A driving program for the visually impaired

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ABSTRACT: This driving program for the visually impaired individual was devised in 1986, as a specific adjunct to the pre-existing training program, designed for the cognitive and physically impaired patients. Two important purposes of the program are: 1) To give the low vision practitioner and staff the capability to be able to recommend a specific training program for telescopic and visually impaired drivers. 2) To try to ensure that every visually impaired telescopic driver (prescribed with a telescopic system by the low vision center) would not only meet legal visual acuity and visual field requirements for the State of Michigan, but would also improve the competency of using their telescopic system for driving.

KEY WORDS: driving program, visually impaired driver, road evaluation, restricted license, telescopic driver, multidisciplinary approach, driving training sessions, pre-screening, co-pilot

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The issue of visually impaired drivers, licensed to drive with a spectacle-mounted telescopic system, has always been controversial and is well documented.[1–8] Currently, this issue has become even more complex with improvements and diversity in the technology (rear mount, miniaturized, micro spiral galilean, vision enhancing system, bilevel telemicroscopic and behind the lens) of telescopic systems. These systems, by the very nature of their design, may also require a different approach to fitting, training, and specific use while driving, than the Designs for Vision bioptic telescope.[9] There also has been a recent increase in interest in the field of low vision (as evidenced by increased attendance at Academy low vision lectures, increased membership in the AOA Low Vision Section, etc.) and perhaps general practitioners, practicing low vision and fitting spectacle mounted telescopes, with driving as the patient's primary goal. This may be initiated without accessibility and multidisciplinary capability, for specific training for telescopic driving and substantiation of safe driving skills. Today, the aging population along with the visually impaired older adult are also more acutely concerned with maintaining their mobility, flexibility and independence in the 1990s.[10,11] Therefore, with safety and mobility of the visually impaired driver as the issue, (as well as the passengers, other drivers and pedestrians) rehabilitative resources for the eye care practitioner and the prospective visually impaired telescopic driver must be made available.

Uniform requirements and protocol within each state must be established and the necessity for a multidisciplinary team approach to establish competency realized. This is particularly significant with the older adult population, which is becoming an increasing portion of our nation and may be experiencing an age-related, visual impairment. The complexity of evaluating this segment of the population cannot be understated with respect to the psychosocial impact of maintaining mobility and independence. There is also the socioeconomic benefit of possible prolonged employment and health, along with the recognition that cognitive, visual and motor functions may be more functionally compromised.[10–13] Therefore, with those concerns, a driving program for the visually impaired and specifically, the telescopic driver, was established as an adjunct to the pre-existing driving program for the cognitive and physically impaired patients. The program was designed to improve competency in driving, beyond the states' requirements relative to visual acuity and the field of view.

These requirements in the state of Michigan are: 1) 20/40 visual acuity with the telescopic system; 2) A visual field of 140 degrees (binocular field), 90 degrees (monocular field); and 3) Unspecified visual acuity through the carrier lens.[14] This program, initiated in 1986, continues to be dynamic in philosophy and protocol, utilizing the expertise of multiple health care professionals with a team approach. "Driving is a privilege," is the philosophy of our program.

Requirements for enrollment

Every participant in the driving program must be referred by an optometrist or a physician and possess either a valid temporary driver's permit or driver's license. The patient must be medically stable and seizure free for at least 6 months.

Visual acuity requirements are evaluated using the B-VAT II Mentor System[a]; unaided, aided (best spectacle correction) and telescopic visual acuity (98 percent contrast) and is documented. Visual field requirements are assessed (central and peripheral) using the Amsler Grid, Goldmann (stimuli based on the patient and pathology, generally exceeding 6mm target used by the state) and/or appropriate automated field (120 3 Zone). If all requirements are met, the patient is then scheduled for a pre-screen evaluation.

Pre-screening evaluation

Medical and ocular history is reviewed by the staff. Particular interest is with medications currently being taken and any relevant manifestation and/or general health considerations relative to safe driving. When necessary, appropriate consultation with the specific health care practitioner is established. Previous driving history is reviewed and reasons for cessation of driving documented.

The Motor Free Visual Perception Test (MVPT)[b] is given to evaluate visual perception and processing time. The MVPT test is a 36 item, timed test of visual perception that includes assessment of spatial relations, figure ground, form consistency, visual discrimination and visual memory. It can be administered and scored with ease, is not influenced by a lack of motor ability, and is standardized for the adult population.[15] While the MVPT has been determined to be a fairly accurate instrument for predicting on-the-road abilities, it is realized that a primary limitation of such a test is the inability to assess a person's ability to continue processing new information at varying rates of speed and to use that information to make appropriate decisions.[16]

The H cancellation and Line bisection are used to assess visual scanning skills and detect unilateral neglects, hemianopias and midline orientation deficits. These tests are used simply as a screening, to further augment information that may have been previously elicited from visual field testing and further clarify difficulties that a patient may be experiencing as a result of systemic and ocular pathology.[17,18]

The Porto-Clinic/Glare Test[c] is used to measure color recognition, depth perception, glare recovery, night vision and reaction time. Simple and complex subjective reaction time are measured utilizing an accelerator and brake simulator while the patient reacts to visual and auditory stimuli. Glare recovery and night vision are also tested in conjunction with the BAT Mentor System.[d] The B-VAT II Mentor System is used for further documentation of stereopsis and contrast sensitivity. Color perception is evaluated utilizing the Porto Clinic/Glare and the Farnsworth D-15.

Cognitive evaluations are performed, by the staff's registered occupational therapist, when indicated. This is considered an invaluable information source relative to our older adult patients, those recovering from cerebral vascular accidents (CVA) and all post traumatic brain injuries. Disease, injury or the aging process may affect a patient's cognitive skills. Cognitive processes include those of knowing and understanding, awareness, judgment, problem solving and decision making. Deficits in these areas may affect the patient's ability to drive safely. Therefore, when cognitive deficits are suspected, the staff occupational therapist will perform a cognitive evaluation using the Toglia/Abreu Perceptual Profile.[18]

Finally, this battery of tests performed in the prescreening evaluation is not graded on a pass/fail system. Rather, it is utilized as an information gathering process and, it is hoped, an indicator of the patient's probable capability to drive safely and efficiently, prior to the road evaluation.

Psychosocial aspects

When psychosocial aspects manifest themselves either from the patient and/or the patient's support team (i.e., family member, spouse, friend) a social work consultation is requested. Consideration is currently being given to utilization of social work with all prospective driving program patients. This is primarily due to the extreme complexity of the goal and so that the expectations and commitment of all individuals involved are recognized and understood. This approach seems most appropriate, in the case of outside referrals where established rapport is lacking and psychosocial aspects are unknown.

Telescopic evaluation

An average of 20 clinical hours of assessment (i.e., low vision evaluation, clinical telescopic evaluation, loaning of a telescopic system, fitting, dispensing, training, follow-up and pre-screening) is provided for our patients before driving evaluations are performed. This amount of time spent with the patient primarily relates to a patient who has not previously worn a telescopic system. Generally, previous history of telescopic wear, dramatically decreases the amount of time necessary for clinical assessment and follow up. We have found, over the years, that increased assessment time (loaning of telescopic systems prior to prescribing, training and followup) has led to increased success with our patients in using their telescopic systems.[5,9,19] That has been

substantiated further by improved performance of the patient in the initial road evaluation (as reported by our occupational therapist and certified driving instructor) lending itself to a reduction in necessary training hours (and decreased cost) within the driving program, as well as lessening patient and staff frustration. Since our fee structure for prescribing a telescopic system is inclusive of dispensing and all follow up, patient pay and third party agencies are not affected by increased time spent with the patient in adaptation of their systems.

Patient evaluation of telescopic use on a standardized course (developed by our orientation and mobility specialist) is usually the final step in determining if the patient is ready for the driving program. It is also a prerequisite for an outside referral, (due to lack of knowledge regarding proficiency in using their telescopic systems) prior to any assessment inside an automobile. The purpose, for initiating the standardized course for telescopic wearers, was to put the patients in a busy, unfamiliar environment and assess as well as monitor how they apply the skills they have learned. Evaluating a patient, initially, in an unfamiliar environment where he or she must track, locate, fixate and recognize objects, gives our staff an impression of the patient's acclimation to the system. The indoor course is divided into three levels of skill, (reinforcing the initial verbal, written instruction and training given to the patient following the dispensing of the telescopic glasses). Skills evaluated are: 1) locating stationary objects while stationary; 2) locating moving objects while stationary; and 3) locating moving objects while moving. The course is timed and begins outside the low vision center in the medical office building hallway and involves a major portion of the hospital campus complex. The course can be completed in 30 minutes, with most patients who are acclimated to the telescopic system completing the course in 23 to 25 minutes. The course can be modified for those patients in wheelchairs or using walkers. If the patients present difficulty with this functional exercise, it has been our experience that putting them in a moving vehicle would probably be premature.[5,19] This exercise also helps reinforce to the patients that the telescopic system can be used for a variety of tasks in their daily life other than driving. After completion, the staff and the patient then conclude with determining if the patient is ready for the driving program or if more training with the telescope is indicated. Quite often, the patient makes the determination that more training is necessary (based on deficits noted during the exercise). The end results make this evaluation a very important objective and subjective exercise. Finally, this exercise allows the orientation and mobility specialist and occupational therapist to evaluate: orientation, mobility, gross motor skills, fine motor skills, auditory-visual skills, dynamic visual acuity, problem solving, etc. It is at this point that introduction to the driving program is established.

Co-pilot training

The concept of the co-pilot session was developed to expose the patient to a driving situation without placing anyone at risk. This portion of the program is also primarily for initial telescopic wearers and/or patients with no previous driving experience. Three people are necessary for efficiency in the evaluation:

1. A driver who is familiar with the standardized course (O.T.R. or low vision staff member)
2. A staff member or the occupational therapist who rides in the right rear seat of the vehicle, observing, recording and calling off objects for identification and interpretation
3. The prospective telescopic driver, simulating decisions and judgments necessary, while riding as a passenger in the car.

This training exercise allows the patient to differentiate skills learned for general lifestyle use vs. decisions and judgments made in a motor vehicle. Establishing a co-pilot program also places responsibility for confirming driving competency, on the visually impaired individual and the support team. We encourage the patient at approximately 4 weeks post dispensing (dependent on subjective acclimation to the system, frequency of wear, etc.) to begin this exercise for experience and self-assessment.[5,19] Once the patient expresses confidence based on the training, the occupational therapist and orientation and mobility specialist take the patient, in a vehicle, on a standardized course. This course encompasses various levels of complexity, while driving in a busy suburban environment. It may be determined, at this session, that the patient requires further co-pilot sessions prior to the actual road evaluation. If the patient is considered to be competent and comfortable in this exercise, an on-the-road evaluation is planned.

Road evaluation

The purpose of the road evaluation for a potential telescopic driver is to place the patient in an unfamiliar environment with a variety of stimuli and assess his or her skills behind the wheel using the telescopic system.

One of the challenges of the program has been to be cost efficient for third party programs or patient pay. It is also realized that the road evaluation, which determines the original segment of training sessions, by its very nature creates anxiety and decreased performance (further augmented by the unfamiliar environment). However, we feel that a lack of pre-deter-

training sessions that will be provided by the certified driving instructor with possible supervision by other members of the team, as warranted. The block of training sessions is determined by the past experience of the driver, telescopic proficiency with driving and frequency and severity of the deficits displayed during the road evaluation. At the conclusion of each training session the performance is reviewed and documented by the patient and the staff. The patient's support team is encouraged throughout the training process to provide positive reinforcement and facilitate improvement of skills wherever possible (co-pilot, dialogue relating to the concepts and practices of safe driving). The initial group of sessions, most frequently, is set at 10 sessions, with a degree of flexibility, based on the program's philosophy and the patient's previous driving experience. Generally, previous driving experience and age play a significant role in the total number of sessions required before completion of the program. Prospective drivers without prior experience average 20–30 hours of training and with the experienced driver usually 10–15 hours. Acclimation and understanding of their visual impairment and telescopic system is absolutely crucial for success in this program. Following the conclusion of the original group of specified sessions, if the deficits have been corrected (or a prognosis needs to be established) a second formal road evaluation is scheduled. If deficits are again displayed, further training plans are devised. If the patient successfully completes the road evaluation, recommendations are given.

Recommendations

The ultimate goal of the program is to provide the patient with a positive unrestricted recommendation, based on safe, competent driving skills. To provide a restricted license or recommendation (radius of travel, type of highway or environment the patient is allowed to drive) implies there may be probable deficits or lack of driving skills and that may not be in the best interests of that particular individual or society. This is of particular concern to our staff, since we feel it may also create an avenue for abuse that is difficult, if not impossible, to enforce. Negative recommendations from the program are most frequently given for the following reasons: inability to master safe, defensive driving skills, impaired judgment and/or poor reaction time (generally increasing with age), and lastly, attitude.

Discussion

The philosophy and goal of this driving program is to provide the visually impaired driver the means to demonstrate and substantiate safe driving skills. This program utilizes multidisciplinary expertise and a team approach, to try to obtain this goal and protect the "privilege to drive" for the visually impaired. The socioeconomic impact of a mobile, independent, safe, visually impaired driver cannot be understated. This program continues to be dynamic in philosophy, with progressive changes in protocol, that, it is hoped, lends itself to cost efficiency, while trying to ensure competency in driving. Another important purpose of the program was to give the low vision practitioner and staff the capability to recommend a specific training program for telescopic and visually impaired drivers.[6,19–21] From a legal standpoint, (in view of a litigious society) this further offers the patient the opportunity to obtain objective documentation of his or her involvement in establishing safe driving skills. The review of visually impaired drivers by the Department of Motor Vehicles and realization that this subject has always been controversial, dictates that programs for the visually impaired driver must exist, be readily accessible and cost efficient. As technology continues to improve, further research studies are necessary to determine the efficacy of various telescopic systems, relative to safe driving skills. We further realize that we could improve our own program by providing simulation-aided driver training, eliminating risk factors in lieu of a safer environment for assessment and training, perhaps reduce and enhance actual road driving time required, thereby reducing the cost of the program to the patient and agencies. ■

References

1. Spitzberg LA. A patient's experience on driving with a bioptic. J Vis Rehab 1991; 5(1):17–21.
2. Barron C. Bioptic telescopic spectacles for motor vehicle driving. J Am Optom Assoc 1991; 61:37–41.
3. Taylor DG. Telescopic spectacles for driving: User data satisfaction, preferences and effects in vocational, educational, and personal tasks: A study in Illinois. J Vis Rehab 1990; 4(2):29–59.
4. Lippmann O, Corn AL, Lewis MC. Bioptic telescopic spectacles and driving performance: A study in Texas. J Vis Impair Blind 1988; 82(5):182–7.
5. Vogel GL. Training the bioptic telescopic wearer for driving. J Am Optom Assoc 1991; 62:288–93.
6. Fonda G. Bioptic telescopic spectacle is a hazard for operating a motor vehicle. Arch Ophthalmol 1983; 101:1907–8.
7. Welner AH. The driving environment and visual disability. Am J Phys Med 1987; 66(3): 133–6.
8. Colenbrander A, Fletcher DC. Low vision rehabilitation: vision requirements for driving. J Ophthalmol Nurs Tech 1992; 11(3): 111–5.
9. Keverline-Walls M, Molenda M. Training procedures for more cosmetically appealing miniaturized telescopes. J Vis Rehab 1991; 5(1): 11–6.
10. Waller PF. The older driver. Hum Factors 1991; 33(5):499–505.
11. Shinar D, Scheiber F. Visual requirements for the safety and mobility of older drivers. Hum Factors 1991; 33(5):507–19.
12. Klein R. Age-related eye disease, visual impairment and driving in the elderly. Hum Factors 1991; 33(5):521–5.
13. Brouwer WH, Waterink W, Van Wolffelaar PC, et al. Divided attention in experienced young and older drivers: Lane tracking and visual analysis in a dynamic driving simulator. Hum Factors 1991; 33(5):573–82.
14. Michigan Department of State, Bureau of Driver Improvement DI-4V Review Procedures - Visual standards for a motor vehicle driver license, Administrative Procedures Act of 1969, 1-6 Appen-

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References

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4. Lippmann O, Corn AL, Lewis MC. Bioptic telescopic spectacles and driving performance: A study in Texas. J Vis Impair Blind 1988; 82(5):182–7.
5. Vogel GL. Training the bioptic telescopic wearer for driving. J Am Optom Assoc 1991; 62:288–93.
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7. Welner AH. The driving environment and visual disability. Am J Phys Med 1987; 66(3): 133–6.
8. Colenbrander A, Fletcher DC. Low vision rehabilitation: vision requirements for driving. J Ophthalmol Nurs Tech 1992: 11(3): 111–5.
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10. Waller PF. The older driver. Hum Factors 1991; 33(5):499–505.
11. Shinar D, Scheiber F. Visual requirements for the safety and mobility of older drivers. Hum Factors 1991; 33(5):507–19.
12. Klein R. Age-related eye disease, visual impairment and driving in the elderly. Hum Factors 1991; 33(5):521–5.
13. Brouwer WH, Waterink W, Van Wolffelaar PC, et al. Divided attention in experienced young and older drivers: Lane tracking and visual analysis in a dynamic driving simulator. Hum Factors 1991; 33(5):573–82.
14. Michigan Department of State, Bureau of Driver Improvement DI-4V Review Procedures - Visual standards for a motor vehicle driver license, Administrative Procedures Act of 1969, I-6 Appen-

dix B(9487)
15. Strano CM Visual assessment for driver potential. Occup Ther Pract 1991; 3(1):35–41.
16. Miller GJ. Technology review; Prospectives on occupational therapy practices. Proceedings on annual meetings. American Occupational Therapy Association; 1989. Baltimore, MD.
17. Siev E, Freishtat B, Zoltan B. Perceptual and cognitive dysfunction in the adult stroke patient: A manual for evaluation and treatment. Thorofare, NJ: Slack Inc. 1986.
18. Toglia J, Abreu B. Cognitive rehabilitation. Suffren, Ny: East Village Copy Center, 1985.
19. Jose R, Carter K, Carter C. A training program for clients considering the use of bioptic telescopes for driving. J Vis Impair Blind 1983; 77(9):425–8
20. Huss C, Ramsey W. Low vision driver education training. Coburn Optical Industries Newsletter, Muskogee, OK: 1989, 1(3):1–2.
21. Huss C. Multidisciplinary approach to driving for the visually handicapped. Rehab Optom 1984; 2(2):10–11.

Footnotes

a. B-VAT II Video Acuity Tester Mentor O&O, Inc., 3000 Longwater Drive, Norwell. MA 02061–1610
b. MVPT Manual Academic Therapy Publications 20 Commercial Blvd., Novato, CA 94947
c. Porto-Clinic/GlareDriver Testing Equipment, Inc.1020 South Main Ave., Scranton, PA 18504
d. BAT Brightness Acuity Tester, Mentor O&O, Inc., 3000 Longwater Drive, Norwell, MA 02061–1610

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