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The Low Vision Rehabilitation Service. Part Two: Putting the Program Into Practice

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Introduction

The ideal philosophy of low vision care is both success-oriented and interdisciplinary, with the patient/client as the central member of the rehabilitation team. A comprehensive assessment of low vision includes both a functional assessment and a clinical examination. The low vision assessment sets the stage for treatment with optical as well as non-optical aids. The other core elements of a comprehensive vision rehabilitation program are patient instruction, and the provision of resource information, materials, and support.

Part one of this two-part series presented a four-phase, interdisciplinary model of low vision services.[1] This paper (part two) focuses on methods of assessing low vision, providing clinical services, and establishing an adaptive training and instructional program within this four-phase model. The collaborative relationship between the patient/client, low vision physician (optometrist or ophthalmologist), and allied health professional (occupational therapist) is described.

The Role of Occupational Therapy

Occupational therapists are health professionals dedicated to building their clients' capabilities for engagement in activities of meaning and purpose, i.e., occupations. The three principal features of occupational therapy intervention are as follows:

1. Assessment of physical, cognitive, and emotional limitations in terms of client-identified problems and goals related to participation in daily life.
2. Exploration of influences on the client's involvement in the therapeutic process (e.g., social/family support, psychosocial adjustment to limitations, motivation, home environment).
3. Use of occupation-centered interventions (i.e., personally relevant activities) to build skills or adaptive strategies aimed at improving participation in client-determined activities of daily life.

Low vision frequently causes difficulties and safety risks with participation in occupations critical to daily life. Examples of such activities include taking medication, paying bills, and preparing meals. In addition, low vision can make social participation, work and leisure pursuits quite challenging.

The consequences of low vision often challenge the sufferer's spirit and psychosocial resilience in the face of losing opportunities to participate in that which makes him or her independent and unique. Therefore, occupational therapists and other members of the interdisciplinary care team must be committed to empowering individuals living with low vision.

Phase 1: Functional Assessment

Using the proposed Four Phase Model, we present an overview of how optometry and occupational therapy are involved in empowering individuals living with low vision. Phase 1 of this model involves assessing the visually impaired person's level of independent functioning in order to determine an individualized plan for additional services and provision of resources.[1]

Various factors may affect a person's visual function. Phase 1 implements evaluative activities to assess visual function. This assessment is usually qualitative, but may also include some quantitative measures. For example, testing the ability to discriminate geometric shapes, contours of objects, and details of patterns may assess a patient's functional visual acuity. These evaluative activities result in "environmental" measures, as opposed to clinical measures.

In addition to the functional evaluation, other pertinent information is gathered through an interview, review of medical data, and an assessment of the person's needs. Some of the key assessments in Phase 1 are listed in the following table:

Table 1. Functional Assessments

Functional visual acuity
For distance vision tasks (roughly 10 feet and beyond)
For intermediate vision tasks (2-8 feet)
For near vision tasks (2 feet and closer)
Functional visual field
For central vision loss
For peripheral vision loss
For visual blur that involves the entire field
For field neglect
Ability to cope with challenges related to glare, illumination, and contrast
Ease of mobility

Occupational therapists are accustomed to assessing the quality and nature of independent functioning of their clients by using a combination of interview, observation, and/or standardized and non-standardized assessment tools. They strive to compile an Occupational Profile of each client.[2] This profile explains the client's history of engagement in occupation, daily routines and habits, values, interests and needs related to their priorities and targeted outcomes. Occupational therapists can use this profile to identify and work with potential clients in need of low vision care. Optimally, the occupational therapist will conduct the initial assessment in the environment(s) most frequented by the client in order to gain contextually relevant information for determination of necessary services. Within Phase 1, occupational therapists screen clients in need of low vision care from one of two pathways.

From one pathway, the occupational therapist meets the potential low vision client when the client is already receiving occupational therapy because of the functional implications of a non-low vision condition. Examples are a client in treatment after total hip replacement (THR) or after a hand injury inflicted due to the consequences of diabetic neuropathy. In the case of the client status post THR, the occupational therapist may learn that the client's medical history also includes, for example, a diagnosis of glaucoma. Therefore, the occupational therapist can pose questions or make observations during intervention related to THR to determine if the client requires further assessment of low vision (Phase 2). Likewise, the occupational profile of the client with a hand injury related to diabetes may reveal vision-related tasks such as chopping vegetables that are difficult for such a client, which would prompt a referral for further low vision assessment.

From the second pathway, the occupational therapist meets potential low vision clients when involved in programs designed to screen for functional implications related to medical conditions before referral to occupational therapy. This may occur in a medical environment (e.g. inpatient rehabilitation program or skilled nursing facility) or in a community-based program (e.g. senior center, assisted living facility or home health services). The questions used to construct the *Occupational Profile* can provide information indicating the need for referral for a low vision evaluation (Phase 2). Potential client responses may reveal a desire to prepare meals independently or dress without assistance. Subsequent probing may indicate a visual impairment as a contributing factor in a person's occupational challenges. For example, the client may share how difficult it is to see the temperature setting on the stove, to appreciate colors in selecting clothing from the closet or identify foods in the pantry for meal preparation. Such responses reflect the need for additional low vision assessment. Occupational therapists may also enter Phase 1 through a referral from the optometrist or another health care professional, case manager, or social worker.

In addition, a tool such as the Impact of Vision Impairment (IVI) Profile may be used to screen for those clients in need of low vision care. The IVI is a 32-item questionnaire that measures the client's perceived restriction of participation in daily activity.[3] Questions on the IVI pertain to five domains of functioning: leisure and work, social and consumer interactions, household and personal care, mobility, and emotional reaction to vision loss. Clients rate the impact of vision impairment on a six-level scale from "no difficulty" to "can't do because of vision". Results can indicate the need for moving the client into Phase 2 of the Low Vision Model of Care.

In summary, Phase 1 emphasizes discerning the functional capabilities and limitations of individuals living with visual impairment. The goal is to determine the client's need for low vision services, so that the client can continue forward to the clinical evaluation of visual status (Phase 2). As a result of assessing the visually impaired person's needs and level of independent functioning, an individualized plan implementing various aids, rehabilitative services and other resources can be conceived.

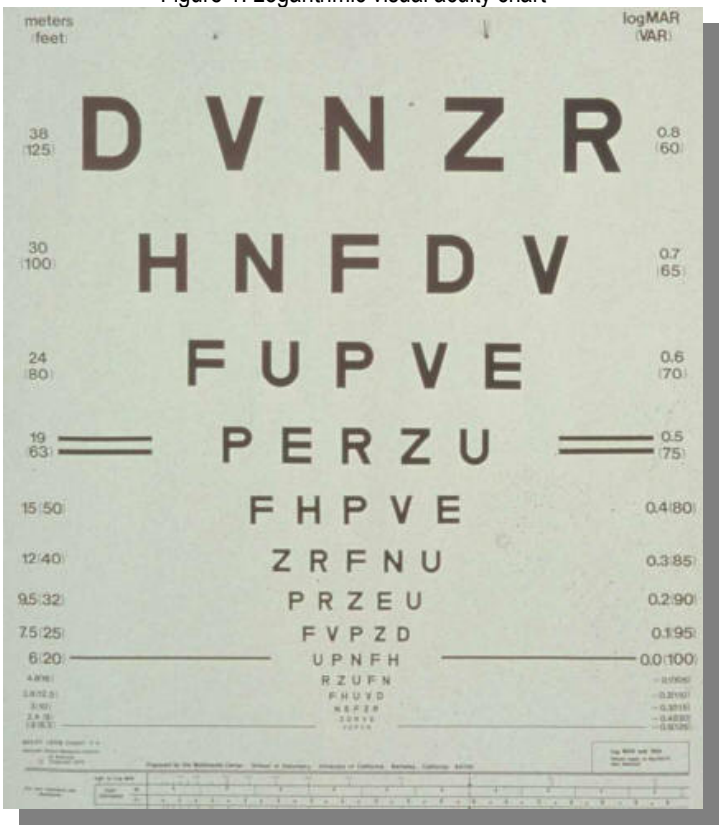
Phase 2: Clinical Examination

Phase 2 entails the clinical evaluation of eye health and visual status in order to enable the low vision physician to recommend optical devices and relevant rehabilitative services. An optometrist or an ophthalmologist usually performs the low vision clinical examination. The role of the occupational therapist in this Phase depends upon the infrastructure of the medical or community-based health environment to which the client presents.

The low vision clinical examination includes a quantitative assessment of the patient's residual visual acuity, refractive error, residual visual field, contrast and glare sensitivity, binocularity status, and response to different levels of illumination. A thorough examination of the anterior and posterior ocular structures, including the areas of pathology, is performed. Without an understanding of the ocular diseases involved in low vision, it is difficult for any clinician (and, therefore, for the entire low vision team) to formulate an appropriate treatment plan.

In determining a patient's visual acuity, several types of test charts may be implemented, ranging from large-print numbers to letters that change size in logarithmic steps (See Figure 1.)

Figure 1: Logarithmic visual acuity chart



A patient's residual visual field is best measured using kinetic or static perimetry, in which light stimuli of varied size and intensity are presented to the central or peripheral visual field of each eye (See Figure 2).

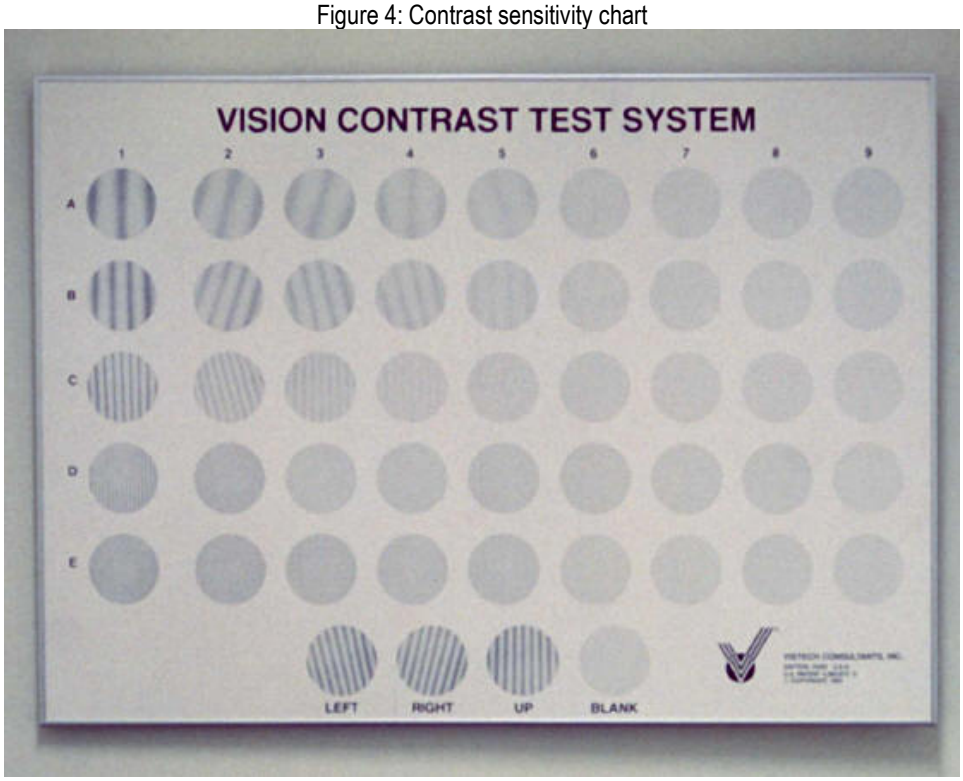
Figure 2: Automated perimeter for visual field testing

Brightness acuity testing may be accomplished by introducing a glare source while measuring acuity (See Figure 3).

Figure 3: Brightness acuity tester for glare disability

Contrast deficits may be detected by contrast sensitivity testing, in which a patient is asked to identify targets composed of bright and dark bands of varied size, contrast, and orientation (See Figure 4). These are all typical measures of a patient's visual function.

Figure 4: Contrast sensitivity chart



Basic Optics Definitions

In this section on the optics of low vision devices, we shall discuss the topic of magnification and how it should be specified when communicating with the various professionals involved in the care of the visually impaired person.

There are four ways of enlarging the retinal image or "creating" magnification:

1. ***Angular magnification*** is the ratio of the size of the image viewed with an optical system (such as a simple hand-held magnifier or a telescope) to the size of the object viewed without the optical system.
2. ***Relative size magnification*** is the ratio of the size of the physically enlarged object to the size of the initial object. An example would be the use of large print textbooks.
3. ***Relative distance magnification*** is the ratio of the size of the object at some closer distance to the size of the same object at some initial, farther distance.
4. ***Electronic magnification***, also termed projection magnification, is the enlargement of an object by projecting it onto a screen. The most familiar low vision aid that uses this principle is the closed-circuit television system (CCTV).

The basic formula for magnification is as follows:

M = dF

Where d = reference distance in meters and F is the equivalent power of the optical system in Diopters.

Although the reference distance is arbitrary, traditionally, 25cm (or .25 meters) has been assigned as this value. When d = 25cm, we have M = F/4.

Therefore, the labeled magnification for a +20 Diopter hand magnifier is usually specified as "5 times" or 5X. In communicating with other health professionals, we usually include both the Dioptric value and labeled magnification, e.g. "5X hand-held magnifier (+20D).

Treatment Options in Low Vision

Low vision treatment usually focuses on the use of optical devices and adaptive techniques. These optical aids may include:

- Spectacles and contact lenses
- Telescopes- These may be hand-held or mounted in spectacles. Telescopes may be prescribed monocularly or binocularly (See Figure 5).

- Telemicroscopes- This is simply a telescope modified for near use with a reading « cap » or plus lens attachment.
- Microscopes- This term refers to any high-plus powered near lens.
- Magnifiers- May be hand-held or built on a stand (See Figure 6).

Figure 5: Spectacle-mounted telescopes

Figure 6: Hand-held and stand magnifiers

In addition, various non-optical aids may be implemented, including:

- Electronic magnification
- CCTV- (See Figure 7) This closed circuit TV system is simply the projection of an enlarged image onto a monitor.
- Head-borne systems- These enhance image size by means of a rotating digital camera that captures and enlarges the image.
- Illumination
- Contrast Enhancement and Glare Control- This involves the use of tinted lenses, filters, visors, and adaptive aids to reduce scattered light (glare). (See Figure 8).
- Field enhancement- This is usually accomplished through the use of optical prism and/or visual scanning techniques.

Figure 7: Electronic magnification

Figure 8: Absorptive lenses and filters

Occupational Therapy becomes involved in Phase 2 in one of two ways. The first way stems from the results determined from Phase 1, the functional assessment. Occupational therapists may recommend a referral to a low vision physician who then begins with the clinical assessment. The second way occurs when occupational therapy was not involved in Phase 1, but the results of the clinical assessment reveal that the patient would benefit from occupational therapy. In this case, the low vision physician communicates the clinical examination findings to the occupational therapist. While this communication can take the form of a written referral and case summary, it is most beneficial if there is verbal dialogue between the two providers. In this way, the occupational therapist can glean additional information about the client's level of adjustment to the condition and initial response to the optical devices evaluated by the low vision physician. It also provides an opportunity for the occupational therapist to ask relevant questions about the clinical findings.

During Phase 2, the provider team must be ever cognizant of the patient's goals, needs, motivation level and psychosocial status. At the conclusion of this phase, the low vision physician makes preliminary recommendations of optical devices, adaptive training, and instruction. These preliminary recommendations are often made with significant input from the other members of the team.

Phase 3: Instruction and Adaptive Training

Phase 3 focuses on instructing the client in the use of optical aids, non-optical aids and adaptive strategies in order to enable him/her to resume participation in daily activities with increased independence, confidence and safety. Both optometrists and occupational therapists are involved in this phase. In most states, a prescription or written referral from an optometrist or medical physician is required in order to initiate occupational therapy intervention (this referral is also required for the occupational therapist to receive reimbursement from a third party payer).

Occupational therapy intervention for a client living with low vision is very much like intervention with any other client. Typically, the first treatment session involves an in-depth interview and observation of client capabilities and limitations during performance of activities of daily living and/or instrumental activities of daily living. This session culminates with a plan consisting of client identified occupation-centered goals and a corresponding outline of treatment procedures that the occupational therapist intends to use in order to meet the stated goals. The level of involvement by the occupational therapist in Phases 1 and 2 influences the format of the initial session. Ultimately, the occupational therapist must evaluate and document the need for skilled intervention and the potential for functional improvement in areas of meaning to the client [4].

Evaluation of Occupational Performance

Occupational therapists use the information learned from the Occupational Profile compiled in Phase 1 to direct the evaluation process and develop the treatment plan. If the occupational therapist did not construct the Occupational Profile previously, he/she begins Phase 3 with that step. In conjunction with building this profile or subsequently, the occupational therapist analyzes and evaluates the client's occupational performance or ability to carry out daily activity. Three tools that an occupational therapist can use to discern client capabilities and deficits are: the Canadian Occupational Performance Measure (COPM), the Melbourne Low-Vision ADL Index (MLVAI), and the SAFER.

The COPM is a semi-structured interview designed to assess a client's perception of his/her capabilities and limitations [5]. The COPM is preferred due to its unique approach to helping a client prioritize his/her main problems and then rank his/her performance in each problem area, as well as and satisfaction with this performance over time. The COPM helps to ensure that intervention is meaningful to the client and has a feature to calculate the percentage of change between reassessments in order to monitor outcomes.

The MLVAI is an assessment of a client's ability to perform 18 standardized observations of complex activities of daily living and respond to 9 questions regarding self-care [6]. Examples of observed items are reading newsprint, reading medicine labels, writing checks, and using a telephone. Questionnaire topics address, but are not limited to, ability to eat, bathe, shop and prepare meals. Occupational therapists rate client performance and responses, respectively, using a five-point scale ranging from "very unsatisfactory" to "very satisfactory."

The Safety Assessment of Function and Environment for Rehabilitation (SAFER Tool) is an instrument used to evaluate people's abilities to perform functional activities safely at home[7]. Occupational therapists administer the 97-item Safer Tool while in a client's home in order to determine the nature of problems a client may have in this environment. This tool addresses living situation, mobility, fire hazards, medication management, communication and each basic activity.

In addition to these evaluation tools, occupational therapists may also assess the performance skills of sensory function and mental status as these contribute to the ability to participate in occupations and in the therapeutic process. In order to asses sensory function, occupational therapists may use the Weinstein Enhanced Sensory Testing (WEST) tool which is a standardized assessment using calibrated monofilaments [8]. This tool offers information about a client's protective sensory mechanisms and ability to discriminate using tactile sense. This tool can provide information regarding a client's ability to use touch to compensate for diminished vision. In order to screen mental status, which may affect a client's ability to assimilate new information, the occupational therapist may use the Short Portable Mental Status Questionnaire (SPMSQ)[9]. This is a 10-item questionnaire addressing recall of information, orientation, and calculation providing a score indicating severity of impairment. It is preferred over the more traditionally used Mini-Mental State Examination[10] because the SPMSQ does not require visual function to read or write. Further, the intervention should include a screening for depression, because of the relationship between visual disability and depression established by Rovner and colleagues[11]. The Beck Depression Inventory- Fast Screen is a 7-

item self-report tool designed to determine the presence and degree of depression in adolescents and adults [12].Ultimately, results of assessments completed during the start of Phase 3 help the occupational therapist determine a course of action as he/she begins the intervention.

Occupational Therapy Intervention

During Phase 3, the instruction and adaptive training phase, the occupational therapist aims to assist the client in generalizing the use of the prescribed optical aids and strategies to real life. Such intervention can take place in a clinical setting with simulated experiences or in the client's home/work environment. Regardless of the intervention type or location, the occupational therapist must accommodate for the client's level of adjustment to the implications of low vision and the range of the complexity of treatment aids and strategies.

Occupational therapy, for a client with low vision, centers on two broad categories of intervention: education in the use of optical devices and education in the use of non-optical devices and strategies. A number of factors must be considered in the selection of devices, adaptive training techniques, and other treatment strategies. Among these factors are the client's stated functional vision needs, visual and ocular health status, and psychosocial status. The greatest opportunity for a successful outcome occurs when the occupational therapist and low vision optometrist or an ophthalmologist collaborate. This usually results in better coordination of care and an enhanced ability to address the chief concerns of the client.

Optical Aids and Strategies

Typically, Phase 2 culminates with the prescription of optical aids and/or strategies related to using one's remaining vision. These optical interventions often relate to magnification, visual field enhancement and/or eccentric viewing. The occupational therapist's main role in Phase 3 is to troubleshoot with the client as the client practices using the prescribed optical aids and strategies during participation in daily activity. The occupational therapist continually analyzes the fit between the person, the device/strategy and the environmental factors in order to optimize performance.

Concerning magnification, devices that provide angular and electronic magnification often present the greatest challenges to clients. Angular magnification devices, (e.g., stand magnifiers, hand-held magnifiers, microscopes and telescopes) often require clients to adapt to new ways of coordinating reading material while simultaneously using a device or positioning themselves for more sustained reading sessions. In addition, tasks requiring the use of such devices often require additional steps or a slower pace. Electronic magnification devices (e.g. Closed-Circuit TV, large-font computer software) also require new ways of applying perceptual and sensory skills.

Visual scanning and eccentric viewing are two strategies aimed at enabling a client to systematically utilize his/her remaining vision in a specific way to optimize the amount and/or quality of what he/she desires to see for reading, writing, social participation and daily activity. Occupational therapists teach clients to use compensatory strategies like using a reading guide or template during tasks requiring visual scanning. Eccentric viewing is a technique taught to those individuals with central vision loss who demonstrate the capability to use a portion of the retina that is peripheral to the damaged central retina to view information or persons [13]. Either the optometrist or occupational therapist conducts a screening to determine the direction in which a client should fixate his/her eyes in order to use this peripheral portion of the retina. Often it helps to use the clock dial method to assist clients. For example, in order to recognize a person across the table during mealtime, some clients can look above the person's face or to "12:00" in order to view a person's facial features more clearly. As one can imagine, the technique of eccentric viewing takes time and repetition, and is best learned by practicing in the naturalistic context while engaged in meaningful activity.

One of the reasons for providing occupational therapy to these clients relates to the unforeseen complexity of adjusting to using such devices and strategies. While it seems intuitively simple to use a magnifier, one must consider the magnitude of learning a new way of reading mail, bills and the newspaper after decades of reading without a thought related to working distance, posture or quality of the written material. Compounding the complexity of the adjustment and rehabilitation is the loss many low vision clients experience when there is not a device or strategy to enable a them to continue engagement in a habitual task such as reading the stock page, driving, or financial management. And finally, many clients with low vision are community dwelling and have few other functional limitations, therefore, they are acutely aware of their limitations, losses and the potential of a worsening condition. Occupational therapists are uniquely poised to offer an individualized, occupation-centered and contextually relevant rehabilitation plan aimed at building capabilities while adjusting to losses.

Non-Optical Aids and Strategies

In addition to optical aids intervention for clients with low vision includes education in the use of non-optical devices and strategies, as well as environmental modification to optimize safety and use of remaining vision. Such interventions relate to use of lighting, contrast, adaptive devices and compensatory strategies.

Lighting is an essential, yet under utilized strategy for the person living with low vision. Therefore, components of the rehabilitation process include helping the client determine the type of lighting needed and the optimal location of the light source. In this way, the client can develop the habit of using proper lighting to enhance visual function. Likewise, incorporating highly contrasting colors and shades into daily activity can mean regaining independence in a meaningful occupation. For instance, serving light colored foods (e.g., chicken and rice) on a dark plate and darker foods (e.g. steak and vegetables) on a light plate makes feeding oneself far more feasible and enjoyable. Lighting and contrast enhancement strategies are frequently used in home or workplace modifications in order to enhance safety.

There are countless adaptive devices specifically designed for the client with low vision. Many of these incorporate the concept of relative size magnification by making items larger with large print (e.g. large print check register or playing cards). Other devices incorporate auditory or tactile modifications (e.g. talking watches and slicing guides). The keys to successful use of these devices are a) analyzing and prescribing only those devices needed to meet the client's individualized needs and b) teaching the client to use these devices, preferably in the natural environment or at least using accurate and meaningful simulations.

Equally innumerable are the compensatory strategies available to the person living with low vision. The occupational therapist is particularly skilled at analyzing the demands of activity and the capabilities of the person in order to strategize a new way of accomplishing a task with a person living with low vision. Compensatory strategies often encompasses incorporating a number of the above non-optical devices or strategies into performance of activity. For instance, oven dials can be marked with highly contrasting, raised rubber "dots" to assist a client with safe meal preparation. In this way, the client can rely on differentiating the contrasting color and/or feeling how the dials line up with the "dots" in order to determine the temperature setting. In addition, the rehabilitation process often includes helping a client hone his/her other senses in order to accomplish tasks. For instance, clients may differentiate between black pants and blue pants by feeling for the safety pin on the waistband of each pair of blue pants. Occupational therapists seek to collaborate with the client to find the most personally relevant strategy for the necessary tasks.

Phase 4: Follow-up and Beyond

Phase 3 is concluded upon the successful delivery of instruction and adaptive training in the use of optical and non-optical devices and strategies. Phase 4 emphasizes the continuum of care now established for the client living with low vision. Due to the progressive nature of eye conditions causing low vision, ongoing follow-up is imperative in order to continue to optimize the client's participation in daily life. Occupational therapy is one of the options available for subsequent intervention when the client experiences a change in functional capability related to his/her vision impairment.

Measuring Outcomes

In order to measure outcomes, a vision rehabilitation program must evaluate the extent that the client achieves his/her targeted goals, which are determined at the start of the process. The Occupational Therapy Practice Framework (AOTA, 2002) uses seven categories that further delineate the nature of outcomes of meaning within the profession. These include occupational performance, client satisfaction, role competence, adaptation, health and wellness, prevention and quality of life. It is beyond the scope of this article to address the array of assessment tools available to address each of these domains of participation. The tools described in Phase 1 and 2 of the Four Phase Model of Care in Low Vision, namely the IVI, COPM, and MLVAI, are designed to monitor outcomes related to participation in daily life. Overall, the measurement of outcomes is an important process that facilitates an ongoing collaboration between the health care team and the patient/client. The processes are aimed at optimizing the client's ability to safely and independently use his/her functional vision to perform occupations of meaning.

Conclusions

The low vision rehabilitation team is a diverse group of caregivers that are committed to empowering individuals living with low vision to optimize their safety, independence, and quality of life. With proper education and training, occupational therapists can be involved in all 4 phases of this proposed model of Low Vision Rehabilitation.

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