Optometric low vision rehabilitation practice in Norway – public health care

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Abstract

The purpose was to describe the patient characteristics, the prescribing trends and habits among the public health care optometrists who perform low vision rehabilitation in Norway. Data were collected using a questionnaire to gather background details of the optometrist, and a practice registration form to register patient characteristics and information about the low vision device(s) prescribed. Both forms were distributed to 44 public health care optometrists. A total of 30 questionnaires and 20 practice registration forms were returned. This included data for 147 patients with visual impairment. Moderate to severe visual impairment according to The World Health Organization (WHO)'s definition (visual acuity $\leq$ 6/18) was present in 82 (59%) of the patients. Three out of four (75%) patients did not have sufficient vision for reading. Distance visual acuity was improved with best optical correction in 39 (28%) of the patients compared to the presenting visual acuity. The most frequently prescribed optical devices for near and distance vision were hand magnifiers and filters/tinted lenses respectively. Optometrists play an important role in vision rehabilitation of older people attending the low vision services. A number of the patients seen in low vision services are referred from non-eye care professionals and achieve improved vision with appropriate optical correction. Others are only mildly visually impaired with adequate optical correction alone. This indicates a potential to use general optometric practice as the first step for vision rehabilitation, as a number of people are only mildly visually impaired with adequate optical correction.

Sammendrag

Hensikten med studien var å beskrive pasientkarakteristika, foreskrivningstrender og vaner blant optikere som utfører synsrehabilitering i det offentlige helsevesenet i Norge (Hjelpemiddelsentralene). Data ble samlet inn ved hjelp av en spørreundersøkelse om optikerens bakgrunn og et praksisskjema for å registrere pasientkarakteristika og informasjon om synshjelpemidlen(e) som ble foreskrevet. Begge skjemaene ble distribuert til 44 optikere. I alt 30 spørreskjemaer og 20 praksisregistreringsskjemaer ble returnert, disse inkluderte data for 147 pasienter med synshemming. Moderat til alvorlig synshemming i henhold til WHOs definisjon (synsskarphet $\leq$ 6/18) var til stede hos 82 (59%) av pasientene. Tre av fire (75%) pasienter hadde ikke lesesyn. Synsskarphet på avstand ble forbedret med beste optiske korreksjon hos 39 (28%) av pasientene. De syns-hjelpemidlene som ble foreskrevet hyppigst var håndluper for nær og filterbriller for avstand. Optikere spiller en viktig rolle i syns-rehabilitering av eldre mennesker med synshemming. Flertallet av eldre henvises til syns-rehabilitering av ikkesynsfaglige og får bedre syn med riktig brillekorreksjon. Det betyr at det ligger et uutnyttet potensiale i å bruke lokale optikere som første steg i syns-rehabilitering ettersom mange eldre kun har mild synshemming med riktig brillekorreksjon.

Introduction

Data on prevalence of visual impairment in Norway and the Nordic countries are sparse. A population study in Denmark found a prevalence of blindness and visual impairment of 0.2% and 0.66% respectively, and a study in Iceland found slightly higher prevalence of 0.57% and 0.96% respectively (age $\geq$ 50yrs) (Buch et al., 2004; Gunnlaugsdottir, Arnarsson, and Jonasson, 2008). Age-related macular degeneration (AMD) is a leading cause of visual impairment and blindness in the elderly (Buch et al., 2004; Gunnlaugsdottir et al., 2008; Klaver, Wolfs, Vingerling, Hofman, and de Jong, 1998; Laitinen et al., 2008).

Thanks to medical advances, new technology and healthy living, people are living longer (Brunborg, Texmon, and Tønnessen, 2012; Christensen, Doblhammer, Rau, and Vaupel, 2009). The prevalence of ocular disease and related vision loss increases as we age (Attebo, Mitchell, and Smith, 1996; Buch et al., 2004; Klaver et al., 1998; Klein, Klein, Linton, and De Mets, 1991; Lindekleiv and Erke, 2013; Muñoz et al., 2000; Sjøstrand, Laatikainen, Hirvela, Popovic, and Jonsson, 2011) and so does the need for medical care and rehabilitation. However, new treatment methods for age-related macular degeneration and diabetic retinopathy may limit the increase in number of people with visual impairment because of these conditions (Arora, Kolb, Goyder, and McKibbin, 2012; Rostron and McKibbin, 2012). Low vision rehabilitation services exist to: (i) assess people with visual loss, (ii) prescribe low vision devices and training to maximally utilize remaining vision and (iii) give visually impaired people information and support. The goal is to improve quality of life (Marinoff, 2012).

In Norway, optometric low vision rehabilitation is carried out by optometrists in different county based eye care services, in private optometric practices, special education and rehabilitation institutions and in a few hospital eye departments.

The Assistive Technology Centres (NAV Centres) in each of the 19 counties are part of the health care system and distribute various technical aids, such as low vision devices, wheelchairs and other products to improve functional capabilities of individuals with disabilities. The technical devices are provided on a loan basis, and most of the devices are covered by the Government, similarly to low vision clinics elsewhere in Scandinavia (Gustafsson and Inde, 2009). There are also a few special education institutions, Statped, Department of Visual Impairment, providing visual rehabilitation. These institutions employ optometrists, ophthalmologists, low vision therapists and mobility instructors.

Visually impaired patients are referred from ophthalmologists, optometrists or general practitioners (GPs), to the optometrists at NAV Centres for (i) refraction and visual assessment, (ii) assessment of requirements for low vision devices and (iii) training and advice.

Every country has its own definition of low vision for legal and social purposes. In Norway reduced visual acuity ($\leq$ 6/18), visual field defects, reduced night vision, reduced reading acuity, reduced dark adaptation, and glare give the right to public visual rehabilitation. When the circumstances are verified, financial aid may be given according to the National Insurance Act §10-7 ("LOV 1997-02-28 nr 19: Lov om folketrygd (folketrygdloven)," 1997) even if the visual acuity is better than 6/18. However, reduced visual acuity ($\leq$ 6/18) with the best optical correction is the main criterion for low vision, which corresponds with the WHO definition.

The definition of visual impairment in accordance with the WHO and the International Statistical Classification of Diseases and Related Health problems (ICD-10) (L. Dandona and Dandona, 2006; WHO, 1992) is:

- Category 0: mild or no visual impairment, visual acuity better than or equal than 6/18.
- Category 1: moderate visual impairment, visual acuity equal or worse than 6/18 to 6/60.
- Category 2: severe visual impairment, visual acuity equal or worse than 6/60 to 3/60.
- Category 3: blindness, visual acuity equal or worse than 3/60 to 1/60, or a central visual field of 10° or less.
- Category 4: blindness, visual acuity worse than 1/60 to light perception, or a central visual field of 5° or less.
- Category 5: blindness, no light perception.

The aim of this study was to describe optometric low vision rehabilitation within the public services in Norway in terms of patient characteristics, prescribing trends for low vision aids and working habits of the public health care optometrists. To our knowledge, this is the first Norwegian national survey of low vision rehabilitation of people of all ages provided by optometrists. Other studies in Norway and the Nordic countries have focused on older adults and prevalence estimate of ocular diagnoses (Bjornsson, Syrdalen, Bird, Peto, and Kinge, 2006; Gunnlaugsdottir et al., 2008; Sundling, 2011).

Methods

The study had a descriptive cross-sectional design, and the classification of the visual impairment was based on the WHO categories. The target population was optometrists working in the public health care ($n = 50$) in Norway. The sample populations were optometrists working in low vision rehabilitation services ($n = 44$) and their patients ($n = 147$).

Two data registration forms were prepared, one questionnaire and one practice registration form, and distributed to all public health care optometrists working in low vision rehabilitation services throughout Norway.

All public health care institutions (The NAV Centres, hospital eye departments, and Statped) employing optometrists were informed about the study before it started. Six hospital optometrists advised that they did not provide low vision rehabilitation at all, and they were excluded from the study.

All optometrists were asked to fill in both the questionnaire and the practice registration form.

The questionnaire included questions about:

1. The optometrist; age, gender, educational level, years of work experience, geographic location and whether their institution requests for tender to private optometrists to do low vision assessments on behalf of The NAV Centre,
2. The low vision examination; magnification requirements and whether other tests, such as visual fields and contrast sensitivity, were included in the assessment, as well as one question related to patient education,
3. The available resources; the time scheduled for the initial assessment (first appointment), education of other healthcare providers, waiting time to get an appointment, and collaboration with private optometrists, general practitioners (GPs), and ophthalmologists.

The practice registration form focused on the low vision patient and included information about age, gender, ocular diagnosis, presenting and best corrected visual acuity, and who had referred the patient. It also included a list of all the low vision devices and lighting ordinated for distance and near vision, as well as the given patient information, training and final advice and prescribed optical correction.

The optometrists were asked to fill in the practice registration form for 10 consecutive patients seen for low vision rehabilitation for a given period. Some of the optometrists examined fewer than 10 patients during this period, in total, data for 147 patients were collected. All patients ($n = 147$) were informed about the study and gave informed consent to the data collection.

Data were collected between October 2013 and February 2014. The data were analysed in frequency and summation tables and group differences were analysed with standard statistical methods using Excel and SPSS. A p-value less than 0.05 was considered statistically significant.

The Norwegian Social Science Data Services were notified prior to commencement of the study. The study was presented to the Regional Committee for Medical Research Ethics, Ethics; the study was not regarded subject to specific evaluation and approval.

Results

A total of 30 optometrists (68%) responded to the questionnaire, and of these 20 (67%) returned the practice registration form. The practice registration forms included data from consultations with 147 visually impaired people.

The majority of the optometrists (88%) were in full-time positions. The majority (82%) worked in an NAV Centre. The mean age of the optometrists was 45 years, and most of them (90%) had a bachelor degree or equivalent and some (10%) had a master's degree in optometry.

The majority of the optometrists preferred using trial lenses and trial frame for determining the appropriate optical correction and used the Keeler A near acuity system at 25 cm with a reading addition of +4 DS for estimating the appropriate near magnification. Some optometrists preferred retinoscopy, mainly those working in hospital eye departments. The most commonly reported additional tests used were Amsler Grid, contrast sensitivity and peripheral visual field testing.

Most commonly, 1.5 to 2 hours were scheduled for the first appointment. More than half of the institutions had a waiting time of 2–10 weeks for the patient to have an appointment.

The majority of the optometrist (97%) reported receiving referrals from ophthalmologists, and half of them (50%) reported that they receive referrals from GPs. Communication in terms of telephone conversations, reports and referrals, was significantly more frequent with ophthalmologist than with general practitioners (Fisher's Exact Test, $p < 0.05$). The total list of the collaboration with ophthalmologists and the GPs is shown in Table 1.

Table 1: Collaborations with ophthalmologist and general practitioner as reported by the optometrists, n (%).

	General practitioner	Ophthalmologist
Receive referrals	15 (50)	29 (97)
Receive patient reports	11 (37)	25 (83)
Send reports*	12 (40)	21 (70)
Refer/confer by telephone*	5 (17)	16 (54)
Send referrals*	4 (13)	13 (43)
No collaboration	12 (40)	0 (0)

*Fisher's Exact Test, $p < 0.05$.

In terms of communication with the patients, 75% of the optometrists reported using less than 20% of their time on information and advice in use of CCTV, optical devices or computerized workstation and most used less than 15% of their time on information about the patients' ocular conditions. Very few optometrists reported doing dispensing related jobs, and very few of the public health care optometrists (16%) reported inviting tender for low vision assessments from private optometrists on behalf of The NAV Centre.

The majority of the patients (67%) were 60 years or older and

63% were female. The mean age was 64 (±28) ranging from 4 to 100 years. The referrals to low vision services in the public health care institutions were made by either an ophthalmologist (36%), a visual health care assistant in the community (25%), an optometrist (5%), a general practitioner (1%) and others (33%). The primary ocular diagnosis for referral was age-related macular degeneration (AMD). See Figure 1 for an overview of the primary ocular diagnosis of patients referred for low vision assessment.

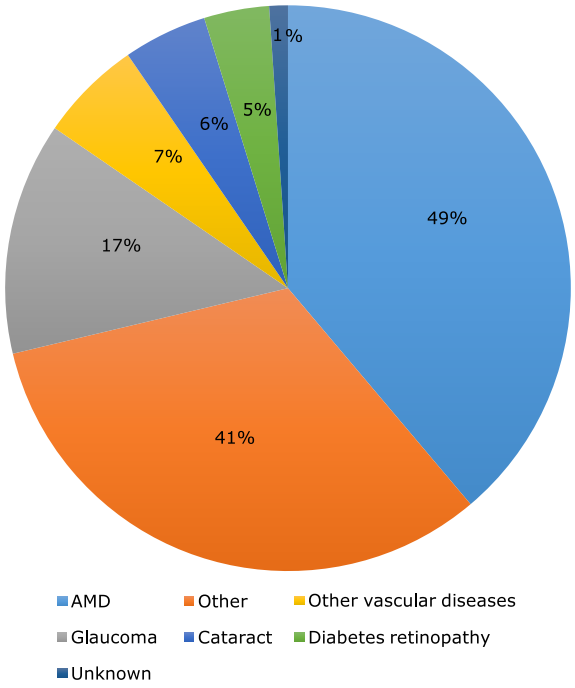

Figure 1: Primary ocular diagnosis of all the visual impaired patients.

Vision was recorded for 140 (95%) patients. Moderate or severe visual impairment (6/60 < visual acuity < 6/18) was present in 82 (59%) cases, and blindness (visual acuity < 3/60) was present in 12 (8%) patients. Mild or no visual impairment (visual acuity > 6/18) was present in 46 (33%) of the participants. In total 38 (27%) patients achieved improved visual acuity with best optical correction, of these 17 (12%) improved by one WHO Category step or more, e.g. from severe (Category 2) to moderate (Category 1) visual loss.

Nearly half of the visually impaired people (44%) could only read newspaper headlines, 24% were able to read headlines and subheadings, and 22% did not read at all. Also among those patients with mild or no visual impairment 12% reported not reading at all. See figure 2 for patients' reading abilities related to the WHO Categories of visual impairment.

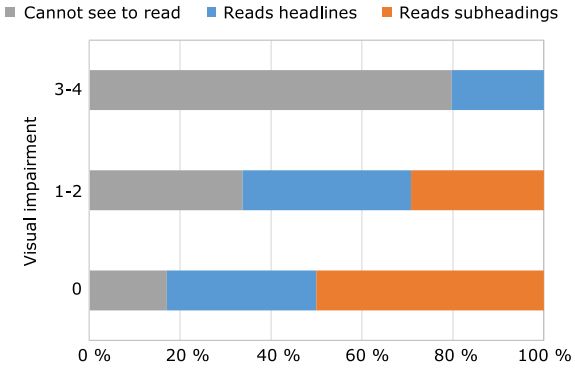

Figure 2: Habitual reading abilities related to the WHO-categories for visual impairment.

The most frequently prescribed or recommended optical devices for near vision were hand magnifiers with and without illumination.

For distance vision, the most frequently prescribed devices were filters/tinted lenses. The recommended or prescribed low vision devices for distance and near are summarized in Tables 2a and 2b, and the prescribed or recommended types of lighting are shown in Table 2c. Among those patients who were prescribed one or more low vision device, 80 out of 129 (62%) were given training in use of the device.

Table 2a: Prescribed or recommended distance low vision devices.

		Visual impairment		
	All *	**Cat. 0**	**Cat. 1-2**	**Cat. 3-4**
Low vision device	(n = 147) n (%)	(n = 46) n (%)	(n = 82) n (%)	(n = 12) n (%)
Filters/Tinted lenses	44 (30)	16 (35)	24(29)	2 (17)
Spectacle mounted telescope	24 (16)	2 (4)	21 (26)	1 (8)
Monocular telescope	18 (12)	0 (0)	17 (21)	1 (8)
Distance camera	5 (3)	0 (0)	5 (6)	0 (0)
Binocular telescope	3 (2)	0 (0)	3 (4)	0 (0)

* Missing data on visual acuity for 7 patients.

Table 2b: Prescribed or recommended near low vision aids, not mutually exclusive.

		Visual impairment		
	All *	**Cat. 0**	**Cat. 1-2**	**Cat. 3-4**
Low vision device	(n = 147) n (%)	(n = 46) n (%)	(n = 82) n (%)	(n = 12) n (%)
Hand magnifier	57 (38)	14 (30)	37 (45)	4 (33)
CCTV/Reading machine	44 (30)	5 (11)	30 (37)	6 (50)
Stand magnifier	29 (19)	9 (20)	19 (23)	1 (8)
Video magnifier	22 (15)	1 (2)	20 (24)	1 (8)
Computer hardware and software for magnification	17 (12)	4 (9)	11 (13)	1 (8)
Spectacle mounted plus lens magnifiers, monocular and binocular	24 (16)	3 (7)	20 (24)	1 (8)
Bar and flat-field magnifiers	7 (5)	5 (11)	2 (2)	0 (0)
Half-eye spectacles, monocular	6 (4)	2 (4)	4 (5)	0 (0)
Half-eye spectacles binocular	4 (3)	1 (2)	3 (4)	0 (0)
Monocular telescope, reading add.	1 (1)	0 (0)	1 (1)	0 (0)
Aplanat system magnifiers	2 (1)	0 (0)	2 (2)	0 (0)
Binocular telescope, reading add.	1 (1)	1 (4)	0 (0)	0 (0)

* Missing data on visual acuity for 7 patients.

Table 2c: Prescribed or recommended lighting.

		Visual impairment		
	All *	**Cat. 0**	**Cat. 1-2**	**Cat. 3-4**
Low vision device	(n = 147) n (%)	(n = 46) n (%)	(n = 82) n (%)	(n = 12) n (%)
Task lighting/reading lamp	39 (26)	14 (30)	22 (27)	2 (17)
Light magnifiers	21 (14)	9 (20)	11 (13)	1 (8)
Ambient illumination	16 (11)	6 (13)	8 (10)	0 (0)
Torch	11 (7)	3 (7)	8 (19)	0 (0)

* Missing data on visual acuity for 7 patients.

Discussion

The majority of patients seen for optometric low vision rehabilitation in this study were over 60 years old. The primary diagnosis causing vision loss was AMD. This reflects the fact that AMD is the primary cause of blindness and visual impairment among elderly people in the industrialised countries (Bourne et al., 2013; Buch et al., 2004; Muñoz et al., 2000).

Three out of five patients attending the low vision rehabilitation services were moderately or severely visually impaired, and three out of four persons in this study did not have sufficient vision for reading tasks, that is reading mail, newspapers, and medical instructions. This is likely to give impaired quality of life and reduced capacity to perform activities associated with everyday life. Moreover, there is a relationship between impaired vision and increased risk of falls and accidents in older people (Cumming et al., 2007; Lamoureux et al., 2008). An Australian study found that low vision rehabilitation does not only improve reading and fine detail work, but also improves general vision, mobility, lighting, psychological adjustments and activities of daily living significantly (Wolffsohn and Cochrane, 2000). Moreover, our study showed that a proportion of patients (12%) achieved improved vision by one WHO Category step or more with best optical correction. More than half of the patients (58%) were referred by non-eye care providers. This highlights the importance of both available and appropriate vision care and low vision rehabilitation services for older people.

Our study did not evaluate the effectiveness of the low vision rehabilitation services or quality of life. However, in nearly one third of the patients the distance visual acuity was improved with the optical correction compared to the presenting acuity. This number might be underestimated as data on either presenting or best corrected visual acuity were missing for quite a few of the patients. Several studies of the general population have shown improved visual acuity from habitual visual acuity after refraction (Attebo et al., 1996; Muñoz et al., 2000; Sundling, 2011). Our study demonstrates the importance of refraction and accurate optical correction also in people with low vision, and highlights the role of the optometrist in a low vision rehabilitation team.

Interestingly, with appropriate optical correction visual impairment was not present, or only mild, in one third of the patients. This can imply two things; that people are referred to the public low vision services even when they are not visually impaired (according to visual acuity) and that some people are referred to public low vision services without having prior appropriate refraction. This was somewhat surprising. However, our study did not register information about other functional disabilities, multi-handicap or visual field defects, which may account for some of these cases. This is a limitation of the study. Nevertheless, the fact that the number of people with visual impairment will increase as result of aging and our study shows that people with normal visual acuity are referred to the public low vision services, indicates a potential to use local optometrists and optometric practices in public health care and low vision rehabilitation.

In our study, the most frequently recommended and provided low vision devices were simple hand magnifiers with or without illumination. This has also been shown in other European studies (Crossland and Silver, 2005; Leat and Rumney, 1990; van Rens, Chmielowski, and Lemmens, 1991) and is also supported by a US study which reported magnifiers to be very useful for patients with vision loss because of AMD (Decarlo et al., 2012). However, in 2012 the National Health Service reduced the opportunity to prescribe low magnification and some daily living devices free of charge as entitled by the National Insurance Act §10-7 ("LOV 1997-02-28 nr 19: Lov om folketrygd (folketrygdloven)," 1997). Because of this, some interesting comments were made by the optometrists: "This makes it difficult for the oldest group of patients, because some have problems buying the magnifiers" and "We spend time on giving information about where to buy magnifiers."

The second most frequently prescribed device was CCTV and reading-machines. Electronic vision enhancement systems increases the reading speeds compared to optical magnifiers (Peterson, Wolffsohn, Rubinstein, and Lowe, 2003). This may explain the high frequency of advanced electronic optical devices and low number of high adds and spectacle mounted plus lens magnifiers prescribed in our study. Spectacle mounted plus lens magnifiers, monocular and binocular, were the third most prescribed device in our study, and the frequency of prescription is similar to other studies (Crossland and Silver, 2005; Leat and Rumney, 1990; van Rens et al., 1991), which also showed a low number of prescribed spectacle mounted telescopes for near.

Only one in four patients was given task lighting or a reading lamp. Lighting has a marked influence on visual acuity and several studies have shown the importance of high illumination in attaining maximal acuity for patients with macular disease (Fosse and Valberg, 2004; Sloan, Habel, and Feiock, 1973). Different task lamps are therefore often part of the first prescription together with the spectacles. The relatively low frequency of lamps and lighting given in our study could be because the patients already have task lighting or that they are not entitled to lighting according to the National Insurance Act, due to low magnification need. However, our study did not examine this.

Conclusions

Optometrists have an important role in vision rehabilitation of older people attending the low vision services. A number of the patients seen in low vision services are referred from non-eye care professionals and achieve improved vision with appropriate optical correction. Others are only mildly visually impaired with adequate optical correction alone. The main low vision devices provided were hand magnifiers and electronic low vision devices for near vision and tinted lenses/filters for distance vision. This indicates a potential to use general optometric practice as the first step for vision rehabilitation, freeing up the more trained and experienced optometrists in vision rehabilitation centres for patients with severe visual impairment.

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