NSW HEALTH

A literature review

The effect of the built and natural environment of Mental Heath Units on mental health outcomes and the quality of life of the patients, the staff and the visitors

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Executive summary

The task of crafting an executive summary of a literature review is a delicate one. The articles reviewed have very individual areas of focus on the impacts that the built and natural environments have on patients, staff and visitors. To be useful, we have attempted to include a sufficient level of summary detail, while attempting to avoid trivialising the findings from individual studies for the sake of brevity.

In addition, the 46 articles reviewed are based on many different types of research. Some of the studies included have been undertaken using statistically valid methods whilst others have used observational and other qualitative methods, that while not statistically reliable, do provide a level of primary research that enables a more comprehensive understanding of the issues studied.

Major themes from the literature

The majority of the studies reviewed have concentrated at a macro level on the impacts of the built and natural environments (including the impact of design in general, remodelled wards or gardens and natural spaces) rather than micro level issues that are related to the size or function of smaller or more individualised spaces.

Based on the evidence presented in the studies reviewed, it is apparent that mental health care facilities that are designed using *supportive design* methods, that is those designed with specific reference to the needs of patients, staff and visitors, deliver positive outcomes:

- Generally improved quality of life benefits to health care patients and staff,
- Specified improved clinical outcomes for patients, and may contribute greater cost and operational efficiencies to the wider mental health care system in general.

Major themes from the literature … continued

More specifically, it appears from the literature that the built and natural environments exert a range of impacts on patients and staff in health care and mental health care environments. Effective design that incorporates the needs of patients, staff and visitors can have a positive impact on the level of satisfaction and mood and even patient behaviour. Ulrich (undated – refer to Chapter Two) believes that there is a very likelihood of reducing stress and anxiety for patients and family/visitors.

The financial benefits of an appropriately designed environment are far reaching. By reducing stress within the environment there is improved job satisfaction for employees enabling fewer staff absentee rates and a lower staff turnover. The patients are also affected by having a decrease in hospital stay and even a decrease in the amount of medication taken. Overall it appears that patients feel that physical changes in ward environments help them to feel better, whilst staff are able to generate a more positive work attitude.

The built environment was shown throughout this study to matter to patients and contribute to a decrease in hospital stay. Patients do notice good quality design and this improves patient dignity and self-image assisting them with their recovery. Consequently, the views of patients, staff and visitors should always be considered when designing health care facilities.

Discussion of specific findings

The literature review is divided into six chapters each focussing on areas that had significant impact over patient, staff and visitor well-being. Interestingly, most of these factors involve small changes to the environment that don't require major construction. Patients merely preferred an environment that was more 'like home', they also preferred having a sense of control over their environment and a range of recreational and leisure activities made available to them.

The major findings from this literature review found that:

- Gardens appear to have positive impacts upon both patients and staff related to stress reduction and in terms of improving patient clinical outcomes.
- The quality of artificial light is important. One study (Vinall 1997) found that sleep quality and thus recovery is enhanced by a combination of increased light during awake periods and decreased light during the sleep period.
- Views onto natural environments are more helpful for patients than views onto urban environments.
- Windows and access to sunlight and natural light are important for patients in particular. According to Brill (1992– refer to Chapter Two) apart from issues related to status, windows have little impact on staff job performance or satisfaction. Hence, it may be more important to provide patients with windows and views than staff. For example, staff areas can be oriented towards internal views to common areas with external windows beyond.
- Noise appears to be a factor that is stress-inducing for both patients and staff, and requires specific attention in the design of new health care facilities.

Chapter One

The study process

How the study was undertaken

The People for Places and Spaces is delighted to have been commissioned by the Centre for Mental Health, NSW Health Department to prepare this literature review, which examines the effect of the built and natural environments of mental health units on mental health outcomes and the quality of life of the patients, the staff and the visitors.

The review cites 40 research references, which explore various aspects of the study. We had hoped that the review would include research studies that focused on the effect of the built environment on our safety in Mental Health Units. We were unable to identify any relevant research results for this particular topic area. However our processes of searching for the safety research based studies took us to a range of research, guidelines and opinion based papers related to safety within the general health area, but not within the built environment. These references can be found in Appendix A, Safety and Security in Mental Health Units and Other Health Settings: Selected Research, Guidelines and Opinions Based Papers.

In selecting articles to include within this literature review, the writers have been careful to include articles that refer, in the first instance, to mental health units or where appropriate, to other health facilities. Priority was given to articles that are based on empirical research evidence. In view of the different objectives, environments and methodologies of the various studies, care has been taken not to draw inferences across studies that cannot be supported.

Although, there is literature in other social science fields about the impact of the built environment on the human condition, this was considered to be too far out of context to be directly applicable to mental health units, and has not been included.

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How the literature was sourced

We cannot claim to have found all relevant literature. We can claim, to have been vigorous in our attempts to source relevant literature in this emerging and important topic.

A wide variety of processes were used to source the literature, including:

- Web searches using Google and other search engines.
- Library searches – NSW Health, Brian Tutt Library and Resource Centre; University of Sydney; University of New South Wales; University of Technology, Sydney.
- An intensive search of The Journal for Healthcare Design Vols 1-10
- Contact by mail, phone and e-mail with leading researchers, practitioners and organizations in the field including:
  - Environmental Design Research Association. USA.
  - Pebble Project – The Center for Health Design. Pleasant Hill, CA, USA
  - Lawrence Nield, Specialist Hospital Architect, Bligh Voller Nield
  - Ann Noble, Chair Architects for Health, Royal British Institute of Architects.
  - Dr Roger Ulrich – Professor Director, Center or Health Systems & Design, Departments of Architecture, Landscape Architecture and Urban Planning, Texas A & M University, USA.
  - Professor Brian Lawson and John Wells Thorpe, Sheffield University
  - Peter Senior, Arts in Health, Manchester metropolitan University.
  - Haya Rubin, John Hopkins Medical School
  - Mungo Smith, MAPP (Medical Architecture Research Unit, London)
  - John Ratcliffe, Director, Liveable Communities and The Academy of Architecture for Health, American Institute of Architects.
  - Peter Scher, UK Architect and author practicing as an independent consultant – personal contact while he was visiting Sydney.
- Attendance at Australasian Health and Health Facilities Conference, 6th November 2003.
- Attendance at ‘Architects for Health’ meeting, 12th November, 2003

Statistical reliability of the articles

In general, it appears there have been three broad types or research used in the various studies.

1. Statistically significant studies

Some studies are stated by their authors as statistically significant, using experimental-type research methods. In these studies, we have noted this fact.

2. Non-specific research

The multi-method approach relies to a greater or lesser degree on observations and qualitative data, which are not statistically valid. It is noted however, that as such methods are common in research within the built environment and social sciences, we believed them to be of enough value to be included.

3. Non-specific research

The writers of articles have not specified the methodologies used. However, where these

articles appeared to have worthwhile findings and appeared to be carried out by researchers and professionals within the health care system, they have been included.

Using this literature review

In relation to the issue of statistical reliability, it is important to note that these studies were undertaken in different cultural contexts in other countries. As they are generally social science studies, rather than natural science studies, any statistical reliability of particular studies will apply only in the cultural context in which the studies were undertaken. In other words, all the studies will contain some level of ‘cultural bias.’

The writers believe the information in the literature review provides a very useful starting point to understand the ways in which the built and natural environment might impact patients, staff and visitors and mental health outcomes in NSW mental health units. Further contextualisation work within the NSW mental health system is strongly recommended if the implications of the literature review are to be more fully understood, and if gaps in the literature are to be identified, from within the NSW context.

Chapter Two

Impacts of facility design of hospitals and mental health units

In this chapter, the research covers the impacts of design on patients and staff and visitors within health care facilities and mental health units, including a wide variety of general design issues, for particular hospital features such as bedrooms, communal spaces and staff offices.

It appears that facility design does have health outcomes for patients and staff, especially related to stress reduction, as well as greater staff job satisfaction. Ulrich (undated) proposes a theory of supportive design, which he claims is likely to achieve these outcomes.

In relation to the statistical robustness of the articles, it appears that those by Ulrich related to general design issues are the most rigorous and are mainly based on scientific studies. The majority of the remaining studies combine elements of survey and other methods or are purely qualitative in nature.

It is noted that the majority of the research reviewed focused on patients and, to a lesser extent, on staff. Visitors receive only a passing mention in some studies units.

2

Supportive design

Ulrich (undated) argues that well-designed environments deliver benefits for both patients and staff. He has postulated a *Theory of Supportive Design* supported by *General Guidelines for Supportive Design*, which appears to be largely developed to reduce patient stress and the attendant health outcomes that stress can engender.

In arriving at his *Theory of Supportive Design,* Ulrich states that the basic premise underlining his theory is that the potential for environments to promote improved outcomes is linked to their effectiveness in facilitating stress coping and restoration (quoting his own research Ulrich 1991, 1997, 1999). He states that the great majority of patients experience stress and many suffer from acute stress, which is a significant health outcome in itself and which can directly and negatively affect many other outcomes.

Quoting Cohen et al. (1991), Ulrich states that these outcomes include numerous psychological, emotional, physiological, biochemical and behavioural changes. In response to this, he states that good design can reduce anxiety, lower blood pressure and lessen pain.

Conversely, Ulrich argues that psychologically unsupportive surroundings are linked to negative effects such as a higher occurrence of delirium, elevated depression and greater need for pain medication, and in certain situations, to longer hospital stays.

Ulrich also states that stress is a problem for families and is pervasive among health care staff.

Importantly, Ulrich (undated) asks the question: 'What advantages can health care administrators, designers, medical professionals (and the public) reasonably expect to achieve by including psychosocially supportive design criteria in the objectives for a new facility? Ulrich offers the following list, which he states: 'compiled all the advantages in terms of improved outcomes that seem realistically attainable in a well-designed facility.' The following table is not comprehensive.

In summarising the benefits of supportive design in relation to construction and operational costs, Ulrich (undated) has this to say:

'Most supportive characteristics or strategies probably cost no more than poorly designed or unsupportive facilities and many cost less. It is only too common to find facilities that were costly to build but nonetheless fail in major respects when judged according to evidence-informed supportive criteria. To reduce costs and greatly increase the potential benefits of supportive design, it is important that supportive knowledge and objectives are included early rather than late in facility design and programming. Taking a long-term perspective on costs, facility design and construction costs are low compared to expenses for facility operation, staff salaries and the day-to-day delivery of health care.'

Realistically attainable improved outcomes in a well designed facility (Ulrich)

Outcome	Likelihood of achieving		
	Very High	High	Moderately High
Reduced stress anxiety for patients and family/visitors	✓		
Improved sleep		✓	
Reduced pain			✓
Lower infection occurrence (especially for intensive care patients)			✓
Improved patient satisfaction			✓
Benefits for staff that at least some will be achieved - (reduced stress, improved job satisfaction, possibility of reduced turnover, greater attraction of qualified employees)	✓		
Cost Saving - by improving medical outcomes for example, reduced infection occurrence and reduced intake of costly strong analgesics (dependent on extent to which hospital is well designed throughout.)		✓	

Other design features

Ulrich (undated) maintains that design does affect medical outcomes: quoting Rubin et al. (1998): 'there is suggestive evidence that aspects of the designed environment exerts significant effects on clinical outcomes for patients'.

Citing his own research (Ulrich 1991, 2000) and that of (Rubin et al 1998), Ulrich maintains that the following environmental characteristics, which he groups under the banner of the *State of Scientific Knowledge,* can affect health outcomes. He further states that the discussion is not intended to be comprehensive or to include all environmental factors that may influence patient health.

Noise: According to Ulrich (undated, quoting Hilton 1985) most studies suggest that noise detrimentally affects at least some critical care outcomes, for example, increasing sleeplessness and elevated heart rate. Ulrich also states that noise is also often a major source of stress for staff and can detrimentally affect workplace performance. (See also Chapter Three - Effect of noise lighting, sun, temperature and colour).

Ulrich states that there appears to be sufficient evidence on negative effects of noise to justify the recommendation that noise reduction should be a major consideration in the design of new healthcare buildings.

Music: Pleasant music, especially when controllable, often reduces anxiety and stress (Ulrich undated, quoting Standley 1986; Menegazzi et al., 1991).

Windows: Research in intensive and critical care units strongly suggests that a lack of windows can detrimentally affect patients. Lack of windows is associated with higher rates of anxiety, depression and delirium as compared to rates for units with windows (Ulrich undated quoting Keep et al., 1980; Verdeberber, 1986, Leather et al, 1987).
(See also the section in this chapter: *Office design in health care facilities* on page 16).

Sunny rooms and views: Ulrich states that patient rooms that look out into sunshine, rather than cloudy or drab conditions are linked with more favourable outcomes (Ulrich undated citing Meauchemin & Hays 1996.)

Single rooms versus multi-bed units: Ulrich states that sound research is lacking that could clarify whether single occupancy rooms, compared to double or multi-bed rooms are better for acute care patients. A more recent study however, (Lawson & Phiri, 2003 – see Chapter Four) suggests that patients in non-mental health facilities are about evenly split on this issue. Overall, 54 percent of patients actually expressed a preference for multi-bed accommodation, with 43 percent preferring single bed and 3 percent not expressing a preference either way. However there appears, to be no evidence that relates specifically to mental health facilities in this regard.

Flooring material: Ulrich refers to only a small body of research that compares the advantages for patients of different types of flooring materials including carpet, vinyl and linoleum. He suggests that carpet is often superior from the standpoint of several patient-centred considerations, however, the majority of staff prefers vinyl composition surfaces, primarily because of greater ease in cleaning up spills (Ulrich undated quoting Harris 2000).

Furniture arrangement: Ulrich (undated quoting Sommer & Ross 1958) states that changing furniture arrangement to more cluster settings improves patient eating and social behaviours.

This is supported in this literature review (see Chapter Seven: *The effect of furniture rearrangement on patient sociability*) through studies undertaken by Baldwin 1985; Merlin et al 1985; Peterson et al 1977; Christenfeld et al 1989).

Sloane et al (1998) studied a representative sample of Alzheimer's disease patients in special care units to determine the extent to which agitation is associated with aspects of the treatment environment.

The study found that both physical design and staff treatment appear to influence agitation rates, notwithstanding that agitation tends to increase as Alzheimer's disease progresses. The study found that a number of physical environmental features were associated with increased agitation levels. These included:

- Low light intensity;
- Large unit size;
- A low level of 'homelikeness' within the facility;
- Poor levels of cleanliness of halls and maintenance of public areas and bathrooms, including the presence of urine/stool in public areas and bathrooms and poor resident grooming;
- The absence of non-glare non-slip floors;
- The absence of a public kitchen for activities and family use.

A study by Min Kantrowitz & Associates (1993) used multi-method research in a series of case studies at six leading general medical centres in the US. The institutions studied include:

- Harvard Community Health Plan: Quincy Health Centre, Boston, Mass.
- MacNeal Hospital: MacNeal Medical Health Centre, Bridgeview, Illinois
- Henry Ford Health System: Redford Medical Centre, Redford, Michigan
- Group Health, Inc. Inver Grove Heights Medical and Dental Centre. Inver Grove, Minnesota
- Ochsner Clinic: Ochsner Metairie Neighbourhood Clinic, Metairie, Louisiana, New Orleans
- Group Health Cooperative of Puget Sound, Inc. University Medical Centre
- Seattle, Washington.

The studies were largely qualitative research including: observations, photography, staff and patient interviews and other unspecified techniques.

Although the findings are not statistically significant, they point to design processes and issues that appear to be common to these well-regarded institutions and may be considered to represent elements of 'best practice' at the time of the study. It is worthwhile to note that a number of the findings of these case studies have been supported by other studies in this literature review.

The report identifies a series of noteworthy design issues, based on the analysis of the findings from the six case studies.

1. Design of processes involved in facility development

- Physical design reflects and supports the organisational philosophy.
- The design process directly involved a range of medical and administrative staff in design issues.
- The planners analysed community needs and designed the facility to meet them.
- The planners used feedback from previous facilities in the design.

2. Humanistic design issues

- The facilities emphasised client satisfaction based on respecting patients' human needs.
- The case studies recognised the importance and value of employee and staff satisfaction, by providing attractive staff lounges, access to outdoor areas and patios, views of the outdoors, access to natural light and the provision of staff lockers.
- Design based on small clusters.
- Natural light is a strong feature of all of the facilities studied.
- Availability of telephones.
- Provision of music [Supported by Ulrich (undated) quoting studies by Standley 1986; Menegazzi et al (1991)].

3. Functional factors

These include those which enhance efficiency and support the smooth operation of the facilities.

- The design of each facility supports staff interaction with patients.
- Facilities are located for user convenience.
- Generous, convenient and free parking is provided close to the entry.
- Functional zoning is clear.
- Flexible spaces.

4. Technical factors

These include a series of materials, systems and design integration as well as adaptability for electronic communication systems.

- Most facilities rely on modular furnishing systems.
- Wall mounted desks and cabinets that are easily maintained.
- Most sites integrate computers in design.
- Natural and artificial light are well integrated.
- Durability is important in all sites.

5. Aesthetic factors

- Facility designs are based on a consistent and identifiable design theme.
- Natural light and interesting views are significant features.
- Some facilities provide selected views of staff at work.
- Artwork is carefully selected and not just limited to public entry areas.
- Plants enhance the visual environment.

6. Cost factors

- All facilities have health education components.
- Sites provide staff amenities to decrease staff turnover and training costs.
- Sites use standardisation to control design costs.

7. Materials and furnishings

- Systems furniture and modular furniture are widely used.

- Patterned materials are specified.
- Furniture is varied to meet a range of user needs.

Some clear trends were noted in these facilities, which indicate the following:

- The organisations studied are finding ways to lessen the sterile clinical image of medical settings and are designing more comfortable, welcoming spaces in primary care facilities.
- There appears to be a shift from large-scale to smaller-scale facilities and facility components, in order to enhance the reality and perception of personal attention and individual care.
- Significant design features noted in these case study sites included the addition of patient education rooms, community rooms, comfortable liveable and workable space for staff and patients and staff interaction rooms.
- All users consistently mentioned the importance of natural light.
- It is clear that patients, medical care staff, administrative staff and visitors notice and appreciate good quality design. Staff feel it helps them to do their jobs better and to increase their job satisfaction whilst patients feel design allows them dignity and makes them feel respected, more relaxed and have more confidence in their care when in attractive, calming environments.

Seclusion room

Siegel (2002), quoted by the National Academy of Sciences discussed during a Neuroscience and Health Care Facilities Workshop some anecdotal evidence related to design impacts on behaviour. Siegel's architectural firm was called in by a hospital to change a newly constructed psychiatric unit designed by another firm. The 'emergency' (seclusion) room had tile walls, bars on the window and a drain in the floor, where 'disturbed' patients did what was expected of them, for example they threw faeces on the walls etc, but it was very easy to clean up.

However, a new director put carpet on the floor and drapes on the walls, together with some pictures. When they moved violent patients in they no longer acted destructively. According to Siegel, as a result of this, the layout of the entire unit was modified, which in turn changed the involvement of patients with their environment.

Office design in health care facilities

According to Mitchell McCoy (2003), Mitchell McCoy & Evans, (2003) and Brill (1992), research on the impacts of the design of the office work environment on productivity and quality of work life is well addressed in the literature across the disciplines of creativity, organisational behaviour and environmental and behaviour studies.

Further, it is generally accepted that the design of offices should be undertaken with close reference to the types of activities that will be undertaken in them and that the organisation of office spaces can facilitate or inhibit communications and collaboration between staff members, affecting performance, productivity and satisfaction Brill (1992) and Mitchell McCoy (2003).

Research conducted by Brill (1992) found that 'in hospitals, office-type work accounts for about 10 percent of the total costs and about 25 percent of the total person-hours.' In particular Brill notes that that 'many settings for office-type work in health care facilities are

poorly designed' (Brill 1992). He disagrees with the assumption that any improvement of the office space design requires considerable economic cost. Brill further argues that incremental changes can be made to the office space without total office redesign because the aspects which affect job performance and satisfaction, act fairly independently of each other.

Impact of windows and job performance

Interestingly, Brill states that although windows are very often associated with job status, the presence of a window was found to have little effect on job satisfaction, job performance and 'bottom line measures'. He suggests that the satisfaction gained from windows can be maximised by ensuring the windows are allocated in common areas (Brill, 1992).

In regards to mental health units it would appear to indicate that orientation of buildings should be such that priority is given to views for patients.

Brill (1992) also states that job performances of managers are affected by their location in the office. Research has revealed that low levels of enclosure for managers 'greatly reduces their own ease and quality of communication' (Brill 1992). Moreover, he suggests that 'clerical workers who are visually supervised and those who are not, have equal levels of 'job performance'. This may indicate that supervisory staff in mental health units would benefit by some level of spatial separation to maximise their performance.

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Chapter Three

Effect of noise, lighting, sun, temperature and colour

This chapter focuses on the effects of noise, lighting, sun, temperature and colour on patients and staff. These are additional features that have not been included in Chapter Two as part of architectural design issues.

A section is devoted to each individual feature, which is discussed in relation to the relevant literature. The chapter places emphasis on how these additional features contribute to the overall ambience of the mental health unit.

Research suggests that for design to be effective, each feature has to minimise the stress it places on the individual using the environment. For example although the research on noise is limited, it is often considered a widespread source of stress that can detrimentally patient comfort and work performance by staff. Noise appears to be related to design features, such as hard surfaces, as well as to human causes, such as staff talking during shift changeovers in particular. Simply minimising noise levels from identified sources can reduce stress, in both patients and staff.

It appears that lighting has different impacts on different user groups and that as a result patients, visitors, support staff and practitioners each require different lighting. Patients may benefit from increased levels of lighting during the awake period and decreased levels of lighting during the sleep period, which may enhance sleep quality and thus speed recovery.

3

Effect of noise, lighting, sun, temperature and colour

Chapter Three

Effect of noise, lighting, sun, temperature and colour … continued

Exposure to sun in ward rooms in a psychiatric ward was shown to significantly reduce the average number of days spent in the ward. In sunny rooms the average stay was 16.9 days compared to 19.5 days in dim rooms. The results of this study are statistically significant.

Room temperature was shown to have physiological impacts and different impacts on males and females. The impacts included hot rooms producing more aggression in both genders, but more so for males, to raised blood pressure in hot rooms and conversely, lowered blood pressure in colder rooms.

Although the literature contains major gap on the use and effects of colour, one writer found that colour does influence behaviour and that it can be harnessed to influence productive function and improve the quality of life. Such issues as wayfinding, highlighting and camouflaging particular areas and mood enhancement can all be influenced by the use of colour.

Effects of noise on patients

The effects of hospital noise on patients in general health care settings does not appear to have been widely studied. Ulrich (undated, citing Hilton 1985) states that studies suggest that noise detrimentally affects at least some critical care outcomes, for example, through increased sleeplessness and elevated heart rate. Additionally, noise appears to be a major source of stress for staff and can detrimentally affect workplace performance.

Ulrich further states that there appears to be sufficient evidence on negative effects of noise to justify the recommendation that noise reduction should be a major consideration in the design of new health care buildings. Apart from the Hilton citation, however, he provides no other supporting evidence.

Lawson and Phiri (2003) state that they had ‘many complaints about noise’ in the two hospitals they studied. They noted that hospitals are generally ‘pretty noisy places’, where noise is exacerbated by hard surfaces. They found that patients find noise generally annoying, but appear to distinguish between types of noise. For example, patients frequently complained about nurses chatting as they changed over shifts at night. ‘Such noise levels are probably very low in real terms, but none the less annoying!’

Owen & Golden (1998, cited in Rubin et al 1998) interviewed 91 patients about the impact of noise. 39 claimed their sleep was unaltered in the hospital as compared with home, 28 ‘slept worse’ in the hospital and 24 ‘slept better’. Of the 28 who ‘slept worse’ in hospital, nine stated this was due to noise. However, these results are not statistically significant.

In relation to staff exposure to noise, Mitchell McCoy (2003, quoting Glass & Singer 1972; Smith 1989) state that there are noise exposure limits physiologically, and that exposure to noise has less negative impacts on staff work performance if it is predictable and controllable.

Effects of lighting on patients and staff

Environmental light appears to be of central importance in the occurrence of rest/activity rhythm disturbances. Since light synchronizes rhythms and increases amplitudes, and is related to health in general, the combination of increased light during the awake period and decreased light during the sleep period in the hospital environment may enhance sleep quality and thus speed recovery.

Vinall (1997) studied the effect of environmental light on sleep quality. He stated: ‘People under increased stress require more sleep and sleep deprivation has been described as a stress factor that may interfere with recovery from disease.’

Patients

Patients wore data recorder wristbands during a pre-hospital period for one week within a variety of environments. These included: the home, within the hospital environment in the ICU, in the room after surgery and for one week in the home environment following discharge.

Effects of lighting on patients and staff … continued

The rhythms of the patient group were compared with a control group to monitor the differences.

Vinall (1998) found that light levels in patient rooms are often too low during the normal awake period and too high during the sleep period, at least when viewed in the context of what is required for a healthy healing environment.

This appears to accord with Brainard (1995) who found that lighting in health care facilities should be specific to each classification of individual within the facility, that is, patients, visitors, support staff and practitioners require different lighting.

He states in addition to the quality of lighting, the quality of the darkness provided should be considered, with particular reference to patients need for darkness to enhance their sleep.

Staff

Brainard (1995) also suggests three strategies for improving the shift work environment in health care facilities. These are:

- Use biologically compatible shift schedules.
- Improve the education of employer and employee involved in shift work so that they can understand the issues and can develop strategies for adaptation.
- Change the shift work environments, specifically using bright light stimuli to reset the internal clock and enhance the biological adaptation of the worker to the night-time workplace.
- He also noted that studies show that brighter light may be useful in the day-oriented workplace as well.

Effects of sun on patients

A study by Beauchemin & Hays (1996) citied in Rubin et al (1998) of 174 patients admitted to a psychiatric ward with clinical depression were randomly assigned to either sunny or ‘dull’ hospital rooms. The average length of stay for the two groups of patients was then compared.

Patients in the sunny rooms stayed an average of 16.9 days compared to 19.5 days for those in the dimly lit rooms. The difference was consistent over all seasons and was statistically significant.

Effect of room temperature on patients

A study by Thayer (2002) Rubin et al (1998) present an experimental trial, in which male and female patients were subjected to rooms of different temperatures for 30 minutes in each room. Heart rate variability was recorded continuously and blood pressure every minute and a half. A subjective report from each person was obtained relating to their comfort and aggression. According to Thayer, this is what is called ‘subjective design’, that is, how each person experienced each room, each serving as their own control.

The findings produced noticeable effects on mental state as a function of temperature. A hot room produced more responses of aggression in both genders, but more so for the males. Females rated a warm room more comfortable than males, and vice versa for the males. Thayer further stated that his experiment also connected the physical state (room temperature) with physiology. Hot rooms produced a tendency to raise blood pressure and cold rooms tended to lower blood pressure. There were also a variety of heart rate-related responses to temperature. Hence Thayer stated: ‘We’re able to tie physical environment to mental state and physical state. We’re able to tie physical state and mental state together. We’re able to do this using architectural, engineering and neuroscience principles.’

Impact of colour on patients

Colour in an environment increases the visual legibility of the environment and can also evoke an emotional response from persons using it. In a literature review, Cooper (1994) presents the *Environment-Behaviour Functional Colour Model* as an instrument to categorise information on colour. The model is employed as a framework to organise the review of the research on colour relevant to long-term care design and to identify gaps in knowledge. The paper concludes by offering suggestions for the pragmatic application of colour based on the information currently available.

Cooper found that the colour of objects and of the setting is believed to influence the affective state of the users by addressing their aesthetic needs. That is:

- Preference of colour for certain objects or for the setting (Ball, 1965; Holmes and Buchanen, 1984 cited in Cooper 1994).
- Modifying mood (Cooper 1985, cited in Cooper 1994).
- Through symbolic association (Cooper, Letts and Rigby, 1994 cited in Cooper 1994).

Impact of colour on patients … continued

Kaiser (1984), cited by Cooper (1994), states that colour undoubtedly does influence behaviour and it can be harnessed to influence productive function and improve quality of life.

Cooper states that there are still major gaps in the literature but the literature reviewed indicates the following uses of colour:

- Facilitating way-finding
- Attracting attention to specific areas
- Providing camouflage for areas that should not receive attention from the residents
- Creating and identifying functional areas for all users of the facility
- Influencing mood by the creation of pleasant areas, providing visual interest and avoiding excessive arousal.

These uses of colour are consistent with good universal design principles. Cooper maintains however, that the application of these principles becomes even more important when planning environments for people with cognitive impairment.

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Chapter Four

Patients and multidisciplinary teams perceptions of design

The articles in this sub-section are drawn from research with patients in general health care facilities. Although only one study (Lawson & Phiri 2003), was conducted within a psychiatric unit, it is apparent that patients are aware of design, react to it and are articulate in expressing how design impacts their period of time as patients in a health care setting. Lawson and Phiri are strongly of the view that patients' opinions on their environments provide important insights to the design process and thus should be considered by design professionals when designing new facilities.

A study by Min Kantrowitz and Associates (1993) revealed that patients, staff and visitors notice good quality design and that this improves patients dignity and self image, assisting staff to do their jobs better.

All studies were qualitative in nature.

4

Patients views of facility design

Patients' views of health care facility design appear to coalesce around a number of issues identified. These are:

A sense of personal space that promotes privacy and confidentiality
This includes confidentiality in shared rooms, privacy for treatment and quiet areas (lounges) for conversations between patients and families. It also considered the impact of other patients, by maintaining privacy in multi-bed rooms while maintaining social interaction between patients when they desired this (The Picker Institute 1997; Douglas & Douglas 2003; Cram & Hobbs 2002 and Carpman et al 1986).

A home-like and welcoming atmosphere that promotes well-being and relaxation
Patients here emphasised a welcoming atmosphere, a sense of homeliness, such as not making each corridor look the same using different colours and design features. Some suggested access to the Internet, so they could keep in touch with friends, which may also assist with the provision of diversionary activities (The Picker Institute 1997; Cram & Hobbs 2002; Douglas & Douglas 2003;).

An environment that meets the needs of visitors and family members
Patients discussed the ability of visitors to access food, or to eat with patients; the provision of tea and coffee facilities for visitors; and the ability to be able to telephone patients direct. They also talked about provision for children and more space for families to visit, including chairs for visitors. (Douglas & Douglas 2003; The Picker Institute 1997).

Physical design which promotes and helps to maintain independence through useability, accessibility, convenience and controllability
Patients talked about fixed partitions between beds in multi-bed wards, carpets in bedrooms, and more bath and toilet facilities in shared rooms. Other issues mentioned, included proper climate control; centralised nursing stations that have views of all patient areas and different types of seating, including some armchairs (The Picker Institute 1997).

Single rooms versus multi-bed units:
Lawson and Phiri (2003) suggests that patients in non-mental health facilities are about evenly split on this issue, depending somewhat on which type of room they inhabited during the interview, or whether they had been moved between different types of rooms prior to interview. Overall, 54 percent of patients actually expressed a preference for multi-bed accommodation, with 43 percent preferring single and 3 percent not expressing a preference either way.

Access to external areas that promotes a sense of normality through large windows, pleasant outdoor views, balconies and courtyard areas
Patients mentioned more visual access to the outside and better ventilation (Douglas and Douglas 2003; the Picker Institute 1997.)

Supportive environments for effective communication between patients, staff and relatives
Patients are keen to see an environment that facilitates interaction between patients and staff. This included the location of the staff desk, seating

arrangements and communication systems (Douglas & Douglas 2003; The Picker Institute 1997).

Facilities for recreation and leisure activity that meet patient and visitor needs and provide something to occupy the mind.
Patients in general wards were quite clear that they wanted leisure and recreation choices, alternative therapies, mobile hair treatment, tea and coffee facilities, facilities for visitors to eat with patients (for long stay patients), a cinema in the lecture theatre, swimming pool and video hire. Although patients in general wards mentioned these, they are included here as some could be applicable to patients in psychiatric units (Douglas & Douglas 2003).

Hobbs and Cram (2002) make the general point that designers should focus on the identification of anxiety creators and seek to reduce them. This point accords greatly with Ulrich's (undated) stated thesis in chapter two that, patients in health care environments suffer stress and anxiety. Properly conceived and executed, health care design has a *very high* likelihood of reducing this.

The views of multi-disciplinary teams on facility design

This section discusses the findings of two multi-disciplinary teams which examined the effects of the environment. As each is quite different, each will be discussed separately.

Gross et al (1998) studied a multi-disciplinary team of architects, mental health professionals and administrators to examine the effects of design in mental health facility at the Chaim Sheba Medical Centre at Tel-Hashomer, Israel. The findings of the study are based on daily clinical observational research.

The authors conclude that attention to the design of the physical environment of a psychiatric hospital can provide major support for patients and their treatment programs, as well as for their families and for the staff. Cooperation between architecture and psychiatry is seen as essential and should be maintained during each phase of a project.

Their basic findings include a set of guidelines for ward design, that include:

- Patients should not be overcrowded or over-concentrated.
- A variety of spaces that support social interaction should be provided – a large day room, a well-lit and ventilated dining room, spacious lobby and corridors.
- Design that resembles a living room with residential furniture.
- Buildings that are well kept and maintained.
- Safety aspects include observation by staff, lighting, exits and smoke detectors.
- Staff work and rest areas are well segregated and provided with separate entrances.

The paper further makes assertions about the effects of the design process, based on daily clinical observations by the staff:

- Patients will enjoy their physical environment, if it offers them a safe, comfortable, non-threatening and readily comprehensible set of surroundings.

The views of multi-disciplinary teams on facility design … continued

- The physical environment sends clear messages to patients about the level of respect for the patient and concern for his or her physiological and psychological well-being. A well-designed and maintained environment sends strong positive messages while the opposite sends strong negative messages.
- Physical environments also contribute to the quality of life and sense of professional dignity of the staff.
- A psycho-environmental approach to psychiatric design can provide an important and effective tool in the pursuit of a humane, efficient containment and reduction of severe psychopathy.
- The study supports a prediction that a well-planned environment may favorably affect both patients and staff.

A study by Martineck (2003) engaged 15 separate teams, including architects, hospital staff and community members who took part in designing a 298 bed general hospital. The study included a review of the hospital's own research that showed that patients' greatest concerns were opportunities for them to maintain:

- Their privacy,
- Emotional comfort and
- Control within the hospital environment.

These findings accord very much with those of (The Picker Institute 1997; Douglas & Douglas 2003; Cram & Hobbs 2002 & Carpman et al 1986) in the previous section *Patient views on facility design* in this chapter.

Design features included:

- Family amenities that were designed to make family members feel a welcome part of the care team
- Staff facilities that emphasise staff comfort and convenience
- A community health information centre.

The results included annual staff turnover that reduced from 19 percent to just 1.7 percent in five years.

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Chapter Five

Impacts of remodelled wards

The studies are reviewed in this chapter have all examined the impact of remodelled wards on patients and staff. Three of the studies were undertaken in psychiatric wards within the same hospitals (Gutkowski, Ginath, Guttmann 1992, Cory et al 1986 and Christenfeld et al 1989).

The fourth study (Lawson and Phiri 2003) examines changes in a psychiatric and a general ward, each located in a different hospital.

Only the Christenfeld et al (1989) study analysed both patient and staff perceptions and behaviours in relation to ward changes. The other studies examined only patient perceptions and behaviours, although Lawson and Phiri (2003) examined staff's views of the changes in patient behaviours.

In general terms it can be stated that all the studies found that remodelled wards have measurable, and largely positive impacts, on a broad range of patient and staff satisfaction, perceptions and behaviour. Specifically:

- Increased patient and staff levels of satisfaction with their environment
- Improved patient self image and
- Positive patient and staff behavioural changes.

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Chapter Five

Impacts of remodelled wards … continued

In relation to the statistical reliability of the findings, the Cory at al (1986), the Christenfeld at al (1989) and the Lawson and Phiri (2003) studies are the most robust, each employing test/retest methods and recognised scales to test changes in the control wards which were not remodelled. The Corey et al (1986) study and the Christenfeld (1989) study used Ward Atmosphere Scales (WAS) to measure a list of standard subscales (see table on the following page). The Lawson and Phiri (2003) study used a multi- method research included qualitative focus group and qualitative questionnaires.

Although the Gutkowski et al. Study was conducted over three years, it did not disclose the methodology used, hence no comment can be made in relation to the reliability of its findings. From the style of the article it is suggested that it is more likely to have been a qualitative study, which means that its findings would not be statistically reliable.

Patient impacts

Corey et al (1986) used Ward Atmosphere Scale (WAS) in a test/retest methodology to measure both patient and staff perceptions of improvements on the WAP subscales, in three different settings:

- An Acute Psychiatry Ward (open and locked units).
- A Psychiatric Research Unit and
- An Alcohol Treatment Unit

The redesign included: furniture style in rooms; furniture arrangement in lounge and dining rooms; floor covering; room colour; ornamentation and individualisation of living space.

The findings on the WAS scales are rather complex. A selection therefore, of the most relevant findings is presented below from the Acute Psychiatric Unit only. In this unit, staff perceptions were associated with positive shifts on the following WAP scales* (see table opposite for explanation of all of the scales)

Clearly, it can be seen from the WAS subscales that remodelling wards leads to more positive shifts than negative ones.

	Patient reactions	
	Positive shift associated with	Negative shift associated with
Acute Psychiatric Unit	Involvement; Autonomy; Practical Orientation; Personal Problem Orientation; Anger and Aggression	Program Clarity and Support
Open Unit Psychiatric Ward	Involvement; Support; Spontaneity; Autonomy; Practical Orientation; Personal Problem Orientation; Organisation and Program Clarity	Anger and Aggression
Locked Psychiatric Ward	Involvement; Support; Spontaneity; Autonomy; Organisation and Program Clarity	Practical Orientation; Anger and Aggression

*WAS subscales; Involvement (I); Support (S); Spontaneity (SP); Autonomy (A); Practical Orientation (PO); Anger and Aggression (AA); Order and Organisation (OO); Program Clarity (PC); and Staff Control (SC)

Patient impacts … continued

Christenfeld et al (1989) studied the effects of two standard remodelled wards (called Model Wards) at New York State's Harlem Valley Psychiatric Centre on severely regressed psychotic in-patients and the staff who treat them. The changes to the wards included:

- Ceilings in the day room, bedrooms and central hallway were lowered;
- Installation of shaded lights;
- Floor redone in light-coloured tiles;
- Walls covered with vinyl in calm colours and sylvan designs;
- Waist-high room dividers;
- Separate seating areas with regrouping of furniture;
- Relocation of nursing station for maximum viewing;
- A room set aside for a retreat was carpeted;
- Recessed lighting, vinyl walls and archways installed in central hallway along with a small seating area, full carpeting and non-institutional clocks and other wall hangings;
- Ceramic tiles and full-length mirrors added to the bathrooms, together with vanity style sinks, new private dressing rooms outside the tiled showers with non-slip mats and non-weight supporting showerheads;
- Wood covered cabinets were built to conceal the hampers of dirty laundry;
- The smoking porch was ventilated and decorated, as were all the patient areas, with paintings, posters and hanging baskets of flowers and plants;
- The choice of colours and decorations was determined by the requirements in different ward areas for stimulating or calming, reassuring effects.

Within eight months of the inauguration of the redesigned settings, the authors reported selective behavioural and attitude changes in both staff (n=27) and patients (n=37) compared to the four matched control wards (staff n=44); patients (n=44).

Key patient-related findings were evident in increased satisfaction with facilities and behavioural changes:

- Patients reported significantly more satisfaction with the day room, with a lesser degree of satisfaction with bedroom, shower room and dining room. It was noted that the dayroom was the area that was most radically altered and was the locus of most daytime activities.
- Patients reported improvement in their self-image, but not in irritability, isolation or depression.
- The rate of patient violent behaviour decreased by almost 50 percent.

The Christenfeld et al. suggested four reasons for the improvements, which may be useful in understanding how improvements in the physical environment translate to changes in patient and staff attitude. In discussing each of these below, the authors further quote other studies to support their comments:

Symbolic changes – refer to the fact that ward renovation may improve morale by demonstrating that the hospital is actively concerned with quality of life and responsive to expressed needs (quoting Rodin 1986). Soliciting the preferences of those who actually live within the in-patient wards provided an experience of entitlement and

autonomy beyond what can ordinarily be accorded in a hospital.

Aesthetic differences. Quoting Maslow and Mintz (1958) the authors suggest that mood and behaviour may have been enhanced merely by improving the appearance of the residential environment. The pride of the staff and patients in their shared quarters might have been raised by a setting that is pleasing to observe and live in. For patients, a homelike environment, with opportunities for privacy and individual possessions, may encourage more normal behaviour, than does a smart, impersonal, institutional setting (quoting Goffman 1961).

Group dynamics. Certain configurations of furniture (eg. chairs at right angles to one another (Christenfeld et al quoting Sommer and Ross, 1958) and divisions into sub-areas, facilitate normal social interaction. Citing Barton and Mishkin 1984, Christenfeld et al. suggest adding a series of waist-high walls throughout a ward's large dayroom prevented patients forming a hollow square and promoted conversation. They further stated this is considered valuable, especially for schizophrenic patients, to allow for *buffer zones*, and places where a patient can be alone (Christenfeld et al. quoting Horowitz et al 1964).

Functional differences. A psychiatric ward for chronic patients, beyond its asylum and guardian functions, is a setting for rehabilitation. Spivack (1984) stated: 'What is missing' in our contemporary, often aesthetically elegant hospital structures is…richness and meaning' (cited in Christenfeld et al 1989). In response to this, the Model Wards were provided with areas and appliances for grooming and self-maintenance. Other areas were demarcated for specific recreational programs, and these were facilitated by soundproofing. Resultant increases in such activities may be related to the patients' enhanced self-image.

Christenfeld et al. concluded that the Model Wards Program, although not instrumental in reversing the course of psychosis, makes some measurable differences in the patients it is intended to help. They stated 'If their living environment is made more attractive, more conducive to normal social interaction, more suitable for rehabilitative therapies, if they are reminded each day by their setting that the conditions of their life are considered important, they in turn apparently think better of themselves and behave more normally.'

Lawson and Phiri (2003) tested the proposition that the hospital architecture and the physical environment may contribute to patients' sense of well being and may aid actual recovery. Field investigation was undertaken in two hospitals, one a general hospital and the other a mental health ward. Multi-method research was used, in strictly controlled conditions, using samples of patients in old and new wards.

The authors stated that their study has found that 'patients are sensitive to and articulate about their architectural environment in hospital.' They specifically rejected a suggestion in a focus group made by a health care designer that 'patients in hospital have so much on their mind about their illness that they are unable to focus on the architecture and may not even really notice it.'

Lawson and Phiri's findings were quite detailed and precise.

Patient impacts … continued

	Expressed satisfaction	
	Pre-test (%)	Post-test (%)
Ward Appearance and Overall Design		
General Ward	37	73
Psychiatric Ward	20	40
Immediate personal or private bed area		
General Ward	38	72
Psychiatric Ward	16	51
Patients' reactions to their treatment in the new architecture		
General Ward	68	85
Psychiatric Ward	39	68

The study measured levels of expressed patient satisfaction on a number of areas, discussed below. They found that patients in the non-psychiatric ward had higher levels of satisfaction than those in the psychiatric ward, albeit each was in a different hospital

Environmental comfort (lighting, temperature, air quality and noise)

Lawson and Phiri found that while improvements were recorded in relation to these factors, they were so small that they were not statistically significant, or at best only marginally so.

However, they noted that they had many complaints about noise, hospitals are generally 'pretty noisy places', where noise is exacerbated by hard surfaces. They stated that patients find noise generally annoying, but appeared to distinguish between types of noise. For example, patients frequently complained about nurses chatting as they changed over shifts at night. 'Such noise levels are probably very low in real terms, but none the less annoying!'

Environmental control (patients control over temperature, lighting, air quality, blinds/curtains and noise)

The findings in relation to this area were less clear and appeared to relate to patients in the general ward, who may be bed ridden and unable to control lighting and curtains to prevent sun glare, from the bed, without calling a nurse.

It is clear that patients in both medical settings feel that the environment assisted to help them to feel better, with a 68 percent increase of patients within the psychiatric ward holding this view, compared to just 39 percent of patients in the old wards.

Interestingly, patients in the remodeled wards also gave higher ratings to the treatment they received from their medical staff. In the psychiatric ward, the treatment they received was rated good by 56 percent of patients, against 39 percent in the older wards despite the same staff being present in both wards. Although the authors stated this difference was not statistically significant, it does add to the overall picture that patients were happier in the newer wards.

Following discussion of patients' perceptions of their environment in relation to both types of wards, the following specific findings were discussed in relation to health outcomes.

Reduction in treatment times:

- In the general medical sector, non-operative patients treatment times were reduced by about 21 percent in remodeled wards.
- In the mental health wards patient treatment times were reduced by about 14 percent in remodeled wards.

Reduction in medication:

- In the remodeled general medical wards, the average number of days in which Class A pain-killing drugs were administered was reduced by 22 percent.
- The number of doses applied on those days reduced by 47 percent.

Findings concerning patient behaviour in the mental health unit:

- The number of incidents of verbal and physical abuse remained largely the same but the severity dropped significantly.
- The number of instances of patients injuring themselves dropped by two thirds
- The amount of time patients were put into seclusion was reduced by 70 per cent, with an average reduction of 9 days, from 13 days to 4, in a typical stay. (It is noted that at the mental health unit, authors stated the 'typical' stay is between 35 and 40 days).

The authors noted however, that noise remained a significant problem at both hospitals.

Gutkowski et al (1992) found in a three year study (methodology was not specified) that minimal architectural changes made at a mental health centre located in an antiquated hospital in Jerusalem led to improvements in how the setting functions, with positive effects on patients, staff and families.

Minimal architectural changes can be defined as the kind of physical alteration that does not dramatically change the external or internal appearance of a building and does not require a significant financial investment. The changes that were studied here were:

- The addition of five new entrances (noting that this was already an antiquated building with little interaction with its surrounding environment).
- Modifications of a day hospital unit to include brightening paint and changing lighting.
- Re-opening of a separate stairway for use by patients not enrolled in the day unit.
- Defining separate living, dining and personal expression areas within the common rooms.

In their conclusions, Gutkowski et al. stated that they believe the physical environment has a major role in 'creating and conveying a therapeutic atmosphere'. They further state that they believe that 'small architectural change can trigger a significant innovative process (which) may alleviate or even reverse tendencies toward stereotypical behaviour for both patients and staff. The message of a single change can be extremely meaningful for chronic patients'.

The idea of change as a continuous process, rather than an exception event, should be incorporated into the organisation's culture.

Finally, Gutkowski et al. state that cooperation between architecture and psychiatry is essential if the environment is to be used to help achieve therapeutic goals.

Staff impacts

Christenfeld et al (1989) was the only study that specifically measured changes in staff attitudes and behaviour in relation to remodelled wards. They noted key findings in relation to the effects of the changes on staff, which were related to both mood and behavioural changes:

- Staff mood levels were raised significantly in the Model Wards compared to those in the control wards, which remained constant.
- Staff unscheduled absence rate was cut in half.
- However, staff did not report significant improvement on scales of ward atmosphere and patient functioning.

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Chapter Six

Impacts of gardens and nature

This chapter focuses on the research on the impacts of gardens in the general health care facilities. Findings from the studies review suggest that in health care settings there are:

- **Stress reducing effects of viewing plants and nature.**
  Simply viewing certain types of nature and garden scenes significantly ameliorates stress within only five minutes. Limited scientific research has found that viewing nature for long periods not only helps to calm the patients, but can also foster improvement in clinical outcomes.
- **Benefits of gardens in healthcare settings.**
  There appears to be mounting evidence that gardens help foster restoration for stressed patients, family members and staff. Well designed gardens can reduce stress and improve clinical outcomes. Gardens and nature can also heighten satisfaction with the health care provider and the overall quality care.
- **Effects of nature on clinical outcomes.**
  Views of nature can have important benefits in terms of improving patients clinical outcomes.
- **Qualities of effective restorative gardens.**
  Although there is a lack of rigorous research, studies on the impact of the different design approaches to hospital gardens have yielded a few broad conclusions and general guidelines.

6

Types of gardens

Cooper Marcus (1995) in a major study of gardens in health care facilities drew on observations of more than seventy hospitals to categorise different types of hospital gardens.

- Landscaped grounds: typically a large medical complex with lots of outdoor space between the buildings. These are often not very helpful for someone wanting to go out and be quiet in a shady space or have a pleasant place to sit.
- Landscaped setback: usually required by zoning regulations to set a building back from the street. This is often a space that is green and pleasant to look at but very rarely used or designed for use.
- The front porch: every medical building has something like a front porch that could be used as an entry garden.
- Entry garden: a landscaped area close to a hospital entrance that is a green space with a garden image and is designed and detailed for use
- Courtyard: space that forms the core of a building. If planned and detailed with care, these can be beautiful, sheltered, useable spaces that will be used by staff and families
- Plaza: outdoor areas, furnished for use, and predominantly hard surfaced. They may include trees, shrubs, or flowers in planters, though the overall image is not of a green space, but of a paved urban plaza.
- Roof terrace: an accessible outdoor area that is bounded on one side by a building and often forms a long narrow ‘balcony’ to that building.
- Roof garden; area on top of a hospital building that is designed and landscaped for use by patients, staff, and visitors.
- Healing garden: outdoor or indoor garden spaces in hospitals that are specifically designated as healing gardens
- Meditation garden: a small, very quiet, enclosed space specifically labelled with a plaque as a meditation garden
- Viewing garden: with space and budget limitations, some hospitals incorporate a small garden that cannot be entered but can be viewed from inside the building
- The viewing/walk-in garden: a variation of the viewing garden in which a space that is predominantly a garden to look out at from inside the hospital can also be entered and sat in by a very limited number of people.

Research on gardens in health care facilities

The history of the use of gardens in hospitals has been well documented by Ulrich (2002), and Cooper, Marcus and Barnes (1995). The belief that plants and gardens are beneficial for patients in healthcare environments is more than one thousand years old, and appears prominently in Asian and Western cultures. European and American hospitals in the 1800s commonly contained gardens and plants as prominent features.

During the early decades of the 1900s, the strong emphasis on infection reduction, together with the priority given to functional efficiency, shaped the design of major hospitals that are now considered starkly institutional, unacceptably stressful, and unsuited to the emotional needs of patients, their families and healthcare staff.

According to Ulrich (2002), a substantial body of research has now demonstrated that stress and psychosocial factors can significantly affect patient health outcomes. This knowledge strongly implies that the psychological or emotional need of patients be given high priority along with traditional concerns in governing the design of hospitals. The fact that there is limited but growing scientific evidence that viewing gardens can measurably reduce patient stress and improve health outcomes has been a key factor in the major resurgence in interest internationally in providing gardens in hospitals and other healthcare facilities

Stress reducing effects of viewing plants and nature

According to Ulrich (2002), findings from several studies have converged to indicate that simply viewing certain types of nature and garden scenes significantly ameliorates stress within only five minutes or less. A limited amount of research has also found that viewing nature for longer periods not only helps to calm patients, but can also foster improvement in clinical outcomes, such as reducing pain medication intake and shortening hospital stays. Two specific examples of the research are discussed below.

Ulrich (1981) conducted a controlled experiment that addressed the question whether subjects' psychophysiological states changed in different ways as a function of the type of environment viewed. Eighteen subjects in fifty-four sessions (three sessions per subject) were exposed to sixty slides for each of three types of landscape content:

- Nature with water.
- Nature dominated by green vegetation.
- Urban without water or vegetation.

Subjects provided self-ratings of their feelings both before and after the slide exposure. Measurements of alpha amplitude and heart rate in the eyes-closed condition were taken immediately before and after the presentation of the slides, and also at the halfway point in the slide viewing. Eyes-open alpha and heart rate were measured continuously while an individual viewed the slides.

Concerning *psychological* effects of the three environments, the results reflect a clear-cut pattern. Compared to the influences of the urban slides, exposure to the two nature categories, particularly water, had more beneficial influences on psychological states. In the case of feelings of attentiveness and positive effect, there was evidence that influences of the vegetation scenes were stronger for females than for males.

Gardens in health care facilities research … continued

The alpha results support the conclusion from the self-ratings that the most positive influences on well being were produced by the nature scenes.

Ulrich states that although the pattern of psychological and physiological evidence favouring the nature scenes is impressive, it is clear that exposure to the nature environments did not have a global or comprehensively beneficial effect on the individuals' states.

Ulrich concludes that it is reasonable to propose tentatively that people benefit most from visual contact with nature, as opposed to urban environments lacking nature, when they are in states of high arousal and anxiety.

Another study (Ulrich et al 1991) tested the hypothesis that if individuals are stressed, an encounter with the most unthreatening natural environments will have a stress reducing or restorative influence whereas many urban environments will hamper recuperation. A study of 120 subjects who viewed a stressful movie and were then randomly assigned to a recovery period consisting of one of six different videotapes of either nature settings (vegetation or vegetation with water) or built settings lacking nature. Recording instruments continuously recorded blood pressure; heart rate, skin conductance and muscle tension and subjects were also asked to rate their feelings before and after the stressor.

Findings from four continuously recorded physiological measures were consistent in indicating that recuperation from stress was faster and much more complete when individuals were exposed to the nature settings than any of the built environments. Data from self-reports of feelings indicated that the nature environments likewise produced substantially more recuperation in the psychological component of stress.

Benefits of gardens in healthcare settings

In the case of hospitals and other healthcare facilities, there appears to be mounting evidence that gardens are especially effective and beneficial settings with respect to fostering restoration for stressed patients, family members and staff. Cooper, Marcus and Barnes (1995) used a combination of behavioural observation and interview methods to evaluate four hospital gardens. They found that restoration from stress, including improved mood, was by far the most important category of benefits derived by nearly all users of the gardens.

Well designed hospital gardens not only provide calming and pleasant nature views, but can also reduce stress and improve clinical outcomes through other mechanisms, for instance, fostering access to social support and privacy, and providing opportunities for escape from stressful clinical settings (Cooper, Marcus & Barnes 1995).

In addition to ameliorating stress and improving mood, gardens and nature in hospitals can significantly heighten *satisfaction* with the healthcare provider and the overall quality of care. Evidence from studies of a number of different hospitals and diverse categories of patients strongly suggests that the presence of nature increase both patient and family satisfaction (Cooper Marcus & Barnes 1995; The Picker Institute; Center for Health Design 1998).

Benefits of healthcare gardens for staff

Healthcare staffing problems are critical issues (Ulrich 1991). Healthcare occupations such as nursing are stressful because they often involve overload from work demands, lack of control or authority over decisions, and stress from rotating shifts. Ulrich further states that staff use gardens for positive escape from workplace pressures and to recuperate from stress. Evidence has begun to appear showing that hospital gardens increase staff satisfaction with the workplace and may help hospital administrators in hiring and retaining qualified personnel (Cooper, Marcus & Barnes 1995).

Effects of nature on clinical outcomes

Findings from a few studies focusing on hospitals and other healthcare facilities suggest that views of nature can have important benefits in terms of improving patient clinical outcomes. A Swedish study investigated whether exposing heart surgery patients to simulated nature views would improve recovery outcomes (Ulrich et al 1993, cited in Ulrich 2002).

160 patients in intensive care were assigned to one of six visual stimulation conditions: two nature pictures, two abstract pictures and two control conditions (either a white panel, or no picture or panel). Results suggested that patients who viewed the trees/water scene were significantly less anxious during the post-operative period than patients assigned to the other pictures and control conditions. Moreover, patients exposed to the trees/water view suffered less severe pain, as evidenced by the fact they shifted faster than other groups from strong narcotic pain drugs to moderate strength analgesics.

Ulrich states that a ‘surprising’ finding in this study was that an abstract picture dominated by rectilinear forms produced higher patient anxiety than control conditions of no picture at all.

Another medical outcomes study compared the recovery records of gall bladder surgery patients who had a bedside window view of either trees or a brick building wall with no nature (Ulrich 1984). The data showed that those with the nature view, compared to those who looked out at the wall, had shorter hospital stays and suffered fewer minor post-surgical complications. Patients with the view of trees more frequently received positive written comments from staff about their conditions, whereas the wall view group had far more negatively evaluative comments. Another major difference was that persons with the view of trees, compared to the wall view patients, needed far fewer doses of strong narcotic pain drugs.

Qualities of effective restorative gardens

Few studies have examined rigorously how different design approaches and specific environmental characteristics affect hospital garden performance with respect to fostering restoration from stress or improving medical outcomes (Ulrich 2002). However, studies have yielded a few broad conclusions and general guidelines regarding design directions for creating successful healthcare gardens.

The limited evidence to date suggests that gardens will likely calm or ameliorate stress effectively if they contain verdant foliage, flowers, water (not tumultuous), congruent or harmonious nature sounds (birds, breezes, water), and visible wildlife (birds), (Ulrich 1999). Additionally, nature settings with savannah-like or park-like qualities (grassy spaces with scattered trees) are known to foster restoration. In their study of users of four hospital gardens,

Cooper, Marcus and Barnes (1995) found that the most frequently mentioned positive garden qualities were visual nature elements, especially trees, greenery, flowers and water. Respondents strongly associated these natural features with restorative influences on their moods.

By contrast, a characteristic that usually worsens garden effectiveness in reducing stress is predominance of hardscape (such as concrete) or other starkly built content (Ulrich, 1999). Other garden qualities that can hamper recovery or even aggravate stress include: cigarette smoke; intrusive, incongruent urban or machine sounds (traffic, for example); crowding; perceived insecurity or risk; prominent litter; and abstract, ambiguous sculpture or other built features that can be interpreted in multiple ways (Ulrich 1999).

In relation to abstraction and ambiguity, there is mounting evidence that designers of hospital gardens should exercise considerable caution before including abstract art works or ambiguous design features. It appears that acutely stressed patients may be vulnerable to having stressful rather than positive reactions to ambiguous art or design (Ulrich 1991). Current evidence suggests that the safest, most consistently effective general strategy for designers of hospital gardens is simply to feature the restorative, unambiguously positive qualities of greenery, flowers, and most other nature content (Ulrich 1999).

Research on gardens and nature in mental health facilities

Much of the research cited above has relevance to any healthcare facility, including mental health facilities. As studies specific to mental health facilities are rare, this section discusses one study in some detail.

Sachs (1999) provides a useful historical overview of the use of outdoor space in psychiatric hospital and units. Sachs concludes that despite moves towards hospital decentralisation and the inclusion of units within general hospitals, mental hospitals have continued to be built as large structures, often removed from the environment around them. Similar to other trends in healthcare since the 1950s, increasing emphasis has been placed on technology and medication to remedy mental illness. Hospitals built within large metropolitan areas have been high-rises with little or no access to the outdoors, including windows that are often sealed.

Only in the past thirty years has this trend slowly begun to reverse. The late 1950s and early 1960s saw the beginning of a new academic discipline, environmental psychology that was closely linked with the concept of milieu therapy. Early research in this field was mostly limited to small, measurable factors such as colour, quality of light, sound and room size, and was almost solely restricted to the indoor environment. The groundwork laid during this era has been critical in fostering interest in outdoor spaces as part of the therapeutic environment. Environmental psychology was one of the first interdisciplinary approaches to hospital design in which teams of psychiatrists, psychologists, designers, sociologists, and other researchers and administrators collaborated with designers to create institutions that would better serve their patients. Viewed as a new, revolutionary idea three decades ago, environmental psychology is beginning to be accepted by most healthcare professionals (Sachs 1999).

Many newer psychiatric hospitals and units still utilise outdoor space if there is money left over or if a donor specifies such a project. Most hospitals do not pay the same attention to integrating outdoor spaces into their site design as they pay to the design of patient units, common rooms, cafeterias etc. This ignorance of the potential of the outdoor spaces is partially due to the dearth of research and scientific evidence 'proving' that such design would positively affect both patient and staff quality of life; it is also due to the scattered nature of the information that does exist (Sachs, 1999).

Sachs confirms that 'literature on the use of outdoor space as a therapeutic tool in psychiatric care is scarce'. She points out (Sachs 1999 pp 248 –251):

- In the field of environment psychology the focus has been almost exclusively on hospital interiors.
- Numerous academic studies have documented the salutary psychological effects of nature and the outdoor on human beings, but the vast majority of this literature focuses only on people from the general population not on those with mental or even physical disabilities.
- The work of Ulrich and Cooper Marcus and Barnes document the physiological effects of the outdoor environment on people with physical health problems, and speak to the need for outdoor spaces in health care facilities. However, this work does not specifically discuss psychiatric hospitals or units.
- Most of the literature that at least mentions the outdoor spaces of psychiatric hospitals is from either design-related (mostly architectural) publications or from healthcare publications. Typical of the architectural reviews of psychiatric hospitals has been the complete disregard for anything outside of the building (including views out of the windows).
- Discussing the outdoor space of a mental hospital does not automatically mean that the outdoor space is as successful as a therapeutic environment.
- Until there is more serious academic research focusing on the links between psychiatric healthcare and outdoor space in care facilities, designers must make inferences from related literature, history and present day examples.

Research on gardens and nature in mental health facilities … continued

In six case studies Sachs (1999) then gives an in-depth review and analysis of mental healthcare facilities with exemplary outdoor spaces.

In one of the case studies Sachs discusses clinical empirical research that has taken place.

Four studies were conducted at a 312-bed in-patient psychiatric hospital. The studies were designed to create a logical and defensible process through which hospital executives, clinicians, and support staff could better understand the link between the physical environment and patient behaviours and experiences.

The studies were:

- The objective of the first study was to assess the existing use of the grounds by patients and staff through surveys and structured behavioural observations.

  The study found that patients and staff used the areas near the buildings for short periods of ten to twenty minutes during four peak periods during breaks between programs or following meals, generally for smoking.

  In general, the farther the setting was from the hospital, the more passive and solitary were the behaviours observed. The observations substantiated a widely held assumption that patients and staff used the natural areas of the grounds which were furthest away from the hospital, to ‘get away’, ‘find some peace’, and to ‘walk alone or with significant others’.

- A second study was designed to test patient and staff preferences for a wide range of both settings and behaviours. The goal of this study was to link patients’ preferences for certain environmental settings with their preferences for certain behaviours. A stand-alone touch screen computer survey was developed that met confidentiality guidelines and could be used by respondents in a secure ward.

  Patients and staff expressed clear preferences for specific settings in which to engage in specific behaviours.

  ‘Enclosed’’ outdoor settings, such as paths through woodland, were generally more preferred for behaviours best characterised as active (walking, strolling with others), while open settings were linked to passive behaviors such as sitting, reading, and smoking.

- The goal of the third study was to ascertain not only which settings patients and staff preferred but why they preferred them. A series of individual and group meetings were held in which both patients and staff were asked to identify special places on a map. In addition, patients were asked to provide a brief written description of why they found those places to be special.

  Both patients and staff had no difficulty identifying many ‘special’ places. Most of the patients were quite articulate in describing why specific places were selected. It was expected that ‘special places’ would generally be found in accessible areas, yet a number were removed from the hospital and walking routes. The majority of identified locations were natural settings that patients linked to specific personal experiences.

  It was evident that many patients had deep

and personal attachments to specific settings based on their individual experiences. Many places that might have been overlooked or deemed common by the investigators, were identified by patients and staff as places meriting recognition in planning and design.

- The fourth study aimed to link patients' expected experiences while viewing a video with physical qualities of the special places in order to create a planning and design framework applicable to the entire site. A *virtual tour* was created which was used as a search instrument to examine the link between attributes of environmental settings and people's expected experiences within those settings.

  Most settings clearly promoted a set of commonly shared experiences among staff and patients. Both staff and patients generally used the same adjectives to describe their expected experiences for specific settings. For example, settings rated as natural, enclosed, less complex, highly textured and small in scale were always described as settings in which patients would expect to feel 'calm', 'relaxed', 'tranquil' and 'at peace'.

  Settings rated as complex – whether natural or built – and lacking unity or organised form were expected by patients to elicit feelings of 'nervousness', 'coldness', and 'discomfort'.

  The outcome of all these studies was a better understanding of patient and staff behaviors within the existing environment and a better understanding of how psychiatric patients experienced the diverse natural environments at the institution. Based on this information a series of twelve design principles was used to create a master plan specifying steps in planning and designing a range of settings.

Sachs (1995), uses the above studies and her research experience generally to develop a set of design guidelines that are more specific to the needs and issues of psychiatric healthcare.

- Design for the needs of the client.
- Collaborate with other designers and with clients.
- Treat the outdoor space as one part of a cohesive whole.
- Bring the outdoors inside.
- Provide easy access from the indoors to the outdoors for patients, visitors and staff.
- Design for specific needs where possible.
- Provide a variety of spaces and experiences.
- Allow for a variety of experiences, even in small areas.
- Balance privacy and safety.
- Provide at least one space where the layout is 'readable' by the user.
- Avoid fishbowls.
- Provide separate spaces for staff.
- Keep in mind possible ways in which materials might be use.
- Use materials that are durable and, if safety is an issue, impossible to use as a weapon.
- Provide temporal cues.
- Sun and glare: provide plenty of options for shade; reduce confusing shade patterns; reduce glare.
- Use plants that are pleasing to more than one sense.
- Avoid poisonous vegetation.
- Avoid plants that are irritating to the touch.

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Chapter Seven

Effects of furniture rearrangement on patient sociability

In this short chapter, reported changes in the arrangement of furniture in two ward day rooms and in a dining room appear to have yielded improvements in social interaction. One study further suggests a trend towards reduced time spent in seclusion in intervention wards, a reduction of casualty incidents and an increase in staff perceptions of improved patient social interaction.

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Patient impacts

A number of studies have found that that by rearranging patient seating from rows of seating along walls to grouped seating around tables, patients appeared to have increased levels of talking and social interaction (Baldwin 1985; Merlin et al 1985, Peterson et al 1977; Maslow & Mintz 1958 cited by Christenfeld et al 1989). The context of the studies was similar in the Merlin et al (1985) and the Peterson et al (1977) studies, which were carried out in ward day rooms in psychogeriatric wards. The Baldwin (1985) study was undertaken in a dining room of a maximum security hospital.

Further, in the Maslow and Mintz 1958 study (cited by Christenfeld et al 1989) it was suggested that large day room areas be divided into sub-areas through the use of waist-high walls, as this prevented patients forming one ‘vast hollow square and promoted conversation. Further provision should be made for ‘buffer zones’ (here Christenfeld et al quote Horowitz et al 1964) and places where a patient can be alone’.

Specifically, patients were grouped around dining tables during meal times, rather than in the usual manner, where patients dined from meal trays in their seats, which were located in rows. Ulrich (undated) quoting Sommer and Ross (1958) states that changing furniture arrangement to more cluster settings improves patient eating and social behaviours.

Further, patients in the Baldwin study (1985) participated in meal choice and composition, which resulted in significantly improved eating behaviour within the experimental group. Baldwin, cautioned that the findings were not significant, as he noted that the participation of staff in the study might have contributed to the results The Baldwin study also found that casualty incidents were found to decrease throughout the intervention period, by comparison with the control wards. Patients in the experimental ward also earned more *reward points* than those in control wards, whose overall number of reward points decreased during the intervention periods, although no reason was suggested for this.

Finally, he noted a trend towards an overall decrease in the duration of seclusion in intervention wards, which he noted was not statistically significant.

Staff impacts

The Baldwin study found that nursing reports examined during the intervention period reflected favourable attitudes to the intervention. Nurses within all intervention wards had recorded anecdotal observations indicating that the social interaction of residents had improved.

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