

Determining the Affect of Evidence on Built Environments in Elder Care Facilities

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Introduction

Considerable research has been described in the literature in recent years that examines the relationship between built environments and better health outcomes in acute hospital care and although some literature exists regarding the evidence of the impact from built environments on the elderly most of it is not well researched. This paper explores the possible links that can be drawn between the general literature on supportive design and the likely contribution the research makes in affecting better outcomes for aged residents, especially those with dementia. The paper also examines ways that can be used to create better design principles that will resolve many of these issues.

Examining the Evidence

In a literature review of the built environment with affects on health and healing we found a great deal of information about what authors described as good or bad design of facilities. There is however very little research literature that showed the evidence and made the links to a cause and effect between environments and better health outcomes for aged residents.

We did however find some useful reviews of literature covering the links between the designs of general healthcare facility environments and the way they affect a patient's medical outcomes. One such recent example of a literature review

is the work by Rubin and her colleagues for the Centre for Health Design in California¹⁾. This covered some 70,000 titles of which 1,000 articles were analysed. In the end only 67 studies provided some scientifically validated evidence of improved patient outcome resulting from an environmental factor.

However it is clear that there is still a great shortage of solid evidence connecting the affects of built environments and health outcomes. Regardless, it is important to note that Rubin's research has identified useful data for developing general design principles and especially an extensive body of research by Roger Ulrich from the Texas A & M University has shown how the reduction of environmental stressors assists with improving patient outcomes^{2) 3)}.

Recent work conducted with dementia specific facilities by GHAAP (the Group for Health Architecture and Planning) at University of Technology, Sydney, Australia and DSDC (Dementia Services Development Centre), Sydney, Australia shows that a body of literature is growing to describe better design practice in the building of dementia specific residential accommodation, even when the literature produces little hard evidence for its scientific validity⁴⁾.

Does this mean that we can not move forward to designing more appropriate kinds of facility? Clearly the answer is no and the reason is that the

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designer are looking for something quite different from the scientist. Designers are not so concerned with the evidential nature of the information but rather are concerned with determining whether the new information is reasonably supported and helps to solve an immediate problem or group of problems. Scientists on the other hand are ready to completely discount the validity of something if they feel there is some compounding variable that might have influenced an aspect of the study.

In attempting to examine the issues around the links between health outcomes, specifically dementia and the built environment for this paper, we decided to use the literature supporting evidence about better health facility environmental design in general terms and to transpose these in answering questions about the likely influences on health outcomes.

Changing Attitudes to Design

In recent years we have seen a change of attitude in business of buildings from the purely functional and technical concerns for treatment and care of patients, to a wider concern about improving health outcomes. Clearly many of these outcomes are measured in terms of the improvement in clinical results but also the broader concern is to answer the question as to whether all the money and effort put into health provision actually makes people healthier.

When we come to talking about acute intervention much of the improved outcome can be related to returning peoples' functions and returning an individual's performance to what it was before the onset of the condition requiring treatment. This is not the case with the elderly who are slowly deteriorating and have continuing dysfunction to varying degrees. The best we can do is support these people in achieving their optimum functioning state and in accommodating conditions that will never actually return to some pre-interventional state.

Additionally, the design of all healthcare

facilities was dominated in the past by the concerns to achieve operational efficiency. This could be defined as the most cost effective way of ensuring staff skills and medical technology were applied to the patient's treatment in achieving the expected healing outcome. This was driven by medical concerns such that both designers and clinical staff, who were setting the agenda, seemed oblivious to the psychological and emotional needs of the patients, supporters or health care staff.

While this may not have seemed important in short-stay environments, it has now become a big concern in long-stay environments especially with regard to clients in residential care and the many chronic patients who continually revisit hospitals and health centres for ongoing treatment. There is now a small but growing body of scientifically based knowledge that suggests where the facility design doesn't support patients emotionally, it doesn't support the patient physiologically and this leads to induced stress. Continued high stress is significantly correlated with negative health outcomes. That is why we now should realize the importance of physical environment in facilities in terms of not only operational efficiency but also in its emotional aspects.

A Philosophy of Supportive Design

Of all the research on physical environments, the works done at the Texas A&M University's Environmental Psychophysiology Laboratory in the USA, at the Karolinska Institute in Sweden, at Sheffield University in UK and at a few other universities and centres around the world have been most significant. These works focus on charting the relationship between stress and the physical environments. The advantage of these works is that the manifestations of stress can be tracked through well-documented psychological and physiological consequences. Additionally the negative influences of stress on health are possible to be measured and identified and have

been well documented in the scientific literature.

Importantly we also know that psychological problems are associated with stress include anxiety, depression and a sense of helplessness. This perspective provides the essential link to decisions about the areas in which wellness and physical space can be examined. A new area of investigation is being carried out in a discipline called PNI this is called "Psychoneuroimmunology". This transdisciplinary field is concerned with the interaction between behaviour, the immune system and the nervous system⁵⁾. The linkages cover understandings of biological mechanism underlying the influence of psychosocial factors on immunologically resisted and mediated diseases. Another is an understanding of the immune systems contribution to psychiatric illness.

From a designer's point of view, to understand that the psychosocial influences created by better environments can have an influence on the immune system, suggests that the body's ability to resist diseases and to contribute to wellness is critically important for spatial design. We need to understand the aspect of design which make for positive influences and negative ones. We know for example of the deleterious impact by stress on the body through the prolonged elevated levels caused by neuroendocrine induced hormones on cardiovascular risk⁶⁾.

Using what we know about Supportive Design

If we concentrate on what causes stress and anxiety in users of a space and seek ways to counter these things, we have a better chance of creating positive wellness environments rather than negative depressing ones.

One of the many things we know about the way that people use space is to recognise that health institutions expect us to be "patients" which in sociological terms means we hand over responsibility for ourselves to a care provider and

allow them to intervene on our behalf. This loss of self control has time and again shown to be a major contributor to anxiety and depression²⁾³⁾. For the aged, increased loss of self-care ability can only be reinforced when it is necessary to operate in spaces that force staff in institutions to protect people from hazards and to control their movements for their own good. Let us examine the known areas for design improvement.

Space and Circulation

The first of these design measures is circulation and spatial planning in a facility. Having control over the ability to move freely depends on making sure that doorways go somewhere safe and come back again without the possibility of wandering away or getting lost. Doors should never be located where they are visible to a demented person and then locked. This causes continued agitation at the door as the cue given by the door is "out" and they forget that when they have tried the door minutes before it was locked.

Colour coded lines in floors and endless corridors that offer no understanding of what is ahead are of little use and contribute to confusion and anxiety. This requires planning for where people might go when they leave their room and what cues they are getting from the environment around them. Putting windows along one side of a corridor looking into a courtyard or outside, makes landmarks familiar, or enables the ability to see where the corridor leads ahead. If there is an outside and it is attractive then people should be able to access it. If there is a place where people can sit and talk, watch TV, or engage in social activities then this should be visible from the bedroom and easily accessed by a short corridor without staff support (Fig.1).

Poor spatial planning creates frustration by having doors that are locked, or spaces on the wrong side of a clear glass area that can be seen but not accessed. These kinds of spaces reinforce the helplessness of people and contribute to



Fig.1

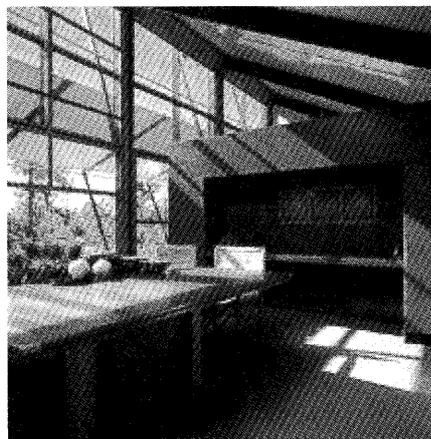


Fig.2

anxiety and depression.

Lighting

Having natural light is critically important. Firstly there is good physiological evidence that natural light supports the physiology. Similarly being subjected to low light levels for extended times, such as that seen in the darkened northern hemisphere winters, has strong associations with adverse biorhythmic, physical and mental effects. It is often strongly correlated with severe depression as well as sleep, eating and other disorders. The careful planning of natural light or any light is one way to improve the wellness effect. We need to work with bright lights to enhance alertness and to stimulated functions, then low lights to suggest and invoke the natural diurnal response for sleep at night. Design of lighting is easy to achieve and an important tool to reduce depression (Fig.2).

Noise

Noise is another element, which if intrusive has prolonged deleterious effects. Studies done in the USA by the Environmental Protection Agency have shown such effects. While benchmarked noise levels in healthcare environments are supposed to be kept to between 35db and 45db, studies have shown noise spikes as high as 120 db

when trays are dropped or doors slammed⁷⁾. It is recorded that in many aged care facilities as many as 30 outbursts of noise as high as 60 db occur at night. Sleep deprivation and disturbed sleep have well known consequences on behaviour and depression⁸⁾. In addition, continuous background noises caused by hard and resilient surfaces create a hubbub that makes comprehension by the elderly with hearing impaired much harder. This also adds to confusion and disorientation.

Resolution of these noise problems is not hard⁹⁾. Source attenuation is possible using insulation against noise penetration, and sound absorbing surfaces, while source elimination is also possible by eliminating beeping equipment, telephones, intercom and pagers. Introduction of “white noise” such as water falls and landscape noises including fountains or water streams just outside a window has a calming effect (Fig.3). Judicious use of music with lots of client control can also add a positive effect.

Aroma Control

Indoor pollution, clean air and aromatherapy are areas that some investigations have shown good results. The introduction of natural ventilation is not only an important environmental value so that less air-conditioning is needed



Fig.3

and the removal of smells is easily achieved. Examples are found in the USA where aroma machines subtly dispensing natural scents derived from flowers, herbs, leaves, woods, resins, spices and fruits are diffused into the air³⁾. This has been shown to supplant unpleasant smells and to cleanse the air, prevent cross infection and unconsciously reduce patients' stress.

Essential oils have also been used in this fashion and they have been shown to be effective as antibacterial, antifungal and it is claimed antidepressant and uplifting although the evidence is scant. There is little supportive evidence to accompany these ideas but they remain an interesting idea.

Landscapes and Views

Normalising locations through outlooks onto familiar scenes is well researched and determined to be important⁹⁾. The evidence of a link to sub-conscious responses caused by the view of and involvement with gardens and landscape has clear benefits¹⁰⁾. The "*biophilia hypothesis*" suggests that humans are sensitive to landscapes due to genetic connections and should use them to reduce stress¹¹⁾. Especially important is the ability to access flowers and gardens (Fig.4). Studies show that the ability to provide such stimulation



Fig.4

and distraction is positive.

We know from studies done that watching restful longer distant views increases healing rates in hospitals¹²⁾. This should produce similar benefits for residents of long-term care homes although no studies have been done to measure this specifically.

Landscaped areas are important elements in positive distraction. Use of objects as landmarks outside the window enables way-finding, hence more functional self-control. This extends to being able to go with ones relative, or by one's self, to a quiet natural space and being alone. Some research has shown this is beneficial²⁾³⁾¹³⁾. It has shown to reduce stress and is believed to be part of an important human coping mechanism.

Research into exposure to natural environments shows rapid changes in physiological measures, including reductions in blood pressure, muscle and skin conductance. This works for everyone, staff, residents and visitors. Distraction also helps with pain reduction since it has been shown that

exposure to supportive environments helps the body release endorphins, which assist with pain relief.

Creating emotionally supportive spaces

In recent times the operators of aged care facilities in the USA, Europe, Australia and Japan are concerned about increased levels of depression in the elderly residents of care facilities. There is little or no scientific evidence that directly links physical environments and depression, however because there is good evidence relating environmental influences caused by stress we can build on that.

There appears to be reasonable links between prolonged stress and depression and it is with these areas that we can make headway using the knowledge derived from the research available to us^{3) 14)}.

We believe the design tools are available to reduce stress and therefore depression. It is essential to create spaces using the psychosocial design tools we have outlined in making spaces positive for aged care residents, their relatives and carers.

Conclusion

Spaces that are functional, familiar and comfortable will help reduce anxieties and depression and provide the necessary support to make a healthy environment for everyone. It is therefore important that priority be given to increasing the use of research data and to support the further generation of evidence to use in design decisions. Until this happens we will not achieve the built spaces we deserve and will not be able to assist with the reduction of poor aged care environments.

Moreover the needs of staff are often overlooked in the design of facilities. They often work in facilities that can't support their activities and this adds frustration and stress to their lives. We know from other industries that improved

design of workspaces produce the same kinds of improved environments we have advocated here and this will help the staff as well. The staffs who enjoy their work because they have pleasant environments generally feel better and consequently treat the residents better. There is clear evidence of less staff turnover with well-designed spaces and generally healthy outcomes are achieved for everyone involved.

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