

The living environment in the nursing home for older adults with low vision: development of an environmental observation scale

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Abstract— In the USA and the Netherlands, respectively 26 and 36% of the nursing home residents are estimated to have visual impairments. Vision impairment can result in the loss of basic visual abilities: acuity, contrast sensitivity and visual field. Changes in visual function must be taken into account when considering activities of daily living, quality of care, and the environmental design of the nursing home. In the first phase of the study a literature review was conducted to define aspects of the environment relevant to older adults with low vision. The environmental aspects were listed into an environmental observation scale and adjusted by real observations in practice. In a feasibility study the scale was tested in two nursing homes and a specially designed environment for the visually impaired. The optometrist can be involved in visual screening and coaching of professional carers in the nursing home.

I. INTRODUCTION

LOW vision is very common among older adults. Visual impairments can be a result of the normal ageing process or of a disease, such as diabetes. In the USA and the Netherlands, respectively 26 and 36% of the nursing home residents are estimated to have visual impairments [1,2]. Vision impairment can result in the loss of basic visual abilities: acuity, contrast sensitivity and visual field. Changes in visual function must be taken into account when considering activities of daily living, quality of care, and the environmental design of the nursing home. Creating a healthy environment for older persons with low vision includes improvement of the living environment, controlling lighting and brightness, the use of clear colours and contrasts, the arrangement of spaces and clear acoustics. Improvement of care includes the use of contrast and lighting in daily activities.

II. OCULAR DISEASES

A major part of blindness and visual impairment in the Western World is caused by four ophthalmologic disorders: age-related macula degeneration, cataract,

glaucoma and diabetic retinopathy [2].

There are two types of macular degeneration; a dry type due to atrophy of the light-sensitive cells in the macula area, and a wet type in which an increasing number of new blood vessels develop underneath the retina. As a result the retina may break down with haemorrhages and destruction. This especially occurs in the area of the macula, and results in a loss of visual acuity and contrast sensitivity [2].

Cataract results from changes of the protein structure of the lens due to progressive thickening and opacification. For a person with cataract this results in increased sensitivity to glare, loss of contrast and visual acuity and a diminished visual field [2].

Glaucoma can be defined as a progressive optic neuropathy with a particular pattern of optic nerve damage and visual field loss that results from a variety of diseases affecting the eye. A major problem for glaucoma patients is the peripheral field loss. In daily life this results in higher risks for falling and bumping into objects that are outside the field of view [2].

Retinopathy due to diabetes mellitus results in new vessel formation and intra-retinal haemorrhages influencing the macula. These changes may cause retinal and visual damage experienced as scattered field loss, decreased visual acuity, increased sensitivity to glare and loss of colour and visual acuity [2].

III. VISUAL PROBLEMS

Eye diseases result in a loss of visual functions and subsequently in limitations in activities and restrictions in participation. The loss of visual functions include decline of the visual field, loss of colour discrimination, adaptation to the dark or the amount of light one needs to do a task. The visual field area declines with age. The visual field is defined as the entire area that can be seen when the eye is directed forward, including that what is seen with peripheral vision [5]. For the older adult this means that the portion of space in which objects are simultaneously visible is declining.

Colour discrimination decreases with age. Blue, green and violet colours are most affected by the natural yellowing of the lens. Blue objects tend to be observed as darker than they are [2].

Dark adaptation is the ability to regain visual sensitivity after being in a dark room for a certain time interval. Adapting to the dark can be limiting for older adults when moving from light to dim environments. Older persons require more light for carrying out the same tasks compared to younger persons [1].

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The amount of light that reaches the retina is reduced with increasing age. This is a result of normal ocular changes that result from ageing [9]. A 60 year old person needs three times the amount of light as a 20 year old to complete a visual task comfortably. The challenge is to provide enough light without creating glare [1].

Glare or light that is reflected directly back into the eye causes difficulties to see for older adults. The recovery time from the effects of glare is much longer for older than younger adults [9].

Changes in visual function must be taken into account when considering activities of daily living, quality of life, and the design of facilities in the nursing home. Improvement of the living environment includes awareness among professional carers of lighting, controlling brightness, the use of clear colours in daily activities and the arrangement of spaces and clear acoustics. Many professionals are involved in care for older adults with low or impaired vision. It is important to consider the multi or interdisciplinary nature of care for the older adult in the nursing home. In this context the older adult, the family carer, the disciplines involved in professional caring in the nursing home are target groups of implementation strategies. Improvement of care environment includes the use of contrast and lighting in daily care procedures. The living environment and the daily care procedures were observed in a number of nursing homes.

IV. VISUAL PROBLEMS IN THE NURSING HOME

In the Netherlands 36% of the nursing home residents are estimated to have visual problems [1,2]. It is possible to increase quality of life and well-being by improving lighting conditions [2]. Humans react both consciously and unconsciously to the area in which they live. This concerns residents as well as professional carers. The environment has a profound effect on feelings, behaviour and general health issues [6]. Environmental factors in the home contribute to prevent falls and improve ambulatory ability among older persons. Improved lighting, optimal contrast by use of colours in areas where the older person spends a lot of time, can prevent falls [2,9]. The relation between human behaviour and the environment is studied by environmental psychology. Relevant questions are how to enhance our environment to reduce accidents and create comfortable spaces, but also how to improve optimal use of the environment [6]. In the nursing home the resident depends on professional carers for instance for the use of available lighting conditions. Aim of this study is to develop an instrument to increase the awareness of professional carers in creating optimal visual conditions for residents with visual impairments. Van Geen [8] described a quality intervention program in which a questionnaire was used to empower clients in residential care homes in the Netherlands. The procedure was designed to influence individuals as well as processes in the institution. This intervention program was called 'The Measure and Discuss procedure' and reflects a standardized intervention aimed to invoke quality improvement. Essential aspect of

the procedure is that the result of the survey is discussed in the organisation. The program aims to strengthen the position of residents by questioning them about their opinions. The relevance of those opinions is proved in regard to policy-making. The procedure is designed to produce relevant data, but also to influence people and processes in the organisation [8]. The idea of influencing participants in an organisation by an intervention consisting of measurement and discussion is adopted in this study. Measurement and discussion will not lead directly to policy making, but will elevate the awareness of professional carers on management of low vision problems. The measurement aspect is applied on vision screening by optometrists and the use of an environmental observation scale. The discussions will enhance background information, nuances and recommendations for improvements and the awareness of vision problems by professional carers will increase. Professional carers should be aware of visual problems of the residents as well as environmental strengths and weaknesses. In this study the first stage of the development of the environmental observation scale for visual impairment (EOVI) is reported. The EOVI consists of a list of aspects of the different rooms and places in the nursing home that are of importance to the residents with low vision.

V. STAGES OF CHANGE

In the transtheoretical model (TTM) or the stages of change model (SOC) Prochaska [7] describes stages of change in relation to healthy behaviour. These stages are suitable to different problems and are applicable in change in healthcare professions as well as in health education. The idea behind the model is that behaviour change does not happen in one step. Rather, people tend to progress through different stages on their way to successful change. Advantage of the use of this model is that it represents the temporal dimension of the progress of change over time in six stages [7]:

1. **precontemplation:** people do not foresee to take action in the near future (within six months). They are not informed or under informed about the consequences of their behaviour or they are demoralized by former attempts.
2. **contemplation:** people are aware of pros and cons, but they are ambivalent to the balance and as a result they are not ready for immediate action.
3. **preparation:** in this stage people have a plan of action and intend to take action in the immediate future.
4. **action:** people have made observable modifications in daily practice.
5. **maintenance:** people are more confident and strive to prevent from relapse.
6. **termination:** former procedures are not observed any more.

Especially in the stage of precontemplation people are not informed or under informed. 'The Measure and Discuss' procedure [van Geen, 1997] can help to solve this problem. The optometrist coaches professional carers by

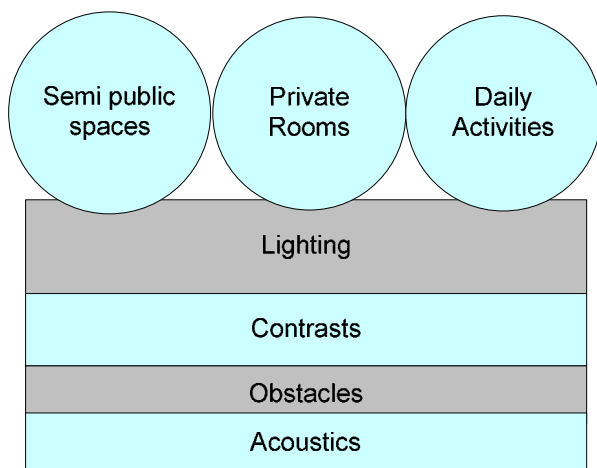


Fig. 1. Structure of the EOVl.

using the EOVl. They become more informed about strengths and weaknesses of the nursing home environment as well as the care context for residents with low vision. Apart from coaching professional carers the optometrist can enhance awareness of by identifying older adults with visual impairments.

VI. METHOD: CONTENT VALIDITY OF THE EOVl

Content validity is concerned with adequately covering the area that is being measured [10]. The judgement of content validity is not completely objective, but mostly based on judgement of experts (for instance, residents with visual impairments or professional carers) in the content area. The development of measurement instruments and the description of the process of content validation has been of interest to nursing science. In 1986, Lynn [12] described a procedure of content validation in the development of an affective/personality measurement instrument. In this procedure the development of the instrument is described as the first stage of a two stage process. In the second stage the instrument will be judged by psychometric measurement.

In the first stage of development Lynn [11] describes the procedure of representing the specific area as follows:

1. Limitation of the area of research; the research area was restricted to the living and social environment of older people with visual impairments living in a nursing home.
2. Literature review regarding the subject; a literature review in Medline was conducted to define aspects of the environment relevant to older adults with low vision. Keywords that were used are; low vision, elderly, nursing home, environment. In the literature the problems and risks for older adults with low vision were described. These aspects were listed in a checklist for a building project of a mock-up dwelling for older adults with low vision.
3. Specification of indicators and the generation of items for all indicators; the checklist was modified into the EOVl.
4. The composition of items in a usable format; the scale was tested in two nursing homes and in a

specially designed environment for the visually impaired.

In the two stage procedure content and face validity are differentiated. The first stage of face validity is a procedure of acceptance by the lay person or, in this study the user of the instrument in the future.

Construction of the EOVl

The environmental observation scale consists of several subscales concerning common spaces, private rooms and daily activities.

In each room items concerning low vision problems were listed. These items are lighting, use of contrasts, prevention of obstacles and use of acoustics. In Figure 1 the structure of the EOVl is explained.

Semi public Spaces consist of entrance, corridors, stairs, external spaces (garden), common living room and kitchen. In the private setting the room of the resident was observed in separate parts: living room, bed room, kitchen, bathroom and toilet.

According to daily activities residents were observed during the day as professional carers practice the use of low vision facilities like lighting, contrasts, obstacles and acoustics in order to list limitations in daily activities.

All rooms were observed on lighting aspects, the use of contrasts, prevention of obstacles and use of acoustics. The use of contrasts for instance can be observed in common spaces like contrasting colours for stair handrails, the white toilet seat on the white toilet, or the white plate on the white table.

All items were scored on a two point scale of observed as present or absent.

For each room a general score was obtained about the use of contrasts, prevention of obstacles and use of acoustics and a specific score was obtained about lighting in each room.

VII. RESULTS

For each nursing home scores were collected per heading. In nursing home 1 and nursing home 2 care professional are still in the precontemplation phase of change whereas in the specialised nursing home this is not the case. In Table 1 these scores are compared with the professionally-designed environment.

Table 1 Results of the scores of nursing homes and the professionally designed environment

	Nursing Home 1
Excellent	Use of contrasts floors and doors Luminance dining room 'Talking' elevator Rounded table corners No disturbing sounds Handrails in bathroom
Moderate	Obstacles in path No contrast table/chair No contrasts in plug sockets and light switches Signs not placed on eye level Small fonts of communication notes

	Stair handrail starts too late
Bad	Lighting stairs at night No contrasting colour on first and last step Illumination of corridors is irregular

	Nursing Home 2
Excellent	Sun blinds available Doorsteps and stairs provided of a contrasting strip No disturbing sounds Bars and grips in toilet Doors and doorposts in contrasting colours
Moderate	Furniture not placed in small groups Obstacles not placed at one side of corridor Resident not informed who is entering and leaving the room
Bad	No audible change of rooms Illumination of corridors is irregular Reflective working top No contrast in table laying No use of reading glasses No contrasting toilet seat

	Professional Organisation
Excellent	Catwalk from train till entrance is marked by edges Stickers on apparatus Use of gadgets like a 'talking' pair of scales Use of contrasts on doorknobs, doorframes, table laying, table and chairs Eye catching accessories to improve orientation

Results of Table 1 show the excellent aspects of the professional organisation specially designed for residents with low vision. Although the nursing homes both scored excellent aspects in the use of lighting, contrasts and acoustics there were also moderate and bad aspects in these categories. Mainly the presence of obstacles and illumination can be improved. Preliminary results show that low vision has been taken into account in designing the living environment, but way founding is still difficult. Attention should be given to the awareness in professional carers in the use of lighting and contrasts in daily care situations.

VIII. DISCUSSION AND CONCLUSION

In future the environmental observation scale will be tested in more departments of several nursing homes to gain information about the usefulness for professional carers as well as the applicability of the observation scale in the home situation. Attention should be given to the

awareness among professional carers about the use of lighting and contrasts in daily care situations. Special attention must be paid to illumination of semi public spaces like corridors and stairs. The optometrist should coach professional carers by using the EOVI. This, in order to make care professionals more informed about strengths and weaknesses of the nursing home environment as well as the care context for residents with low vision. Apart from coaching professional carers the optometrist can enhance awareness of by identifying older adults with visual impairments. In the future the EOVI can be an instrument for professional carers to become aware of low vision problems and to improve the nursing home environment for older adults with low vision. Information to clients, family and professional carers is a first stage of changing daily care procedures and improve quality of eye care in the nursing home.

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