

Pacific University

CommonKnowledge

College of Optometry

Theses, Dissertations and Capstone Projects

5-1996

Optometric referral guide for physical and occupational therapists

Christine R. Gebhardt
Pacific University

Recommended Citation

Gebhardt, Christine R., "Optometric referral guide for physical and occupational therapists" (1996). *College of Optometry*. 1172.

<https://commons.pacificu.edu/opt/1172>

This Thesis is brought to you for free and open access by the Theses, Dissertations and Capstone Projects at CommonKnowledge. It has been accepted for inclusion in College of Optometry by an authorized administrator of CommonKnowledge. For more information, please contact CommonKnowledge@pacificu.edu.

Optometric referral guide for physical and occupational therapists

Abstract

The purpose of this manual is to provide an optometric referral guide for use by rehabilitative therapists. The manual will provide criteria to determine whether optometric services are indicated in either primary care or vision therapy. This guide is an effort to enhance comprehensive care for the patient and strengthen interdisciplinary interaction. The conditions requiring optometric referral, as discussed in this manual, include: Cerebrovascular Accident, Traumatic Brain Injury, and Demyelinating Disorders. Suggestions for optometric examination based on the overlapping populations that rehabilitative therapists and optometrists serve include: Geriatrics, Pediatrics, and Indigent Care. The manual reviews symptoms and signs of given visual disturbances as well as comanagement treatment strategies.

Degree Type

Thesis

Degree Name

Master of Science in Vision Science

Committee Chair

Robert Rosenow

Subject Categories

Optometry

Copyright and terms of use

If you have downloaded this document directly from the web or from CommonKnowledge, see the "Rights" section on the previous page for the terms of use.

If you have received this document through an interlibrary loan/document delivery service, the following terms of use apply:

Copyright in this work is held by the author(s). You may download or print any portion of this document for personal use only, or for any use that is allowed by fair use (Title 17, §107 U.S.C.). Except for personal or fair use, you or your borrowing library may not reproduce, remix, republish, post, transmit, or distribute this document, or any portion thereof, without the permission of the copyright owner. [Note: If this document is licensed under a Creative Commons license (see "Rights" on the previous page) which allows broader usage rights, your use is governed by the terms of that license.]

Inquiries regarding further use of these materials should be addressed to: CommonKnowledge Rights, Pacific University Library, 2043 College Way, Forest Grove, OR 97116, (503) 352-7209. Email inquiries may be directed to: copyright@pacificu.edu

OPTOMETRIC REFERRAL GUIDE
FOR
PHYSICAL AND OCCUPATIONAL THERAPISTS

BY

CHRISTINE R. GEBHARDT

A thesis submitted to the faculty of the
College of Optometry
Pacific University
Forest Grove, Oregon
for the degree of
Doctor of Optometry
May, 1996

Adviser:


Robert Rosenow PharmD, OD

OPTOMETRIC REFERRAL GUIDE
FOR
PHYSICAL AND OCCUPATIONAL THERAPISTS

Submitted by

Christine Gebhardt

Christine Gebhardt



Adviser



OPTOMETRIC REFERRAL GUIDE
FOR
PHYSICAL AND OCCUPATIONAL THERAPISTS

Submitted by

Christine Gebhardt

Adviser

Mal P. P.

Grade

A

Biographical Sketch
of
Christine R. Gebhardt

Christine's academic career has provided her with the knowledge and skills to succeed in the rapidly changing field of optometry. She has attended two distinctly different institutions of higher education. At the University of Illinois she received a Bachelor of Science in Biology in 1992 and she will graduate from Pacific University College of Optometry in May of 1996 at which time the degree of Doctor of Optometry will be conferred. Christine has been a member of Beta Sigma Kappa Honor Society, a local liaison for the College of Optometrists in Vision Development and has worked as a teaching assistant, tutor, and optometric technician. Her preceptorship at the Marshfield Clinic in Wisconsin was an extremely beneficial experience because the cases were challenging, diverse, and numerous and the professional atmosphere enriched her personal growth. Christine's decision to pursue optometry has been greatly influenced by her work experience. She has worked in both corporate and private optometric settings and has enjoyed each experience. Christine hopes to promote the high ethical standards that she has observed in her employers in her own practice. It has been rewarding for her to successfully pursue her professional goals, and she will appreciate the opportunity to develop them further in her own practice. Christine desires to practice full scope primary care optometry in a team oriented, multidisciplinary setting. Her special interests include low vision, functional/restorative optometry and treatment and management of ocular disease.

Acknowledgments

Christine R. Gebhardt would like to acknowledge her own dedication and commitment in pursuing her professional goals. Her sister Michelle, a practicing physical therapist, and her dear friend, Dr. John Valentino, who suffered from an untimely stroke, were the inspiration for this thesis. Additionally, she would like to thank her adviser, Dr. Rosenow for his time and involvement in this project. Dr. Rosenow accepted this project into an already full schedule and his efforts are significantly appreciated. Lastly, Christine thanks her family and friends for their continued support.

Abstract

The purpose of this manual is to provide an optometric referral guide for use by rehabilitative therapists. The manual will provide criteria to determine whether optometric services are indicated in either primary care or vision therapy. This guide is an effort to enhance comprehensive care for the patient and strengthen interdisciplinary interaction. The conditions requiring optometric referral, as discussed in this manual, include: Cerebrovascular Accident, Traumatic Brain Injury, and Demyelinating Disorders. Suggestions for optometric examination based on the overlapping populations that rehabilitative therapists and optometrists serve include: Geriatrics, Pediatrics, and Indigent Care. The manual reviews symptoms and signs of given visual disturbances as well as comanagement treatment strategies.

Referral Manual for Physical and Occupational Therapists

The purpose of this manual is to provide an optometric referral guide for use by rehabilitative therapists. The manual will provide criteria to determine whether optometric services are indicated in either primary care or vision therapy. This guide is an effort to enhance comprehensive care for the patient and strengthen interdisciplinary interaction. The guide is structured for quick and easy reference regarding referral criteria for specific conditions, but it is hoped that the therapist reviewing the manual read through it in its entirety to familiarize oneself with the scope of optometric care that is available to rehabilitative therapists and their patients. Also, in reviewing the manual it will become evident that the populations that rehabilitative therapists and optometrists serve is largely the same. The need for visual rehabilitation has been recognized by some occupational therapists. However lack of knowledge of the therapeutic value of optometric services has led to some therapists attempting to fill the gap by assessing visual skills and providing vision therapy(Suchoff 171). This is to the discredit of optometry that we have not made the scope of our skills and services known to our fellow practitioners. It is hoped that this referral manual will enable members of the rehabilitation team to see opportunities for optometric care, establish a referral protocol, and define the role of the optometrist as a valuable member of the rehabilitation team, in the best interest of our patients.

The possibility of suffering from a stroke or traumatic brain injury increases as the population's life span lengthens. Recent statistics note 900,000 people per year suffer from head injury significant enough to require hospitalization(Cohen530). Also, Cerebrovascular accidents remain the third leading cause of death in the United States and the single most expensive disease process in terms of total medical expenditures(Swanson 52). These patients will most likely undergo some form of physical or occupational therapy. Very few health care professionals including those at rehabilitation centers are aware of visual disturbances that result from acquired brain injury. This creates the potential for an inadequate or incomplete rehabilitative treatment regimen if these needs are not addressed.

Optometrists can fill this gap through the creative and judicious use of lenses, prisms, low vision aids, and vision therapy. Through enhancing a patient's visual efficiency the ultimate goal of the rehabilitation team can be achieved, that is improvement in the patient's ability to function in daily activities (Thomas). However, many ocular conditions arising from their head injury will go undiagnosed and untreated due to the lack of an appropriate referral protocol between therapists and optometrists.

I. Acquired Brain Injury

A. Cerebrovascular Accident

The anatomy and physiology of the skull and vascular network contribute to the effects of insult to the visual system. The most common ocular problems seen with head injury include binocular dysfunction, or inability of the two eyes to work together efficiently, blurry vision, ocular motility deficits, visual field losses, and perceptual motor dysfunction (Cohen 530). However each case presents a unique constellation of signs and symptoms based on the location of the injury and the extent of the damage. Because the rehabilitative therapist is involved in treating sensorimotor integration deficits, a comanagement situation fits perfectly into the rehabilitative scheme (Hellerstein 122). A functionally oriented optometrist is the most qualified and trained practitioner to evaluate the visual sensory system, treat the visual deficits, and aid in the therapeutic regimen administered by other members of the rehabilitation team.

The location and extent of the insult can produce widely variable presentations. Focal versus diffuse damage are two distinctive types of damage that can occur after CVA. In focal damage, a particular defined area of injury can be isolated and the typical type of impairment described. An example would be brainstem lesions. These are likely to involve the cranial nerve nuclei and therefore produce defects in ocular motility or parietic eye muscles. It is also known that midbrain and brainstem lesions can lead to disruption of accommodative and convergence relationships, conjugate gaze palsies, nystagmus, and a variety of disturbances of resting fixation (Vogel 540). Whereas in diffuse damage the area of abnormality is nonspecific. Diffuse damage leads to a variety of sensory, motor, or cognitive ophthalmic disorders (Swanson 52). Neither type of damage can be seen as better prognostically for the

patient considering, local and overall damage to the brain are the key factors in the ultimate recovery of the patient(Vogel 537). Each represents different challenges for the therapists treating the patient. Consulting with an optometrist is vital for either case presentation to develop the best treatment strategies that compensate for the areas of dysfunction.

Another problem, dependent on the location of the injury, are deficits involving functions nonspecific to vision that are amenable to and enhanced by optometric intervention. For example, extensive left hemisphere injury can cause global aphasia, where both speech comprehension and production are disrupted (Aksionoff 564). An optometric examination can be performed by objective means, involving little or no patient response, while receiving a great deal of information about the patient's visual function. Also, in this scenario, the optometrist provides the opportunity to maximize the patient's temporarily preferred and isolated learning channel, the visual system. This will help enhance therapeutic strategies employed by the rehabilitation therapists. Alternatively, a therapist may notice that a patient has poor self awareness in space. This may cause clumsiness or awkward navigational ability. While the etiology of the disturbance may not be visual, integrating the visual system into the rehabilitation program through vision therapy techniques can significantly improve the patient's total function.

1. Symptom Inventory

A patient may present with any of the following complaints, which may signal a vision problem. These include:

- Blurred Vision
- Sensitivity to Light
- Double Vision
- Head Tilts or Head Turns
- Headaches or Eyeaches
- Visual Field Losses
- Reading or Comprehension difficulties
- Attention and Concentration difficulties

2. Signs and Treatment Protocol

The signs that an optometrist will look for in detecting visual involvement include:

- Ocular Pathology

Strabismus (An eye turned in, out, up or down)
Accommodative or Convergence Dysfunction
Nystagmus
Decreased Blink Rate
Cognitive and Visual/ Perceptual Impairments
Spatial Neglect-especially common after right side CVA

After the evaluation the optometrist may find a need for lenses to correct for refractive error or compensate for deficits in accommodation. Ocular pathology can be treated or co-managed. Dry eye secondary to facial paresis can often be helped by therapeutic soft contact lenses and lubricating drops. Low vision needs can be addressed and optical devices prescribed. Various methods of visual field enhancement may also be employed. Prism may be used to compensate for an eye turn or convergence problem or prism can be used creatively to solve a number of problems including abnormal head posture, motility disturbances, nystagmus and others.

An optometrist may prescribe yoked prism therapy to augment the gross motor training utilized by the therapist. Research has shown that the sensory-motor mismatch created by the prism can help reorient the system toward proper functioning(Padula16-21). This is based on the idea of neurological learning through motor planning. As the patient interacts with a novel environment induced by the prisms, the patient integrates sensory, proprioceptive and motor responses. This type of vision therapy enhances the rehabilitation of the association areas in the frontal, parietal, temporal and occipital cortices. The rehabilitative therapist can add auditory stimuli to allow for full sensory integration(Cohen 535). This technique is not exclusive to patients having suffered from a stroke, but can be used to enhance treatment in all forms of brain injury where neural reintegration is required.

Other ideas and suggestions can be elaborated on an individual basis. Optometric consultation can be helpful in improving quality of life. For example, patients that are bed ridden may benefit from a simple device known as bed spectacles. These are glasses that have right angle prisms incorporated in them to allow television viewing from a supine position, without moving or lifting the head(Falk 551).

B. Traumatic Brain Injury

Many of the deficits in function that present as a result of traumatic brain injury are common to those having suffered from a cerebrovascular accident. Optometric intervention involves diagnosis of affected areas, compensation for deficits, and treatment to recover lost function.

1. Symptom Inventory

Blurred Vision
Sensitivity to Light
Double Vision
Head Tilts or Head Turns
Headaches or Eyeaches
Visual Field Losses
Reading or Comprehension difficulties
Attention and Concentration difficulties

A visual symptom questionnaire has been developed by Dr. Hellerstein that may be useful in helping gauge visual involvement. The following questions are adapted from her evaluation forms.

Patient name and date of evaluation
Are you having difficulty with seeing?
Do you wear glasses? Bifocals?
Do your glasses work as well now as before the trauma?
Do you ever see double?
Do you ever find that when you reach for an object that you knock it over or misjudge its location?
Are you experiencing headaches or eyestrain?
Do you have trouble with reading? Lose your place? Letters missing or appearing to move?
Do things suddenly appear from your side view? Are portions of objects missing?
Do you have difficulty concentrating on tasks?

2. Signs and Treatment Protocol

Disorders in the Post Traumatic Vision Syndrome:
Exophoria or Esophoria
Accommodative Dysfunction

Convergence Abnormalities
Saccadic Abnormalities
Reduced Acuity
Reduced Blink Rate
Spatial Disorientation
Balance and Postural Difficulties

The post traumatic vision syndrome, as described by Dr. Padula, has been intimately associated with diffuse TBI. The current explanation is that the presentation evolves from the acceleration-deceleration forces common in cases of head injury(Swanson 52).

The visual field loss patterns are characteristic of the location of the injury. The implications for the patient are dependent on the depth of the area of vision loss and region of the field involved. One of the most devastating field losses is a right homonymous hemianopsia. This field loss can create problems with motility and manifest as an extreme deficit in reading ability. The patient may not be aware of the extent of the loss but will complain of losing their place easily while reading. To compensate for this prism can be added to the lateral half of the patient's spectacles with the base of the prism toward the defect, to expand the patient's useable visual field. A non optical approach is to teach the patient to read material upside down. Alternatively, the patient may be fitted with mirror coatings on the back lateral surface of the glasses(Waiss 577). This technique will not improve reading ability but will expand the visual field.

Another area that occupational therapists are becoming actively involved in is treatment of perceptual deficits. These include form perception, figure ground, visual closure, visual memory, and sensory integration(Hellerstein 6). There are several batteries of tests that assess the patient's function in these areas. Some behaviorally oriented optometric practices perform these tests as well in obtaining a composite picture of the patient's total visual function. It is extremely important that excellent communication and correspondence is maintained between practitioners involved with a case so that redundant testing is avoided. A recommended patient flow scheme for optometrists and rehabilitative therapists is found in Table 1(Hellerstein 123)

Practitioner	Testing	Outcome:determined by findings
Optometrist	Visual Evaluation	Optical correction Disease management
	Binocular Evaluation	Vision Therapy
Occupational Therapist	Sensorimotor Testing	Occupational Therapy

Table 1. Patient Flow Scheme

II. Demyelinating Disorders

A. Multiple Sclerosis

Patients recently diagnosed with multiple sclerosis should be referred for optometric evaluation due to the numerous ocular implications of this disease. Early optometric intervention can help explain the course of the disease to the patient, begin adaptive treatment plans and lessen the negative ramifications of associated pathology. The following ocular conditions are the most commonly associated with demyelinating disorders.

1. Optic Neuritis

a. Definition and Symptom Inventory

"Optic Neuritis is a presenting feature in about 25% of MS patients and occurs during the course of the disease in about 70% of the patients" (Kanski 442). The symptoms of this disorder include sudden and/or progressive visual loss, possible pain located in or around the eye which worsens with movement of the eye, and color desaturation (Spalton 17.18). Significant correlative risk factors for the development of systemic MS include presentation of Uhthoff's phenomenon, recurrence, and Human Leukocyte Antigen testing revealing the DR-2 marker (Kanski 443).

b. Signs and Treatment Protocol

Optometric examination may reveal swelling of the optic nerve head, which may result in significant decrease in visual acuity, visual field losses, typically with a centrocecal scotoma pattern, neural pathway conduction deficit manifest by an afferent pupillary defect, Pulfrich phenomenon, and red desaturation. The patient should have a Magnetic Resonance Imaging scan, if one has not been previously performed, to confirm the etiology of the disorder. However, if the patient is referred from a therapist and the primary systemic disease has already been revealed this step will be unnecessary and optometric care can ensue based on the presumptive diagnosis of optic neuritis secondary to demyelinating pathology. Depending on the severity of the presentation and whether it is a primary or a recurrent presentation corticoid therapy may be initiated. The use of high dose intravenously administered methylprednisone represents a modest advance in the treatment of MS for patients in acute relapse or exacerbations of the disorder. These patients may find a shortened course of the symptomatic disorder with this treatment protocol. (Duane 2(5):48). Reassurance and close observation to monitor the progression of the disease are often the continuing treatment plan for these patients.

2. Internuclear Ophthalmoplegia

a. Definition and Symptom Inventory

Bilateral internuclear ophthalmoplegia, INO, in young patients is almost always associated with MS. The condition is due to lesions in the medial longitudinal fasciculus, MLF. Patients may notice doubling of images or contraction of their visual field due to the deficit in extraocular motilities, or movement of their visual world, as a result of nystagmus.

b. Signs and Treatment Protocol

The patient will present with poor ability to adduct the affected eye, and an abducting nystagmus of the contralateral eye. The patient will retain the ability to converge the eyes. A more extensive unilateral lesion of the MLF, and involving the horizontal gaze centers, will produce a combination of a gaze palsy and INO known as the One and a Half Syndrome. In this situation the only horizontal movement that the patient can make is abduction of the contralateral eye. Essentially the affected eye is frozen and the contralateral eye retains only the ability to abduct and make vertical movements. Also associated with INO in MS patients is a vertical nystagmus present on upgaze and skew deviations. (Spalton 19.11-12). A pendular nystagmus may be present and is a dissociated type

nystagmus where presentation is variable or asymmetric on differing gazes. (Duanes2(11):14)

The symptoms of INO can be partially alleviated through lens and prism applications. Prism can be utilized in a variety of ways in addition to its compensatory function for strabismus and motility problems. A visual field expander can be made by placing prism on the lateral half of the lens on the side of the defect(Smith notes). Nystagmus can often be dampened by use of conjugate prisms. For example, a patient may need to turn their head to reach a null point in the nystagmoid movement. This can be counterproductive to their general motility and posture. The prism will serve to redirect the light and alleviate the need for the head turn(Griffin 422-3). Other options or approaches may be available to fit the given clinical presentation. Clearly, all patients with MS should be introduced to an optometrist to establish a working relationship should the need for intervention develop. In this way the treatment regimen can be more personal and customized to the patient's lifestyle.

III. Other categories of referral criterion

A. Patients that may have neglected healthcare issues

1. Geriatric Care

It has been discussed previously that elderly patients that have suffered a Cerebrovascular accident or other form of closed head injury clearly require optometric referral, optometric intervention and often times, concurrent therapeutic care. However, it should be noted here that geriatric optometry is a growing subspecialty within the optometric field. This subspecialty has developed due to the rising demand for care and specialty services necessitated by the aging population in this country. Patients that are receiving therapy for a fractured hip may also benefit from the skilled observation of the therapist in noting difficulty with reading tasks, complaints of headaches, or even something as simple as a broken or poorly fitting spectacle frame. Postural improvements can often be achieved through the use of prisms. For example, yoked prism base down may be prescribed for a patient with a slumped forward posture. In this situation the prism encourages a raised head and will hopefully make the patient assume a straightened body position(Lowery). Additionally, patients diagnosed with Parkinson's Disease often

experience ocular disturbances such as involvement of the eyelids, dry eye syndrome, and extraocular muscle impairment(2(10):8). Types of services that are available for geriatric patients include:

a. Standard Optometric Examination

The exam will identify visual function and assess ocular health. The appointment also provides the patient the opportunity to ask questions and address health concerns regarding issues pertinent to their age group, such as glaucoma, cataracts, skin cancers and the ocular effects of systemic diseases like hypertension and diabetes. Early detection, management or treatment is crucial for good prognosis in patients with these systemic conditions because they contribute to the three top causes of death in the United States which are Heart Attack, Cancer and Stroke. (Walls notes)

b. Low Vision Evaluation and Services

This optometric function can be essential in helping restore quality of life to an elderly patient. Low Vision is the third leading debilitating and/or handicapping condition in the United States affecting persons over 65 years of age. (Marshfield). A comprehensive low vision program furnishes the patient with various types of visual aides, adaptive equipment, and lifestyle retraining in addition to providing information on vision loss. The optometrist also serves as an intermediary for the patient by allowing the patient to gain access to community programs and support groups. (Marshfield). Several federal, state and local agencies provide information and assistance to the visually disabled. The Commission for the Blind and Visually Handicapped, and the Department of Vocational Rehabilitation are state agencies that work closely with optometry to help rehabilitate persons with various forms of visual loss(Soden 593).

2. Pediatric Care

The American Optometric Association recommends that the initial pediatric eye examination occur at 6 months of age (AOA 4). This guideline was established based on normal ocular development profiles. At this age, visual acuity, accommodation, and binocular vision are at a critical stage of development. "Interference with development during this critical phase may lead to serious lifelong effects on vision."(AOA 4). As a health care practitioner, therapists have an obligation to be authorities, and be able to provide information, regarding major public health concerns. Moreover, therapists can serve as family health advisories. Parents are often unaware that preventative medicine exists within the

eyecare field. Therapists have a unique relationship with their patients and are often quite closely involved with the patient's family members. Although the infant or child in the family may not be the patient being treated, a recommendation for visual evaluation of the child can often ensure the child's future educational readiness skills are not overlooked.

Significant risk factors for abnormal vision development include:

- Prematurity, Fetal distress, or low Apgar score
- Family History of genetic disease, high refractive error, or strabismus
- Known or suspected central nervous system dysfunction
- Maternal infection during pregnancy with rubella, toxoplasmosis, or a sexually transmitted disease

Discovery of the presence of any of these conditions or risk factors warrants prompt optometric referral. Again, early intervention in treating visual inefficiencies can significantly improve later function. Additionally therapists can help the parent's find the most cost effective treatment options for acute care by referring the child to an optometrist. Highly prevalent juvenile conditions, such as conjunctivitis, are easily and efficiently managed by a therapeutic licensed optometrist. In the era of managed care it will become increasingly evident that all members of the healthcare team exercise their fiduciary responsibility to control costs without compromising patient care.

3. Indigent Care

Often times people without insurance or knowledge of how to access state and federal aid programs may neglect vision care or fail to receive their vision care benefits. The PT/OT that treats these patients resulting from an injury or major medical illness of recent onset is in the perfect position to refer these patients for a comprehensive vision examination. The PT/OT is an educated professional with knowledge and access to a variety of health care practitioners. The purposes of providing a referral to an optometrist for this group of patients include:

a. Ethical/Legal issues

To ensure quality of care is provided regardless of ability to pay. The PT/OT will have listings of practitioners that accept public aid. Low income patients that have not established relationships with healthcare

practitioners may be suffering from as yet undetected systemic pathology that may have ocular implications. There is often a relationship between low income and poor health manifestations. An optometric examination is an expedient, cost effective strategy for determining overall health of the individual, detecting pathology, assessing visual performance and treating and consulting appropriately.

b. Correcting Referral Patterns

Referring to an optometrist alleviates the time constraints and overloaded schedules of family practitioners. In the era of managed care appropriate referral is critical. If a patient that presents with conjunctivitis can be effectively treated and managed by an optometrist this is the correct and appropriate referral.

It is recognized that it can be difficult and time consuming to research local optometric authorities capable of dealing with the various types of issues addressed here on a case by case basis. For this reason, it is recommended that the therapist reviewing this manual have the foresight to develop a referral network and foster relationships with these optometrists to maximize comanagement and interdisciplinary interaction, as well as ensuring that each patient referred is served optimally. The Blue Book of Optometry can help locate optometrists practicing in your area, and the College of Optometrists in Vision Development Membership Directory, has lists of optometrists specializing in functional and rehabilitative optometry. A list of other convenient resorces follows:

American Optometric Association
243 N. Lindbergh Blvd.
St Louis, MO 63141-7881

College of Optometrists in Vision Development
P.O. Box 825
Chula Vista, CA 92012

Neuro-Optometric Rehabilitation Association
P.O. Box 1408
Guilford, CT 06437
(203) 453-2222

Optometric Extension Program Foundation, Inc.
1921 E. Carnegie Ave., Suite 3-L
Santa Anna, CA 92705-5510
(714) 250-8070

References

- Aksionoff EB, Falk NS. Optometric therapy for the left brain injured patient. *Journal of the American Optometric Association* 1992; 63: 564-568.
- Aksionoff EB, Falk NS. The differential diagnosis of perceptual deficits in traumatic brain injury patients. *Journal of the American Optometric Association* 1992; 63: 554-558.
- Cohen AH, Rein LD. The effect of head trauma on the visual system: The doctor of optometry as a member of the rehabilitation team. *Journal of the American Optometric Association* 1992; 63: 530-536.
- Cohen AH. Optometric management of binocular dysfunctions secondary to head trauma: case reports. *Journal of the American Optometric Association* 1992; 63: 569-575.
- Cohen AH. Optometry: The invisible member of the rehabilitation team. *Journal of the American Optometric Association* 1992; 63: 529.
- Falk NS, Aksionoff EB. The primary care optometric evaluation of the traumatic brain injury patient. *Journal of the American Optometric Association* 1992; 63: 547-553.
- Glaser JS, Parks MM, eds. *Duanes Clinical Ophthalmology Volumes 1 and 2*; 1995.
- Gottlieb DD, Freeman P, Williams M. Clinical research and statistical analysis of a visual field awareness system. *Journal of the American Optometric Association* 1992; 63: 581-588.
- Griffin, JR. *Binocular Anomalies Procedures for Vision Therapy*, 2nd ed. Boston: Butterworth-Heinemann, 1982.
- Gutting A. The role of occupational therapy in rehabilitating stroke patients. *Journal of the American Optometric Association* 1992; 63: 595-598.
- Hellerstein L, Fishman B. Vision dysfunction in traumatic brain injury/ stroke patients- the interactive roles of the occupational therapy

practitioner and the behavioral optometrist. The American OTA's Professional development program conference notes; 1995.

Hellerstein L, Fishman B. Vision therapy and occupational therapy-an integrated approach. *Journal of Behavioral Optometry* 1990; 1: 122-124.

Kanski JJ. *Clinical Ophthalmology*. Oxford: Butterworth Heinemann, 1989.

Krantz JL. Psychosocial aspects of vision loss associated with head trauma. *Journal of the American Optometric Association* 1992; 63: 589-591.

Lowery JP. Assessment and management of the traumatically brain injured patient. Guest Lecture Notes; April 14,1995.

Marsfield Clinic Informational Brochure: Low Vision 1995.

Padula WV, Shapiro JB, Jasin P. Head injury causing post trauma syndrome. *New England Journal of Optometry* 1988; 41(2)Winter: 16-21.

Scheiman MM. Pediatric eye and vision examination. *Optometric Clinical Practice Guideline* 1994; 1-45.

Smith D. *Optometry 718 course notes*. 1994.

Soden R. Community resources and third party billing for patients who have had head trauma/ head injuries. *Journal of the American Optometric Association* 1992; 63: 592-594.

Spalton DJ. The Optic Disc and Neuro-Ophthalmology. In: *Atlas of Clinical Ophthalmology*, Wolfe Puublishing, 1994: 17,19.

Suchoff I. Occupational therapy and optometry developing a relationship. *Journal of Behavioral Optometry* 1991; 2: 170-178.

Swanson M. Neuro-rehabilitation. *EyeQuest Magazine* 1995; 5(1): 50-56.

Thomas J. Acquired brain injury and hidden visual problems. *Optometric Extension Program Informational Pamphlet*1994.

Vogel MS. An overview of head trauma for the primary care practitioner: Part 1-etiology, diagnosis, and consequences of head trauma. Journal of the American Optometric Association 1992; 63: 537-541.

Vogel MS. An overview of head trauma for the primary care practitioner: Part 2-ocular damage associated with head trauma. Journal of the American Optometric Association 1992; 63:542-546.

Waiss B, Cohen JM. The utilization of a temporal mirror coating on the back surface of the lens as a field enhancement device. Journal of the American Optometric Association 1992; 63: 576-580.

Waiss B, Soden R. Head trauma and low vision: clinical modifications for diagnosis and prescription. Journal of the American Optometric Association 1992; 63: 559-563.

Walls L. Optometry 731 course notes 1995.

Optometric Terminology

Adapted from Hellerstein/ Fishman OTA Professional Program Notes

Optometrist (O.D.) - Doctors of Optometry are independent primary health care providers who specialize in the examination, diagnosis, treatment and management of diseases and disorders of the visual system, as well as the diagnosis of related systemic conditions. These health care professionals are specifically educated, clinically trained and state licensed to examine the eyes for the presence or absence of vision problems, eye diseases or ocular manifestations of systemic diseases such as diabetes, hypertension, and hyperthyroidism. The scope of optometric practice also encompasses assessment of functional vision, dealing with issues such as how the eyes lead the body, and determining the interaction of the two eyes, as well as rehabilitation for areas of visual deficiency. This area is often referred to as vision therapy.

Ophthalmologist (M.D.) - A medical doctor who is educated, trained and licensed to provide medical eye care, including prescribing medication, performing eye surgery and eye examinations.

Optician - The person who fills prescriptions for glasses, written by optometrists and ophthalmologists. Opticians duties include grinding lenses to fit into a specific frame and fitting the frame for the patients comfort.

Vision - A cognitive act which enables us to look at an object and not only identify it, but to determine its location in space, its rate of movement, its texture and everything else that can be determined by visual inspection. Whereas eyesight is a sensorimotor function, vision is a learned process derived from sensory interaction with the environment. Visual experience is required to learn to see. Vision is the culmination of many subprocesses involved in sight that allows us to derive meaning from visual input.

Vision Therapy - Optometric vision therapy is a treatment plan used to correct or improve specific dysfunctions of the visual system. It includes, but is not limited to, the treatment of strabismus, other dysfunctions of binocularity, amblyopia, accommodation, ocular motor function and visual-perception abilities. Optometric vision therapy is based upon a medically necessary plan of treatment which is designed to improve specific vision dysfunctions determined by standardized diagnostic criteria. Treatment plans encompass lenses, prisms, occlusion,

and other appropriate materials, modalities and equipment in addition to ocular/ visual training procedures.

Anatomy

Cornea - The transparent, anterior one sixth, fibrous coat of the eye.

Sclera - The white part of the eye. The sclera is continuous with the cornea, providing the remaining five sixths of the protective covering of the eye.

Conjunctiva - A mucous membrane extending from the eyelid margin to the corneal limbus.

Limbus - The zone where the cornea, sclera and conjunctiva meet.

Pupil - The opening in the iris through which light enters the eye.

Iris - The colored portion of the eye, containing two muscles which regulate the amount of light that enters the eye.

Crystalline Lens - The biconvex, normally transparent lens located directly behind the pupil of the eye. The lens is supported by the sensory ligaments around its entire circumference. The ligaments are attached to the ciliary muscle and ciliary processes. Their function is to control the curvature of the crystalline lens.

Aqueous Humor - The clear, watery fluid that fills the area of the eye between the cornea and lens.

Vitreous Body - The transparent, colorless gel filling the posterior part of the eye between the lens and the retina.

Retina - The sensory membrane that lines the eye, containing many specialized nerve cells, including the rods and cones. The cones are specialized in detecting color and fine detail. The rods are specialized for night vision and motion detection.

Fovea - A retinal area, directly in line with the pupil, that contains the highest concentration of cones. This area provides the sharpest vision. The macula is the retinal area that surround the fovea.

Optic Nerve - The second cranial nerve comprised of nerve processes carrying the nerve impulses from the retina to the brain. The point where the optic nerve exits the eyeball is called the optic nerve head.

Extraocular Muscles - The set of six muscles attached to the eyeball that are responsible for eye movements. The innervation to these muscles includes Cranial Nerve III, IV, and VI.

Measurement Terms

Diopter - The unit of measurement of the refracting power of a lens or optical system equal to the reciprocal of the focal length in meters (1/meter).

Sphere - A lens with the same curve in all directions. Spherical lenses can be either plus or minus powers to correct for hyperopia (farsightedness) or myopia (nearsightedness), respectively.

Cylinder - A lens having no refractive power in one meridian and maximal power in the meridian 90 degrees away from the zero power meridian. It is used to correct for astigmatism.

Prism - An optical element that can be incorporated into a lens that functions to deviate the path of light. Light entering a prism is bent toward the base of the prism. Prism has many uses including correction of ocular misalignment or binocular instability.

O.D. - Oculus Dexter- right eye

O.S. - Oculus Sinister- left eye

O.U. - Oculus Uterque- both eyes

P.D. - Pupillary Distance- the distance between the centers of the pupils of the two eyes.

V.A. - Visual Acuity- Acuteness or clearness of vision often measured clinically with the Snellen chart.

Diagnoses

Refractive Error (Ametropia) - A condition of the eye where parallel light rays entering the eye do not focus on the retina.

Emmetropia - The visual condition when light rays coming from a distant object enter the eye and are focused on the retina.

Myopia - Nearsightedness- The visual condition where light entering the eye is focused in front of the retina causing close objects to be seen more clearly than distant objects.

Hyperopia - Farsightedness- The visual condition where light entering the eye is focused behind the retina causing distant objects to be seen more clearly than close objects.

Astigmatism - The visual condition where light entering the eye is focused at two different distances from the retina causing blurriness or distortion. This is generally due to an irregularly shaped cornea or lens. In this condition there are two different curvatures which produce two different points of focus.

Anisometropia - The visual condition in which the refractive errors in the two eyes are different.

Presbyopia - The visual condition derived from Latin meaning old vision. The ability to focus for near work is reduced due to decreased elasticity of the lens, usually as a function of aging.

Strabismus - The inability of the two eyes to be used together in binocular fixation due to misalignment of the two visual axes. An eye turn.

Exotropia - An outward deviation of an eye.

Esotropia - An inward deviation of an eye.

Hypertropia - An upward deviation of an eye.

Amblyopia - Often referred to as lazy eye. The condition is reduced visual acuity in an eye that is not correctable with lenses and not attributable to structural or pathological abnormalities.

Suppression - The cortical inhibition of an eye. This is a condition where information coming in from one eye is selectively attenuated and not attended to by the brain. This manifests as a method of compensation for a poorly functioning binocular system.

Visual Skill Elements

Accommodation - The ability to adjust the focus of the eyes as the distance from the object changes. Accommodation increases as a distant object is brought closer. The adjustment occurs as a function of the elasticity of the lens and is accomplished by contraction of the ciliary muscle which makes the lens more convex. Accommodation is measured in units of Diopters.

Binocular Vision - Normal vision involving the simultaneous use of both eyes such that the brain can gather information received from each eye separately and form a singular image.

Convergence - The ability of the two eyes to turn toward the midline as is required for looking at a near object.

Divergence - The ability of the two eyes to turn away from the midline, as is required in changing fixation from near to far.

Stereopsis - the visual perception of depth occurring when the two eyes are being used together efficiently.

Ocular Conditions

Corneal Abrasion - An area on the cornea where a portion of the epithelium (outermost layer) has been scraped away, usually as the result of injury.

Conjunctivitis - Inflammation of the conjunctiva, generally of bacterial, viral, or allergic origin.

Conjunctival Hemorrhage - A bright, red area of accumulated blood just beneath the surface of the conjunctiva, indicating a small blood vessel has broken in the area.

Color Deficiency - Commonly called color blindness, which is a misnomer due to the fact that very few individuals in the population have a true absence of all color perception ability. Color deficiency is usually a sex linked hereditary defect occurring in 8% of all males and 0.4% of all females. Most defects are in red-green discrimination.

Floater - Substance suspended in the normally transparent vitreous humor that are visible while looking at a blank field, like a blue sky. As a result of the normal aging process the vitreal composition changes causing areas of liquefaction and condensation of the collagen matrix. A sudden onset of multiple floaters can be indicative of retinal detachment.

Cataract - Any opacity of the crystalline lens. These opacities can cause hazy, distorted or blurred vision. If the cataract significantly interferes with vision, or with patient's daily functioning it can be surgically removed. An eye without the crystalline lens is termed aphakic. If an intraocular lens implant, (I.O.L.) has been inserted the term used is pseudophakic.

Glaucoma - A disease of the eye characterized by an increase in intraocular pressure, or increased fluid in the eye, causing damage to the nerve fibers. If it is left untreated, visual field defects and blindness can result.

Retinal Detachment - The term used when the retina pulls away from the back of the eye. Some of the symptoms include: A sudden onset of floaters, flashes of light, visual field defects, or loss of vision. A common description is that the field of vision is being filled with cobwebs or that a curtain is coming down over an area of the visual field.

Screening Protocol:

The major areas that should be assessed if there is suspicion of a poorly functioning visual system or possible visual deficit are summarized below. It should be noted that if a patient passes this rudimentary screening a visual or ocular health problem could still be present. It is important not to offer a false sense of security. This screening should be used only to detect gross deficits. It should not be used in place of a comprehensive vision examination, as can be provided by optometrists.

Visual Acuity - Using Snellen charts at 6 meters and 40 centimeters far and near acuity can be assessed. It is important to test both monocular (one eye at a time) and binocular (both eyes together). A reduced acuity or difference in acuity between the eyes, with the patient wearing their current glasses, is a significant finding.

Accommodation - A Donder's card or newsprint sized typewritten material is slowly brought closer to the patient until the print can no longer be read by the patient. This distance is measured in inches or centimeters from the patient's face. The test should be performed both monocularly and binocularly. This test is for younger patients, since the geriatric population is presbyopic, and no longer has the ability to accommodate. A distance of 20cm is normal for young patients.

Convergence - Using a pen tip as a target, have the patient follow the pen tip as it slowly brought closer to the patients face along the midline. Ask the patient to tell when they see two pen tips. This is their near point of convergence break, or the point where they can no longer converge their eyes, resulting in doubling of the target. Have the patient close their eyes and move the pen tip in a bit closer. Have the patient open their eyes and report when they see on pen tip again. This is the recovery finding. If the break is beyond 4 inches or 10cm or the recovery is beyond 6 inches or 15cm they have poor convergence ability.

Visual Fields - A gross detection of field defects can be performed by a finger counting visual field. Cover one of the patients eyes. Align yourself with the eye being tested. Have the patient keep looking into your eye while you hold up fingers into the four quadrants of space. Have the patient report how many fingers they see. A full monocular field is 60° superiorly, 70° inferiorly, 60° nasally, and 100° temporally.

Ocular Motility - Three areas should be addressed. Pursuits, saccades, and range of motion. Pursuits are the ability of the eyes to smoothly track a slowly moving target. Jerkiness or inability to track a target indicates pursuit dysfunction. Saccades are the ability to quickly and accurately follow a rapidly moving object. Have the patient move their eyes between two different targets in all fields of gaze. Note if the patient can move their eyes in this manner, note if the patient makes small midline jumps to get from one target to the other. Range of motion testing can be used to detect extraocular muscle paresis or restrictions. The eyes should be able to follow a target into all fields of gaze: vertical, horizontal, and oblique.

To assist your detection of involved muscles the following two diagrams describe the EOM actions and their primary actions in various fields of gaze. The diagrams are of a patient's right eye from the observer's perspective. For example, using the H-diagram, the inferior oblique acts primarily to elevate the eye in adduction, so if you were looking at this patient and had the patient look to their nose (look to their left) and then had them try to look up, if they could not do this, the inferior oblique muscle may be involved. The second diagram shows the actions of each of the muscles from primary (straight ahead) gaze.

