Healthy Living Environments for Older Adults with Dementia

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Summary: Many older adults suffer from a cognitive impairment called dementia, which has severe implications to independent lifestyles. People with dementia and their relatives ask for living environments that support independence, self care and vitality. Although supportive living environments are believed to delay the demand for care, more research is needed to qualify and quantify the exact impact of the physical environment to older people with dementia.

Keywords: Dementia, Living Environment, Older Adults, Independence
Category: Architecture for healthy environment

1 Introduction

The ageing of society, new visions on health care and the emancipation of older adults have consequences to housing. Ageing-in-place, in combination with a sufficient amount of professional home care, is commonly promoted as a strategy for maintaining autonomy, independence, sense of identity, and quality of life, and for maximising financial resources [1]. Research shows that living at home supports personal notions of normalcy and continuity in self-identity in view of the disruptive effects of age-related declines, chronic illness, and multiple personal losses [2]. In addition to remaining within one’s familiar home and community, ageing-in-place may also refer to residential life away from home. The wish to remain living independently, regardless of the condition of housing, neighbourhood, and health, is often a personal choice of older adults themselves [3]. On the individual level, this desire leads to home modifications, moving, or simply living under less favourable conditions that might pose a hazard to the quality of life. Older adults do not comprise a homogenous population, particularly in terms of lifestyle, impairments and disabilities. Impairments in hearing, the neuromusculoskeletal system, vision, and cognition vary in severity and mix. These differences have great impact on the type of living environments required.

2 Dementia

An estimated 24.3 million people (81.1 million by 2040) worldwide cope with a decline in intellectual functioning called dementia [4]. Dementia is a syndrome, which is defined by the American Psychiatric Association as the loss of cognitive function of sufficient severity to interfere with social or occupational functioning. There are about 100 known causes of dementia. Alzheimer’s disease (AD) accounts for 50-70 % of all cases. In AD, brain cells wither away and die, disrupting the production and distribution of neurotransmitters that carry messages within the brain [5]. AD develops regardless of gender, race, or social status [1]. Vascular dementia is the next most common cause [5].

The early symptoms of AD may be overlooked because they resemble signs of natural ageing. Symptoms can be divided into three kinds: (i) impairment in activities of daily life (ADL), (ii) abnormal behaviour, and (iii) loss of cognitive functions [5]. If the area of destruction involves the basal ganglia, signs of Parkinsonism can be evidenced, which supplement the chronic disorientation, confusion, and memory loss of dementia. The pattern of loss of intellectual function follows the principle of ‘last learnt, first lost’. Memory for events in the remote past is preserved in the early stages of the disease. Basic capabilities, such as toilet habits and recognition of immediate family members, are preserved. As the disease progresses, additional functions are lost. In the more advanced stages, the patient becomes almost child-like, being completely dependent on others in terms of ADL. AD often results in frequent falling because of visuospatial impairment and motor apraxia [6]. The consequence of these problems is that eventually the person suffering from AD becomes bound to the home almost completely, requiring complete care at all times [1]. A rapid progression of the disease leads to premature death, often due to suffocating or falls [5,7]. Patients can, however, survive up to 15-20 years after the onset of illness [5]. In the Industrialised World, AD ranks fourth as a cause of death of older adults, after cardiovascular disease, cancer, and cerebrovascular disease [1].

3 Dementia and the home environment

Older adults with dementia pose great challenges in terms of creating appropriate, healthy and supportive...
living environments, in which they can perform optimally and are being compensated for decreasing vitality and overall health status (Fig. 1). The current design of (mainly institutionalised) home-like ‘deinstitutionalised’ housing for older adults with dementia is regarded as a therapeutic resource to promote well-being and functionality among the residents. In such institutional settings, residents with dementia are often housed separately from the cognitively intact, who would suffer declines in mental and emotional status when living in close residential proximity [8].

![Diagram](image)

Fig. 1. The disablement process model applied to AD [15,16] and the impact of supportive living environments.

Standard housing concepts for older adults are, to a certain extent, not appropriate for people with dementia, e.g. due to frequent falling and an increased sensitivity to environmental conditions. People with dementia are often so sensitive that they have an increased mortality risk when moved to another house. Behavioural disturbances are seen in 90% of patients with dementia at some point in their course [9] (in particular insomnia), irrespective of the level of cognitive impairments. These disturbances cause immense patient suffering and, together with functional loss, are responsible for caregiver stress, long-term institutional placement, and acute hospitalisation, rather than cognitive deterioration [9]. The increased sensitivity of persons with dementia to environmental conditions occurs because the illness reduces the individual’s ability to understand the implications of sensory experiences [10]. Non-pharmacologic interventions can play an important role in managing behavioural disturbances [9,11,12]. The foundation of non-pharmacologic management is recognising that the person with dementia is no longer able to adapt, and that instead the environment must be adapted to the patient’s specific needs [11]. Adapting living environments to specific user needs in terms of both architectural and technological solutions [13] - in a balanced combination with pharmacologic and behavioural approaches - is likely to be most effective in improving the health, behaviour, and quality of life of people with dementia [14].

3.1 The built environment

The limited capacity of acquiring new knowledge and skills sets limits on the type of environment that is useful to people with dementia. A good living environment can reduce confusion and agitation, improve way-finding and encourage social interaction among older adults with dementia. On the other hand, poor environments increase confusion and problem behaviours [17], and can lead to anxiety, insomnia, social dysfunction or depressive feelings [18]. Particularly corridors and bathrooms can make older adults with dementia restless [19]. Reflections and repetitive patterns can be experienced as depth, which can cause fear and restlessness and confusion. The same accounts for shadows and contrasts [20]. Architects could consider open floor plans to allow both residents and carers to have an overview of spaces, and avoid corridors. Doors and traffic zones should be wide enough to allow passage by wheelchairs. Front doors should be conspicuous and distinctive by the use of colours or even a show case. Doors (and closets) that are supposed to remain closed or unattractive should be camouflaged in order not to draw attention. Doors should not have windows or glass, and should be equipped by lever door handles. Doorsteps (or colour accents on floors) should be avoided to minimise confusion and reduce the number of fall incidents. For the same purpose, walk ways should be kept free of clutter, all furniture should be stable, and loose floor covering should be secured. All plug sockets in the home as well as loose cables should be covered. Dangerous electronics, cleaning chemicals and kitchen utensils should be stored away safely. Sanitary rooms should be equipped with grab bars and handles and allow access to wheelchair users. Kitchen blades, toilet seats and wash-hand basins should be adaptable in height. Thermostat taps should be installed for safety. A bubble bath could be installed as part of a therapeutical multi-sensory environment to provide leisure, as well as distraction in order to allow carers to carry out other tasks. The toilet (or a picture on the door) should be visible from the living room, as a reminder to use it. Rooms could be equipped with clocks and, calendars for temporal orientation. A photo wall could be used for reminiscing. Beds and seats could be placed along a secured window to allow people to look outside and provide sensory stimulation.

The indoor environment (odours, the thermal climate, illumination and sound) plays an important role in the domestic environment of people with dementia. People with dementia loose mental and physical capabilities faster than their senses. Olfactory sense activation, e.g. by cooking smells, improves appetite and results in weight gains [20]. Perfumes as well as non-poisonous (or even artificial) plants and flowers in and around the home can be used for aromatherapy.
(and even tactile stimulation). Accessible gardens allow people to get in contact with nature and to get fresh air. On the other hand, over-stimulation is also possible through unpleasant smells, glare or excessive noise [20]. Thermal comfort is particularly important in bathrooms and bedrooms, where people have to (un)dress. Homes should be equipped with floor heating instead of wall panels, which collect dust and can be dangerous in case of falls. Flat roofs should be avoided because of temperature rises in summer, and solar blinds should be installed (also to reduce glare).

The most important and promising indoor environmental factor in the homes of older adults with dementia is illumination. Lighting plays a role in regulating important biochemical processes in older adults [21], as well as in a balanced circadian rhythm, which is orchestrated by the suprachiasmatic nuclei (SCN) in the human brain. The SCN of AD patients shows fragmentation, leading to nocturnal restlessness (and wandering) that forms a high burden for caregivers and is one of the main reasons for institutionalisation [22,23]. Bright light therapy (particularly blue light, E > 3000 lx), influences the abilities and behaviour of people with AD, operating through both the visual system and the circadian system, improves sleep quality and reduces depression [22,24]. There can be little doubt that lighting has a role to play in the management of AD patients [24], e.g. by decreasing sundowning behaviour through built-in light therapy. Even in terms of visual performance there is still a great potential for improvement, since residents of many nursing homes are found to be living in (too) dark conditions [22].

One way to account for the decline in cognition is to ensure that all features of the environment, including furniture, would have been familiar to them in their early adulthood [17]. Apart from this need for familiarity, there is also a need for safety (wandering, kitchen-fires, medical aids-related injuries and falls). Measures to maximise home safety may need periodical re-evaluation as memory loss progresses [25]. In short, the following environmental strategies can be adopted to make the domestic environment safer and more functional in order to manage specific needs; such as hazards and potentially dangerous objects; (II) Remove or modify objects in order to make the home safer, such as hazards and potentially dangerous objects; (III) Restrict or change areas in order to protect the person with AD from harm; (IV) Introduce environmental modifications in order to increase safety and supportiveness, and to make the home fit behavioural needs; (V) Simplify tasks and the environment based on the functioning status of the person with dementia, while at the same time reinforcing the patient’s abilities. Keep the environment simple and uncluttered to make it less perplexing and frustrating; (VI) Provide appropriate environmental and sensory stimulation in case a person with dementia is feeling agitated, bored or restless by removing the person to another setting; and (VII) Divert attention through the introduction of a familiar or enjoyable activity rather than exhibiting anger or annoyance at a specific act may decrease some problem behaviours.

3.2 Supportive technology

The complexity of the technology around people with dementia plays a role in their loss of abilities, and carers often emphasise the disabling of contemporary technology [26]. Older adults with cognitive impairments use the least number of assistive devices among all impaired older adults [27]. The needs and abilities of people may vary considerably depending on the stage of dementia. In case of cognitively impaired people, technology can be used for reminding (memory support); promoting independence; coping and providing activities (leisure); reducing emotional burden due to worries, anxiety, stress or irritation; pointing out or responding to dangers; preventing unwanted incidents or accidents; as well as creating unwanted negative feelings; surveillance; restricting access; and maintaining social networks [26,28]. Moreover, technology can be used to monitor the home environment (lighting, indoor air quality, thermal comfort, security); the person’s movement in the home (opening doors, using appliances); health status (blood pressure, weight); and self-care needs (shopping, banking, dressing) [27].

Some studies on utility and usability of technology in home care situations [28,29] have resulted into a series of general guidelines and design recommendations for technology for people with dementia. Technology and equipment should (i) not require any learning, (ii) look familiar, (iii) not remove control from the user, (iv) require a minimum of user interaction, and (v) reassure the user [29]. A wide range of applications are already in the marketplace to (in)directly support people with dementia, such as occupancy sensors, property exit sensors, gas detectors and shut off valves, smoke detector, sensors for temperature extremes, fall detectors, enuresis sensors, smoke detectors and carbon monoxide detectors [30]. To cope with the problems accompanying wandering behaviour, Passive Infra Reds or movement detectors, and door contacts can be purchased and installed. The alarm can be set to only alarm during the hours of darkness or to alarm if a person has left their dwelling for a longer than usual length of time/time of day [30].

When equipment is installed, installers should answer user questions repeatedly, listen and be sensitive to the state of mind of the client [31]. People with dementia are curious about new equipment and are
often uninhibited about dismantling it to “find out how it works” [31]. People with dementia need rapid responses to perceived difficulties, as they are often unable to understand the reason for a fault occurring or work around it [31]. In order to successfully implement technology in (home) care settings, carers should be made familiar through training.

A new trend in technology for care are inexpensive support systems for older adults staying alone at home, allowing care and health centres to remotely observe and help them. Such technologies could be valuable to the large number of older adults living alone [32]. Telemedicine, often in combination with smart home concepts, for cognitively impaired older adults could replace a significant proportion of domiciliary nursing visits by telephone calls, and even be used for identifying people during the earliest stages of dementia [33]. Unfortunately, it may be difficult for people with dementia to utilise equipment, due to apraxia, tremors, muscle weakness, and vision problems [1,33]. This new technology needs to be explored in terms of usability for older adults with dementia in home care situations.

4 Discussion

Design guideline(s) for housing older adults with dementia typically offer hypotheses on spatial organisation and appointment of the physical environment. They are frequently based on practical experience of designers or facility administrators, although in some cases findings from clinical research are applied [8]. Even though compelling arguments are made for the therapeutic efficacy of an appropriate living environment, which can be regarded as non-pharmacological intervention, only little systematic research has been carried out to date to determine whether the special design features are, in fact, effective in reducing symptoms, and to quantify to which extent they contribute to self care, quality of life, and vitality [11,14]. At the same time, it is still unclear how best to individualise care environments in a single congregate setting [34].

More research is also needed when recommended design solutions conflict with each other, or when such measures have major or controversial impacts for cost or quality of life [8]. Although some design data exist for institutionalised housing, the own dwelling is a largely ignored territory. Many people with dementia end up institutionalised after being diagnosed, although a large number of older adults with dementia is actually living alone [32]. Little research has been done on day care and assisted living facilities too. These places often have different resident populations, care practices and philosophies, physical environments, and regulatory realities [8]. Given the newness of the field, the limited research, and the small number of significant demonstration projects, the existing guidelines are best viewed not as inflexible directives, but as an effort to expand and stimulate thinking on the relationships between dementia and design. They are hypotheses amenable to, and requiring, implementation and validation [1].

5 Social relevance

A healthy living environment for people with dementia supports ageing-in-place, improves self care capabilities, and might delay the demand for expensive institutionalised care. This delay will alleviate the national health care system, which is under pressure in our ageing and hazing society with respect to capacity (future shortage of professional caregivers). Home environments can contribute to activation and stimulation of older adults with dementia; which might even lead to an increase in family visits and improved work satisfaction among carers.

References


