

Principles and evidence: healthcare

Kirsty Bennett

Manager Environmental Design Education Services
NSW/ACT Dementia Training Study Centre

Richard Fleming

Director
NSW/ACT Dementia Training Study Centre



Copyright

The Environmental Audit Tool copyright is held by the NSW Ministry of Health.
See - Fleming, R., I. Forbes and K. Bennett (2003). Adapting the ward for people with dementia.
Sydney, NSW Ministry of Health.
The copyright of the additional material is held by the University of Wollongong and all rights are reserved.

The authors wish to thank Cathy Greenblat for providing the cover photograph and encouraging us all to find a positive way to work with people with dementia. Photograph © Cathy Greenblat 2013. All rights reserved.



The evidence base

Over the last thirty years there has been a substantial amount of effort put into gaining a better understanding of the key features of good environments for people with dementia. This has been systematically reviewed in a project funded by the Australian Government through the University of New South Wales based Dementia Collaborative Research Centre (Fleming R., Crookes, Sum 2008; Fleming R. Purandare 2010). The full review of the literature is available on the UNSW DCRC web site at <http://www.dementia.unsw.edu.au/DCRCweb.nsf/page/TechDesign>. The findings of this review are summarized here in relation to the sub-scales of the Environmental Audit Tool (Fleming R. in press; Fleming R, Forbes, Bennett 2003).

Safe and secure

One of the most common problems associated with caring for people with dementia in an environment that has not been designed for their use is that of keeping them safe from the danger of wandering away and perhaps getting lost or run over (Rosewarne, Opie, Bruce et al 1997). The most obvious response to this problem is to provide a secure perimeter, preferably one that allows for safe wandering and access to an outside area.

Positive effects have been found when unobtrusive means are used to provide a secure perimeter

“Depression was negatively correlated with another environmental factor exit design. Residents in facilities whose exits were well camouflaged and had silent electronic locks rather than alarms tended to be less depressed. A hypothesis to explain this correlation is that residents try to elope less in such settings and that caregivers - tending to consider such environments safer - afford residents greater independence of movement. Residents who experience this greater freedom, and hence have less conflict about trying to leave the SCU, feel a greater sense of control and empowerment, leading in turn to less depression. Until further research is carried out measuring personal state-of-mind variables that might be implicated in such a process, this explanation remains only a hypothesis” (Zeisel, Silverstein, Hyde et al 2003).

This feature is mentioned as one of the central characteristics of the special nursing home unit evaluated by Wells and Jorme (Wells Jorm 1987) which found that residents did as well as those cared for at home.

Security features are also central to the group living facilities developed in Sweden and Italy (Annerstedt 1993; Bianchetti, Benvenuti, Ghisla et al 1997). However none of these studies attempts to define clearly “what is meant by security” or to quantify its provision.

Annerstedt clarified the purpose of providing a safe environment as enabling the resident to have the opportunity to focus on the identity preserving features of group living:



“The safety provided in GL makes environmental barriers easy to overcome. Energy can be used to extend the territory and the demented can benefit from everyday activities, the accessibility of cues in social life and the external memory aids built into the setting” (Annerstedt 1997).

But again there is no attempt to quantify or fully describe the safety and security features.

The provision of hidden or subtle locks on doors may have some beneficial effects but it does raise the question of wouldn't it be better if residents could go outside and be safe. This question was answered elegantly (Namazi K. H. Johnson 1992a) in a study involving 22 residents with probable Alzheimer's disease who were observed for 30 minutes after trying outside doors leading to a safe area. In one condition the doors were locked in the other open. While the authors make no attempt to calculate the significance of the results it is clear that there was a dramatic, positive difference in agitation, aggression and wandering following an encounter with an open door as compared with a locked door.

There is a suggestion that establishing a secure perimeter may have the unwanted side effect of restraining people with dementia who while confused, are not likely to abscond. In a cross sectional study of 11 nursing homes Low found that harmful behaviours, particularly risk taking and passive self harm were associated with better security features and an increased number of special design features for frail residents and residents with dementia (Low, Draper, Brodaty 2004). The possibility that an emphasis on safety has unwanted side effects is supported by a recent study carried out in the UK (Torrington 2006).

“Safety and health was the only domain in the DICE study that had a negative association with the quality of life scores. The low dependency group of residents had lower scores for enjoyment of activities and ability to control the environment in buildings with higher scores for safety and health. Large buildings had consistently high scores in this area with median scores of 79% as against 66% and 65% for small and medium homes”.

A small study (Chafetz 1991) comparing decline in a special care unit and a normal nursing home provided information on two safety features, the securing of exits and the securing of drawers and cupboards which were the major environmental changes made in establishing the special care unit. The study results suggest that these interventions have no significant effect on the rate of cognitive decline or the presence of behavioural disturbance.

In summary the evidence supports the use of unobtrusive safety features but warns against over- emphasis on safety.

Small

Size may be defined in terms of the number of beds per facility or by the area available per person.

The effects of having fewer beds in a facility was investigated by comparing a Special Care Facility (SCF) with 'traditional institutional facilities (Reimer, Slaughter, Donaldson et al 2004).



“The SCF, which received a new-construction design award from the Society for the Advancement of Gerontological Environments, featured a decreased density of residents, with 10 people living in each of six separate and self-contained semi-attached bungalows...”

A Special Care Facility is described as being the next step in the evolution of the SCU, a facility that is “more comfortable and more like home and offers more choice and more privacy than traditional setting. It also includes more personal contact and meaningful activity. The vision requires a different physical environment with enhanced knowledge and skills of caregivers.”

The comparison showed that SCF residents experienced

“Less decline in activities of daily living, more sustained interest in the environment, and less negative affect than residents in the traditional institutional facilities. There were no differences between groups in concentration, memory, orientation, depression, or social withdrawal”.

However the SCF also had

“... enhanced staffing ratios, which enable the integration of personal care, leisure, and rehabilitation activity into the role of the staff caregiver (rather than an expert model of episodic therapist intervention); and a biodiverse environment (e.g. multigenerational, live-in pets, plants). The physical environment and daily activities were arranged like a typical home, with residents able to help in the kitchen, sweep the floor, sit by the fireplace, or go outside into a small enclosed garden area”.

and there was no way to evaluate the separate impact of these interventions.

A study which controlled for most of these factors (Zeisel, Silverstein, Hyde et al 2003) resulted in a positive finding for larger facilities

“The larger the facility - the more residents there are in the SCU - the lower the social withdrawal scores tend to be”.

No significant correlation was found between facility size - large or small - and physically aggressive behaviours in a sample of 695 residents of SCUs and traditional nursing homes (Leon Ory 1999) However this study defined large facilities as those with more than 150 beds, a definition that may have swamped the effects of genuinely small facilities.

A comparison of residents of small, group living facilities and residents of traditional nursing homes (Annerstedt 1993) showed that smaller size makes it easier for residents and staff to work together as a group and is associated with higher levels of competence and job satisfaction. However the additional staff training provided in the smaller units was not controlled for. The study also reported better motor functions, slightly improved or maintained activities of daily living and smaller doses of both antibiotics and psychotropic drugs.

A similar result was reported in a later paper by the same author (Annerstedt 1997), comparing life for 28 people with dementia in a Group Living (GL) environment with life in a nursing home (NH), for 29 people matched on age, diagnosis, physical and social dependency. The GL environment was deliberately made small (9 beds) but also incorporated features to make it



familiar, homelike and safe.

“During the first year of observation there was a positive development in the GL patient compared to the NH group. However in the more severely impaired residents less effects of the environmental engineering were observed, i.e. (a) the GL residents preserved intellectual and motoric abilities and practical abilities better which was reflected in ADL performances; (b) the GL residents exhibited less aggressiveness anxiety and depression; (c) the use of neuroleptics and tranquilizers was lower In GL care and (d) the numbers of fractures and Incontinent residents were fewer in GL (non-significant). There was a time related decline of the difference between the groups. After 3 years there were no differences to be noticed between the GL and NH groups in physical and mental dependency” (Annerstedt 1997).

In a survey of 53 special care units for people with dementia (Sloan 1998) found strong associations between larger unit sizes and higher resident agitation-levels, increased intellectual deterioration and greater emotional disturbances.

“...larger unit size is associated with higher agitation supports the popular design concept that small units, or the division of large units into smaller functional subunits, will minimize resident agitation by reducing the potential for overstimulation”

However the multivariate analysis used in this study was able to show

“Summary indexes of the quality of the physical environment and of staff-resident interactions exerted strong, similar influences on unit agitation levels. Indeed, the two measures were so intercorrelated that one served practically as a proxy for the other, and the two effects could not be separated analytically. These findings suggest that not only are both the physical and the human environments important in managing agitation in Alzheimer’s disease, but, in practice, quality in one domain is usually accompanied by quality in the other”.

This study highlights the difficulties of separating out environmental factors from the other factors that go to make up the ‘environment’.

A qualitative comparison in which a specialised dementia unit with 11 beds (Fairhaven) was compared with a 4 storey nursing home suggests that small size is associated with better community life but it is clear that the author was unable to separate out the effects of the size of the unit from the other factors that were active.

“The social model of care practiced at Fairhaven, including staff continuity in resident care and an encouragement of staff relationships with individual residents, appears to have encouraged community formation. Also of importance was the small scale of the facility as well as the residents’ ready access to a range of environmental settings, including areas that are conducive to community-like behavior such as kitchens, small spaces for informal interaction, and outdoor spaces that can be used by residents on their own. The design of formal activities at Fairhaven, including attempts to engage residents in a round of expressive activities and to



adapt activities to their changing needs and competencies, was another key factor. Underlying and supporting these environmental and programmatic features was an institutional philosophy that promoted flexibility, freedom of choice, and a focus on the continuation of the individual's functional abilities and independence" (McAllister Silverman 1999.).

A quantitative comparison between 10 large facilities (16 or more beds) and 12 small facilities (Quincy, Adam, Cynthia et al 2005) indicated no relationship between the size of the facility and quality of life of residents with dementia or their neuropsychiatric symptoms (delusions, hallucinations, agitation or aggression, dysphoria, anxiety, euphoria, apathy, disinhibition, irritability, aberrant motor behavior, sleep, and appetite and eating disorders). Quality of life was measured using the ADRQL (Rabins, Kasper, Kleinman et al 2000), an observer rating scale that is not particularly sensitive.

Contrary findings came from another cross sectional study (Torrington 2006) involving 38 residential and care homes in the UK. In this study small was defined as having fewer than 31 beds, medium as 31-40 and large as greater than 40. Small homes scored best in terms of comfort, normalness, choice and control. "The overall well-being scores [as measured by Dementia Care Mapping] were consistently lower in the large homes (13%) than in the small and medium ones, which scored 38% and 33% respectively."

Another cross sectional comparison of large and small facilities (Kuhn, Kasayka, Lechner 2002), added to the confusion. In this investigation

"Key differences were noted between residents living in small, dementia-specific sites (10 to 28 residents) and those living in large sites that were not dementia-specific (40 to 63 residents). The latter group fared better overall with respect to quality of life and diversity of interactions and activities".

No attempt was made to control for levels of dementia or different care practices. The results are therefore severely limited and at best illustrate the inability of cross sectional studies to provide information on causality.

These studies clearly illustrate the problems associated with coming to a conclusion on the effect of the size (number of people living in a unit). Size has never been varied while all other conditions are kept constant and purpose designed small units are very likely to be homelike, familiar and safe. So while there is a range of evidence that supports the view that small numbers of people in dementia units are better than large numbers, it is not conclusive. The evidence also suggests that the combination of small size with the other attributes of specialized units is not demonstrably beneficial in the later stages of dementia.

The relationship between behavioural disturbance and the size of the space in which the group lives has been investigated in two studies (Bowie Mountain 1997; Elmstahl, Annerstedt, Ahlund 1997) and the findings suggests a lack of association between the amount of space available in a ward and the level of behavioural disturbance.

"It has been assumed that GL (Group Living) units should be small, to prevent disorientation or confusion. However, we found no relation between confusional



reactions and total area, total activity area, or proportion of activity area out of total area” (Elmstahl, Annerstedt,Ahlund 1997).

Elmstahl et al go on to observe that units with ‘a smaller proportion of communication area’ tended to have higher levels of disorientation and lack of vitality in their residents’. This may be taken as evidence of a minimum size beyond which negative effects begin to be shown.

A comparison of behaviour and use of spaces before and after transfer from traditional nursing home to an SCU (Kovach, Weisman, Chaudhury et al 1997) showed increased social activity which was attributed to the small physical and numerical size of the unit. Contrasting results from a qualitative study of staff and family members views (Morgan Stewart 1997) indicated that while there were positive effects in providing additional space for wanderers in a lower density environment in a new unit, which resulted in less noise and general activity, the increased space and smaller number of residents decreased social interaction. A combination of small numbers of residents in a compact design was recommended to overcome this problem.

A study that compared behaviour problems before and after transfer to a unit where the dining area was both physically and numerically smaller (Schwarz, Chaudhury,Tofle 2004) (Forbes rating = weak) demonstrated beneficial effects:

“The new dining spaces served eight to 10 residents compared with the 25 to 30 residents who had their meals in the large dining area before the renovation. Behavioral mapping data indicated that there were fewer incidents of disruptive and agitated behaviors in the new dining areas than in the larger dining space that served the residents prior to the renovation. Staff members seemed to be having more sustained conversations with the residents in the new dining spaces than they were having in the old dining space. The reduction of group size in the new dining areas reduced the possibility of the chain reaction of disruptive behaviors during mealtimes.”

A qualitative comparison between a purpose built Alzheimer’s facility and a traditional nursing home (McAllister Silverman 1999.) suggested that the small scale of the special unit contributed to the higher level of community formation and social interaction found there. An interesting association between large homes and an emphasis on health and safety issues resulting in lower enjoyment of activities and ability to control the environment has been found in a recent UK study” (Torrington 2006).

In summary there is a range of evidence supporting the proposition that small size, in the sense of number of people living together, is associated with a variety of positive outcomes for people with dementia. These include slower decline in ADL skills, more sustained interest in the environment, less aggressiveness, less anxiety, less depression, less use of psychotropic medication and a higher level of community. In the best controlled study (Zeisel, Silverstein, Hyde et al 2003) larger numeric size was associated with less social withdrawal and there was no significant relationship with agitation, aggression, depression or psychotic symptoms. However it is impossible to quantify the contribution that the size of the unit makes in comparison with the other environmental factors that are commonly associated with a purposely designed, small unit e.g. homelikeness, safety and familiarity.



Enhancement of visual access

The observation that people with dementia stand a better chance of finding something if they can see it from where they are led to the idea of 'Total Visual Access' which was incorporated into the design of the NSW Ministry of Health units for the confused and disturbed elderly CADE units (Fleming R. Bowles 1987). It resulted in a very simple, corridor free environment.

The evaluation of the first of the CADE units suggested that the main impacts of this style of environment were to be found in improvements in self help, socialisation and behaviour (Fleming R., Bowles, J. and Mellor, S. 1989) although it is clear that these changes were brought about by the combination of both the environmental and psychosocial factors in operation in specialised units for people with dementia.

More recent research has shown that a simple building 'where residents should be able to proceed from one decision point to the next as they walk along without having to plan for future decisions' is associated with resident orientation but it suggests that the simple environment must be supplemented with a certain amount of explanation or training for the residents to function better (Passini R. , Rainville, Marchand et al 1998.)

Disorientation has been found to be less pronounced in L, H and square shaped units where the kitchen, dining room and activity rooms were located together, which may indicate good visual access for most activities and times. Environments with a single central corridor were associated with higher degrees of restlessness and with reduced vitality and identity (Elmstahl, Annerstedt, Ahlund 1997) .

Evidence of the importance of being able to see what you need to see when you need to see it is provided in a study that investigated the effects of making the toilet visible rather than hiding it away (Namazi K. H. Johnson 1991a). When the toilet was visible to residents with dementia it was, on the average, 8 times more likely to be used than when it was hidden by a curtain. This is described as having a significant effect on the management of incontinence and to be useful to mobile residents with mild to severe dementia. The visibility of the toilet did however result in the residents using the toilet every 9.8 minutes!

The evidence for the incorporation of good visual access on the broad, unit level scale is not strong but the dramatic effect of making an important amenity, the toilet, easily seen provides good supporting evidence for the concept.

Reduce unwanted stimulation

People with dementia have difficulties in dealing with high levels of stimulation. Their ability to screen out unwanted stimuli appears to be reduced. They can become more confused, anxious and agitated when over stimulated (Cleary, Clamon, Price et al 1988.). Common causes of over stimulation are busy entry doors that are visible to residents, clutter, p.a. systems, (Brawley E.C. 1997.; Cohen 1991), alarms, loud televisions (Evans 1989.; Hall 1986.), corridors and crowding (Nelson 1995.).

There is strong evidence from the Zeisel et al study indicating that residents are less verbally aggressive



“where sensory input is more understandable and where such input is more controlled” (Zeisel, Silverstein, Hyde et al 2003)

A smorgasbord of relationships between various behaviours and types of stimulation has been described

“Most behaviors decreased when there was noise around, with the exception of requests for attention which increased with high levels of noise in the environment, and aggressive behaviors, which increased at night when there were high levels of noise. There was a tendency for behaviors to increase when the environment was perceived as cold, with the exception of pacing which tended to occur more frequently under conditions of normal temperature, and requests for attention, which increased when the environment was hot” (Cohen-Mansfield J. Werner 1995) (Forbes rating = strong).

and an approach that includes environmental changes and psychosocial (rather than medical) interventions is recommended.

An approach of this kind, resulting in a reduction of behavioral disturbance, was used in a Reduced Stimulation Unit housing 11 residents

“...where the doors could be easily closed and camouflaged. Small tables for eating and for small group activities were set up in four of the rooms. Visual aspects of the unit (for example, pictures and wall colors) were neutral in design and color. There were no potential sources of stimulation from televisions, radios and telephones except one telephone for emergencies. Residents were free to ambulate anywhere as well as eat and rest whenever they wished on the unit. A planned, consistent daily routine scheduled rest and small-group activity periods” (Cleary, Clamon, Price et al 1988.) (Forbes rating = moderate).

Three months after admission the residents were significantly more involved in ADLs and required significantly less restraint than 3 months prior to admission. Agitation and wandering had decreased (non significant) while medication usage had not changed. Improved relationships between residents and between residents and staff were noted but not measured. The results were modest and whether they were the effect of better care practices or by the environment or a combination of these, could not be determined.

Busy entry doors pose particular problems for staff and residents. They are a constant source of over stimulation and a temptation to escape. The positive results of ways to avoid these problems by hiding the door or door handle, i.e reducing disturbing stimulation, ((Dickinson, McLain-Kark, Marshall-Baker 1995; Namazi K. H., Rosner, T.T., & Calkins, M.P. 1989.) have been described in the section on security. When the door offers tantalising views of the outside world it can be useful to head off escape attempts by installing blinds (Dickinson McLain-Kark 1998; Dickinson, McLain-Kark, Marshall-Baker 1995). These studies show that the attraction of a view to the outside is very strong. It can be sufficient to overcome the aversive effect of dazzling and confusing patterns painted on the floor (Chafetz 1991; Namazi K. H., Rosner, T.T., & Calkins, M.P. 1989.) indicating that there is likely to be an advantage to reducing the stimulation



provided by these views by using blinds or curtains than to add to it by painting grids on the floor.

Some of the decision making problems experienced by people with dementia can be explained in terms of the effects of unnecessary stimulation. They commonly have problems in choosing what to wear from the variety of clothes hanging in a wardrobe. This problem can be alleviated by having two wardrobes, one obvious and one hidden, with the obvious wardrobe containing only one or two sets of clothes. The overwhelming choice is then reduced to manageable proportions. This can be taken a step further by designing the wardrobe to enable staff to display clothing in a pre-selected order (underwear first, shirt, trousers, etc). This has been found to increase residents' independence in dressing and reduce the amount of physical help the person with dementia required (Namazi K. H., & Johnson, B.D. 1992)

Non specific studies involving the combination of reduced stimulation with other environmental and care practice manipulations has been shown to reduce behavioural disturbance (Bellelli, Frisoni, Bianchetti et al 1998; Bianchetti, Benvenuti, Ghisla et al 1997).

The reduction of stimulation must not be taken too far. Care must be taken in reducing light levels, for example, as it has been demonstrated that low light levels reduce wayfinding (Netten 1989.). Indeed there has been a great deal of interest in the potentially beneficial effects of increasing light levels to overcome the exceptionally low exposure to bright light experienced by many people with dementia living in institutions (Ancoli-Israel S., Clopton, Klauber et al 1997) which lead to sleep disturbance.

A very well constructed RCT (Ancoli-Israel S, Gehrman, Martin et al 2003) involving a comparison between morning and evening bright light sessions (mean of 105 minutes exposure to 2,500 lux) with similar exposure to dim red light and normal, baseline light exposure showed that:

“...the effect of light treatment on sleep and circadian activity rhythms in residents with AD suggest that increased bright light exposure, whether in the morning or in the evening, consolidates nighttime sleep by lengthening the maximum sleep bouts during the night. There was, however, no effect of light treatment on total sleep time nor on wake time during the night or day. In other words, sleep was consolidated but overall time asleep did not change as there were longer but fewer sleep bouts. The magnitude of this effect was also clinically meaningful. Morning light increased the maximum sleep bout length by over 30 min while evening light increased the maximum sleep bout length by over 20 min. As nighttime sleep disruption is detrimental to caregivers as well as to residents, the patient's more consolidated sleep may decrease both caregivers' sleep disruption and their concerns about the patient during the night. Therefore, even though the patient's total sleep time is not increased, both the patient and caregiver are likely to sleep better when the patient's sleep is more consolidated”.

Early work (Satlin 1992) supports the use of light therapy but is marred somewhat by having the people with dementia restrained in gerry chairs in front of the light box for 2 hours. This work was extended (Mishima 1994) (Forbes rating = weak) to show that 2 hours of light box therapy,



providing 3,000 to 5,000 lux, not only improved sleep but also reduces behavioural disturbance. The application of this approach in a more naturalistic way, i.e. avoiding the restrictions inherent in getting people with dementia to sit beside light boxes for extended periods by providing elevated light levels in public areas, has been well investigated (Sloane P.D., Christianna, Williams et al 2007)

“Analyses of data from this cluster-unit intervention trial of persons with dementia in two care facilities indicate that high-intensity ambient light therapy in the morning or throughout the day resulted in a small but statistically significant increase in nighttime sleep minutes and inconsistent effects on nighttime sleep consolidation and daytime sleepiness. ...The study also demonstrated that bright light was well tolerated and was not associated with adverse effects. The light delivery method used in this study involved remodeling the activity and dining areas of institutional settings, thereby providing passive light exposure. Data on intervention fidelity indicate that this method produced median light intensities close to the target level of 2,500 lux. Furthermore, mean participant exposure was comfortably above the target of 1 to 2 hours per treatment day, and more than 85% of participants received at least 1.5 hours of exposure regardless of treatment. ...These results suggest that environmental modification may be superior to light boxes, the current therapeutic standard, as a light delivery method. Although statistically significant, the clinical significance of the finding that total sleep time was 11 minutes longer under morning or all-day light is unclear”.

Sloane et al go on to provide a standard by which the significance of these changes can be assessed.

“To better gauge the clinical significance of this finding, the results were compared with those of published clinical trials of commonly prescribed sleep medications. Zolpidem and temazepam, the most commonly prescribed sleep medications in 2005, produce approximately 30 minutes of additional sleep in young adults and healthy elderly volunteers, but the favorable effect of hypnotic medication appears attenuated in older persons. One randomized trial in 72 elderly persons with chronic insomnia, for example, reported only 4.4 more minutes of sleep with temazepam than with placebo. Furthermore, in long-term care populations, the risks of (adverse effects from) sedative–hypnotic medications are particularly high”.

Unlike the light box therapy approach this approach does not appear to involve any additional staff resident interactions. The positive results are therefore more likely to be due to the increase in light levels than to the beneficial effects of spending time with staff.

The possibility that the improvements are due to a placebo effect or extra/different staff attention was shown to be unlikely in a study that provided high light levels (approximately 1100 lux) in the public areas of a geriatric ward (van Someren, Kessler, al. 1997). Residents with visual impairment and dementia did not show the positive changes in the stability of the rest – activity rhythm experienced by the other non-visually impaired people with dementia. Both groups being exposed to the extra light and the same staff interactions.



Supportive evidence comes from a study (Rheume, Manning, Harper et al 1998) (Forbes rating = weak) where exposure to intense light (2,500 lux at eye level) was provided in a pleasant room when residents had difficulty in sleeping. This approach is illustrated with reference to positive outcomes in 3 case studies of people with dementia, but not statistically analysed.

In addition to beneficial effects on sleep patterns the provision of very high light levels (10,000 lux) during a 30 minute breakfast period has been shown to have positive effects on behavioural disturbance as measured by the Cohen Mansfield Agitation Index (Thorpe, Middleton, Russell et al 2000) (Forbes rating = moderate). The brightness of this illumination may be gauged by comparing it to the 1000 lux which is approximately equivalent to being outside on a cloudy day.

The provision of simulated dawn/dusk variations in light produced similar consolidation in sleeping patterns (Gasio, Kräuchia, Cajochena et al 2003) Significant improvement in MMSE scores ($p=0.0012$) was obtained in a group of 9 nursing home residents with either Alzheimer's disease or vascular dementia given 2 hours of bright light therapy (3,000 lux) each day for 10 days. No improvement was observed in the randomly allocated control group (Graf, Wallner, Schubert et al 2001).

In summary there is good evidence to show that the area of stimulus control is important to the well being of people with dementia. When levels of stimulation are optimum residents with dementia sleep better, are less verbally aggressive, less behaviourally disruptive and more able to dress themselves. While it is often impossible to tease out the effects of staff attention in the studies there is sufficient evidence to suggest that the levels of stimulation themselves have an effect which can be either positive or negative.

Highlight important stimuli

One form of highlighting is the provision of signs and aids to wayfinding and it is integral to the design of many special environments for people with dementia (Grant, Kane, Stark 1995).

“Signs may help to recognize places when architectural and interior design features are not sufficient in passing the message. They may provide directional information to remind the residents of where facilities are located and of how to return to their points of origin”.(Passini R., Pigot, Rainville et al 2000).

Evaluation of an Italian approach to the design of SCUs incorporating the use of signs, associates them with reductions in behavioral symptoms (Bianchetti, Benvenuti, Ghisla et al 1997). As in other studies reported here, there is no possibility of teasing out its effect from those of the other environmental manipulations and changes in staff practices.

Some signs and cues can have a negative impact, e.g. the exit signs and panic bars on exit doors which appear to cue residents to try to leave the facility. These can be countered in a number of ways.

Placing a horizontal grid of black tape in front of an exit reduced contact with the door by up to 97% in 4 people with Alzheimer's disease (Hewawasam 1996). The presence of a mirror in front of an exit cues the response not to touch, reducing exit attempts by 50% (Mayer Darby 1991).



In a study with a similar intent (Dickinson McLain-Kark 1998) (Forbes rating = weak) methods of reducing the cues for exiting provided by a door in a residential unit were investigated. Residents were exposed to three test conditions: a mini-blind that concealed the view from the door, a cloth panel that concealed the panic bar of the door, and both the mini-blind and the cloth panel. The findings indicated that hiding the panic bar behind a cloth panel reduced the number of attempts to exit.

The best place for the signs is not at the top of the door but low down, even on the floor, to compensate for the downcast gaze of many people with dementia (Namazi K. H. Johnson 1991b). This study indicated that the best results, for getting residents to use a publicly available toilet on their unit, were obtained by using the word toilet on an arrow on the floor pointing to the toilet. The placing of a graphic depicting a toilet on the toilet door at eye level was also effective but not as effective as the arrow on the floor.

The use of picto-grams for people with dementia has not received much empirical investigation although the use of a handmade sign depicting a pair of scissors enabled a resident with dementia to find the hairdressers when she was unable to find any other location other than her own room (Passini R., Pigot, Rainville et al 2000).

The signs must be large enough to be seen by people with poor vision. In a study with an exceptionally small sample it has been shown that large signs combined with orientation training were effective but not when simply put up without drawing residents attention to them (Hanley I.G. 1981.).

“Signposts alone then do not seem to be generally effective in facilitating improvement in ward orientation. However, in combination with a preceding ward orientation training or more especially an accompanying ward orientation and signs training, improvements are effected, which for two of the four residents above, are maintained fully at three month follow up”.(Hanley I. G. 1981).

The debilitating effects of normal signs in public buildings are carefully and considerably described in an analysis of the wayfinding problems encountered by people with Alzheimer's disease trying to find locations in a hospital (Passini R., Rainville, Marchand et al 1998.). The descriptions of the frustration of trying to read textual signs and the strange perseveration of searching behavior that continued after a sign had been read indicating that the destination had been reached highlight the problem of depending on conventional signage.

“One of the major recommendations emerging from this research is to clean up information clutter on circulation routes. The non-discriminatory reading of information by DAT residents is among the most confusing interferences in the wayfinding process. Graphic wayfinding information notices along circulation routes should be clear and limited in number and other information should be placed somewhere else. It is quite feasible to create little alcoves specifically designed for posting public announcements, invitations and publicity, and these areas could even become small gathering places encouraging social interaction.



The graphic information provided would be of consistent design and systematically located so that the user knows what to look for and where to look for information. This rule facilitates graphic communication and also reduces chances of the user being overloaded by information” (Passini R. , Rainville, Marchand et al 1998.).

There is some evidence that the use of color to distinguish the doors to residents rooms has a beneficial effect (Lawton 1984.) but the experimental design makes it impossible to be certain about the contribution of contrast to the positive and negative outcomes.

Signs and cues in the form of text and graphics are not the only way in which information about the location of spaces can be made available

“The physical environment not only creates the wayfinding problems people have to solve but it can also provide information to solve these problems. ... Information should be presented by different means to allow for personal preferences and redundancy. ... Attention has to be paid to avoid distracting residents by non relevant information displays. The environment has to speak a language that the user, the Alzheimer’s patient, can understand” (Passini R., Pigot, Rainville et al 2000).

The recognisability of personally familiar objects can be used to aid orientation. Displaying personal items, selected by relatives because of their significance, in cases outside residents’ rooms is a more effective approach than displaying distinctive, but non-personal items (Namazi K. H., Rosner,Rechlin 1991)). Personally significant memorabilia were most useful for people with moderate dementia; higher functioning residents were able to orient with familiar but non-personal memorabilia as well. Sadly the findings suggest that neither approach was helpful for lower functioning residents. In a replication of this study which more carefully focused on the precise nature of the memorabilia (Nolan, Mathews, Truesdale-Todd et al 2002) some improvement in the location of rooms was found when photographs of the person in their youth were prominently displayed. This effect was contrasted with the ineffectiveness of current photos. The 6 residents in the small sample were moderately demented.

Additional benefits have been suggested as accruing from the display of personal objects :

“Special glass cases installed outside residents’ rooms enable a display of favorite personal objects and pictures. Having personal memorabilia in the shared spaces would provide the possibility of remembering the stories, events, people, and places associated with them. The items also provide an opportunity for the staff to know more about the residents, understanding the individuals as persons with preferences, attitudes, and values” (Kovach, Weisman, Chaudhury et al 1997).

but no empirical research is available to support this attractive idea.

In summary there is limited evidence of the effectiveness of highlighting important stimuli in environments for people with dementia. Those that have some beneficial effect, e.g. large arrows on the floor along with the word ‘toilet’ (Namazi K. H. Johnson 1991b) seem to be in conflict with other principles of design, e.g. the provision of a familiar, homelike environment.



Planned wandering

Planned wandering has two components, the provision of a well defined path and the access the path provides to a range of experiences that might encourage the person with dementia to engage in something other than wandering. No methodologically sound investigations of the use of a well defined path were found. It is usually the case that the wandering path will include an outdoor section and there is literature on the effect of access to the outdoors..

Access to a secure out door area has been shown to be one of the defining features of an SCU (Grant, Kane, Stark 1995). The beneficial effects on levels of agitation of being able to get outside have been well demonstrated (Namazi K. H. Johnson 1992a) and described in the section on security however there is very little empirical evidence of the effect, beneficial or otherwise, of being outside. It is unfortunate that an attempt to include access to a garden in a very well controlled study (Zeisel, Silverstein, Hyde et al 2003) was thwarted by lack of information on whether residents could actually access the gardens that had been identified as being present.

There have been studies of environments that have outside areas incorporated into their design as an amenity to be used by residents (Wells Jorm 1987) but it is impossible to identify the relative contribution that the outside area has made to the beneficial effects, in this case of maintaining the function of the residents.

An Australian study was the first to demonstrate empirically an increase in pleasure associated with being in a landscaped garden (Cox, Burns, Savage 2004). This study examined how effective two types of multisensory environments were in improving the well-being of older individuals with dementia. The two multisensory environments were a Snoezelen room and a landscaped garden. These environments were compared to the experience of the normal living environment. The observed response of 24 residents with dementia in a nursing home was measured during time spent in the Snoezelen room, in the garden, and in the living room. Both the Snoezelen room and the garden decreased the signs of sadness shown by residents in comparison with the living room and significantly increased the signs of pleasure. However there was a significant increase in pleasure in the three environments when the residents were approached by staff. The authors concluded that

“... in terms of the relative effectiveness of each environment in improving well-being of participants, the quantitative data indicate few differences between them. Qualitative data obtained by interviewing staff and caregivers indicated that ‘No matter which of the three environments was being spoken of, it was the opportunities of a one-to-one relationship, quality time, and to feel closer, that was valued...”

The provision of access to an outdoor area is not in itself sufficient however. If the space is unfriendly, too large or too complicated it is unlikely to be used. A systematic approach to developing a ‘therapeutic garden’ is required to encourage residents to use it. The availability of a garden area, whether well designed or not, appeared to reduce aggression and falls in comparison to a facility without a garden (Mooney 1992.).



The enrichment of the experimental facility by the provision of an outside patio (in conjunction with improving security features) had no differential impact on the behavioral or cognitive course of the dementia of residents when compared to the non-enriched, control environment (Chafetz 1991).

A U.S. wide survey of long term care facilities with outdoor areas investigated the characteristics and features of these areas and how they related to the perceived impact on their users. (Cohen-Mansfield J. Werner 1999) Most respondents rated outdoor spaces as very useful and as having a great benefit for users. The perceived benefit was related to the presence of design features, such as the presence of gazebos; and to the number of activities offered in the area. Despite these positive findings respondents stated the areas were not used as much as possible.

The lack of access to outside areas when they are present is usually associated with staff practices. In common with other architectural features of the facility the presence of a pleasant, safe outside space had no affect that could be attributed to it that was not secondary to the impact of the relationships with the staff (Wood, Harris, Snider et al 2005).

So while

“gardens are a lovely and interesting way to provide a source of sensory stimulation and avoid monotony - a virtual symphony of sight, sound, light, color, fragrance, birds, and small animals. Outdoor spaces offer unique opportunities for a wide range of stimulating, potentially life-enriching activities such as assisting someone who has been a lifetime gardener to maintain some form of small outside gardening spot” (Brawley E. C. 2001).

the empirical evidence for their utility in the absence of staff interventions is lacking. Nevertheless, if staff time is available they do provide an opportunity for enhancing staff/resident interactions.

Familiar

The provision of a familiar environment was part of the intervention investigated in an early randomised control trial:

“Most rooms are single and residents bring their own beds and small items of furniture. There are several multi-purpose living or activity areas and a kitchen/dining room” (Wells Jorm 1987).

which showed that residents rate of decline was no different to that measured in a control group of people with dementia living at home.

In a weaker study where the environment was also described as including

“own belongings in his private living area, usually a combined living room/bedroom and [shares] the common living area, kitchen and laundry” (Annerstedt 1997).

the residents in the Swedish group living unit were found to maintain intellectual, motoric and practical abilities (as reflected in ADLs) and to be less aggressive, anxious and depressed



than comparable people in a traditional nursing home. However, there is no way to know what contribution staff attitudes and training or other environmental features of the group living units contributed to this result.

An early study emphasising the need for a familiar environment (Greene Asp 1985) suggested that improvements in behaviour were measurable in 50% of the residents.

Opportunities for privacy and community.

This principal combines factors such as familiarity, variety, specific function and personalisation. It suggests the need for spaces that range from the public to the private. The presence of separate social spaces has been shown to differentiate SCUs from non-SCUs in a statewide survey involving 436 Minnesota nursing homes (Grant, Kane, Stark 1995). The strongest evidence for its importance comes from Zeisel's well controlled study that provides some certainty about the contribution of the individual factors to the well being of the residents (Zeisel, Silverstein, Hyde et al 2003). It contains findings of direct relevance to the principle as the following three quotations demonstrate.

“The degree of privacy-personalization in the SCUs studied was negatively correlated with patient scores on the Cohen-Mansfield total aggression scale. Residents in facilities with more privacy - more rooms that are individual and more opportunities for personalization - generally scored lower on this scale, representing less anxiety and aggression”.

“The amount of variability among common spaces in a facility was negatively correlated with patient social withdrawal scores. The degree of social withdrawal among residents decreased as the variability among the common spaces in a facility increased”.

“Those living in environments scoring high on privacy-personalization tended to have lower scores on the psychotic problem scale”.

“Characteristics of the environment associated with reduced depression, social withdrawal, misidentification, and hallucinations include common areas that vary in ambiance”.

It is possible that environments that have well defined spaces with different functions are easier for people with Alzheimer's disease to navigate (Passini R., Pigot, Rainville et al 2000) (Passini R., Rainville, Marchand et al 1998.).

In a paper full of clearly described hints on creating environments that are thought to be helpful to people with dementia, Hoglund et al (Hoglund, Dimotta, Ledewitz et al 1994) stated that

“...one thing that works well is having a variety of rooms and allowing them to have a definite purpose, rather than being a multipurpose space”.

The postulated advantages of single rooms have been summarised as including the opportunities to choose between privacy and socialisation; to personalise the space, providing familiarity and continuity with the past; support a sense of security and individual identity and to allow residents to control levels of stimulation (Morgan Stewart 1998).



While not being able to tease out the characteristics individually there is strong evidence that:

“The degree of privacy-personalisation in the SCUs studied was negatively correlated with patient scores on the Cohen-Mansfield total aggression scale ($p=0.019$). Residents in facilities with more privacy - more rooms that are individual and more opportunities for personalisation - generally scored lower on this scale, representing less anxiety and aggression”(Zeisel, Silverstein, Hyde et al 2003).

A negative correlation ($p=0.023$) with psychotic symptoms was also found in this study.

The availability of private rooms has been shown to reduce irritability, increase time spent alone and improve sleeping patterns in people with advanced Alzheimer's disease and other related disorders (Morgan Stewart 1998) Time spent alone was seen by staff and relatives as a positive opportunity to 'have their own space' not as a problem.

Studies in which the provision of single rooms is part of the environmental and psycho-social package under investigation but in which it is not possible to partial out the specific affects of single rooms or the provision of privacy (Wells Jorm 1987; Wood, Harris, Snider et al 2005) cannot directly support the provision of single rooms but their overall positive results do not provide any reason for believing that single rooms have negative affects.

Uncooperative behaviors have been found to be associated with shared rooms (Low, Draper, Brodaty 2004). No empirical studies dealing with the size of residents' rooms were located.

In summary there is good evidence for the provision of a variety of spaces in environments for people with dementia as they assist in reducing anxiety and depression while improving social interaction and may assist the resident to find their way around.

Domestic

The rigorous assessment of the effects of providing a homelike environment have taken two basic forms, a comparison of care in a homelike facility with care in the community and comparisons between facilities that vary in their level of homelikeness.

The first randomised control trial of admission to a purpose designed, homelike environment was conducted in Australia (Wells Jorm 1987). The nature of the environment was described :

“The interior and garden areas are as secure as possible and reflect a homelike atmosphere. Most rooms are single and residents bring their own beds and small items of furniture. There are several multi-purpose living or activity areas and a kitchen/dining room. Where possible domestic furnishings and fittings have been used including carpet tiles in all but the bedroom and bathrooms. The care programme involves all staff working in the unit and is based on the philosophy of normalisation. It includes continuing assessment and individual program review”.

Residents showed no difference in their rate of deterioration when compared with a matched group of community dwelling people with dementia who accessed community services such as respite care. This is described as a successful outcome as the trauma and difficulties



associated with admission to residential care were thought to be likely to accelerate decline. An important benefit was found is that the carers of those admitted showed improvements in their stress levels.

However it is clear from the description of the environment that the contribution of the care staff in the form of undertaking systematic assessments and developing individual programs was seen as central to the provision of appropriate residential care. There is no suggestion that this was provided for the community sample. The results therefore reflect the impact of a range of interventions that include the provision of a homelike environment.

In a similar vein a comparison between the Quality of Life (QoL) of 62 people with dementia living in a SCF which is “more comfortable and more like home and offers more choice and more privacy than traditional setting” (Reimer, Slaughter, Donaldson et al 2004) and 123 matched people living in a number of traditional nursing homes showed positive results for people in the mid to late stages of dementia

“The SCF ... featured a decreased density of residents, with 10 people living in each of six separate and self-contained semi-attached bungalows; enhanced staffing ratios, which enable the integration of personal care, leisure, and rehabilitation activity into the role of the staff caregiver (rather than an expert model of episodic therapist intervention); and a biodiverse environment (e.g., multigenerational, live-in pets, plants). The physical environment and daily activities were arranged like a typical home, with residents able to help in the kitchen, sweep the floor, sit by the fireplace, or go outside into a small enclosed garden area”.

While it proved impossible for the authors to allocate residents randomly to these settings the matching of residents on age, sex, Global Deterioration Scale results and co-morbidities provided a firm foundation for comparison.

“This is the first study to directly compare SCF with traditional institutions using prospective follow-up and data collection. Taken as a whole, the findings of the study suggest that QoL for adults with middle- to late-stage dementia is the same or better across time in a SCF than in traditional institutional facilities. This is the first longitudinal study of its type to demonstrate positive effect on QoL over time in these later stages of dementia. Specifically, the group living in the SCF had significantly better ADL function over time than the two control groups, as measured using the FAST. In addition, affect for the residents living in the SCF was better, with increased interest and less anxiety/fear. ..This study suggests that a purposely designed physical and social environment has a positive effect on QoL.”

The reduction in anxiety ($p=0.003$) and an increase in interest in their surroundings ($p=0.017$) were sometimes accompanied by an increase in agitation ($p=0.087$). The increase in agitation was described as not necessarily “a negative finding, because it may indicate that residents had the environmental and biochemical freedom for such activity.”

This study again demonstrates the positive impact of a complex collection of interventions and leaves open the question of how much the physical environment contributed to the improvement



and how much was contributed by the **“enhanced knowledge and skills of caregivers.”**

A serious attempt to control for these variables has been made in a very sophisticated study involving comparisons between 15 special care units (Zeisel, Silverstein, Hyde et al 2003). Statistical controls were included for the influence of, among others, cognitive status, need for assistance with activities of daily living, prescription drug use, amount of Alzheimer’s staff training and the staff-to-resident ratio. This study extended the boundaries of experimental design beyond the traditional randomised control trial.. A hierarchical modeling technique was used to emphasise the variability between settings that would not have been apparent in a random sample and overcomes the problems associated with studies of intervention effects when SCUs are assigned to experimental or control conditions, but the individual is the unit of analysis. For this reason the study has been able to be rated as strong in the Forbes ratings even though the sample is not random.

While the study is exciting in its design the findings in relation to homelikeness are not dramatic

“Persons living in SCUs with a more residential, less institutional environment expressed lower levels of overall aggression than those living in more institutional settings”.

There was no relationship of homelikeness with agitation, depression, social withdrawal or psychotic symptoms.

Perhaps the most obvious features of a domestic environment are the ‘homelike’ furnishings and fittings. A very well controlled investigation of the effects of introducing a few of the most basic elements of a homelike environment into a very institutional nursing home (Cohen-Mansfield J. Werner 1998) showed that residents chose to spend time in a corridor containing comfortable chairs, pictures, coffee table, books and the aroma of citrus in comparison with a normal corridor. There was a weak trend to reduced agitation, pacing and exit seeking in comparison to behaviour in a normal corridor but this positive trend was stronger when instead of a domestic setting being provided a setting reminiscent of a natural outdoor setting was provided. The differences between the two enhanced settings were small. This study is probably best interpreted as supporting any and all steps available to break the institutional character of nursing homes with long hospital style corridors and shiny floors. It does have the advantage though of controlling for staff skills and knowledge and other features of the social environment.

Does a homelike environment have any effect on the rate of functional decline of people with dementia? If it can be assumed that homelikeness is a feature of SCUs in the USA, and there is some doubt about this (Chappel Reid 2000), then the findings of the 4 State study of 800 facilities (Phillips 1997.) are relevant. This showed that SCU residents declined at the same rate as non-SCU residents matched for base line cognitive status, behavioural problems, age, sex and length of stay.

In summary the strongest evidence specifically on the provision of homelike environments supports the idea that they reduce aggression and may have a beneficial effect on levels of agitation. When the homelikeness is part of an intervention that includes enhanced staff skills and knowledge there is strong evidence of beneficial effects on quality of life, anxiety and



interest in surroundings. People with dementia living in such surroundings can be expected to do as well as those living at home with the type of community supports available in 1987, i.e. access to respite and day care. However there are no grounds for believing that a homelike environment will slow functional decline.

Additional, usually supportive, findings are to be found in several studies with weaker methodologies. These studies also throw light on the nature of a homelike environment.

Annerstedt and her colleagues in Sweden demonstrated that in comparison to a reference group living in traditional nursing homes people with dementia living in purpose designed and staffed Group Living units showed, after 6 months, significantly better motoric and emotional functions ($P < (.001)$), and intellectual function and symptoms common in dementia, but not defined, ($P < 0.01$). After 12 months there were no significant statistical differences. (Annerstedt 1993). However it should be borne in mind that 6 months of improvement is very valuable to a person in the latter stages of dementia. The GL units were designed to be small and homelike. Unfortunately this study did not control for different levels of staff training, concentrating on the results of the 'outcome of the intervention as a whole'.

In a study using samples matched on age, diagnosis, social and physical dependency (Annerstedt 1997) small homelike group living units were shown to be effective during a certain stage of deterioration **“when the person is able to act as a social individual”**. During this period **“GL care can act therapeutically to reducing secondary symptoms and preserve independence.”** However Annerstedt is clear that the physical environment is only part of the intervention. **“Prerequisites are a homogenous group of residents according to type and level of dementia, a well-educated, empathetic staff whose competence is maintained and a small home-like setting providing safety and cues.”**

In a related study (Elmstahl, Annerstedt, Ahlund 1997) the findings of Reimer et al (Reimer, Slaughter, Donaldson et al 2004) regarding higher levels of agitation were corroborated. Elmstahl reported that **“The degree of restlessness was significantly higher among residents staying in GL (Group Living) units classified as very homelike than among residents living in moderately homelike GL units.”**

A number of cross sectional studies have tried to assess the relationship between homelikeness and various aspects of the life and symptomatology of people with dementia. The very nature of cross sectional studies renders them incapable of assigning causality and they often seem to raise more questions than they answer.

A systematic attempt to define homelikeness (Quincy, Adam, Cynthia et al 2005) used the Hopkins Homelike Environmental Rating Scale (HHERS) in a comparison of 22 facilities. **“This 14-item measure was designed to capture the overall homelike climate of each facility. It consists of two subscales: family-like social climate (e.g., “Facility caregivers interact socially with the residents”) and homelike physical environment (e.g., “Residents’ rooms are tailored to their personal taste”).”**

The study concluded with the observations that:

“Contrary to our hypotheses, environmental factors, specifically size and homelike



setting, were not significant correlates of quality of life. Homelike environment and size also did not appear to moderate many of the affects of agitation, depression, apathy, or irritability on quality of life”.

A similarly negative finding concerning the relationship between homelikeness, as measured by the Therapeutic Environment Screening Scale (TESS-2+), and agitation, measured by the Resident and Staff Observation Checklist (RSOC) (Sloane P. D., Mathew, Scarborough et al 1991) was found in a cross sectional survey of 53 special care units for people with dementia (Sloane P.D., Mitchell, Preisser et al 1998). While low stimulation, characterised by having residents in bed for part of the day, and small size predicted lower level of agitation, homelikeness did not.

A recent Australian qualitative investigation of the views of staff and relatives on a new purpose designed (Cioffi, Fleming, Wilkes et al 2007) suggested that homelikness is related to concepts such as a pleasant milieu, looking homely, a home-like eating environment, feeling homely, like a kitchen at home, tranquility, light and airy, serene, unrestricted, inviting for relatives and comfortable for children. The authors concluded that:

This study has shown that an improved environment, such as an SCU, can enhance the QOL for residents, the ‘nursing home’ experience for relatives and the working environment for staff. For residents, the QOL improved as a result of decreased agitation, better sleeping patterns, greater freedom and increased appetite. For the relatives, the nursing home experience was improved as the lighter airy home-like atmosphere with garden access increased their comfort with visiting and with having their family member in care. For staff, their work environment was improved by better access to equipment, and greater ability to monitor residents and provide better care. They were able to feel more comfortable about the safety of the residents.

The main features of SCU design that relatives appreciated were the home-like family environment and tranquil atmosphere; these design features resulted in a SCU that was conducive to visitors. The SCU kitchen and dining room were described as very homely and this resulted in residents gaining weight.

It is clear that there is little evidence to support the idea that the provision of a homelike environment in itself will bring about positive results for people with dementia. It has to be combined with appropriate philosophies of care, well skilled staff and good management practices (Atkinson 1995; Moore 1999.; Rosewarne, Opie, Bruce et al 1997).

The appearance of domesticity, ie the ‘homelikeness’ of the environment, is only part of a domestic environment. As well as looking like home a truly domestic environment must provides residents with opportunities to engage in the ordinary activities of daily living that characterise life at home. Many of these activities centre on the kitchen and dining room. The fundamental idea behind these activities is that the resident should not be a passive recipient of services but should be afforded the opportunity of making a contribution, however small. In other words, to be seen as a competent partner (Kihlgren, Hallgren, Norberg et al 1994).

The strongest evidence to support this approach (Reimer, Slaughter, Donaldson et al 2004) comes from a study of a special care facility where **“The physical environment and daily**



activities were arranged like a typical home, with residents able to help in the kitchen, sweep the floor, sit by the fireplace, or go outside into a small enclosed garden area.”

The results included less decline in ADL functions than in the control groups ($p=0.16$), less anxiety ($p=0.003$) and increased interest ($=-0.017$). However this environment was also designed to be smaller and more domestic than those it was compared with and the effects of these characteristics cannot be extracted from the findings.

In what may be the most basic demonstration of the positive impact of engaging residents in an ordinary activity, a familiar dining experience around a table, as compared with providing meals to residents in their chairs in corridors, was linked with increased social interaction and improved eating behaviour. (Melin Gotestam 1981.) The authors note ...

“However, changes in the patient’s environment do not automatically lead to increased activity. To ensure a positive effect on the patient behavior, contingency analyses have to be made. The ward milieu has to be created to increase the possibility to communicate and to obtain reinforcers, not just by putting the residents close together but also by making them dependent on each other if possible. In the present study this was done by changing the meal situation so that the residents had to communicate to get what they wanted from the table” (Melin Gotestam 1981.) (underlining added).

Ordinary activities can also include more personal care, such as grooming. There is clear evidence of the beneficial effects on QoL of engaging residents in these activities in a rich environment that included the opportunity to engage in activities such as food preparation (Wood, Harris, Snider et al 2005) However, this study indicates the need for the active and focused intervention of staff for the environmental provisions to have an effect.

“The most enabling environmental presses occurred when staff managed activity situations in ways that continually supported residents’ positive behaviors and affect. ADL times and some activity groups constituted such situations”. (Wood, Harris, Snider et al 2005)

Wood et al conclude that

“Perhaps most importantly, therefore, attention must be paid to how therapeutically designed, beautiful, and homelike architectural spaces can best be transformed into alive occupational spaces, as well as to what personal and institutional contributions and commitments are needed to make such transformations a reality”.

The CADE units in NSW were designed to provide the opportunity for the involvement of residents in domestic activities and staff were trained and encouraged to do this (Atkinson 1995). The evaluation of the first 15 months of operation of the first of these units (Fleming R., Bowles, J. and Mellor, S. 1989) indicated significant improvement in self help skills, social interaction and behaviour when compared to baseline measurements established in a long stay ward in a psychiatric hospital.

Supportive evidence of the significance of ordinary activities in establishing social networks and



a sense of community has been found in a well executed qualitative study (McAllister Silverman 1999.) (Forbes rating = weak, qualitative) comparing a small, homelike facility with a traditional nursing home. One of the residents remarked:

“ ‘They cook your meals; sometimes I do the dishes—I don’t have to but I help out’. She also told me she’s glad she doesn’t have to cook here, though ‘it was OK cooking at home because you knew what they liked’” (McAllister Silverman 1999.).

Highlighting the fact that not only do environmental characteristics and staff practices influence the effectiveness of interventions but resident perceptions and wishes are also very important.

In summary it may be said that the evidence supporting the importance of the provision of the opportunity to engage in ordinary activities is not strong. The best study involves too many variables to be certain that the ordinary activities are central to the positive effects. The study that shows a positive effect when ordinary activities were introduced did not have an active control group (Melin Gotestam 1981.). The positive responses shown may have been gained by the introduction of any of a variety of types of change to the boring ward environment. The other studies are methodologically weak.

Links to the community

The review identified this as a gap in research. There are no methodologically sound investigations of the impact of linking facilities with the surrounding community.

Summary

While an over emphasis on safety may have a detrimental effect there is good evidence that unobtrusive safety features improve resident well being, especially depression.

While there is evidence supporting the proposition that small size is associated with a variety of positive outcomes for people with dementia it is impossible to quantify the contribution that the size of the unit makes in comparison with the other environmental factors that are commonly associated with a purposely designed, small unit e.g. homelikeness, safety and familiarity. In a study where a strong attempt was made to control for these factors (Zeisel, Silverstein, Hyde et al 2003) larger numeric size was shown to be positive in that it was associated with less social withdrawal and there was no significant relationship with agitation, aggression, depression or psychotic symptoms.

The evidence for the incorporation of good visual access on the broad, unit level scale is not strong but the dramatic effect of making an important amenity, the toilet, easily seen provides good supporting evidence for the concept.

The careful reduction of unnecessary stimulation and enhancement of helpful stimulation is well supported. The evidence extends to increasing levels of illumination beyond what is usually considered to be normal. However the evidence for the effectiveness of signage in environments for people with dementia is not strong and the evidence for the use of personal memorabilia and objects as aids to orientation is limited.



There is good evidence for the provision of a variety of spaces in environments for people with dementia as they assist in reducing anxiety and depression while improving social interaction and may assist the resident to find their way around. However specific evidence for benefits of gardens per se, without enhanced staff interaction, is weak and there have been no well designed studies of the provision of wandering paths.

The provision of a familiar environment, especially when that is taken to include the provision of single rooms that facilitate personalization, is supported.

Providing ways of linking the residential facility to the community through the inclusion of environmental features e.g. a coffee shop, is yet to be properly researched.

The difficulties of distinguishing between the social/professional environment, i.e philosophy of care, staff skills, good management practices, and the physical environment make it difficult to conclude that a homelike physical environment has a broad impact, especially in the case of people with advanced dementia. However there is good evidence that it reduces aggression. The evidence for the beneficial effects of involving people with dementia in ordinary activities of daily living is weak.

While recognising that there are substantial gaps in the literature, especially in regard to information on designing for people with advanced dementia, we may be confident about using unobtrusive safety measures; varying the ambience, size and shape of spaces; providing single rooms; maximizing visual access to important features and providing for stimulus control with the periodic availability of high levels of illumination.



References

- Ancoli-Israel S, Clopton P, et al (1997) Use of wrist activity for monitoring sleep/wake in demented nursing home patients. . Sleep 20 24-27.
- Ancoli-Israel S, Gehrman P, et al (2003) Increased light exposure consolidates sleep and strengthens circadian rhythms in severe Alzheimer's disease patients. Behavioral Sleep Medicine 1(1) 22-36.
- Annerstedt L (1993) Development and consequences of group living in Sweden : A new mode of care for the demented elderly. Social Science & Medicine 37(12) 1529-1538.
- Annerstedt L (1997) Group-living care: An alternative for the demented elderly. Dementia and Geriatric Cognitive Disorders 8(2) 136-142.
- Atkinson A (1995) Managing people with dementia: CADE units... confused and disturbed elderly. Nursing Standard 9(25) 29-32.
- Bellelli G, Frisoni G, et al (1998) Special care units for demented patients: a multicenter study. Gerontologist 38(4) 456-462.
- Bianchetti A, Benvenuti P, et al (1997) An Italian model of dementia special care unit: Results of a pilot study. Alzheimer Disease & Associated Disorders 11(1) 53-56.
- Bowie P, Mountain G (1997) The relationship between patient behaviour and environmental quality for the dementing. International Journal of Geriatric Psychiatry 12(7) 718-723.
- Brawley EC (1997.) Designing for Alzheimer's disease. Strategies for creating better care environments. New York: Wiley,.
- Brawley EC (2001) Environmental design for Alzheimer's disease: a quality of life issue. Aging & Mental Health 5(2 supp 1) 79 - 83.
- Chafetz PK (1991) Behavioral and cognitive outcomes of SCU care. Clinical Gerontologist, 11, 19-38.
- Chappel NL, Reid CR (2000) Dimensions of care of dementia sufferers in long-term care institutions: Are they related to outcomes? The Journals of Gerontology 55B(4) S234.
- Cioffi JM, Fleming A, et al (2007) The effect of environmental change on residents with dementia: The perceptions of relatives and staff. Dementia 6(2) 215-231.
- Cleary TA, Clamon C, et al (1988.) A reduced stimulation unit: Effects on patients with Alzheimer's Disease and related disorders. The Gerontologist, 28, 511-514.
- Cohen-Mansfield J, Werner P (1995) Environmental influences on agitation: An integrative summary of an observational study. American Journal of Alzheimer's Disease and Other Dementias 10(1) 32-39.
- Cohen-Mansfield J, Werner P (1998) The effects of an enhanced environment on nursing home residents who pace. Gerontologist 38(2) 199-208.
- Cohen-Mansfield J, Werner P (1999) Outdoor wandering parks for persons with dementia: a survey of characteristics and use. Alzheimer Disease & Associated Disorders 13(2) 109-117.



Cohen U, & Weisman, G.D. (1991) Holding on to home: Designing environments for people with dementia. Baltimore: Johns Hopkins University Press,.

Cox H, Burns I, et al (2004) Multisensory environments for leisure: promoting well-being in nursing home residents with dementia. *Journal of Gerontological Nursing* 30(2) 37-45.

Dickinson JI, McLain-Kark J (1998) Wandering behavior and attempted exits among residents diagnosed with dementia-related illnesses: A qualitative approach. *Journal of Women & Aging* 10(2) 23.

Dickinson JI, McLain-Kark J, et al (1995) The effects of visual barriers on exiting behavior in a dementia care unit. *Gerontologist* 35(1) 127-130.

Elmstahl S, Annerstedt L, et al (1997) How should a group living unit for demented elderly be designed to decrease psychiatric symptoms? *Alzheimer Disease & Associated Disorders* 11(1) 47-52.

Evans B (1989.) *Managing from day to day: Creating a safe and workable environment.* Minneapolis, MN: Department of Veterans Affairs Medical Centre,.

Fleming R (in press) An environmental audit tool suitable for use in homelike facilities for people with dementia. *Australasian Journal on Ageing*.

Fleming R, Bowles J (1987) Units for the confused and disturbed elderly: Development, Design, Programming and Evaluation. *Australian Journal on Ageing* 6(4) 25-28.

Fleming R, Bowles, J. and Mellor, S. (1989) Peppertree Lodge: Some observations on the first fifteen months of the first C.A.D.E. unit. *Australian Journal on Ageing* 8(4) 29-32.

Fleming R, Crookes P, et al. (2008). A review of the empirical literature on the design of physical environments for people with dementia. Primary Dementia Collaborative Research Centre, UNSW.

Fleming R, Forbes I, et al. (2003). *Adapting the ward for people with dementia.* Sydney: NSW Department of Health.

Fleming R, Purandare N (2010) Long term care for people with dementia: environmental design guidelines. *International Psychogeriatrics* 22(7) 1084-1096.

Gasio PF, Kräuch K, et al (2003) Dawn–dusk simulation light therapy of disturbed circadian rest–activity cycles in demented elderly. *Experimental Gerontology* 38(1-2): 207-216. 38(1-2) 207-216.

Graf A, Wallner C, et al (2001) The effects of light therapy on mini-mental state examination scores in demented patients. *Biological Psychiatry* 50(9) 725-727.

Grant LA, Kane RA, et al (1995) Beyond labels: nursing home care for Alzheimer's disease in and out of special care units. *Journal of the American Geriatrics Society* 43(5) 569-576.

Greene JA, Asp J (1985) Specialized management of the Alzheimer's disease patient: does it make a difference? A preliminary progress report. *Journal of the Tennessee Medical Association* 78(9) 559-563.



- Hall G, Kirschling, M.V., & Todd, S. (1986.) Sheltered freedom - An Alzheimer's unit in an ICF. *Geriatric Nursing*, 7, 132-137.
- Hanley IG (1981) The use of signposts and active training to modify ward disorientation in elderly patients. *Journal of Behavior Therapy & Experimental Psychiatry* 12(3) 241-247.
- Hanley IG (1981.) The use of signposts and active training to modify ward disorientation in elderly patients. *Journal of Behavioural Therapy and Experimental Psychiatry*, 12, 241-247.
- Hewawasam LC (1996) The use of two-dimensional grid patterns to limit hazardous ambulation in elderly patients with Alzheimer's disease. *Nursing Times Research* 1(3) 217-227.
- Hoglund JD, Dimotta S, et al (1994) Long-term care design: Woodside Place--the role of environmental design in quality of life for residents with dementia. *Journal of Healthcare Design* 6 69-76.
- Kihlgren M, Hallgren A, et al (1994) Integrity promoting care of demented patients: Patterns of interaction during morning care. . *International Journal of Aging and Human Development* 39(4) 303-319.
- Kovach C, Weisman G, et al (1997) Impacts of a therapeutic environment for dementia care. *American Journal of Alzheimer's Disease and Other Dementias* 12(3) 99-110.
- Kuhn D, Kasayka RE, et al (2002) Behavioral observations and quality of life among persons with dementia in 10 assisted living facilities. *American Journal of Alzheimer's Disease and Other Dementias* 17(5) 291-298.
- Lawton MP, Fulcomer, M., & Kleban, M. (1984.) Architecture for the mentally impaired elderly. *Environment and Behaviour*, 16, 730-757.
- Leon J, Ory MG (1999) Effectiveness of Special Care Unit (SCU) placements in reducing physically aggressive behaviors in recently admitted dementia nursing home residents. *American Journal of Alzheimer's Disease and Other Dementias* 14(5) 270-277.
- Low LF, Draper B, et al (2004) The relationship between self-destructive behaviour and nursing home environment. *Aging & Mental Health* 8(1) 29-33.
- Mayer R, Darby SJ (1991) Does a mirror deter wandering in demented older people? [Journal Peer Reviewed Journal]. *International Journal of Geriatric Psychiatry* 6(8) 607-609.
- McAllister CL, Silverman MA (1999.) Community formation and community roles among persons with Alzheimer's disease: A comparative study of experiences in a residential Alzheimer's facility and a traditional nursing home. *Qualitative Health Research*, 9, 65-85.
- Melin L, Gotestam KG (1981.) The effects of rearranging ward routines on communication and eating behaviours of psychogeriatric patients. *Journal of Applied Behaviour Analysis*, 14, 47-51.
- Mishima K, Okawa, M., Hishikawa, Y., Hozumi, S., Hori, H., & Takahashi, K. (1994) Morning bright light therapy for sleep and behaviour disorders in elderly patients with dementia. *Acta Psychiatry Scandinavia*, 89, 1-7.



- Mooney P, & Nicell, P.L. (1992.) The importance of exterior environment for Alzheimer residents: Effective care and risk management. *Healthcare Management Forum*, 5, 23-29.
- Moore KD (1999.) Dissonance in the dining room: A study of social interaction in a special care unit. *Qualitative Health Research*, 9, 133-155.
- Morgan DG, Stewart NJ (1997) The importance of the social environment in dementia care. *Western Journal of Nursing Research* 19(6) 740-761.
- Morgan DG, Stewart NJ (1998) Multiple occupancy versus private rooms on dementia care units. *Environment and Behavior* 30(4) 487-503.
- Namazi KH, & Johnson, B.D. (1992) Dressing independently: A closet modification model for Alzheimer's disease patients. *American Journal of Alzheimer's Care and Related Disorders and Research*, 7, 22-28.
- Namazi KH, Johnson BD (1991a) Environmental effects on incontinence problems in Alzheimer's disease patients. *American Journal of Alzheimer's Disease and Other Dementias* 6(6) 16-21.
- Namazi KH, Johnson BD (1991b) Physical environmental cues to reduce the problems of incontinence in Alzheimer's disease units. *American Journal of Alzheimer's Disease and Other Dementias* 6(6) 22-28.
- Namazi KH, Johnson BD (1992a) Pertinent autonomy for residents with dementias: Modification of the physical environment to enhance independence. *American Journal of Alzheimer's Disease and Other Dementias* 7(1) 16-21.
- Namazi KH, Rosner TT, et al (1991) Long-term memory cuing to reduce visuo-spatial disorientation in Alzheimer's disease patients in a special care unit. *American Journal of Alzheimer's Disease and Other Dementias* 6(6) 10-15.
- Namazi KH, Rosner, T.T., & Calkins, M.P. (1989.) Visual barriers to prevent ambulatory Alzheimer's patients from exiting through an emergency door. *The Gerontologist* 29, 699-702.
- Nelson J (1995.) The influence of environmental factors in incidents of disruptive behaviour. *Journal of Gerontological Nursing*, 21,((5),) 19-24.
- Netten A (1989.) The effect of design of residential homes in creating dependency among confused elderly residents: A study of elderly demented residents and their ability to find their way around homes for the elderly. *International Journal of Geriatric Psychiatry*, 4, 143-153.
- Nolan B, Mathews R, et al (2002) Evaluation of the effect of orientation cues on wayfinding in persons with dementia. *Alzheimers Care Quarterly* 3(1) 46-49.
- Passini R, Pigot H, et al (2000) Wayfinding in a Nursing Home for Advanced Dementia of the Alzheimer's Type. *Environment and Behavior* 32(5) 684-710.
- Passini R, Rainville C, et al (1998.) Wayfinding with dementia: Some research findings and a new look at design. *Journal of Architectural and Planning Research*, 15, 133-151.



- Phillips CD, Sloan, P.D., Howes, C., & Koch, G. (1997.) Effects of residence in Alzheimer disease special care units on functional outcomes. *Journal of American Medical Association*, 278, 1340-1344.
- Quincy MS, Adam R, et al (2005) The Association of Neuropsychiatric Symptoms and Environment With Quality of Life in Assisted Living Residents With Dementia. *The Gerontologist* 45(1) 19.
- Rabins PV, Kasper JD, et al. (2000). Concepts and methods in the ADRQL: an instrument for assessing health-related quality of life in persons with Alzheimer's disease. New York: Springer Publishing Company.
- Reimer M, A. , Slaughter S, et al (2004) Special Care Facility Compared with Traditional Environments for Dementia Care: A Longitudinal Study of Quality of Life. *Journal of the American Geriatrics Society* 52(7) 1085.
- Rheume YL, Manning BC, et al (1998) Effect of light therapy upon disturbed behaviors in Alzheimer patients. *American Journal of Alzheimer's Disease and Other Dementias* 13(6) 291-295.
- Rosewarne R, Opie J, et al. (1997). Care Needs of People with Dementia and Challenging Behaviour Living in Residential Facilities: Australian Government Publishing Service.
- Satlin A, Volicer, L., Ross, V., Herz, L., & Campbell, S. (1992) Bright light treatment of behavioural and sleep disturbances in patients with Alzheimer's Disease. *American Journal of Psychiatry*, 149, 1028-1032.
- Schwarz B, Chaudhury H, et al (2004) Effect of design interventions on a dementia care setting. *American Journal of Alzheimer's Disease and Other Dementias* 19(3) 172-176.
- Sloan PD, Mitchell, C.M., Preisser, J.S., Phillips, C., Commander, C., & Burkner, E. (1998) Environmental correlates of resident agitation in Alzheimer's disease special care units. *Journal of American Geriatrics Society*, 46, 862-869.
- Sloane PD, Christianna P, et al (2007) High-Intensity Environmental Light in Dementia: Effect on Sleep and Activity. *Journal of the American Geriatrics Society* 55(10) 1524.
- Sloane PD, Mathew LJ, et al (1991) Physical and pharmacologic restraint of nursing home patients with dementia. Impact of specialized units.[see comment]. *JAMA* 265(10) 1278-1282.
- Sloane PD, Mitchell CM, et al (1998) Environmental correlates of resident agitation in Alzheimer's disease special care units. *Journal of American Geriatrics Society* 46, 862-869.
- Thorpe L, Middleton J, et al (2000) Bright light therapy for demented nursing home patients with behavioral disturbance. *American Journal of Alzheimer's Disease and Other Dementias* 15(1) 18-26.
- Torrington J (2006) What has architecture got to do with dementia care? Explorations of the relationship between quality of life and building design in two EQUAL projects. *Quality in Ageing* 7(1) 34.



van Someren EJ, Kessler A, et al (1997) Indirect bright light improves circadian rest-activity rhythm disturbances in demented patients. *Biological Psychiatry* 41(9) 955-963.

Wells Y, Jorm AF (1987) Evaluation of a special nursing home unit for dementia sufferers: a randomised controlled comparison with community care. *Australian & New Zealand Journal of Psychiatry* 21(4) 524-531.

Wood W, Harris S, et al (2005) Activity situations on an Alzheimer's disease special care unit and resident environmental interaction, time use, and affect. *American Journal of Alzheimer's Disease and Other Dementias* 20(2) 105-118.

Zeisel J, Silverstein NM, et al (2003) Environmental correlates to behavioral health outcomes in Alzheimer's special care units. *The Gerontologist* 43(5) 697.



