

Opinion

by **Assoc. Prof. Binna Nencheva**, MD, PhD, internal member of the scientific jury, appointed by order of the Rector of the MU-Varna No. R-109-2/06.01.2023.

regarding

dissertation of **Dr. Ivelina Yordanova Pitakova**, for the award of the educational and scientific degree "Doctor of Sciences" in the scientific specialty "Ophthalmology", code 03.01.36

on the topic: "Visual rehabilitation for low-vision people with socially significant eye diseases"

Biographical data

Dr. Ivelina Pitakova graduated from secondary education in 1995 in Silistra. She speaks excellent English. She graduated from the Medical University - Prof. Dr. Paraskev Stoyanov, Varna in 2001 with honors. She began specializing in Eye Diseases Hospital Varna in 2003. She graduated in Health Management in 2018. She worked as a medical representative, as a volunteer at the Children's Eye Center of the LIONS Club. Since 2007, she has been working at: "St. Nicholay" Medical Center, and since 2020 at the "Black Sea" - a medical center for marine medicine. She takes part in many specializations, courses and international conferences.

Aactuality of the problem

Blindness causes severe disability and the reduced vision is a severe social problem. Special reading techniques and training, assistive devices and other advances in technology can help and make better the residual vision.

Structure of the thesis

The dissertation contains 152 pages, including 42 tables and 51 figures. Literary sources which are cited are 166, in cyrillic are 35 and 131 are in latin. Presented chapters are 13, corresponding to the purpose and tasks. They compliance with the requirements for the layout of the dissertation work.

Literature review

An analysis and overview of Bulgarian and foreign scientific publications, books regarding the visually impaired is presented. A review of historical data on the creation of writing systems for the blind, as well as educational institutions for children with low vision, is presented. A definition of blindness according to the WHO and its classification are given. The concept of reduced vision is also analyzed. The criteria for ocular disability are explained.

The doctoral student has also made an analysis of the causes of blindness worldwide and in Bulgaria. The socially significant eye diseases were examined - it was determined which diseases are in groups - ARMD, DR, glaucoma.

The causes of impaired vision in children around the world and in Bulgaria have been analyzed.

In the chapter visual rehabilitation and visual assistance, it is defined what they are and what are the tasks.

Visual acuity and tables were reviewed as criteria for central vision status in adults and children. Aids and devices to assist the visually impaired - non-optical, optical, intraocular magnifiers, telescopic contact lens, bionic eye, Argus II prosthesis, stem cells, glasses with built-in artificial intelligence, hardware and software programs were analyzed.

The legal regulations, related to the activity for expert work ability and integration of people with disabilities, were also examined.

Purpose: To study and analyze the modern possibilities for visual rehabilitation of the visually impaired and to develop a behavior algorithm and a model for integrated care for these patients.

To achieve this goal, a set of tasks should be completed:

1. To make a literature review on the topic of blindness, low vision and the possibilities of visual rehabilitation, as well as to study innovative technologies for compensating and improving visual deficits.
2. To study the awareness of the population, as well as the opinion of medical specialists on the topic of blindness and low vision.
3. To study the adaptation of low-vision patients with socially significant eye diseases - ARMD, DR and glaucoma to their prescribed devices to support vision and satisfaction with their use.
4. To analyze the means for visual rehabilitation and the results of their use in children-students with impaired vision.
5. To develop an algorithm for the selection and prescription of the optimal visual aid by ophthalmologists - specialized for working with the visually impaired.
6. To create a model of an integrated approach for patients with impaired vision and different degrees of blindness.

Materials and methods

The subject of the study are visually impaired patients meeting the criteria for low vision, including patients with socially significant eye diseases and visual acuity equal to or less than 0.3. The study participants were divided into four groups: 1-st group with ARMD, 2-nd group with Glaucoma, 3-rd group with Diabetic Retinopathy and 4th heterogeneous group, called "other" for convenience.

Coverage of the study - 80 visually impaired patients/160 eyes were clinically treated, 23 children with impaired vision were retrospectively analyzed, data from a total of 195 (150+45 medical specialist) respondents on the problems of impaired vision and blindness were processed.

Time frame of the study - it was done for a period of 3 years 04.2019 - 04.2022, it was conducted in the Eye Clinic "St. Nikolay" – Varna.

Sociological method through a survey card using the direct survey method. It was conducted under standard conditions. Two groups of respondents were interviewed and two questionnaires were developed respectively.

Questionnaire 1 is for the first group of random respondents, including 16 questions formulated with the aim of obtaining a clear and objective assessment based on the most common answers and prevailing opinion on the topic sought-150 respondents.

Questionnaire 2 is for a second group – medical specialists: ophthalmologists, GPs, opticians, laboratory assistants, nurses, optometrists, trainees and students, including 20 questions, some of them strictly professional, but most overlapping with the first survey-n=45.

A large part of them (89%) have no information about the activity of the Union of the Blind and schools for the visually impaired in Varna and Sofia.

Clinical research method

They included 80 patients divided according to clinical diagnosis. They have been analyzed:

- Demographic characteristics – age, gender, place of residence are placed in the 1st passport part, as well as names and telephone.
- A detailed medical history - family history - yes or not, history of the problem such as years, progression - fast or slow, surgical interventions - which and how many eyes, intraocular applications - how many, diagnoses, TELK - yes or not, HUI-3 vision
- Examination of uncorrected visual acuity for near and far. Distance vision was tested using a Huvitz CCP 3100 standard test projector in each eye separately, near vision was also tested in each eye separately using a Rosenbaum Pocket Vision Screener.
- Determination of vision with optimal optical correction (glasses) of each eye separately, after performing auto-refractometry with Canon RK-F2 (as well as tonometry/pachymetry with Canon TX-20P),
- Improving vision with a magnifying device - what kind and what magnification is recommended are explored in part 3 of the form. At the beginning of the study, a set of

different optical devices was determined, covering a wide range of different needs of patients with different diagnoses. A wide variety of aids were used- magnifiers: 4X, 6X and 8X by Optelec,

Zeiss Head on, OrCam My Eye-"talking glasses", Max TV and Max Detail by Eschenbah,

- Determination of reading speed - the number of words/minute is examined binocularly without correction and after adapting a magnifying device on the first examination - for convenience called "before" and the same - number of words/minute binocularly without correction and after adapting a magnifying device on the second review after 3 months called "after".

- Assessment of functional vision is done in part 4 - near and far vision skills questionnaire. They are assessed subjectively by the investigator and anamnestically by the patient or his personal assistant or companion.

- Evaluation of motivation, adaptation, satisfaction with the rehabilitation and rejection of it. They aim to justify the acceptance or refusal of visual rehabilitation, the difficulties in its implementation and refer to the personal judgment of the patient.

The research included patients with ARMD, Glaucoma, DR and children from the school for the visually impaired in Varna.

Results

The part of respondents who are not interested in specialized training in a visual rehabilitation is 33%. The survey gives an exact picture of the lack of knowledge on the visually impaired and visual rehabilitation. The results strongly confirm the working hypothesis.

At the first visit in 2009 a total of 23 children were studied from 1-3 grade, 17 were male and 6 - female. Their average age was 10 years. At the second visit: the children were only 16. Functional vision assessment showed positively developed near vision skills - students held the optical aid correctly in 93.75% and recognised a face in 81.25%. The assessment for far activities shows 100% coping with stairs. In 50%, further training with the magnifying aid is still required and in only 12.5% the aid is rejected entirely.

The present study was carried out in the eye clinic "St. Nikolay" - Varna for the period: 05.2019 -05.2022. There were examined 80 patients/160 eyes, 25 (31.25%) were men and 55 (68.75%) were women. In all four observed groups, the relative part of female is greater. The detailed analysis showed that 55.62% of distance visual acuity was in the 0.01-0.05 range. It is too low, which predetermines the reluctance of optical correction for distance. Results about reading speed shows that there is a statistically significant difference in the reading speed "before" without and with an increase in the 80 patients. On the first visit, the average speed was: 11.52 d/min without magnification and 33.7 d/min with magnification, and on the second, respectively: 11.40 d/min without magnification and 35.16 d/min with magnification. It is noteworthy that magnifiers are the preferred aids of correction of low vision, followed by electronic magnifiers by 30%. Out of all 80 examined patients, 21 did not purchase any means for optical correction, which is 26.25%. In the analysis (for convenience) we collectively take

these 5 and 21 patients as a total of 26 or 32.5% who "not bought" the recommended device. The group with glaucoma showed the lowest reading speed. Those with DR improved their reading speed from 11.16d/min to 43.83d/min. The best results and motivation were shown by patients with ARMD.

Discussion

The survey proves the poor awareness of the society on the issues of blindness and low vision - the knowledge on the issue of visual rehabilitation of patients with low vision is extremely low. The knowledge and experience of optometrists and specialist ophthalmologists in this field is the connecting link in the care of the visually impaired. The post-graduate training courses in visual rehabilitation of the visually impaired for ophthalmologists, optometrists and specialists, opticians and health care professionals are recommended.

Innovative technologies for improving and compensating visual deficits are also not widely used in Bulgaria - the main optical device that our patients can use is the magnifying glass.

Adaptation of low vision patients to their prescribed vision aids and satisfaction with their use is not an easy task. This is directly dependent on the individual characteristics of the patient. Highly educated patients are more likely to be aware of the need for one. Regarding vision rehabilitation worldwide, the lack of accessibility of the service, poor financing and low awareness have been emphasized.

In the study, the average age of patients offered visual rehabilitation was 72 years. Women were significantly more 63.5% and older than men. The most common diagnoses in this study were macular degeneration, other retinal diseases and glaucoma in the elderly, and hereditary retinal diseases in working age and children. Only 28.67% have been consulted, and 91.25% have purchased an optical device. Of those who recently purchased a magnifying device, 75% are satisfied with the rehabilitation of their vision and use it regularly.

In the study, the average reading speed of the 80 patients without magnification was 11.53, approx. 12 words/min. After a first visit the increase was 33.75 words/min. Three months later, the reading speed without magnification was 11.40 dpm, and after magnification it was 35.16 dpm. We have the lowest reading speed in the group of glaucoma patients and in 4th group has the best reading speed, because they have the best visual acuity and are younger. The most significant increase in reading speed after an increase in DR was 43.8 d/min at the first examination and 47.8 d/min at the second, and the weakest result was in the group with glaucoma. Which the author explains by the fact that in the terminal phases of the disease, only the temporal island of vision is preserved. This explains the need for a specific reading technique with head adjustment.

There are many formulas for determining magnification based on visual acuity, e.g. of Kastenbaum, Lovie, Bailey of Lebenson, etc.

Our results confirm the importance of low vision rehabilitation by adequately providing optical aids to improve reading ability, which significantly increases its speed.

In our study, it was found that most of the visually impaired children had residual useful vision. Depending on the nature and type of visual impairment, they often have difficulty performing their daily tasks. Half of them still need additional training with the aid. This confirms the need for visual rehabilitation at as early an age as possible.

The inadequate public awareness and knowledge of ophthalmologists on the problems of the visually impaired and visual rehabilitation was confirmed in a categorical manner by the survey conducted in both the variants. This unambiguously demonstrates both the need for change in public opinion and specialized training of medical professionals. Therefore, the need to introduce an algorithm for the work of the low vision specialist is justified. It should emphasize the types of visual rehabilitation aids- magnifiers, telescopic spectacles, electronic devices, and television systems-and specify the algorithm for determining the necessary magnification of the aid. The results of the survey show the positive attitude towards the subject and a desire for assistance about the visually impaired. A complex national strategy is needed, because it is an intersection not only of health but also of social policy.

Visual rehabilitation does not have an instant effect. It is a process of diagnosis of the problem, training in the correct use of the optical aid, adaptation to the aid, combined with trust in the team of specialists - ophthalmologists, optometrists, typhlopedagogues, and sometimes a social worker and psychologist. It also involves a period of follow-up, assessment of the condition and motivation in continuing education, all combined with patience and professionalism.

Important conclusions

1. In Bulgaria, there has been no extensive analysis of the overall information on the long-term follow-up of the visually impaired and the possibilities for access to the high-tech achievements of optics and medicine for visual rehabilitation. There are also no studies on the degree of improvement and optimal use of functional vision when adapting to different types of aids. There is limited information on social support and integration opportunities for the visually impaired.

2. The level of awareness of patients as well as medical professionals about blindness and low vision is unsatisfactory. Many of them have no information about the activities of the Blindness Association or schools for the visually impaired, do not know the legal possibilities for prescribing optical aids, and are not interested in specialized training in visual rehabilitation. However, more than 90% of the respondents expressed a positive attitude towards participation in National campaigns to raise awareness and integration of visually impaired patients.

3. From the study of the low vision adult patients, it is clear that due to the fact that the visual acuity for distance in most of them is very low, between 0.01 and 0.05, they show no desire

for optical correction for distance. The preferred means of correcting near visual deficit is magnifiers, followed by electronic magnifiers.

4. There is a statistically significant difference in reading speed "without" and "with magnification", in the second case it is about three times higher in all groups of patients studied. The same significance in reading speed "without" and "with magnification" was maintained at the 3rd month examination. However, there was no difference in the two groups of indicators between the first and second examination. The cited global experience provides the basic framework of the integrated model, to which we added specialists who shaped the multidisciplinary look of the team we proposed. In addition to human resources, Bulgaria also needs a new regulatory framework. The legal provisions that regulate the possibilities of social assistance in visual rehabilitation were very outdated in nature, but promulgated without updating at the start of the 2019 study. The proposals we have made have been reported at several workshops and round tables on the problems of the visually impaired (Retina Association Bulgaria 2021 - round table "Vision for vision"). Namely in the part:

Art. 68. (1) In the cases under Art. 73 of the Law on People with Disabilities, the medical conditions, operational terms and the necessary medical documents for the provision of aids, devices, equipment and medical devices for which disabled people with an established need, according to the type of disability and the individual assessment of needs, use the target aid, are specified in Annex No. 2 of the regulation.

5. Of all 80 patients who underwent primary examination, one-third did not undergo visual rehabilitation despite being recommended an appropriate aid. Assessment of functional vision in those who purchased such aids showed that patients with age-related macular degeneration had the best motivation to use and adapt to them, followed by those with glaucoma and DR. Group 4 patients with the more heterogeneous and more severe diagnoses had the most difficulty.

6. In the study of children with low vision, it was found that with the help of training, assistive magnification devices and other advances in technology, they could make the most of their residual vision. The most preferred magnifying aid for visually impaired students is the magnifying glass. Their high motivation to handle the magnifying aid coincides with their good adaptation and developed skills.

7. There are significant barriers and difficulties in access to visual rehabilitation of organizational and personnel nature - limited resources, lack of trained specialists, lack of integrated approach and formed multidisciplinary team. Overcoming them will contribute significantly to improving the visual assistance of the visually impaired and will ensure comprehensive care based on modern standards and competencies by all specialists involved in the integrated model: ophthalmologist, optometrist, optician, vision therapist/typhopedagogue, social worker and psychologist.

Contributions

1. Contributions of a cognitive nature

1.1. A detailed literature review was made, covering Bulgarian and world literature and accessible databases, dedicated to blindness and the visually impaired

1.2. A systematic theoretical review was carried out on the topic of visual support for children with impaired vision

1.3. An analysis of the visual rehabilitation of adult patients with socially significant eye diseases was carried out

2. Contributions of a scientific and original character at the national level

2.1. First-ever long-term follow-up of low-vision patients and an analysis of magnifiers used in children and adults for visual rehabilitation

2.2. For the first time in Bulgaria, the opinion of patients, healthy people and medical specialists on the subject of blindness and low vision has been studied, and the current regulations in the Republic of Bulgaria regarding visual rehabilitation have been analyzed

2.3. An algorithm for working with patients with impaired vision was developed and proposed by a multidisciplinary team of specialists specialized in applying the innovative achievements of optics and medicine to compensate reduced or missing vision in these patients

2.4. Barriers and difficulties in the implementation of visual rehabilitation were studied and defined, and a model of integrated care for patients with impaired vision was built.

3. Contributions of a confirmatory nature

3.1. The initial hypothesis that the awareness of the population and medical professionals is unsatisfactory on the issues of blindness and low vision was confirmed

3.2. The use of optical magnifiers for visual rehabilitation has been shown to improve residual functional vision

3.3. Weaknesses and shortcomings in integrated care for the visually impaired were identified and pointed out

The dissertation examines a problem that is still searching its solution.

The results presented and analyzed in detail show a weak public awareness of the problems and support for the visually impaired. Solving the problem hides many unresolved issues related to the legal framework, access to the opportunity for visual rehabilitation, staff training and last but not least, the motivation of the visually impaired themselves. Using the right visual rehabilitation equipment can help people with reduced vision to live fully and improve their quality of life. With her dissertation, Dr. Pitakova has started, but it is necessary to overcome the listed difficulties.

Dr. Pitakova has 4 publications related to the dissertation.

The dissertation is a completed scientific development and overlaps the scientific criteria indicated in the Regulations for the Implementation of the Law on the Development of the Academic Staff at MU-Varna.

The volume of the dissertation, the topicality of the problem, as well as the in-depth analysis give me the reason to propose to the Scientific Jury to vote positively to award Dr. Ivelina Pitakova the scientific degree "DOCTOR".

Assoc. Prof. Binna Nancheva, MD, PhD