therapist must also possess strong interpersonal skills, be able to react quickly and effectively to suddenly changing situations, and have keen observation skills.

**Safety:** When combined with visual perceptual deficits serious safety concerns emerge for the individual and may affect the individual's ability to participate in and gain from the rehabilitative process (William, 1995). This becomes an issue in regard to home assessment and functional mobility. According to Boyd and Dawson (2000, p.7), "patients with visual perceptual impairments demonstrate higher emotional distress and increased risk of injury than patients without these impairments."

**Cognitive:** All aspects of daily life can be influenced when visual perceptual deficits are found in conjunction with cognitive impairments.

**Functional Independence:** OT's look at the client's functional capabilities in each individual area presented prior but also holistically to see how the person is impacted in their daily living skills and instrumental activities of daily living. The evaluation information must also include how the person functions in areas such as:

1. bathing, grooming, oral hygiene and showering
2. toileting
3. dressing
4. eating
5. medication management
6. functional mobility

This multifaceted approach covers assessments of the home setting, school, and workplace to further improve environmental factors, such as glare, that may be problematic for the individual.

The initial evaluation determines the route of occupational therapy intervention. Scheiman (2002) indicates that:

Occupational therapists may perform daily therapy techniques prescribed by the optometrist and, most importantly, can help the patient generalize visual skills into daily living activities as well as assist in adaptations (p. 192).

## **Treatment**

Occupational therapists are able to fill the gap between visual training and applying the training to assist individuals to live a full, successful, and functional life. Treatment interventions for ABI/TBI vary greatly as they are dependent on the type and severity of the injury. No two cases of brain injury will present with the exact same complications and disabilities; therefore, treatments, interventions and strategies used to reach optimal function in daily living will vary depending on the individual.

Visual perceptual deficits will impair a person's ability to function in daily living tasks. Therapeutic interventions are geared towards addressing functional skills such as dressing, grooming, bathing, cooking, and other self-care tasks. It is pertinent to ensure that each therapeutic intervention is meaningful to the client, as this will increase the efforts towards improvement by the patient.

A treatment plan is developed by the occupational therapist when rehabilitation potential is determined to be present. Careful consideration is given to the location of treatment sessions and the most contextually pertinent environment is utilized for the client. The treatment environment may include the community, clinic, or the client's home. The patient, in addition to being taught how to use optical devices, is educated by the OT on how to manipulate environmental features including background contrast, lighting, arrangement of furniture, modifying of tools, utensils, food, and writing materials in order to maximize independence and use of remaining vision (Warren, 1995).

The OT works with the client to develop, organize and implement plans to enhance visual performance (Markowitz, 2006). This process begins with the selection of a rehabilitation task that is most important to the client at that time. The therapist and the client establish functional and attainable goals for improving limitations as well as determining the procedure and time frame for treatment (Warren, 1995). Goal focus areas may include but are not limited to:

1. Community reintegration,
2. Maximizing cognitive abilities in natural environments by teaching compensatory and adaptive cognitive strategies that optimize the areas of orientation, attention and memory,
3. Optimize visual-perceptual functioning and abilities through environmental adaptations, compensatory techniques and assistive devices,
4. Restore competence in ADL and IADLs,
5. Participation in previous or new leisure activities,
6. Patient and family education and support,

The focus of occupational therapy is on training individuals how to use their residual vision as efficiently and effectively as possible. The ultimate goal is independence in activities of daily living and instrumental activities of daily living. Warren (1995, p. 881) affirms six areas concerning activities of daily living and instrumental activities of daily living are usually attended to in the treatment plan:

1. Efficient and effective use of optical devices to read materials needed for daily living
2. Ability to write legibly to complete communications needed for daily living
3. Ability to complete financial transactions and manage financial affairs independently
4. Ability to complete self-care and homemaking activities with optimum efficiency, independence, and safety
5. Ability to engage in leisure and community activities
6. Functional adaptations and modifications

Multiple-treatment approaches from the use of optical devices and ADL training to home modifications are being applied to individuals with an acquired brain injury as awareness of visual issues grows.

## **Adaptation / Modification**

Modifications and adaptations are also common techniques when working with individuals who have visual deficits. Occupational therapists offer unique services as they are trained to apply intervention techniques that are based on modifications and adaptations of functioning and to the individual's environment. Therapeutic options often include environmental adaptations, which may include:

1. Making functional adaptations to the home that include replacing heavily patterned tablecloths and floor rugs with solid colors to aid in the identification of objects and decreasing fall risk.
2. Using memory aids
3. Organizing the environment
4. Developing routines
5. Visual acuity deficits may be aided with the use of marking and labeling switches, dials, or keyholes with low-cost items such as paint, colored tape, and Velcro.
6. A therapist may also aid a client in arranging the living space for accessibility purposes and ease of task performance (Wolter & Preda, 2006).
7. Lighting is an important consideration and an OT can provide training for the individual on different lighting options for a variety of tasks.
8. A therapist may also suggest the use of enlarged text items and large button phones as well as talking clocks to aid in independence and safety (Wolter & Preda, 2006).
9. Coping strategies
10. installing proper lighting, bright/contrasting colors around door frames (Willard & Spackman, 2003, p.621).
11. large signs with high-color contrast (Willard & Spackman, 2003, p.621).

## RESOURCES

### Continuing Education

Continuing education is pertinent to the role of an occupational therapist to remain competent and confident in the services that are provided to various clients in a range of settings and situations. The following continuing education resources can be obtained from the American Occupational Therapy Association at [aota.org](http://aota.org). The resources provide educational information focusing on vision therapy and brain injury.

### AOTA Continuing Education Resources

#### **Low Vision in Older Adults: Foundations for Rehabilitation:**

This online course is the result of collaboration between the American Occupational Therapy Association (AOTA) and SightCare, a program of The Jewish Guild for the Blind. Low vision affects people's ability to safely and independently engage in occupations of their choosing and to participate in those occupations in the contexts of their choosing. This online course provides occupational therapists with the knowledge needed to provide low vision rehabilitation care.

Lesson 1 provides an overview of the field of low vision rehabilitation, including topics such as the clinical deficits a client with low vision presents, the eye's anatomy and physiology, the various types of optical prescriptions available, and the functional and emotional aspects of a person's life that are affected by low vision. Lessons 2 and 3 give more in-depth coverage of optical and environmental considerations.

Case examples throughout the course describe the low vision rehabilitation process; from the clinical low vision evaluation done by the optometrist or ophthalmologist through the

occupational therapy evaluation, intervention sessions, home evaluations, and problem-solving techniques.

At the end of the course, larger case examples pull course content together and apply it to a particular client with low vision in an actual practice setting. The case examples facilitate clinical reasoning as well as teach specific techniques. They also emphasize that clients often have other diagnoses, in addition to the low vision impairment, that require the expertise of other rehabilitation providers, exemplifying the multisystem involvement in services to clients with low vision.

### **SPCC: Low Vision: Occupational Therapy Evaluation and Intervention with Older Adults**

When the first edition of this Self-Paced Clinical Course (SPCC) was published in 2000, occupational therapy practitioners had been providing low vision rehabilitation services to older adults without formal education or a reliable reimbursement and referral system. Low vision rehabilitation is also now a concentration of undergraduate and graduate education programs, and numerous continuing education sessions.

Occupational therapy has the potential of becoming the largest service provider in low vision rehabilitation. The number of occupational therapy practitioners who provide low vision services is growing, and with this growth comes the responsibility for establishing and maintaining competence in the field. Low Vision SPCC, Revised Edition is designed to assist occupational therapy practitioners with acquiring the knowledge needed for Specialty Certification in low vision rehabilitation (SCLV credential) and includes revisions, updates, new information on evaluation, and lessons related to psychosocial issues and low vision.



## **Neurorehabilitation Series- Diagnosis - Specific SPCC - Traumatic Brain Injury**

Neurorehabilitation for Traumatic Brain Injury is one of the three Diagnosis-Specific SPCCs in the Series. Traumatic Brain Injury is organized in a natural and user-friendly way. The content parallels the recovery process and the clinical settings within which traumatic brain injury rehabilitation takes place. A case study follows a single hypothetical client through the various stages of intervention. The client descriptions illustrate and add clinical relevance to the content.

### **AOTA Low Vision Specialty Certification Occupational Therapists**

There are standards, competencies and criteria set by the American Occupational Therapy Association that must be met in order for an occupational therapist to practice vision therapy. These competencies are set up in four sections, A, B, C, & D. Competency A measures the OT's ability to perform an individualized low-vision evaluation.

#### **COMPETENCY A**

The OT is able to perform an individualized occupational therapy low-vision evaluation to identify factors that support or hinder use of vision in occupational performance.

**Client Outcome:** Clients are engaged in the identification of strengths, limitations, and goals as they relate to low vision to optimize health and participation in desired occupations.

<b>Standard</b>	<b>Criteria</b>
Knowledge	A1. Has knowledge of the primary conditions that permanently impair vision including the etiology, prevalence, typical onset, and prognosis; and the medical and optical management.

Knowledge	A2. Has knowledge of the changes in visual functions that can occur from congenital, inherited, and acquired conditions and how those changes affect engagement in areas of occupation including co-occupations.
Knowledge	A3. Has knowledge of assessment methods and tools used to measure visual functions including interpretation of vision specific terminology.
Critical Reasoning	A4. Identifies and interprets relevant information from multiple sources to select the best assessments to complete the occupational profile and occupational analysis of the client with low vision.
Performance Skills	A5. Administers selected low-vision assessments according to appropriate protocols, guidelines, and standards.
Performance Skills	A6. Assesses the client's contexts and environments to identify the elements that support or hinder occupational performance and participation.
Ethical Reasoning	A7. Differentiates between the role and scope of practice of the occupational therapy low-vision specialist and that of other members of the rehabilitation team who address low vision.

## COMPETENCY B

The OT is able to develop and implement an individualized occupational therapy low-vision intervention plan in collaboration with the client that reflects the client's priorities for occupational performance. **Client Outcomes:**

1. Clients participate in the development of the low-vision intervention plan, including the identification and prioritization of goals, to achieve desired outcomes.
2. Client engages in desired occupations as identified in the intervention plan using the most appropriate visual or non-visual strategies.
3. Clients are prepared to use services and resources after discharge that foster performance and participation in occupations within varied contexts.

Standard	Criteria
Knowledge	B1. Has knowledge of strategies to facilitate the use of remaining vision through modification of the task, environment, and context, including application of vision specific adaptive equipment.

Knowledge	B2. Identifies occupational therapy theories relevant to low vision to guide development of the intervention plan.
Knowledge	B3. Has knowledge of strategies to facilitate the use of visual performance skills (e.g., scanning, use of the preferred retinal locus [PRL], etc.) to enhance occupational performance.
Knowledge	B4. Has knowledge of the optical properties and uses of lenses and prisms.
Knowledge	B5. Has knowledge of visual and non-visual strategies and techniques to facilitate safe negotiation of environments.
Critical Reasoning	B6. Differentiates between the risks and benefits of visual and non-visual strategies and determines and implements the most appropriate interventions to facilitate occupational performance and participation.
Critical Reasoning	B7. Establishes a discharge plan that prepares the client with low vision to obtain and use services and resources that maximize occupational performance; supports health, participation, and life satisfaction.
Interpersonal Skills	B8. Communicates information in a way that removes or minimizes barriers created by low vision for the client in a given context/environment.
Interpersonal Skills	B9. Establishes and collaborates with a referral and resource network—inside and outside the health care community—to help the client achieve outcomes that support health and participation in life.
Performance Skills	B10. Uses occupation-based interventions to achieve the client’s identified occupational therapy low-vision goals.
Performance Skills	B11. Maintains ongoing dialogue with the referring physician to determine optical devices that are compatible with the client’s performance patterns, contexts, environments, and client factors and reflect the client’s desired goals.
Ethical Reasoning	B12. Considers ethical and fiscal implications associated with the recommendation of low-vision assistive devices.

**COMPETENCY C**

The OT is able to recognize immediate and long-term implications of psychosocial issues related to vision loss and modifies therapeutic approach and occupational therapy service delivery accordingly.

**Client Outcome:** Clients will have immediate and long-term emotional and psychosocial issues related to low vision addressed throughout the occupational therapy process.

<b>Standard</b>	<b>Criteria</b>
Knowledge	C1. Has knowledge of the factors unique to vision loss that influence psychological adjustment for clients.
Critical Reasoning	C2. Identifies and selects evidence-based intervention strategies, including therapeutic use of self, that facilitate psychosocial adjustment to vision loss, and empowers the client to advocate for needed services that support social participation.
Performance Skills	C3. Refers to appropriate mental health professionals when the psychosocial needs of the client are beyond the practitioner's educational preparation or scope of practice.

#### **COMPETENCY D**

The OT is able to advance access to occupational therapy services and advocates for policies, programs, and products that promote health and participation in occupations by persons with low vision.

**Client Outcome:** Clients experience improved access to services and programs that promote optimal health and participation in occupations.

<b>Standard</b>	<b>Criteria</b>
Knowledge	D1. Has knowledge of current and evolving practice developments, trends, and research that affect individuals with low vision.
Knowledge	D2. Has knowledge of federal, state, local, organizational policies, regulations, qualifying criteria and procedures that support or hinder completion of desired occupations (e.g., driving licensure requirements, meals on wheels, talking books).
Performance Skills	D3. Collaborates with key decision-makers at the facility, local, state, or national level to advocate for needed services, programs, or products to support health and participation.
Performance Skills	D4. Educates the public and professionals on the efficacy and scope of occupational therapy services for persons with low vision.
Performance Skills	D5. Contributes to the professional development of occupational therapy practitioners as specialists in low-vision rehabilitation.

## Optometric Vision Therapy Experts

Scheiman (2002) provides the following directory of optometric vision therapy experts:

1. American Academy of Ophthalmology  
PO Box 7424  
San Francisco, CA 94120-7424  
(415) 561-8500
2. American Academy of Optometry  
4430 East West Highway  
Suite 401  
Bethesda, MD 20814  
(301)984-1441  
[www.aaopt.org](http://www.aaopt.org)
3. Association for Education & Rehabilitation of  
The Blind and Visually Impaired  
4600 Duke Street, Suite 430  
PO Box 22397  
Alexandria, VA 22304  
(703) 823-9690
4. College of Optometrists in Vision Development  
243 N. Linbergh Boulevard, Suite 310  
St. Louis, MO 63141  
(888) COVD-770  
[www.covd.org](http://www.covd.org)
5. National Association of the Visually Handicapped  
22 West 21<sup>st</sup> Street, 6<sup>th</sup> floor  
New York, NY 10010  
(212)889-3141  
[www.navh.org](http://www.navh.org)
6. Neuro-Optometric Rehabilitation Association International  
PO Box 1408  
Guilford, CT 06437  
(886)222-3887  
[www.nora.cc](http://www.nora.cc)
7. Optometric Extension Program  
1921 E. Carnegie Avenue, Suite 3-L  
Santa Ana, CA 92705-5510  
(949)250-8070  
[www.oep.org](http://www.oep.org)

## Professional Literary Sources

1. Burkhardt, Ann (2004). *Stroke Rehabilitation: A function-based approach*(2<sup>nd</sup> ed.) Mosby Inc.: St.Louis, MI.

This text was written by an occupational therapist. It specifically includes:

- background medical information
- comprehensive review of standardized and nonstandardized evaluations and assessments
- treating techniques
- evidence-based interventions that are all specific to patients who have sustained a CVA.

There is also an entire chapter that is dedicated to visual dysfunction for stroke patients.

2. Scheiman, Michelle.(2002). *Understanding and Managing Vision Deficits: A guide for occupational therapists* (2<sup>nd</sup> ed.). SLACK Incorporated: Thorofare NJ.

This professional literary source is a unique and comprehensive collaboration of optometrists, occupational therapists, and low vision rehabilitation specialists designed to increase the understanding of vision. It is a valuable resource for occupational therapists that covers the diagnosis and treatment of vision deficits. This resource discusses the details of vision therapy for eye movement and visual perceptual deficits as well as OT management of vision problems.

3. Zoltan, Barbara (2007). *Vision, Perception and Cognition: A manual for the evaluation and treatment of the adult with acquired brain injury* (4<sup>th</sup> ed.). SLACK Incorporated: Thorofare, NJ.

This resource is a concisely structured text that addresses clinical reasoning and decision making for the entire evaluation and treatment process of the adult with acquired brain injury. There is theoretical information, guidelines for assessment, information on specific standardized evaluations, guidelines for treatment and information of environmental impact of client performance.

## **Appendices**

This section includes the brochure that was developed in conjunction with this product. The individuals who have created this product and brochure have allowed this section of the brochure to be photocopied for professional purposes.



**Education Provided By: American Occupational Therapy Association Online & Distance Courses**

- Low Vision in Older Adults: Foundations for Rehabilitation
- Low Vision: Occupational Therapy Evaluation and Intervention with Older Adults
- Neurorehabilitation Series- Diagnosis - Specific SPCC - Traumatic Brain Injury

**Professional Literary Resources**

- Burkhardt, Ann (2004). Stroke Rehabilitation: A function-based approach(2<sup>nd</sup> ed.) Mosby Inc.: St.Louis, MI.
- Golisz, K. & Pascale-Torgia, J. (2003). Perception and cognition. In Crepeau, E.B., Cohn, E. S., & Schell, B.A.B. (Eds.), Willard & Spackman, 10<sup>th</sup> Ed. (p. 407). Philadelphia: Lippincott, Williams & Wilkins.
- Pascale-Torgia, J., Golisz, K., Goverover, Y. (2008). Evaluation and intervention for cognitive perceptual impairments. In Crepeau, E.B., Cohn, E. S., & Schell, B.A.B. (Eds.), Willard & Spackman, 11<sup>th</sup> Ed. (p. 769). Philadelphia: Lippincott, Williams & Wilkins.
- Scheiman, Mitchell.(2002). Understanding and Managing Vision Deficits: A guide for occupational therapists (2<sup>nd</sup> ed.). SLACK Incorporated: Thorofare NJ.
- Zoltan, Barbara (2007). Vision, Perception and Cognition: A manual for the evaluation and treatment of the adult with acquired brain injury (4<sup>th</sup> ed.). SLACK Incorporated: Thorofare, NJ.

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**Occupational Therapy Education Brochure**

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**Through the Eyes of  
Traumatic Brain  
Injury / Acquired  
Brain Injury:  
The Role of  
Occupational Therapy  
in Vision Therapy**



## The Occupational Therapy

- The Occupational Therapist (OT) works with the client to develop, organize and implement plans to enhance visual performance (Markowitz, 2006). This process begins with the selection of a rehabilitation task that is most important to the client at that time. The therapist and the client establish functional and attainable goals for improving limitations as well as determining the procedure and time frame for treatment (Warren, 1995). Goal focus areas may include but are not limited to:
  1. Community reintegration,
  2. Maximizing cognitive abilities in natural environments by teaching compensatory and adaptive cognitive strategies that optimize the areas of orientation, attention and memory,
  3. Optimize visual-perceptual functioning and abilities through environmental adaptations, compensatory techniques and assistive devices,
  4. Restore competence in ADL and IADLs,
  5. Participation in previous or new leisure activities,
  6. Patient and family education and support
- The focus of occupational therapy is on training individuals how to use their residual vision as efficiently and effectively as possible. The ultimate goal is independence in activities of daily living and instrumental activities of daily living. Warren (1995) affirms six areas concerning activities of daily living and instrumental activities of daily living are usually attended to in the treatment plan (p. 881):
  1. Efficient and effective use of optical devices to read materials needed for daily living
  2. Ability to write legibly to complete communications needed for daily living
  3. Ability to complete financial transactions and manage financial affairs independently
  4. Ability to complete self-care and homemaking activities with optimum efficiency, independence, and safety
  5. Ability to engage in leisure and community activities
  6. Functional adaptations and modifications

## Functional Capabilities

**Functional Independence:** OT's look at the client's functional capabilities in each individual area presented prior but also holistically to see how the person is impacted in their daily living skills and instrumental activities of daily living. Occupational therapists may perform daily therapy techniques prescribed by the primary vision therapy expert.

There are several areas that the occupational therapists assess to determine the clients functional capabilities, these areas include but are not limited to: 1) visual-perception; 2) motor planning and processing; 3) psychological; 4) safety; 5) cognitive skills and; 6) functional independence. The evaluation information must also include how the person functions in areas such as: 1) bathing, grooming, oral hygiene and showering; 2) toileting; 3) dressing; 4) eating; 5) medication management and; 6) functional mobility

**Visual Perception:** visual perceptual problems can have a devastating effect on the individual's ability to participate and independently complete self care skills. They can often experience (not an inclusive list):

1. unstable orientation in space, so objects, the walls and floors can be perceived to be moving and/or shifting.
2. difficulty with object localization and visual judgments in space
3. poor visual memory
4. problems with depth perception which affects the ability to judge the position of objects.
5. functional tasks such as finding items in a crowded closet, drawer, or supermarket shelf and locating information on a bill, map or schedule may present difficulty (Pascale-Toglia, et al., 2008, p. 760)..

**Motor Planning and Processing:** how to get their body to do what they want it to do (PascaleToglia & Golisz, 2003, p. 407). It involves a number of different processes such as; vision and perception, cognition and language.

**Psychological:** Identification of any of these behaviors will consequently be addressed in treatment. Possible psychological issues could include, but are not limited to:

1. attention and concentration problems, low frustration tolerance, and fatigue (Iverson, Woodward, & Smith-Seemiller, 2000),
2. lack of awareness of deficits/denial causing safety issues,
3. disinhibition of inappropriate behavior,
4. depression
5. change in family and societal roles
6. management of agitation
7. difficulty with community reintegration and adaptation

**Safety:** When combined with visual perceptual deficits serious safety concerns emerge (William, 1995). According to Boyd and Dawson (2000, p.7), "patients with visual perceptual impairments demonstrate higher emotional distress and increased risk of injury than patients without these impairments."

**Cognitive:** All aspects of daily life can be influenced when visual perceptual deficits are found in conjunction with cognitive impairments.

## Visual Rehabilitation Treatment Team

- Occupational Therapist
- Ophthalmologist
- Optometrist
- Low Vision Practitioner
- Neuro-ophthalmologist
- Neuro-optometrist

### Vision Therapy Experts

1. Academy of Ophthalmology  
PO Box 7424  
San Francisco, CA 94120-7424  
(415) 561-8500
2. American Academy of Optometry  
4430 East West Highway  
Suite 401  
Bethesda, MD 20814  
(301)984-1441  
[www.aaopt.org](http://www.aaopt.org)
3. Association for Education & Rehabilitation of  
The Blind and Visually Impaired  
4600 Duke Street, Suite 430  
PO Box 22397  
Alexandria, VA 22304  
(703) 823-9690
4. College of Optometrists in Vision Development  
243 N. Linbergh Boulevard, Suite 310  
St. Louis, MO 63141  
(888) COVD-770  
[www.covd.org](http://www.covd.org)
5. National Association of the Visually  
Handicapped  
22 West 21<sup>st</sup> Street, 6<sup>th</sup> floor  
New York, NY 10010  
(212)889-3141  
[www.navh.org](http://www.navh.org)
6. Neuro-Optometric Rehabilitation Association  
International  
PO Box 1408  
Guilford, CT 06437  
(886)222-3887  
[www.nora.cc](http://www.nora.cc)
7. Optometric Extension Program  
1921 E. Carnegie Avenue, Suite 3-L  
Santa Ana, CA 92705-5510



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## CHAPTER V

### SUMMARY

#### **Summary of Purpose**

The purpose of this project was to research how the profession of occupational therapy can be more involved in vision therapy for individuals with traumatic brain injury. *The Role of Occupational Therapy in Vision Therapy Promotional Packet*, is the result of a concentrated literature review on the relationship of vision therapy and occupational therapy. The product developed from this project is aimed toward health care professionals, including occupational therapists, who are involved with patients with visual deficits. The purpose is to better define the role of an occupational therapist as part of the visual treatment team. It supports occupational therapy as a unique and significant addition to the visual rehabilitation team for individuals with brain injury.

Occupational therapists have the proficiency and competence to evaluate and depict the functional disability or ability of the ABI client as a whole. The client may present with deficits in motor planning, physical deficits, sensory disturbances, cognitive impairments, problem solving, language/communication, and emotions. These areas cannot be treated solely by a vision therapy specialist and may require other rehabilitation professionals such as occupational therapists, physical therapists and speech therapists. Occupational therapists are specifically trained in all the areas as they impact functional skills and abilities in the client's daily functioning.

## **Limitations of Project**

Limitations to this product include:

1. A lack of information in professional literature that is focused on the visual deficits associated with TBI/ABI, the role of occupational therapy related to vision therapy, and
2. A clear definition to vision therapy.

## **Proposal for Project Implementation**

This project is intended to be implemented as an informational resource to educate occupational therapists and other health professionals on the potential role of occupational therapists as a part of the visual rehabilitation team for individuals with TBI/ABI with associated visual deficits; not as a guide for beginning treatment for individuals with visual deficits. This project will benefit occupational therapists interested in the area of vision therapy by providing the role of OT in this setting and useful resources for becoming certified in vision therapy through continued education resources.

Additional resources are provided in the product that can be used for treatment in this population. The usefulness of this product can be measured by including a survey along with the product to the individuals who obtain this promotional packet.

## **Conclusions**

In conclusion, this product will allow occupational therapists and other health care professionals to gain a better understand the role of OT in vision therapy. It identifies the significance in visual deficits associated in individuals with TBI/ABI and how occupational therapy is a qualified and fitted to be included as a part of the visual rehabilitation team for this specific patient population. It is recommended that:

1. This product be used as an informational packet only, and not as a guide for beginning treatment for individuals with visual deficits.
2. Education occur in relation to occupational therapy and its role in vision therapy for OT students, OT clinicians and other healthcare professionals on the community, state and national level.
3. Further development/expansion of this product is recommended.
4. A nationwide criterion is established for vision rehabilitation services specifically for the ABI/TBI populace.
5. Further extensive research and resultant publications is needed to impart evidence-based data demonstrating the efficacy of vision therapy as well as OT's role in vision therapy

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