Wayfinding/Dementia Care/Nursing Home Design

Over the past few years, much has been learned about design features that facilitate wayfinding for nursing home residents with dementia. In this unique submission, the author has pulled together the relevant evidence-based research on wayfinding from recent years and compiled a checklist and rating scale. This checklist and rating system can be used by owners, staff and facility designers of nursing homes when they consider either the upgrade of existing units, or the design of new facilities.

By William Benbow, M.S.W., Development Consultant

Evidence-based checklist for wayfinding design in dementia care facilities

A good deal of emphasis is currently placed on "Evidence Based" features in the design of care facilities for residents with dementia. A body of knowledge is coalescing, based on practice, observation and research. The challenge is to make this consensus more available. Brawley pointed out in (2001) that "finding necessary basic information can be difficult, and obtaining the latest research findings a next to impossible task." This article is intended to gather together the consensus related to wayfinding design for dementia and present it in a format that is readily available to those in the field of designing and providing care for dementia residents.

Decision points

Wayfinding is basically how people find their way around an environment. It generally involves problem solving based on a series of decisions, starting with the decision to make a journey.

Next is the need to plan the route, usually by forming a mental image or map based on available information and past experience.

People with dementia have difficulty forming such a site map. They are more dependent upon help with decision points as they occur along the way. They are lost without assistance to pick out relevant information at these decision points.

The research and analysis of Gesine Marquardt is particularly relevant. Her 2009 study of 30 German nursing homes is ground breaking in the analysis of dementia unit floor plan layouts. Her 2011 overview of literature on architectural wayfinding design for people with dementia provides an excellent summary of recent research.

Marquardt organized her findings of environmental interventions that promote wayfinding into a table divided into two aspects:

1. the design of the floor plan typology
2. environmental cues

Mapping environments

Marquardt found five studies, including her own, that pertain specifically to building structure, and several other studies that support specific recommendations for environmental design (Marquardt, 2011).

John Zeisel (2005) describes these two over-arching design principles as "natural mapping environments" that have all the information needed to use embedded in the environment itself, and "memory cueing environments" which fill in for missing cognitive skills and that can take advantage of remaining skills.

For this paper, Marquardt's table has been realigned into a checklist of eight items under *'Building Structure,'* with her environmental design cues expanded into an *'Interior Design'* section of twelve items. This checklist of twenty items has been further refined to include a rating scale. (See page 6).

This scale can be used to:

- determine how well existing facilities utilize these principles;
- measure and demonstrate change over time in pre- and post-renovation projects;
- used as a planning guide to ensure that wayfinding principles are incorporated in design planning of new dementia units.

The 20 items are well supported by research, expert opinion and practice.

BUILDING STRUCTURE

All eight items under ***'building structure'*** are built into the architectural design to promote wayfinding:

1. Small scale

Ann Netten studied 13 UK homes and found that group homes provide a more favourable design than larger communal

Distinctive Doors: Dementia Services Development Centre, University of Stirling, Scotland.

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homes in terms of wayfinding - especially for those with dementia.

She found that a key element in unhelpful design was a lot of 'meaningless' decisions. In larger homes this might occur when there were few identifiable 'zones' and lots of doors (**Netten, 1989**). This finding has been well substantiated by numerous researchers over the years.

An ideal size of House unit is thought to be around 10-12 residents, although Houses up to 20-22 can be designed to function well with simple layouts and subgroupings.

2. Corridor length

Netten found that residents who had longer routes experienced more difficulty finding their way around.

Celine Pinet studied 960 residents in five nursing homes and found that social spaces closest to residents' bedrooms were used significantly more often by residents than spaces that were farther away. In those homes, a space 20 feet away would be used five times as often as a space 100 feet away. Pinet concluded that, with the right features, designers could encourage walking and the use of social spaces (**Pinet, 1999**). Corridors need to be minimized and simplified in order to lead to areas most used by residents. Thirty metres (100 feet) or less is the ideal.

3. Direct visual access

Passini, et al., conducted two controlled studies in Quebec and concluded that residents with dementia were incapable of forming an overall plan for a wayfinding task, but rather made their decisions based on explicit architectural information: they had to see where they were going in order to make a decision; and their destinations had to be recognizable, i.e., well articulated and identifiable.

Passini recommended that settings should not be large and should be a simple configuration so that residents could move from one decision point to the next as they walk along without having to plan ahead, i.e., the setting should offer direct visual access to its major spaces and functions (**Passini, 1998; 2000**).

Dementia residents need to be able to

Wayfinding Evidence-Based Checklist And Rating (WEBCAR)

Benbow 2013

UNIT: ---------- **DATE:** ----------

CONTACT PHONE: ---------- **E-MAIL:** ----------

	Design Features	Minimal	Average	Superior	Score	Notes
Intervention	**Rate on a scale of 2 - 5 - 8**	**2**	**5**	**8**		**Rating scale Building Structure items** **Assign rate of 2, 5, 8 for each item.**
Building Structure	1. Small scale	19 - 22 residents	14 - 18 residents	6 - 13 residents		If number of residents is 19 - 22, house should be subdivided into wings
(Max. 64 pts.)	2. Corridor length	45m (150 ft.)	40m (130 ft.)	30m (100ft.)		Short distance from bedroom to amenities
	3. Direct visual access	50%	75%	100%		Ability to see amenities form bedroom and bedroom from core amenities
	4. Layout	H shape	L shape	Open plan or one corridor		Limited changes in direction
	5. Reference points (architectural)					Built-in landmarks at decision points Small number of spatial anchor points
	6. Minimal repetitive elements					Built-in distinctiveness: e.g., resident doors
	7. Rooms with legible meaning	Combined amenity	Distinct areas	Distinct dining and lounge		Function and meaning self-evident
	8. Spatial proximity of amenities	Satelite lounges	Amenities at one end	Intermediate element		Co-located core amenities: dining, lounge, activity
Interior Design	**Rate on a scale of 1 - 2 - 3**	**1**	**2**	**3**		**Rating scale: Interior Design items.** **Assign rate of 1, 2, 3 or 0 for each item**
Signing and Cueing	1. Residents name and photo					To identify resident's bedroom door
(Max. 36 pts.)	2. Pictogram					To identify toilet, etc.
	3. Lettering enlarged, contrasting					Minimum 3/4 inch height
	4. Low placement of signs and cues					Below 48 inches
	5. Landmarks (added to structure)					Design elements at decision points One landmark for every room Distinctive form, function & meaning
	6. Colour contrast					Avoid similar hues, pale tones Avoid blue-green combinations
	7. Personal memorabilia					In memory boxes, resident room
	8. Lighting - glare and lux					Particularly on floors
	9. Minimal information clutter					Avoid over-stimulation
	10. Reduced floor patterns and lines					Prevents access to desired routes
	11. Visibly accessible toilet					Leave door open, colour contrast
	12. Multiple cueing					Combine cues
Total Score						

see, from their bedroom doorways, core amenities such as dining, lounge, and activity areas. In addition they should be able to see an access point to outdoors from the core amenity area.

4. Layout

Solve Elmstahl studied 105 residents in 18 dementia units in Sweden and found that the floor plan layout had a definite effect on symptoms and behaviour. He compared a straight corridor design with L shaped, H shaped and square shaped layouts. He found that residents living in the L shaped design had less disorientation than the others **(Elmstahl, 1997)**.

Marquardt and Schmieg followed up with a similar study of 450 residents in Germany and found that the key element was the number of shifts in direction. In straight layouts, residents were able to find their way better than in designs that required corners, such as L and courtyard designs **(Marquardt and Schmieg, 2009)**.

The preferred layout for a dementia unit is one with no changes in direction, i.e., a straight route from bedroom to core amenities. This could be an open plan such as a Green House model or one with a short direct corridor. A layout with only one change in direction such as an L, V or T is nearly as good, particularly if the major decision point is clearly landmarked.

5. Reference points

Netten found that 'meaningful decision points' were a critical aid to a resident finding his/her way around, i.e., built in landmarks and places actually used by residents. These 'spatial anchors' are particularly helpful if positioned at junctions, and at important decision points **(1989)**.

Passini notes that the elements of the (environmental) circulation system, such as stairs, elevators and significant places, can serve as reference points **(1998)**.

Marquardt suggests that core amenities used as an "intermediate element" can serve as reference points to break up a long corridor **(Marquardt, 2011)**.

Zeisel, drawing upon neuroscience, maintains that humans are universally preset to use physical landmarks that stand out from the rest of the landscape **(Zeisel, 2005)**. Dementia residents depend upon meaningful clues at decision points, such as architectural features like well delineated entrances to rooms and corridors, perhaps with distinguishing canopies, colours, landmarks, and signage.

6. Minimal repetitive elements

Passini found that monotony in architectural composition, such as repetitive environments, render wayfinding more difficult - like long corridors with similar doors and indistinguishable wings. Residents particularly found it difficult to find their rooms because they could not distinguish between the doors **(Passini, 2000)**.

University of Stirling in Scotland has an excellent example of distinctive doors on its website: <https://dementia.stir.ac.uk/files/Bed%20Door%2010.swf>. **See page 5.**

It is helpful to stagger opposing bedroom doors along corridors to reduce confusion. Marquardt emphasizes that spatial situations and places should not be repeated; in particular the dining area should be a unique and recognizable feature so as to function as a spatial anchor point **(2009)**.

7. 'Legible' rooms

Marquardt adds that all places within the care home need to be architecturally 'legible'; that is, their function should be evident through their size, proportion, materiality and furnishing.

Distinct and familiar places help enhance the residents' orientation. Libraries, hair salons, treatment rooms, dining rooms, lounges, should all have distinct décor, furnishings and fittings. Signage with pictograms and words can reinforce this orientation.

Netten found that residents had difficulty when there were few identifiable 'zones' and long corridors with lots of doors. Passini pointed out that interior zones and destinations need to be identifiable with their own entrances and meaning and distinctiveness. He called this 'environmental or architectural communication' **(Passini, 1998; 2000)**. In dementia units, corridors need to lead to meaningful and easily identifiable destinations.

8. Spatial proximity of amenities

Elmstahl observed that disorientation was less pronounced in units in which the kitchen, dining room, and activity room were located together **(Elmstahl, 1997)**. Similarly Marquardt found that the central dining area had a great importance for residents as a spatial anchor point, particularly if there was only one such area **(Marquardt and Schmieg, 2009)**. This is particularly helpful at the junction of wings or as an intermediate element in a straight corridor; in addition, such collocation facilitates staff and resident interaction.

INTERIOR DESIGN

The following 12 items can be added to enhance and provide cues to wayfinding:

1. Name and photo

In two studies, Beth Nolan found that a portrait type photograph of the resident as a young adult outside their bedroom increased room finding by 45-50%. In one of the studies a name plate was used as well **(Nolan, et al., 2001; 2002)**. It is most helpful if this signage is on the resident's door rather than beside it.

2. Pictograms

Kevan Namazi and Beth Johnson compared the effectiveness of nomenclatures and pictograms for finding toilets in two dementia units. Although a pictogram of a toilet increased usage, it was the combination of the nomenclature 'toilet' with arrows on the floor that produced the best results **(Namazi and Johnson, 1991; 1992)**.

Passini pointed out that arrows need to be in close spatial proximity with the name of the destination in order for the connection to be made **(Passini, 1998)**.

3. Lettering: enlarged, contrasting

Namazi and Johnson used six-inch high letters with success in their toilet wayfinding study **(Namazi and Johnson, 1991; 1992)**. Elizabeth Brawley recommended a minimum of ¾ inch high letters, and noted that contrast was far more important than colour **(Brawley, 1992)**. There needs to be contrast between sign and mounting background, as well as between lettering/pictogram and sign background.

4. Low placement

Passini noted that the elderly, and Alzheimer's patients in particular, tend to

look at the ground and are seldom aware of signs or other objects placed on doors or walls.

In their 1991 study, Namazi and Johnson found much better results when they lowered signage initially to eye level, and even better when placed on the floor (**Namazi and Johnson, 1991**). Caution is needed, however, as floor patterns can disturb dementia residents. Signage needs to be in the normal visual field of residents which, for dementia, is generally low.

5. Landmarks

Marquardt emphasises the importance of placing landmarks and cues at the spot where direction changes. In addition, dementia residents have better recall for landmarks that have long-term meaning to them. Familiarity is critical for residents with dementia, given the capacity they retain for long-term memory (**Marquardt and Schmieg, 2009**).

Passini noted residents were particularly relieved once they found their own rooms and recognized familiar personal items, such as the bed spread (**Passini, 1998; 2000**).

6. Colour contrast

Brawley pointed out that changes in the eye's lens affect colour perception; the environment slowly takes on a yellowish-brown cast. This change causes difficulty in distinguishing both dark shades and light tones from each other. Older people have difficulty distinguishing their room colour as different from their neighbours and find colour coded corridors of little help. She recommends colour contrasts: light entry ways, dark door jambs; light floor, dark furniture (**Brawley, 1992**).

Contrast is more important than colour. In their 'Virtual Suite', Stirling University measures contrast as a Light Reflectance Value (LRV) on a scale of 0 to 100. Acceptable contrast needed for seniors to distinguish between surfaces is an LRV greater than 30.

(**See:** <http://dementia.stir.ac.uk/virtualhome>).

7. Personal memorabilia

Namazi and Johnson studied whether prominently displayed personal memorabilia of long term significance would serve as orientation cues to help identify bedrooms. Two display conditions were used to show this helpful cuing orientation. Namazi found that object selection was crucial, that the further back in time the reference point, the greater the likelihood of eliciting recall. Those linked to the resident's childhood years were best (**Namazi and Johnson, 1991**). The resident's room needs to be personalized so as to be recognizable to the resident; this personalized memorabilia can be helpful in providing background for staff and visitors.

8. Lighting - glare and lux

Netten concluded her study with the statement that "the most important aids to people finding their way around would appear to be the level of lighting and 'meaningful decisions." She found deficient lighting to be a critical issue (**1989**).

Brawley echoes this in her concern for consistent light sources to eliminate shadows, attention to eliminating glare, and focused task lighting. She indicates that light requirements for very old people may be as much as five times greater than for younger people (**Brawley, 2001**).

Corridors need to be bright and evenly lit at least at double normal levels - a minimum of 500 lux is preferable.

9. Minimal information clutter

Passini recommends that competing information displays should be reduced to minimize confusion for residents seeking cues. Floor plans in particular are of little use (**Passini, et al., 2000**). He indicates that non-discriminatory reading of information is among the most confusing interferences in the wayfinding process. He recommends that graphic information along circulation routes be minimized. Public notices should be placed elsewhere.

Graphic wayfinding information should be provided in a consistent design and location, so that the user knows what to look for and where (**Passini, et al., 1998; 2000**). Information overload is confusing and makes wayfinding more difficult.

10. Reduced floor patterns and lines

Brawley points out that impaired depth perception can cause a sharp contrast in the colour or pattern of the floor covering and be seen as a step, hole or pit. This can impede wayfinding by preventing access to a desired route (**Brawley, 2001**).

Perritt, et al., confirm that large, bold patterns immobilize residents and interfere with wayfinding, spatial exploration and social interaction.

Appropriate floor patterns for persons with Alzheimer's include mottled and mini-print patterns that are very small in size. Larger patterns may be used if there is not a strong contrast between the subject matter and background (**Perritt, et al., 2005**). It is best to eliminate strong patterns and contrast, particularly at thresholds from one space to another. Where flooring material changes, the difference in Light Reflectance Value (LRV) should be below 30 in order to avoid trip hazards and confusion.

11. Visibly accessible toilet

Namazi and Johnson report that wandering and disorientation may be a result of attempts to find a bathroom. They suggest that toilets that are "out of sight may be out of mind."

In their 1991 study they found that the frequency of toilet use increased when toilets were visually accessible to residents, primarily through an open or removed door (**Namazi and Johnson, 1991; 1992**). Though this may be a challenge to decorum, washroom doors ideally should be left open so that the toilet is visible, with a contrast between the toilet seat/bowl and floor. The washroom needs to be well located and visible with good signage. In the resident's ensuite, the toilet needs to be visible from the bedhead.

12. Multiple cueing

Marquardt recommends a combination of multiple cues, as does Nolan, who found that the combination of cues, such as a photo of the resident, the residents name, and personal memorabilia, was most effective in resident room identification (**Marquardt, 2011; Nolan, 2001; 2002**).

Zeisel points out that verbal agitation and psychotic symptoms are reduced in settings where people are provided multiple sensory cues.

The environment should be designed so what people see, hear, touch, and smell all provide consistent environmental information (**Zeisel, 2005; January, 2009**).

Conclusion

These eight Building Structure elements and twelve Interior Design features make up the *Wayfinding Evidence Based Checklist and Rating* which is provided for field use and trials. As Margaret Calkins recommends, "the design process is guided by the best evidence available, design assumptions are made explicit throughout the design process, and then evaluations are conducted after the building is occupied to test those assumptions" (**Calkins, 2011**).

Zeisel, however, raises a cautionary note, namely, not to lose sight of the underlying purpose of design guidelines: to increase residents' quality of life.

Zeisel also stresses the importance of coordinating the designed environment with caregiving approaches, activities and medications (**2005; 2009**).

Support documentation for assistance with scoring the checklist is available from the author. ■

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About the author

William (Bill) Benbow, M.S.W., is a planner, development consultant, researcher and writer from Victoria, B.C., with experience and interests in facility functional programming and design guidelines. He has had numerous articles published on functional design of nursing home facilities. **Contact:** <billbenbow@shaw.ca>; Website: <wabenbow.com/>.

Neuroscience and architecture

Creating spaces that liberate the mind

Architects of the ancient world understood intuitively how design influences people's states of mind, but the tools and techniques to test what goes on in the brain as it responds to a particular architectural environment are, at most, only a few decades old.

Polio vaccine inventor, Jonas Salk, was among the first to advance the idea that neuroscience research could benefit architecture.

Salk tells a story from the early 1950s when he found himself stuck intellectually in his search for a cure for polio. He decided to take a kind of 'personal sabbatical' at Italy's famous Abbey at Assisi (Basilica of St. Francis of Assisi). Something about the abbey's architecture was so stimulating to his imagination, he later recalled, that he had a crucial insight into the impasse that had blocked his progress.

He left the abbey with the 'germ of the solution' that would become the life-saving vaccine. Subsequently, Salk was to advocate for a partnership between architects and neuroscientists that would probe the type of experience he had in Assisi and - more broadly - use the insights of neuroscience to find out how architectural settings influence our experience.

Fittingly, Salk Institute neuroscientist, Fred H. Gage, Ph.D., presented the keynote address at the American Institute of Architecture's 2003 annual meeting, the same gathering that saw the launching of the Academy of Neuroscience for Architecture. ■

Basilica of St. Francis of Assisi