Providing Low Vision Rehabilitation Services With Occupational Therapy and Ophthalmology: A Program Description

Mary Warren

Key Words: low vision • rehabilitation

This article describes a low vision rehabilitation program operating within a hospital-based outpatient rehabilitation clinic. The program uses a team approach combining ophthalmology and occupational therapy services. Patients are referred to the program by their primary care physician for a low vision evaluation completed jointly by the ophthalmologist and occupational therapist. The ophthalmology portion of the evaluation includes assessment of visual acuity, contrast sensitivity function, and macular perimetry with a scanning laser ophthalmoscope. The occupational therapy evaluation focuses on assessing the functional limitations experienced by the patient due to the vision loss and determining how the patient is best able to use remaining vision to complete daily activities. Occupational therapy treatment emphasizes training the patient to use remaining vision as efficiently and effectively as possible to complete daily activities and includes training in use of optical devices. Because of the specialized nature of the service provided, additional postgraduate preparation is needed to enable occupational therapists to provide effective low vision rehabilitation.

An estimated 3 million Americans live with partial or total vision impairment, including 600,000 to 900,000 classified as legally blind and another 100,000 who experience light perception only or total blindness (Kirchner, 1985). Two thirds of the low vision population are more than 65 years of age with women substantially outnumbering men (Fletcher, Shindell, Hindman, & Schaffrath, 1991). According to projections made in 1979, the estimated number of elderly persons with marked visual impairment will increase from 990,000 to 1.7 million by the year 2000 (Kirchner, 1985). Most of these persons experience vision loss secondary to chronic age-related conditions such as macular degeneration, diabetic retinopathy, and glaucoma (DeSilva, 1990). Although techniques exist that control the rate of deterioration, medical science has been unable to establish effective cures for these conditions, which leaves persons affected by them with permanent and irreversible vision loss.

Persons with low vision live in a kind of gray area between normal correctable vision and complete blindness (Orr, 1992). They are not totally blind, yet they do not have sufficient vision to read food and medication labels, write a check, balance a checkbook, drive a car, operate a computer, prepare a meal, or complete other functional activities needed to maintain an independent lifestyle (Warren & Lampert, 1994). For a considerable number of older persons, low vision is their primary physical impairment. However, because of the impact of low vision on the performance of activities of daily living (ADL), many older adults with low vision find they must enter retirement and residential care facilities or reside with their children (Orr, 1992).

Traditionally, low vision rehabilitation services for adults have been administered through community-based organizations such as Lighthouses for the Blind or through state vocational rehabilitation services. Generally, these programs use an educational model with rehabilitation teachers, counselors, and orientation and mobility specialists for service delivery. Although occupational therapists have been included in these rehabilitation teams, the number of occupational therapists providing low vision rehabilitation services through the blindness system has been quite limited. The reason for this limitation is largely because occupational therapists traditionally practice within the health care system, which has had only minimal involvement in low vision rehabilitation.

In 1990, The Health Care Financing Administration (HCFA) approved low vision as a physical impairment appropriate for rehabilitation (Code of Federal Regulations, 1994). This inclusion enabled Medicare to cover rehabilitation services delivered through recognized health care providers including occupational and physical therapists, licensed psychologists, and social workers through physician referral and direction. Consistent with...
established Medicare guidelines for occupational therapy (American Occupational Therapy Association [AOTA], 1994), treatment must be medically necessary, meaning that the patient's ability to complete necessary ADL has been greatly compromised by the vision loss, and reasonable, in that there is an expectation that the patient's functional ability will improve with therapy.

The inclusion of low vision as a physical impairment in the HCFA guidelines enables low vision rehabilitation services to be broadly incorporated into the health care delivery system for the first time. This inclusion has the immediate positive effect of making possible more widespread and comprehensive service delivery to persons with low vision, because most hospitals already have established outpatient therapy departments or home health services or both that could expand to include low vision rehabilitation in the services they provide. The effect would be most dramatic in meeting the needs of older adults, who constitute the largest proportion of the low vision population but generally receive only limited services (Crews, Frey, & Peterson, 1987; Herndon & Landry, 1995).

Although it is now possible to provide low vision rehabilitation through outpatient therapy services, few programs exist in the health care system that provide this service. The purpose of this article is to describe a hospital-based outpatient therapy program that provides low vision rehabilitation with ophthalmology and occupational therapy services.

Description of the Visual Independence Program

The Visual Independence Program (VIP) was established in 1992 at the Eye Foundation of Kansas City, a private not-for-profit foundation that serves the educational and research needs of the Department of Ophthalmology at the University of Missouri Kansas City School of Medicine. The program operates as an outpatient rehabilitation clinic as part of the ambulatory care services of Truman Medical Center, which is the teaching hospital affiliated with the School of Medicine. The program is staffed by an ophthalmologist and five occupational therapists who are employed by the medical center. One of the occupational therapists has a master's degree in orientation and mobility. Primary rehabilitation services are provided by the occupational therapy staff members. However, ancillary services such as social services, nursing, and physical therapy are available through the medical center as needed.

The goal of the program is to provide rehabilitation services to persons with low vision to enable them to continue to live productive and satisfying lives as independently as possible. The program is not limited to specific conditions or age ranges. Services are delivered to both children and adults with visual impairment secondary to congenital and hereditary conditions, age-related and systemic diseases, and neurological conditions. However, the median patient age is 77 years, and the most prevalent condition is age-related macular degeneration (36%), which makes gerontology the primary focus of the program (see Table 1). Since the inception of the program, occupational therapy services have been delivered to more than 1200 persons. Referrals are primarily received from ophthalmologists within the city and surrounding metropolitan area. Retinal and glaucoma specialists make up the primary referral base for the program, which includes approximately 157 physicians. A limited number of referrals are received from optometrists, area school systems, state rehabilitation services for persons who are blind or have visual impairments, or the patients themselves.

The program uses a team approach that combines ophthalmology and occupational therapy services. The ophthalmologist serves as the medical director of the program and provides physician referral and direction for the rehabilitation services provided by the occupational therapists. Patients are referred to the program for a low vision evaluation. During the initial visit, the patient is evaluated by the medical director and an occupational therapist. After completion of the evaluation, it is determined whether the patient is appropriate for and would benefit from rehabilitation services. If services are needed, the medical director writes an order for occupational therapy. Therapy services are then initiated and carried out in consultation with the physician. Patients are seen one to two times weekly depending on their needs and are treated in the clinic, home, or community. Monthly staff meetings are held with the medical director and occupational therapists to discuss the progress of individual patients, update treatment plans, and complete discharge planning. Patients are discharged from the program when the goals established on the plan of care are met or maximum potential has been achieved.

Table 1

<table>
<thead>
<tr>
<th>Diagnostic Classification</th>
<th>Visual Impairment Level</th>
<th>Average Number of Treatment Sessions Provided Per Impairment Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macular degeneration</td>
<td>Severe</td>
<td>20</td>
</tr>
<tr>
<td>Diabetic retinopathy</td>
<td>Severe</td>
<td>24</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>Moderate</td>
<td>59</td>
</tr>
<tr>
<td>Neurological</td>
<td>Unqualified</td>
<td>17</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

Note: N = 1,246. Average age = 68 years, Mean age = 77 years. Number of men 452, Number of women 794.
Evaluation

The Ophthalmology Evaluation

During the initial visit to the program, the patient receives joint ophthalmology and occupational therapy evaluations to establish the medical necessity for rehabilitation. Because the patient is referred with a diagnosis, the ophthalmologist concentrates on evaluating the functional visual capacity of the patient to provide the therapist with information needed for treatment. A precise acuity measurement is obtained with techniques developed for low vision evaluation (Colenbrander & Fletcher, 1992). Contrast sensitivity function is measured to determine the patient’s ability to see accurately objects with reduced contrast presentation (such as curbs, steps, etc). Visual field testing is completed with either confrontation testing or tangent screen, or automated perimetry.

Patients with suspected macular scotomas (blind spots) are evaluated with macular perimetry by using a scanning laser ophthalmoscope (SLO). The SLO is a sophisticated imaging device that scans an invisible infrared laser directly onto the patient’s retina to image the retina while a HeNe laser presents stimuli to precisely map out the boundaries of the macular scotoma in relation to the fovea and characterize fixation. The device provides substantial information for rehabilitation because it determines where the patient has relocated the preferred retinal locus for fixation (PRL) when the fovea is no longer functioning (Schuchard & Fletcher, 1994). The PRL essentially functions as “new” fovea and can be used by the patient to resolve visual detail (Schuchard, Fletcher, & Maino, 1994), although not at the same level of acuity as the actual fovea. The therapist will use the information from the SLO to determine what eye movement the patient must make to use the PRL and resolve visual detail. In addition to these visual function tests, the physician examines the anterior and posterior segments of the eye and may evaluate clarity of the optic media, ocular motility, refraction, and other parameters if indicated. The patient’s psychological status and functional limitations are informally assessed by the physician through observation and interview.

The physician uses the information gained from the evaluation to write the medical prescription for occupational therapy services. The prescription includes the level of visual impairment (from profound to moderate) (see Table 2, Colenbrander & Fletcher, in this issue), the diagnosis (such as macular degeneration), 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 therapist to establish and carry out treatment. The physician provides the therapist with suggestions on the strength of magnification needed on the basis of the acuity measurement and a range of appropriate optical devices that the therapist may use in treatment.

The Occupational Therapy Evaluation

Consistent with Medicare Part B guidelines, the initial evaluation completed by the occupational therapist is used to determine whether there is medical necessity for therapy intervention. It must be established that the patient’s vision loss has resulted in a functional limitation in ADL or unsafe performance of ADL or both (AOTA, 1994). Depending on the nature of the patient’s vision loss, he or she will have difficulty completing activities at near, middle, or far visual distances. Because vision is used in some aspect of the completion of almost all ADL, comprehensive evaluation of the patient’s ADL skills is completed. For patients with retinal macular involvement, resolu-

<table>
<thead>
<tr>
<th>Self-care</th>
<th>Meal Preparation</th>
<th>Home Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applying makeup</td>
<td>Setting appliance dials</td>
<td>Cleaning</td>
</tr>
<tr>
<td>Applying toothpaste</td>
<td>Measuring ingredients</td>
<td>Washing clothes</td>
</tr>
<tr>
<td>Completing nailcare</td>
<td>Timing food cooking</td>
<td>Ironing</td>
</tr>
<tr>
<td>Selecting clothing</td>
<td>Determining when food is done</td>
<td>Yard maintenance</td>
</tr>
<tr>
<td>Mending clothing</td>
<td>Cutting, chopping, slicing</td>
<td>Car maintenance</td>
</tr>
<tr>
<td>Managing medications</td>
<td>Reading recipes, instructions</td>
<td>Minor household repairs</td>
</tr>
<tr>
<td>Eating neatly</td>
<td>Identifying foods</td>
<td>Telephone usage</td>
</tr>
<tr>
<td>Seasoning foods</td>
<td>Pouring liquids</td>
<td></td>
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<td>Spreading toppings</td>
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**Figure 1.** Examples of common daily living tasks that are difficult for persons with low vision to accurately and safely complete.
tion of visual detail is the major visual impairment, and reading is the primary activity affected. Although reading is often thought of as something done for pleasure, a major amount of reading for information must be completed each day to maintain an independent lifestyle. One must be able to read food and medication labels, instructions, appliance dials, the telephone directory, incoming mail, expiration dates, price tags, financial statements, bills, menus, recipes, the thermostat, clock and watch faces, the telephone touch pad, an address book, street signs, aisle markings, store signs, advertisements, and so forth.

Two standardized tests are used to measure reading ability: the Pepper Visual Skills for Reading Test (VSRT) (Watson, Baldasare, & Whittaker, 1990) and the Minnesota Low Vision Reading Test (MNread) (Legge, Ross, & Luebker, 1989) (see the Appendix). The VSRT is designed to assess the visual component of the reading process by measuring the patient's visual word recognition skills (Baldasare, Watson, Whittaker, & Miller-Shaffer, 1986; Watson et al., 1990). MNread is designed to provide a quick, reliable estimate of maximum reading speed in the patient with low vision (Ahn, Legge, & Luebker, 1995; Legge et al., 1989). Although these tests give precise information on how the vision loss has affected accuracy and speed of reading, they do not provide information on whether the patient is able to read materials with reduced contrast presentation (for example, green letters on a yellow background), print distortion created by poor quality or script lettering, or reduced illumination presentation (such as that in a dark restaurant). Therefore, standardized testing is augmented by clinical observations of the patient's performance on different types of printed materials under different levels of illumination.

The functional application of writing to a variety of activities is another activity affected in persons with macular vision loss. Although vision is not needed for the physical act of writing, it is needed for the functional application of writing to ensure legibility. Because there are no standardized low vision assessments for handwriting, evaluation is completed through clinical observation. The patient is asked to fill out a blank check, make an entry into a financial ledger, complete his or her signature, and complete a dictated sentence. During these tasks, observation is made as to whether the patient is able to write legibly, stay on line when writing, and complete the writing task within a reasonable amount of time and with a reasonable amount of effort.

Self-care and homemaking performance are addressed through completion of a self-performance rating questionnaire completed by the patient through an interview with the therapist. The patient is asked to rate his or her difficulty in performing a variety of ADL including leisure activities that involve seeing at near, middle, and far visual distances. A 1- (unable or dependent on others) to 5- (independent or no problem) point scale is used.

The questionnaire focuses on those ADL that require vision for successful completion. Some of these activities are described in Figure 1. In addition to the questionnaire, the patient is asked to perform several simple activities such as filling a glass with water, identifying coins, buttering a piece of bread, and reading a food label. This initial evaluation is followed by evaluation of performance in specific areas identified by the patient as being difficult to perform when treatment is initiated. For example, the patient is asked to prepare a typical meal or complete a sewing task during a treatment session. The initial evaluation additionally includes assessment of the patient's rehabilitation potential.

The patient's success in therapy will depend in part on his or her ability to efficiently and effectively use remaining vision for functional activities. The patient's ability to locate, maintain, and use an eccentric viewing position (the PRL) is evaluated through clinical observations combined with analysis of the patient's performance on the VSRT and MNread tests. Performance on these two tests is correlated with information obtained from the macular perimetry testing, acuity measurement, PRL threshold sensitivity, and contrast sensitivity testing completed by the ophthalmologist. This information is used to determine the patient's potential to use his or her remaining vision to see visual detail and to determine the treatment strategies needed. If the patient does not have sufficient remaining vision to use for ADL, his or her ability to effectively use other sensory systems to compensate for the vision loss (including hearing, tactile discrimination, kinesthesia, and proprioception) is evaluated.

Other issues that may affect the patient's ability to participate in and benefit from therapy are informally evaluated through interview. These issues include the patient's apparent adjustment to disability, his or her emotional support system, including family support and financial resources, and whether any serious medical conditions exist that may limit participation in therapy. If medical necessity for treatment intervention can be established but rehabilitation potential is deemed to be poor, then therapy is postponed until the issues limiting potential are resolved. In some instances, therapy is not recommended even though medical necessity has been established, because it is believed that the patient would not be able to fully participate in therapy.

**Treatment**

If medical necessity and good rehabilitation potential are established, a treatment program is initiated by the occupational therapist. Therapy sessions are provided in the most contextually relevant environment for the patient, which may include the home, the community, or the clinic. A plan of care is established with the patient that documents the patient's limitations in ADL resulting from
the vision loss, sets achievable functional goals for amelio­rating those limitations, outlines the procedure by which the goals will be achieved, and establishes a time frame for treatment. In general, five primary ADL are addressed 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.

Performance of ADL is addressed by training patients to use their remaining vision as efficiently as possible. To achieve this with a patient who has a macular scotoma, the therapist initially works on scanning exercises to establish awareness and consistent use of the PRL for identification of visual detail at near, middle, and far visual distances (Goodrich & Mehr, 1986). The patient is taught how to eccentrically view an object by making the necessary eye movements to focus the object on the PRL. Once eccentric viewing is established, the patient is taught to apply it during specific ADL such as reading, writing, and meal preparation and the use of magnification to resolve visual detail is introduced. Because the PRL will not have the equivalent capability to resolve visual detail as the fovea, magnification is necessary for the patient to use the PRL to see print and other small visual details. The patient is taught how to match the PRL to the focal width of the magnifier to effectively use it for reading, writing, and other activities.

Determination of which optical device affords the best magnification will depend on several factors. These include the specific demands of the task (e.g., do the hands need to be free?), the need for illumination, physical limitations of the patient (e.g., presence of tremor, joint deformity in the hand, etc.), refractive needs (such as presence of astigmatism), cosmesis, and acceptability to the patient. Often more than one optical device is needed. For example, the patient may require a stand magnifier for reading and a half-eye magnifying spectacle for writing. Once an optical device is selected, the patient is trained to use it efficiently and safely complete specific tasks such as check writing and management of the checkbook, mending, dialing the telephone, measuring insulin for diabetes management, and reading specific materials (such as menus, the telephone directory, and instructions on food packages).

In addition to training in the use of optical devices, the patient is taught how to manipulate environmental features such as lighting, background contrast, and pattern to maximize the use of remaining vision. A thorough evaluation of the patient’s work and home environment is completed, and recommendations are made for increasing or changing illumination, heightening the contrast of critical environmental features, and modifying arrangement of furniture, tools, supplies, utensils, food, clothing, and so forth to facilitate safety and more independent functioning. Written materials are provided to reinforce learning.

Because most persons requiring low vision rehabilitation services are elderly, the therapy program must address the physical, cognitive, and psychosocial needs of older persons to ensure program success. Many older persons have other disabilities and limitations that may substantially complicate rehabilitation, such as residual weakness or paralysis secondary to stroke, joint deformity and pain secondary to arthritis, hearing loss, cardiac limitations, and age-related tremor. A chart review of 249 patients admitted to the VIP program showed that 67% had at least one secondary medical condition, and 21% had more than one secondary condition. These findings are comparable to those reported by Kirchner and Peterson (1980) that approximately two thirds of elderly persons with low vision have at least one other physical impairment. The limitations imposed by these secondary conditions often limit the options for optical devices available to the patient or require modification of devices and techniques. Another consideration in working with older persons is that the initiation of therapy often occurs simultaneously with other major transitions in their lives. For example, the person’s loss of vision may coincide with a traumatic or stressful event such as the loss of a spouse or a move from home into a residential care facility. The therapist must be sensitive to these other life events and be prepared to address those adjustment issues as well.

The treatment program typically extends over a period of several sessions as rehabilitation goals are addressed (see Table 1). During therapy, progress notes on the patient’s performance in therapy are completed on a monthly basis and are reviewed with the medical director who recertifies the need for continuing treatment. The therapy program is concluded when the patient achieves the established goals and a discharge summary documenting goal achievement is written. After discharge, the patient is scheduled for a brief follow-up visit with the team to ensure that the goals achieved at discharge have been maintained. Patients are encouraged to schedule additional annual follow-up visits with the physician.

In addition to therapy services, patients and their families may participate in a support group for persons with low vision. The group is conducted by the medical director and is scheduled once a month over a period of 5 months. The format is a combination of patient education and group sharing aimed at increasing the patient’s awareness of the nature of his or her condition, commu-
Although occupational therapists have worked with persons with low vision and blindness since the inception of the profession, low vision rehabilitation has not been a major focus. As a result, the literature does not contain studies demonstrating the efficacy of specific occupational therapy intervention in the rehabilitation of persons with low vision. However, studies do exist that demonstrate the efficacy of providing training in the use of optical devices to compensate for vision loss, which is a major portion of the occupational therapy intervention program. Humphrey and Thompson (1986) surveyed low vision patients in a general eye service who were provided with optical devices but were not trained in the use of devices. Of those surveyed, 77% stated that they never used their device, and of those, 50% gave the reason that they thought the device was too difficult to use. In a similar study, McIlwaine, Bell, and Dutton (1991) surveyed 83 patients with low vision who were issued optical devices without training and found that 33% of the respondents never used the devices, and 50% stated that they were not satisfied with the service provided. The authors estimated that approximately $14,000 a year had been wasted on dispensing optical devices out of a total annual budget of $49,455 and concluded that additional staff members are needed to train patients in how to use low vision devices before they are dispensed.

Nilsson (1990) compared the reading performance of patients with low vision who had received formal training in the use of optical devices to that of patients given only brief instruction in use of a device when it was issued. The training group (n = 20) received an average of 4.8 1-hr sessions in eccentric viewing training and use of the device. The no training group (n = 20) was given instruction by an optician when the device was issued and was instructed to practice at home. Both groups had similar visual acuities and were given similar devices. None of the subjects were able to read television titles on the screen or newsprint before the initiation of the study.

Evaluation at 1 month showed that in the group receiving training, 70% were able to read television titles, 100% were able to read newprint, and 85% were able to write legibly compared with 0%, 25%, and 20%, respectively, in the untrained group. In addition, reading speed increased from 0 to 75.5 words per minute in the trained group compared with 0 to 22.6 words per minute in the untrained group. When the untrained group was subsequently given training, their performance improved to levels equivalent to the trained group on all parameters. From this study, Nilsson concluded that "the results clearly show that formal training in the use of aids [optical devices] and residual vision (e.g., training of eccentric viewing) is far more effective than mere instruction in restoring visual performance in practical situations, at least regarding elderly patients with very poor vision" (1990, p. 3).

Implications for Occupational Therapy

Inclusion of visual impairment by the HCFA as a condition meriting rehabilitation provides occupational therapy with an opportunity to provide low vision rehabilitation services through the health care system. Expansion of services into this area will enable occupational therapists to provide more comprehensive services to older patients to better meet the needs of this fastest growing segment of American society. However, two conditions must be satisfied first if occupational therapists are to enter into this field successfully and provide competent, appropriate treatment. The first requirement is education. Although undergraduate course work prepares occupational therapists to work with persons with various disabilities to achieve or regain independent functioning, occupational therapists working in low vision rehabilitation must have additional specialized knowledge of the ocular pathology causing vision loss and the application of optical devices. They can acquire this knowledge by working directly with optometrists and ophthalmologists specializing in low vision, by studying low vision rehabilitation textbooks, and by attending continuing education courses offered through various facilities and organizations.

Occupational therapists must be knowledgeable about the rehabilitation services already in place for persons with low vision and the professionals in these services. These include agencies such as Lighthouses for the Blind, organizations such as the American Foundation for the Blind and the Association for the Education and Rehabilitation of Persons with Visual Impairment and Blindness (see the Appendix), and professionals such as orientation and mobility specialists and rehabilitation teachers. These organizations and professionals have a long tradition of delivering competent and comprehensive services to persons with blindness and visual impairment. Collaboration between occupational therapists and these service providers is necessary to comprehensively meet the needs of the patient.

The second requirement, if occupational therapy is to have any lasting impact in the field of low vision rehabilitation, is to establish the efficacy of our treatment with this patient population. A science must be developed that provides a sound rationale for treatment. Outcome studies are necessary to demonstrate the effectiveness of treatment. The American Occupational Therapy Foundation has provided support in this endeavor by funding a project to develop two instruments to measure performance in persons with low vision that will be used to study the outcome of service delivery. However, ongoing
research is needed to ensure that occupational therapy services merit referral and reimbursement by the health care system.

Appendix

Rehabilitation Resources for Persons With Low Vision

American Foundation for the Blind
15 West 16th Street
New York, NY 10011
(212) 620-2155

Association for Education and Rehabilitation of the Blind and Visually Impaired
206 North Washington Street
Suite 320
Alexandria, VA 22314
(703) 548-1884

Minnesota Low Vision Reading Test (MN Read)
Minnesota Laboratory for Low Vision Research
Department of Psychology
University of Minnesota
Minneapolis, MN 55455
(612) 625-4516

Pepper Visual Skills for Reading Test (VSRT)
Pennsylvania College of Optometry
1200 West Godfrey Avenue
Philadelphia, PA 19141
(215) 276-6291

References


Related Reading


