Evidence Based Assistive Technology for Dementia Care

Dementia-friendly health and social environments should aim to improve the quality of life for people living with dementia. The physical characteristics of health and care facilities can have positive impacts on the occupants by reducing the level of anxiety and stress and improve quality of life [1].

There are two main types of assistive technology:

- those used to monitor or control what the person does
- those that compensate or try to make up for the impairments that are affecting the person.

An individual's needs should be fully assessed first in order to identify the best solutions. The key to success is providing effective assistive technology that will help maintain a person's independence and make best use of their abilities for as long as possible, promoting dignity and respect [1].

Visual

The aging eye demonstrates impairment of colour vision due to retinal changes [2].

Vision deteriorates with age, and can include the following effects [1]:

- decreased visual acuity
- decreased natural vision
- decline in sensitivity of visual field, contrast
- generalised reduced colour vision (colours become less bright and the contrast between different colours less noticeable)
- decreased contrast sensitivity, which also affects the ability to perceive depth
- difficulty in adapting to bright light and darkness
- inability to tolerate glare

Colour design is a fundamental element in dementia-friendly environments [1].

The use of colour and colour contrasts specifically, is effective not only for improving vision and clarity of the environment, but also in promoting better orientation, memory enhancement, a sense of safety and independence [3].

Ensure clear colour contrast between surfaces and among objects [1]. Ensure strong colour accents, bold colours, are used to highlight important elements in the environment, as people with dementia note them [1].

Use consistency and colour throughout an environment identifiable high contrasting colours for sanitary spaces, items and fixtures [1]. Ensure the colours are differentiated for varies tasks eg Eating is red, toileting is blue to minimise disorientation and confusion.

Sensory

Sensory impairment is the reduced ability to see, hear, taste, smell and touch. People living with dementia can find it difficult to distinguish and differentiate between simultaneous sensory stimulations and become confused [1].

Having both dementia and some form of sensory loss is a common and significant problem, and the numbers of people living with both these conditions is increasing as people live longer [4].

As dementia progresses, a sense of fear, isolation, and confusion can prevent people with memory loss from experiencing sensory stimulation in their everyday lives [5].

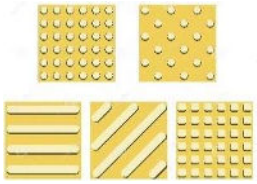
Consequently, people with dementia, whose brains are slowly losing synapses, also begin to experience a loss of sensory stimulation due to the isolation and confusion, as well as physical limitations they face [5].

By giving people with dementia a way to express themselves other than words, sensory stimulation can help them relax and improve their overall mood, self-esteem, and well-being [5].

In addition to evoking positive feelings, sensory stimulation can also help people with dementia communicate. By using certain objects, sensory stimulation can help seniors who are struggling to communicate and relate to the world around them ask questions, respond to verbal clues, or remain calm in a stressful situation [5].

Other benefits of sensory stimulation include [5]:

- Improving cognitive symptoms and maintaining daily function
- Encouraging participation in social groups
- Opportunity for reflection and trips down memory lane
- Increased concentration and alertness
- Easing communication



Tactile

Tactile surfaces enhance positive stimulation to enable people living with dementia by touching differentiated surfaces [1].

Tactile stimulation can be seen as a valuable way to communicating non-verbally, of giving feedback, confirmation, consolation or a feeling of being valuable and taken care of [6].

Tactile stimulation can increase feelings of trust and relaxation in patients with dementia while giving caregivers a positive way to interact with their patient or loved one [6]. People display signs of positive feelings and relaxation. Caregivers are better able to interact with the r in a more positive way [6].

Providing tactile surfaces on blankets and pillows is a purposeful way of implementing tactile sensation to everyday items, improving the respectful manner which this therapy is provided.

Fidgeting

A person with dementia may feel agitated or irritable, fidget, tap their fingers or make other repetitive movements [10]. They may show anxiety or agitation through fidgety hands.

Signs include pulling or rubbing at clothes or bedding, rubbing hands together, twisting fingers, wringing hands, and generally keeping hands in motion.

Sensory therapy or fidget toys are an effective way to reduce anxiety, calm nerves, and provide comfort. These are simple touch-based activities that help someone keep their restless hands occupied in safe, soothing ways.

Sensory cushions provide a safe and comforting support to encourage direction and purpose for fidgeting hands. They enable sensory stimulation from various textures, materials and items to enable fiddling and concentration.

Pressure

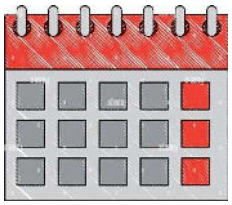
Inadequate sleep affects the health of older people regardless of the underlying circumstances behind the lack of sleep. Insufficient sleep also means a higher risk of falls and other accidents. Poor sleep also intensifies and contributes to the progression of dementia [7].

The effect of deep pressure is described as calming, providing improved sleep, reducing anxiety, decrease aggression, improve participation and generally increasing well-being [7].

The effect is explained by the theory of sensory integration in which deep pressure calms the overactivity of the sympathetic nervous system [7]. It can also model the experience of being held or hugged [5].

Deep pressure stimulation uses pressure to relax the nervous system [5].

- relieve the perception of pain
- reduce symptoms of anxiety
- improve sleep quality
- relieve symptoms of depression



Orientation

In the early stages of dementia people can often lose their sense of time and place. Experts recommend that in-home caregivers be patient and use gentle reminders to help a loved one with dementia.

This disorientation may also increase the risk of a falls and increase agitation for a person living with dementia.

Clocks and calendars in bedrooms can help with time orientation for people who are in bed. They are also useful within day spaces and circulation areas.

Due consideration is required for size, type and colour of the fonts chosen. Text should include large fonts using lower-case and upper-case. Clear contrast between text and background is essential, and consideration should be given to wall colours and light reflection on the surfaces of clocks and calendars [1].

It is essential that buttons on a desktop clock are bold to ensure differentiation occurs and thus independence of access to controlling the clock is supported.

Therapeutic Dolls

Improving areas where people living with dementia can engage in purposeful and meaningful activities reflecting past interests based on life experiences [1] has significant benefit

Doll simulation therapy provides an opportunity for the person with dementia to express their feelings and emotions. The person gets to interact and talk about the doll in a meaningful way [5].

People with dementia may feel a sense of validation, role and purpose by taking care of the baby doll. It may allow people with dementia to reminisce about when they had young children of their own [5].

The tactile and sensory experiences provided by the doll may bring a sense of comfort and security [5]. It offers an opportunity to deal with psychological stress in a more adaptive way [8].

Dolls have often been used as an alternative to medication to reduce the impact of behaviours or unmet needs, such as [5]:

- Social withdrawal
- Apathy
- Vocalising
- Aggressive behaviour
- Restlessness
- Wandering and Intrusion

Doll therapy can transform an individual's own experience and "involve an awakening of the ability for playfulness, laughter, love and affection" [8].

Reminiscence

'Reminiscence' means sharing life experiences, memories and stories from the past. Typically, a person with dementia is more able to recall things from many years ago than recent memories, so reminiscence draws on this strength. So many of our conversations and interactions rely on short-term memory. Reminiscence can give people with dementia a sense of competence and confidence through using a skill they still have [4].

Many people with dementia find themselves routinely having things done 'for' them or 'to' them. When a person shares something about their past and another person shows interest or enjoyment, it is a wonderful opportunity for that person to feel that they are the one who is giving something to another human being, rather than always being the one who is receiving or listening [4].

Talking about the past can also bring up happy memories and good feelings, and this can be wonderful in itself, but particularly if a person is finding life difficult [4].

It is also the case that reminiscence can sometimes provoke painful memories. Emotional reactions are not necessarily a bad thing, but we need to respond sensitively [4].

For people with cognitive difficulties, it is important to tap into all the senses to trigger memories. A picture to look at, an object to touch, a song or a poem to listen to or something to smell or taste can all take someone back in time, often to a very specific memory [4].

Utilising items in the environment that mimic past experience can be very beneficial in support of reminiscence therapy. This can include designs of clocks, telephones and radios that elicit memories of past eras.

Pet Simulation

Providing activity areas for reminiscence which can improve mood and wellbeing, and promote social inclusion and the person as an individual with a unique life experience 1.

Using robotic or plush animals, which can sometimes be referred to as 'simulated pets', can provide an opportunity for people living with dementia to interact with a 'lifelike' animal that may bring therapeutic benefits 5.

Simulated pets can be used as part of engagement or leisure activities to support people living with moderate to severe dementia. They may provide comfort and help engage people living with dementia who show signs of social isolation, reduced communication, apathy or agitation 5.

The tactile and sensory experiences provided by simulated pets may bring a sense of comfort and security to a person in distress by encouraging them to focus on a pleasant experience / memory 5.

It may provide an opportunity for a person to 'look after' the animal and help with building and maintaining a sense of purpose and self-esteem 5.

It may encourage people with dementia to reminisce about animals they once owned or talk about pets they still own thus providing a talking point for others close to the person to encourage conversation and help to build rapport and a relationship if meeting them for the first time 5.

If used creatively, simulated pets may be able to encourage a person living with dementia to eat, sleep better or partake in physical exercise. They may also help to bring a sense of routine and meaningful engagement that links to previous routines and habits 5.

Simulated pets have often been used as an alternative to medication to reduce the impact of behaviours and psychological symptoms of dementia, and such unmet needs as 5:

- Agitation
- Walking that is perceived as "restless or intrusive"
- Lack of meaningful stimulation /occupation
- Loneliness / social isolation
- Reduced sleep and appetite
- Underlying pain

Play

Games and toys have also been shown to defeat restlessness in those with Dementia and help to keep the brain active 5.

Playing board games and solving problems provides mental stimulation that is highly therapeutic for people with cognitive disorders. The games were proven to provide the cognitive stimulation that is necessary to optimise quality of life 5.

This is true for everyone, including those who have Dementia.

Seniors with Dementia often show anxiety or agitation through fidgety hands. Examples of this include pulling or rubbing clothes or bedding, rubbing hands together, twisting fingers and wriggling hands. It is therefore not inappropriate or unreasonable to give toys to people with Dementia but can be helpful in giving them an activity suitable for their cognitive state to keep their mind active 5.

Wandering

Wandering is quite common amongst people with dementia and can be concerning for safety and well-being.

There can be many reasons for wandering [5]:

- Changed environment
- Loss of memory
- Excess energy
- Searching for the past
- Expressing boredom
- Confusing night with day
- Continuing a habit
- Agitation
- Discomfort or pain
- A job to perform
- Dreams

Whilst providing appropriate access and freedom of movement, both indoors and outdoors, is essential, there will be areas of an environment that will require restricted access for safety.

Camouflage can be used to hide restricted access doors. This can be done using murals on doors that allow the surface to blend into the environment.

Due attention should be given to the choice of the images on the doors to ensure they do not cause confusion, distress and frustration [1].

Images that deter interest can be placed on doors or cupboards and may include images such as a bookshelf, book and frames, crockery shelf, sideboard or pot plants. All mimicking standard items found in a room.

Access

The use of traditional and familiar signage can help people living with dementia. Pictorial and written signage with words, icons, images and symbols displayed prominently can be used to enhance clarity [1].

White pictograms and lettering on coloured background (e.g. red, blue, green, yellow and orange) and dark pictograms and lettering on a light background (e.g. black pictograms and lettering on a yellow background) can provide good visual contrast [1].

Size of signage should consider the reduction in eyesight of people living with dementia. Clear distinction in the size of the letters enables people living with different visual acuities and visual impairments to better identify the text. An appropriate combination of text and image should be displayed on signs [1].

Signage should be positioned outside each room, but they can also be incorporated within rooms to support orientation [1]. An example would include signage to determine the bathroom, then once in the room signage to differentiate toilet and shower.

Safety

Clasps, latches and covers can be used to limit access to unsafe areas and items such as kitchen appliances and bathroom cabinets.

These safety devices need to be discrete to ensure a person's dignity is maintained.

If a desire to engage in these activities is of importance, then replicating the environment using safe items is encouraged, such as plastic knives, plastic bottles of water and cooking utensils.

Mobility

Dementia symptoms can include physical impairments associated with balance, gait, motor skills, increased fragility and visual spatial difficulties [1].

Lack of physical activities can improve the risk of obesity, diabetes, heart disease and stroke and the risks of falls as impaired muscle strength and balance is one of the main reasons for falls [1].

The ability of people living with dementia to perform physical activities can be reduced by rigidity, slowness, gait impairment and other disorders of movement [1].

Inactivity will lead to [4]:

- Reduced muscle strength reduces
- Risk of joint contractures
- Potential for urinary infection increases
- Gastro-intestinal movement decreases and constipation increases
- Decreased alertness and concentration
- Increased irritability and depression

Implementing mobility aids to assist safe mobility will form part of a comprehensive assessment.

Where mobility has deteriorated or cognition prevents mobilisation, engaging a person with as much activity as possible in transfers it essential. Utilising slide sheets, lifters and slings in a manner that promotes normal movement patterns and active participation in the task is essential.

Falls Prevention

Dementia and gait impairments often coexist in older adults and patients with neurodegenerative disease. Both conditions represent independent risk factors for falls [9].

Gait is no longer considered merely automated motor activity but rather an activity that requires executive function and attention as well as judgment of external and internal cues [9].

Cognitive decline is an additional independent risk factor for falls. Gait disorders and falls are more prevalent in people with dementia and there is a direct relationship between cognitive impairment severity and increased gait abnormalities [9].

Appropriate design features aimed at falls prevention need to be designed into the environment. This could include [1]:

- increased intensity of lighting and contrast
- handrails that contrast with their background
- appropriate walking aids
- slip-resistant, matt finished flooring with no patterns and shadows
- contrasting leading edges on stairs
- appropriate technology and falls sensors [1]
- Fall prevention mats in wet or slippery areas [12]

With most home falls occurring in the bathroom, slip-resistant surfaces in toilets, bathrooms, and wet-rooms is essential and where flooring is unable to be adapted, mat specifically design for falls prevention can be used.

Movement sensors on beds and chairs and advise when a potential fall is going to occur and enable a caregiver to assist prior to, or after a fall at the chair or bedside has occurred.

Appropriate height seating such as chairs, bed or toilet will not only assist in achieving a sit to stand, but will increase safety whilst performing the task.

Bathroom

The bathroom can present a number of challenges for a person with dementia [4].

A number of design features can help. For example, contrasting colours will assist a person with dementia to use bathroom facilities. Toilet seats, handrails and towels should all be easy to identify. This means that they should be easy to see and look like the item they are supposed to be [4].

People can trip over bath mats and some may be anxious about approaching the bath if they are not sure what it is they are about to step on. Non-slip mats, preferably blending with the bath colour, will reduce the risk of slipping in a wet area. However, if you can replace the whole floor with a non-slip surface, you may reduce the need for mats [4].

Toilet

A person with dementia is more likely to have accidents, incontinence or difficulties using the toilet [10].

People with dementia may face a number of difficulties with using the toilet, particularly as the illness progresses.

These can include [5]:

- Memory: Forgetting to go to the toilet, where it is, or how to use it.
- Sequencing: Struggling to perform the steps in the right order.
- Communication: Not being able to say when they need to go, or when, how and why they are experiencing problems.
- Recognition: Not recognising the sensation that they need to go, or not realising what the toilet is and going elsewhere instead.
- Environment: Finding the toilet may be difficult. Colours, mirrors and surfaces may cause confusion.

Clear signage on toilet doors can help greatly. In group care settings it can also be helpful if the toilet doors are painted a different colour to all the other doors leading off a corridor, to make them more noticeable. At home, it can help if the toilet door is left open [4].

People with dementia can sometimes experience difficulties recognising things and seeing the depth of an object. This can mean that, even though a person is able to see, they may be unable to recognise that a toilet is a toilet or make it out as separate from its surroundings. It's much easier if the toilet seat is a very different colour from its surroundings [4].

Contrasting wall handrails should be used to support mobility and reduce the risk of falls, supporting independence and dignity [1].

Additionally support independence by providing appropriate lighting and guidance between bed and bathroom [1].

Grooming

Dementia can [1]:

- Affect a person's memory, speech, and ability to complete daily activities
- Have considerable impact on privacy, dignity and independence as the need for support with daily tasks increases
- Result in memory loss which can lead to feelings of reduced personal identity and self-esteem
- Reduce communication skills
- Reduce visual and/or physical ability thus making bathing and grooming challenging

Implementation of long handled groom tools can assist physical participation in daily grooming which will facilitate improved independence and dignity of care.

Bedroom

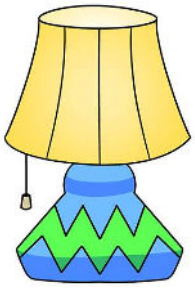
Helping a person with dementia to get a good night's sleep is vitally important [4] for maintaining cognitive function.

A person with dementia may find it difficult to find or identify their bed. They should be able to see their bed easily from as many locations as possible and access it from both sides. Use contrasting bed linen and to help define clearly the sleeping area[4].

A electric bed can be adjusted, raised and lowered when helping someone with dementia to get in and out of the bed more safely. It can also be placed at the exact height for the convenience of the person. Bed rails are a form of restraint and should only ever be used after a risk assessment [4] and appropriate consent.

Low beds can reduce the impact of falling out of bed, depending upon the specific context [1]. It is essential that a low bed is not utilised as a form or restraint, by impeding the ability or mobility for someone to exit the bed.

A more appropriate solution in this circumstance would be a bed sensor falls prevention alarm.



Lighting

People with dementia need to see their environment to help make sense of it and to make the most of their remaining abilities.

Effective lighting can help people with dementia see where they want to go and to identify spaces, rooms, equipment and signs. It helps them to see other people's faces and body language, to enjoy recreational activities, to join in everyday routines, and to enjoy the changing seasons [4].

Poor lighting will substantially reduce a person's ability to do all these things. It can also contribute to accidents, particularly falls, and cause unnecessary stress such as being frightened [4].

Effective lighting involves a combination of increased light levels, good contrast, minimising glare, avoiding sudden changes in light levels and good colour definition. Quality lighting is a vital component of good dementia-friendly design [4].

These should have low-level lighting overnight to improve visibility without disturbing sleep or a mechanism such as a movement sensor which automatically switches the light on when the person gets out of bed [4].

Sensor lights, touch lamps, glow in the dark light switches and strip lighting can all be of benefit.

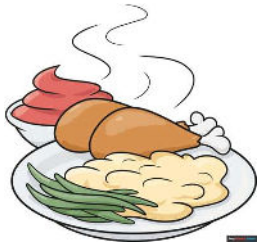
Drinking

Someone with dementia may become dehydrated if they're unable to communicate or recognise that they're thirsty, or if they forget to drink. This can lead to headaches, increased confusion, urinary tract infections and constipation. These can make the symptoms of dementia worse [10].

Dehydration has been reported to be the most common fluid and electrolyte imbalance in older adults. Recent clinical studies have shown that the hydration state affects cognitive performance, particularly visual attention and mood [11].

Traditional and familiar shaped cups will assist acknowledgement of an item containing fluid. High contrasting colour will also improve recognition of the item against the table [1].

Modified cups can assist with preventing spillage and supporting drinking where hand and cognitive function is altered. Preventing drips and spills will allow for a more accurate measurement of fluid intake over the day.



Eating

Good nutrition is vital for the health, independence and wellbeing of people with dementia. However, maintaining a healthy weight can be a challenge. Difficulties eating are more noticeable as dementia progresses and unwanted weight loss is a common problem [4].

Poor nutritional intake and lack of fluids can contribute to the development and severity of delirium – sometimes referred to as 'acute confusional state'. Delirium often occurs when a person is unwell and can lead to a rapid decline in mental state and behaviour. People with dementia are at a greater risk of developing delirium [4].

We also need to be aware that some people with dementia may experience difficulties with their sight and visual perception. They may be unable to see or recognise the cutlery, crockery or the food in front of them and simply sit and stare. This may give us the impression that they are not hungry or uninterested in eating. However, this is an incorrect assumption to make [4].

This can be alleviated utilising colour contrast placemats, crockery and cutlery. It will encourage them to sit around a table, see and eat more food and be more independent, active and healthier [1].

Difficulty in handling cutlery or crockery and getting food from the plate to their mouth can also be a limitation to sufficient nutritional intake. Modified cutlery specifically prescribed can be beneficial in improving independence and success of eating.

As population ageing creates new economic, social and health care demands, increasing attention is being paid to the role Assistive Technology can play in the care of older people living with Dementia.

Novis supplies a wide range of solution focussed equipment for the benefit of Dementia symptoms. Ensuring interventions are evidence based and necessary are at the core of the design and development of the range.

Facilitating improved function and minimising adverse effects of dementia are key to achieving outcomes that maximise independence, dignity and respect.

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