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**DESIGN AND DIGNITY, AND COST-EFFECTIVENESS AT THE
END OF LIFE CARE IN HOSPITAL: a review of the literature**

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DESIGN AND DIGNITY, AND COST-EFFECTIVENESS AT THE END OF LIFE
CARE IN HOSPITAL: a systematic review of the literature

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ABBREVIATION INDEX

AD/DNR orders	Advance directives/ Do Not Resuscitate orders
CPR	Cardiopulmonary resuscitation
EBD	Evidence-Based Design
ED	Emergency Department
EOL/EOLC	End-of-Life /Care
ICU	Intensive Care Unit
LOS	Length of stay
NICU	Neonatal Intensive Care Unit
OP	Outpatient
PCIS	Palliative Care Inpatient Service
PCU	Palliative Care Unit
PC/PCS	Palliative Care/ Palliative Care Service

1. INTRODUCTION

This document is the long version of the literature review “Design and dignity, and cost-effectiveness at the end of life care in hospital”. If you want to look at the full review of the evidence, this is the place to find out. If you want to have access to a summary version with the key findings of it, a short version is also available.

For many people, home is more than a physical space; it represents familiarity, the presence of loved ones, and the possibility of enjoying “normal” life. Despite evidence from the Irish Hospice Foundation and elsewhere that most people would wish to die at home, (Willard and Luker, 2006), the majority of people die in hospital and a high proportion of these die in acute hospitals.

Gomes and Higginson (2006) investigated the determinants of the home/hospital death. They determined the relative influence of different factors on place of death for patients with cancer and developed a model to explain the variations. The risk factors covered all groups of the model: related to illness, the individual, and the environment (healthcare input and social support), the latter found to be the most important (Gomes B. and I.J Higginson, 2006).

In many respects acute hospitals have been changing in ways that make them increasingly unsuitable places to die as lengths of stay have been reduced, and the attempt has been made to limit the role of such hospitals to the most acute phase of an illness. Since it is inevitable that many people will die in hospitals it is important to ensure that facilities, procedures, policies and staffing are arranged in ways that respect the needs of patients and families. The purpose of this review is to gather the evidence on how design and configuration of facilities can be supportive to dignity and privacy around death in hospital, and to determine if in fact these improvements (which may cost more to include) are cost-effective and produce a positive return on the investment.

A systematic literature review was conducted to assemble the evidence concerning the built environment for Dying, Death and Bereavement in acute and non-acute hospitals. In particular the interest is in how the physical hospital/facility environment and its management can optimise care in terms of dignity and privacy at the end of life, and what are their impacts on the initial and operational costs of the hospital.

The primary focus of the review is on end-of-life care (EOLC) facilities. Given that very few studies were found specifically on EOLC facilities, the search was widened to include therapeutic facilities that are similar in terms of the need for dignity and the privacy of the patient.

1.1 Definitions

Brundtland described health, dignity and human rights as inextricably linked and are central to the development of health systems and services both in Europe and through out the rest of the world (Brundtland, 2003). In order to understand what is meant by privacy and dignity, scholars emphasise the difficulty of measuring something that is highly abstract and vague (Griffin-Heslin, V.L., 2005).

For the purposes of this review the following definitions and concepts were used:

1.1.1 Privacy

Privacy was defined simply in an early and influential law review article by Warren and Brandeis (1890) as “the right to be let alone”. Privacy is often characterized as freedom from exposure to or intrusion by others.

Scopp et al. (2003) add that “Privacy concerns a person’s decision to deny or grant access to self”. And how individuals experience their privacy, and what they perceive as a loss of privacy will be influenced by their own cultural background, demographics and ethnicity.

Privacy provides vital space for personal growth and development and for the exercise of freedom. (Law Reform Ireland, 1998). For Calnan et al. (2006) “the concern for privacy and keeping control (both physically and mentally) has implications not only for identity but also for autonomy”.

Allen (1995) distinguishes 3 major usages of the term “privacy”: physical privacy, informational privacy and decisional privacy. Physical privacy refers to freedom from contact with others or exposure of one’s body to others. Informational privacy refers to prevention of disclosure of personal information. Decisional privacy refers to an ability to make and act on one’s personal choices without interference from others or the state.

This literature review focuses on both the physical and informational aspects of privacy.

1.1.2 Dignity

Despite the growing interest among scholars on the concept of dignity, a comprehensive and specific definition of dignity in general, let alone patient dignity in particular, is difficult to find.

Coventry (2006) states that a difficult aspect of dignity is its dual nature. “Dignity is a descriptive notion in that it is a quality that involves self respect and requires a belief in oneself ... and a normative concept in that it has associated obligations and rights” i.e. guarding one self respect to preserve dignity and preserving the dignity of others during interactions.

Caygill (1990) believes it is “a socially recognised sense of worth”.

Haddock (1996) suggests it involves feeling and being treated as a human being in a non-judgmental environment. She gives an operational definition of dignity as the ability to feel important and valuable in relation to others, communicate this to others and be treated as such by others in the contexts which are perceived as threatening.

Leino-Kilpi et al. (2002) go on to consider physical and social aspects of privacy in hospitals including physical touch, the need to undress and patients' lack of control over their environment.

Fenton and Mitchell (2002) suggest a conceptual definition of Dignity of Older people in Long term care as: "A state of physical, emotional and spiritual comfort with each individual valued for his or her uniqueness and his or her individuality celebrated. Dignity is promoted when individuals are enabled to do the best within their capabilities, exercise control, make choices and feel involved in the decision making [that underpins their care]"

Fenton & Mitchell outline the fundamental elements to maintaining dignity and privacy among which are: respect for the personal world of patients (patients experience care in an environment that actively encompasses respect for individual values, beliefs and personal relationships), respect for the individual's personal space and boundaries, communication between staff and patients that takes place in a manner which respects their individuality, and availability of areas so that privacy can be respected (patients and or carers can access an area that safely provides privacy).

1.1.3 Cost-effectiveness

Among the factors driving the market for hospital design and construction are competition for patient market share and efficiency and cost effectiveness.

The cost-effectiveness represents the good value for money from the perspective of the relevant decision maker.

Evidence-based design (EBD) aims to create better buildings that facilitate physical, mental, and social well-being and productive behaviour in their occupants and through better performance, to improve the organisation's financial position (Berry et al. 2004).

Evidence-based design is relatively new, evidence supporting this approach is not yet robust in many areas and existing research on evidence-based hospital design is not widely known among policy makers, regulators and other decision-makers and opinion leaders.

Researchers and architects anticipate that hospital administrators increasingly will request evidence-based designs to achieve cost savings through risk avoidance and improved patient outcomes and satisfaction (Nelson et al. 2005).

1.2 Search strategy and outcomes

As the initial narrowly focussed search for evidence based publications identified very few papers, the main search for evidence from scientific studies was conducted through PubMed, Scholar Google, using the following extended MeSH terms

hospital, terminally ill, dying, end-of-life care, death, bereavement, design, privacy, dignity, healing, suicide, childhood, maternity, ambulatory, outpatient, parking, emergencies, ICU, ED, mortuary, grief, view, body, spiritual, noise, smell, light, room, single room, nurse station, cluster of rooms, acuity adaptable room/ universal room, way finding, facility, accommodation, bed, space, toilet, palliative care unit, palliative care team, palliative care consultation, hospice, palliative medicine, cost, charges, financing, reimbursement, economics, resources, length of stay (LOS), cost effectiveness, non-clinical outcomes, financial, business ...

The search was limited to English and French language citations. In addition to PubMed and Scholar Google, we searched other relevant sources, such as government health departments around the world, organisations, and associations' websites. This search mainly yielded guidelines, recommendations or standards of practices. It also identified some practical hospital examples in both English and French languages. Our search yielded 167 relevant articles. Most report American studies, but others are Canadian, Swedish, Australian, Japanese or English.

While it is recognised that in some respects issues related to neonatal intensive care are different (since there are different concerns where care is being provided for sick and often premature babies), it was decided to include such papers because they have some interesting material concerning facilities and respect for the family's privacy and dignity.

1.3 Categorisation of evidences

The material found was classified in terms of the quality and strength of the evidence. The categories ranged from high quality refereed evidence to unpublished opinions, and the four chosen categories were

- evidence-based papers in peer reviewed journals
- guidelines
- reviews of evidence
- examples/opinions

Despite the relatively slim literature in the field, the research identified 6 main themes that are important to design enhancing dignity and privacy in death and dying in hospital. These are:

- single room
- internal environment
- unit configuration and positioning of the nurses' station
- family and visitors' facilities
- family care

- external environment

The research suggests as well that the single acuity adaptable/universal room in an upgraded internal and external design in a specific unit layout is cost-effective. And that operating costs of such design appear to cover the extra construction cost of hospitals within the first year of construction.

We could not find any specific information about the cost-effectiveness of the design of outdoors, gardens, day room, admission, waiting room, patient/visitors'/family facilities.

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2. REVIEW

2.1 Single room for inpatient including in Intensive Care Unit (ICU), Emergency Department (ED) and for outpatients (OP), versus shared room

Over the past years, a number of pioneering hospitals have been constructing new room designs intended to provide long-term flexibility and safe patient care based on the Acuity Adaptable and Universal Room concepts.

The Acuity Adaptable concept is maintaining the patient in the same patient room or nursing unit from admission until discharge, regardless of the patient's level of acuity.

The idea of the Standardized or Universal Room is that all patient rooms through the hospital share a uniform design and are capable of handling a wide acuity mix of patients, to help maximize flexibility and facility utilization.

Adaptable and universal approaches have comparable features and design as well as a similar goal of providing flexibility for changing patient acuity; but the purpose of the Acuity Adaptable concept is to eliminate patient transfers by providing comprehensive care combined with a staffing model where the flexibility is used in real time, patient-to-patient; although Universal Room's focus is to provide an adaptable room design that can accommodate changing acuity or clinical needs over a period of years and does not specifically alter the current care practice and transfer of patients.

Both approaches share a number of similar characteristics derived from evidence-based design research of more than 600 studies linking patient health and quality of care to architectural elements (Brown Katherine Kay and Gallant Dennis, 2006).

2.1.1 There was good evidence that most patients and their families preferred single rooms

Evidence-based papers

Little research has been conducted to date (14) on privacy and confidentiality associated with the physical environment, such as single versus double rooms/ open bay in ED, ICU or waiting rooms in OP clinics.

Single occupancy rooms increase patient's privacy, which provides patients with control over personal information, an opportunity to rest, and to discuss their needs with family members and friends who stay substantially longer during visits (Bobrow and Thomas 1994; Burden 1998; Morgan and Stewart 1999; Chaudhury et al. 2003).

Eight studies concluded that the majority of patients and their family preferred a single room particularly if they or their roommate had distressing symptoms or are

dying and were more satisfied with their care while some patients stated a preference for four bed bay accommodation (Kirk 2002; Morita et al. 2002; Lawson and Phiri 2000; Douglas and Douglas 2004; Stevens et al. 1995; Chaudhury et al. 2003) and two studies stated that the benefit of a shared room was the company and the support (Pease and Finlay 2002; Malcolm 2005). The key issue was that each individual should have a choice of type of accommodation. Findings suggested that at least half of the total beds should be in single rooms with community spaces which can meet the needs of those patients who require company, and indicate that adequate patient room size contributes to a perception of better amenities and greater privacy for care receivers during the admission and lessens their emotional and physical burdens.

Two studies highlighted frequent breaches of visual and auditory confidentiality in ED; the participants suggested that knowing they could be overheard constrained information disclosure or that they refused part of their physical examination. Findings suggested that rooms with walls and doors provided the most private and confidential environment. In patient care areas with “curtain walls” or glass partitions almost everything could be heard by an observer in the next room (Mlinek 1997; Barlas et al. 2001).

Two studies found the need for a private room for the patient and family for the peacefulness of the dying process and privacy in the ED (Heaston et al. 2006) and in ICU for the withdrawal of life support (Rocker et al. 2005).

In NICU, nurses suggested that single-rooms were superior for patient care and parent satisfaction with noise level decreased from an average of 63 to 56 decibels; the main issue was ensuring sufficient staff coverage (Walsh et al. 2006).

But one study’s findings indicated that outpatients preferred the environment of an open room with chairs because of the informal social support they and their children received. The patients are taken to the private treatment rooms only if the doctor needs to do a more thorough examination on the patient or if he needs to talk to the parents about private issue. (Prichett and Buckner 2004)

2.1.2 There were suggestions of the importance of the single room and the acuity adaptable/universal room

Guidelines

Four recent guidelines for design and construction of health care facilities recommend a single-bed room as the minimum standard for medical/surgical and postpartum nursing units in general hospitals (the American Institute of Architects 2006), with en suite facilities toilet and bath or shower (Scottish Association of Community Hospitals and Scottish Partnership for PC 2003; Paul Cormie 1999) unless the facility can demonstrate the necessity of a two-bed arrangement.

It is recommended that in the order of 50% of in-patient beds should be in single rooms. Two bed rooms are to be avoided (not popular), four bed rooms are considered to be quite suitable (The Department of Health and Children (Ireland)).

Reviews of evidence

Dowdeswell et al. 2004 found that single rooms

- are quieter than multi-occupancy wards
- can be personalised, in terms of control over lighting and temperature, leading to happier and better rested patients, encouraging patients to recover mobility more quickly and giving them an important sense of self-reliance
- have an important and beneficial effect on the doctor/patient relationship resulting from the ability to discuss clinical or social conditions with greater privacy than that offered by curtains (Press Ganey 2003)
- mean that family and friends can visit more frequently, for longer periods and don't feel that they are disturbing others

This review therefore recommends that guidelines should promote a good practice range of between 50% and 100 % single rooms.

Chaudhury et al., 2003 found that the reasons for choosing single rooms include:

- reduction of medical errors, patients falls and procedural problems
- flexibility for accommodating family
- suitability for examination of patients by health care personnel and collection of patient's history
- patient comfort level
- patient recovery rate
- staff efficiency
- less medication
- better access to bathing facilities
- more space for storage and equipment

But it stated that more detailed study with examples from multiple hospitals is required before drawing specific conclusions.

Example

Brown and Gallant (2006) consider that Acuity Adaptable Care/Universal Room Designs foster continuity of care, build trusting relationship with consistent staff leading to an increased patient confidence in nursing skills and reduce stress and anxiety of transfers.

With space for families in the patient's room, there is less need for larger family waiting areas on medical/surgical floors (Solovy 2002).

McGrath (2006) reports that private rooms are preferred for children's services because of decreased noise and embarrassment and the opportunity for increased rest in the hospital setting. Patients also report feeling they can better control the environment to meet their personal needs without having an impact on other patients.

White (2003) and Brown (2001) report that it also provides appropriate environmental stimuli, lighting and sound for each child and increase privacy and accessibility for families and fathers especially.

Parents can room in, reducing the need for parent rooms elsewhere. Separate rooms for family consultation and grieving may still be necessary, and a room to allow mothers to pump breast milk, breastfeed or provide Kangaroo Care. Private rooms allow families to personalize the room for their baby as their baby's "home away from home". The ability to perform critical procedures and admissions without impact on other patient is a benefit of single room design.

2.1.3 The cost-effective model of patient room: the single room and the acuity-adaptable/universal room

The advantages of single rooms in terms of improving the experience of patients and their families and for some aspects of care are outlined above. Research also shows that the most cost-effective model can be the acuity adaptable or universal room. It appears in the literature that the single and acuity adaptable/universal rooms cost less by improving the patient flow and the hospital capacity; and by improving the nursing productivity and decreasing sentinel events.

Improving patient flow and hospital capacity

There is good evidence of improved patient flow improved through

- shorter mean length of stay (LOS)
- decreased transfer

There was suggestion that the patient flow improved through

- lower complications rates

Transfers of patients within the hospital are costly and this can be avoided in acuity adaptable rooms.

There was good evidence that the hospital capacity increased through

- higher bed occupancy rates with a smaller bed base

There was suggestion that the hospital capacity improved through

- availability of beds
- less need for ancillary spaces
- increased market share of private hospitals

2.1.3.1 Improving the patient flow

Evidence-based papers

A patient's length of stay (LOS) is associated with hospital costs. Research demonstrates that patients' length of stay in private rooms is shorter, which in turn reduces costs (Anonymous, 2000; Hill-Rom, 2002; the 2006 Guidelines for Design and Construction of Hospital and Healthcare Facilities-AIA).

In a study by Lawson and Phiri (2000) conducted in England, patients were moved from conventional psychiatric and orthopaedic wards to refurbished wards that were mainly composed of single-occupancy rooms. Psychiatric patients stayed for shorter periods of time. A pioneering project implementing the acuity adaptable room also showed shorter LOS (Gallant D, Lanning K, Hill-Rom 2001).

Patient flow is defined as how hospitals transfer patients between nursing units, and it is influenced by the level of care required and the severity of patients' conditions. To receive the level of care that matches their patterns of acuity, patients often move 3 to 6 times during their short stay. Today's typical nursing unit may transfer or discharge as many as 40% to 70% of patients every day (Hendrich et al.2004).

As patients are moved from one level of care to another, additional time and disruption to the overall care process are introduced. In addition, information and documentation must be transferred to the receiving unit, also increasing the chance of errors and lost data. Thus the continuity of care can be disrupted.

The process of transferring the patient to care areas downstream is time consuming, uses scarce resources and adds no value. In addition to affecting continuity of care, lowering staff morale and risking the loss of information, the transfer process has a cost.

Each one-way, unit-to-unit patient transfer has three cost components:

- direct cost (direct labour cost),
- indirect cost (room turn-over costs, equipment, bed control, operational costs, and administrative support),
- holding cost (cost associated with holding a patient in ICU after orders for transfer have been issued and a delay is experienced and create costly delays and bottlenecks in the ED and the post-anaesthesia care unit).

Single rooms eliminate the need to transfer patients to a different room because of roommate incompatibility (Berry et al. 2004). Cost savings from fewer transfers is particularly applicable with acuity-adaptable rooms (Hill-Rom, 2002; Ulrich, 2003). Acuity adaptable beds minimize bottlenecks and delays in the patient flow because of the unavailability of the correct level of care (Hill-Rom Company, 2002).

Berry, Coile, O'Neill, Parker, and Sadler (as cited in Ulrich, 2003) generated some estimates of cost reduction in hospitals through upgrades of multi-occupancy rooms to private rooms, including oversized single-occupancy rooms and variable acuity rooms. They calculated cost reduction estimates for a hypothetical hospital, Fable Hospital, and demonstrated that this hospital could save more than \$3 million in patient transfers alone by upgrading to single-occupancy rooms from multi-occupancy rooms (Chaudhury, 2005).

Reviews of evidence

Kay Brown and Gallant 2006 report that in addition to transferring patients for a different level of care, approximately 15% to 20% of all transfers are caused by roommate incompatibility.

Hospitals utilizing the acuity adaptable model of care delivery have realized operational efficiencies and cost savings. The elimination of the transfer has the potential to reduce LOS by at least 0.5 days. Lower complication rates due to increased staff vigilance also have the potential to decrease overall length of stay. (Ulrich R. Effects of single versus multi-bed rooms on outcomes. Paper presented at/ Welsh Health Estates and IHEM Conference; 2006).

2.1.3.2 Increasing the hospital capacity

Evidence-based papers

(Bobrow & Thomas, 2000; Delon & Smalley, 1970) report that operational costs of hospitals are reduced in single occupancy patient rooms compared to multi-occupancy rooms. They indicated that even with higher costs of construction, furniture, maintenance, housekeeping, energy (e.g.. heating and ventilation) and nursing, single occupancy can match the per diem cost of multi-bed rooms because of the higher occupancy rates.

Jones & Bullard (1993) observe that private rooms accommodating the full spectrum of service means that fewer beds need to be built and maintained to achieve a targeted capacity of patient days. Delayed transfers of patients between nursing units and lack of available beds are significant problems that increase costs and decrease quality of care and satisfaction among patients and staff.

Hendrich et al. (2004) tested whether use of acuity-adaptable rooms helps solve problems with transfers of patients, satisfaction levels, and medical errors. They found that significant improvements in quality and operational cost occurred after the move, including a large reduction in clinician handovers and transfers, and increase in patient days per bed, with a smaller bed base (number of beds per patient days).

Reviews of evidence

Likewise, Dowdeswell et al. (2004-Report for NHS Estates) indicate that one study in the Erasmus university hospital in the Netherlands suggests that the greater patient throughput in single rooms means that fewer beds are required to serve the same population. Fewer beds have also meant that there has been room to expand outpatient facilities. Furthermore, single room provision may start to eliminate the need for separate ancillary spaces such as day-rooms, treatment rooms etc.

Kay Brown and Gallant (2006) report that, using the acuity adaptable care delivery model and the universal room, the hospital will achieve improved patient satisfaction that will enhance market share.

Example-opinion

McGrath (2006) suggests that single room design in the NICU is more cost effective because of higher occupancy rates, and reduced transfer costs and labour costs, even when the cost of new construction is factored in.

Improving nursing productivity and reducing sentinel events

There was good evidence that acuity adaptable rooms improved nursing productivity and reduced nursing costs through

- reduction of nurse hours per patient

There was suggestion that acuity adaptable rooms improved

- nurse retention rates

There was good evidence of fewer adverse events including

- reduction in patient falls
- reduction in medication errors

There was suggestion that the hospital adverse events decreased through

- reduction in hospital acquired infection

The advantages of single rooms were shown to be achieved with around 50% of all beds being in single rooms.

2.1.3.3 Increasing the nursing productivity

Evidence-based papers

The flexible, acuity-adaptable room concept has been introduced as a platform for changing care processes to achieve a cost-effective care model that fosters nursing efficiency and increased customer satisfaction.

Patient transfers introduce a number of disruptions to safe patient care and impose a significant amount of additional work on nursing staff and hospital operations (Hill-Rom, 2002). The transfer process adds cost to the patient's hospitalization, considering the staff time involved as well as the duplication of certain amenities and missing medications (in addition to the cost of lost patient articles and potential injury). Often there are delays in transferring patients out of the ICU, these delays waste nursing hours, provide a higher level of care than the patient requires, and inflate hours per patient day, and at times even require extra nurses when delays continue into the next shift.

Hendrich et al. (2004) tested whether use of acuity-adaptable rooms helps solve problems with transfers of patients, satisfaction levels, and medical errors. They found that significant improvements in quality and operational cost occurred after the move, including a large reduction in clinician handovers and transfers; decrease in budgeted nursing hours per patient day and increased available nursing time for direct care without added cost.

Pioneering projects implementing the acuity adaptable room also indicate reduction in nursing hours per patient day (Gallant D, Lanning K. Hill-Rom 2001). Gallant and Lanning (2001), in their article on acuity-adaptable rooms, demonstrated that the less a patient is moved, the greater the reduction in cost. The research they quoted in their article demonstrated that the transfer time from a critical care room to a patient room is approximately 7 labour hours. Thus, by keeping a patient in a private acuity-adaptable room, the hospital cuts down on the salary cost associated with 7 labour hours required for patient transfer

Reviews of evidence

Family-centred rooms may reduce the requirements of nurse hours per patient because of family participation in the care giving process (Chaudhury et al. 2006). In this context, eliminating most transfers can save up to \$5 million per year by building acuity adaptable rooms (Chaudhury et al. 2006). To achieve operational savings associated with the acuity adaptable model of care delivery, staffing must be based on patient acuity.

Kay Brown and Gallant (2006) indicate that many programs report high nurse retention rates with acuity adaptable care/universal room design and attribute this success to a careful screening of potential recruits long with proactive nurse education.

2.1.3.4 Decreasing the sentinel events

Evidence-based papers

Patient falls are costly and result in longer hospital stays and may prolong recovery times. Studies have shown that most falls occur in patient rooms particularly when the patient is alone and attempting to reach the bathroom (Hendrich et al. 1995). Patient falls are thus lower in family-centred rooms because patients are likely to have assistance if they need to get up from their beds (Ulrich, 2003).

In comparison to multi-occupancy rooms, medication errors are reduced in single-occupancy rooms, resulting in reduced costs (Anonymous, 2000; Bilchik, 2002; Bobrow & Thomas, 2000; Hill-Rom, 2002; Morrissey, 1994).

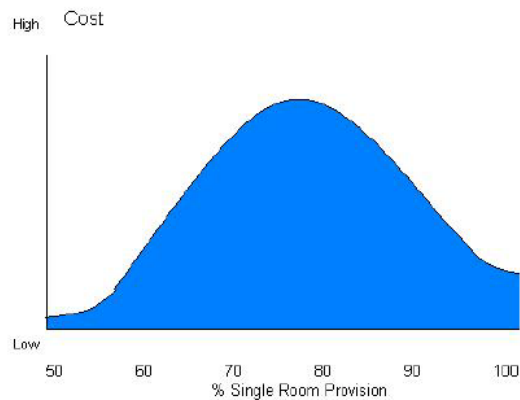
Hendrich et al. (2004) in testing whether use of acuity-adaptable rooms helps solve problems with transfers of patients, satisfaction levels, and medical errors highlighted that significant improvements in quality and operational cost occurred after the move, including reductions in medication error and patient fall indexes. Studies have shown that monthly transfers were reduced by 90% with a resultant 70% reduction in medication errors after implementing the acuity adaptable unit.

Reviews of evidence

Family-centred rooms have been seen to decrease patient falls (Chaudhury et al. 2006). Private rooms have also been shown to reduce medication errors and nosocomial infection by reducing the risk of cross-transmission of microbial pathogens from other patients (Berry et al. 2004; McGrath, 2006).

Patient transfers have safety implications in addition to cost implications. For example, medication errors are more likely when patients are transferred from one care team to another (NHS Estates 2003). Ulrich and Zimring, 2004 reported that the one design improvement that would have the greatest impact on hospital outcomes would be reducing greatly the need for transfers during which a great many medical errors occur. They are often related to transcription omissions and misinterpretations (Kay Brown and Gallant 2006).

Example-opinion



A study by the NHS Estates architectural advisory team suggested that the relationship between cost and the proportion of single rooms was bell shaped, with the ideal combination being between 50% and 100% of beds in single rooms. At 50% there seems to be a good balance between all the factors in play. At some point above this, capital costs rise by more than the savings in revenue costs. This tipping point will vary according to the care and treatment philosophy of the hospital concerned matched against the profiled needs of its patients (Dowdeswell et al. 2004, Report for NHS Estates).

2.2 Key features of internal environment

2.2.1 There was good evidence of internal environment in respect of dignity and privacy of the patient

Four sub themes are included in the internal environment:

Control over the environment (light, noise, temperature, ventilation),

Mobility (surface and floor, bed space, personal space and ownership),

Homeliness (with consideration for impairments, washrooms),

Positive distraction (personal phone, TV, internet)

Access to outside

Evidence-based papers

Eleven studies found how articulate patients can be about the architectural environment and how important they regard it.

The number of patients in a room, the presence of visual screening devices, the location of bathroom and the positioning of the patient's bed all affect privacy

(Bobrow and Thomas 1994; Burden 1998; Morgan and Stewart 1999; Chaudhury et al., 2003).

Patients want control over the environment through the quality of noise, lighting, temperature, and air.

Noise

The average noise level in acute care hospitals is in the 50 to 70 dB range (Grumet 1993; Sutter 1991 (as cited by Schuster et al. 2003)). These levels of noise found in hospital are “ludicrously higher” than the 35 dB background level recommended by the WHO guidelines for hospital bedrooms.

Noise has been shown to create physiological conditions that produce adverse effects to patients (Staples 1996).

Acoustical ceilings absorb sound, porosity of the brick wall, glass partitions, carpets on the floor aids in noise reduction. Overhead banners, soft seating are used to help absorb sound and to create a human scale to the space (Schuster and Weber 2003).

Bishop and Griffin (2006) propose noise control from fixing a squeaking or fast-closing door, installing carpet in a nursing station and patient corridors, or adding acoustical panels or tiles in nursing stations or corridors walls, providing headphones if TV in the room or by softening the noise of charts being returned to holders outside the patient rooms by padding the holders (Berry et al. 2004).

Positive distraction is also known to reduce stress, background (white noise) may in fact decrease the distraction of other louder noises and ultimately produce a soothing effect on the individual (Kryter 1985).

Light

An experimental study that compared the effect of morning and evening light on patient with winter depression found that morning light was twice as effective as evening light in treating seasonal affective disorders (Lewy et al. 1998).

Walch et al. (2005) found that patients exposed to an increased intensity of sunlight experienced less perceived stress, less pain, took 22% less analgesic medication per hour and had 20% less pain medication costs. Thus, an important consideration while designing hospital layouts may be to optimize exposure to morning light in patient rooms by using an east-facing orientation.

Douglas and Douglas (2004) for example propose a light control by providing a pulley so patients who are immobile can shut their own curtains independently.

Temperature and ventilation

But windows within wards designs are also meant for ventilation (Douglas and Douglas, 2005). There must be an effective heating and draught proofing mechanisms (Douglas and Douglas, 2004).

Patients want to keep independence and mobility in the environment

For example the door on the bay toilet should not be heavy and difficult to open (Douglas and Douglas, 2004) or a space around bed is necessary for privacy and accessibility to get around and give space for families and visitors (Douglas and Douglas, 2005).

Larger shower-toilet rooms should be planned and built as accessible facilities with sufficient space for independent and assisted wheelchair users (hoist use) rather than providing a “one space fits all” solution (Hignett and Evans D 2006) and with grab bars next to the toilet. Wheelchair clearance under the sink must be provided as well as heat lamps in the shower room (Cutler et al. 2006); and in case of the use of a commode or urinal, facilities to wash hands afterwards must be provided (Woogara 2005).

Homeliness of the environment

There is strong evidence that design changes that make the environment more comfortable, aesthetically pleasing, and informative relieve stress among patients and increase satisfaction with the quality of care provided (Leather et al. 2003; Swan et al. 2003).

Sun (1996) shows that colour has physiological and psychological effects. In hospital red has been used to increase energy levels, and blue has been used to aid in relaxation, rest and the recovery of patients after ill health.

A study by Harris (2000) found that family and friends had substantially longer visits to rehabilitation patients when patient rooms were carpeted rather than covered with vinyl flooring.

Lawson 2000 shows that orthopaedic patients treated on a refurbished ward required fewer analgesics than those on the older ward. Ulrich (1984) Bishop and Griffin (2006) found that providing a window in a patient’s room that allows views of nature and natural daylight, or painting a wall a soft colour improve patient outcomes.

Patients want positive distractions such as:

- access to nature,
- a fireplace or an aquarium
- music, artwork displays,
- the zone concept which empowers users (Parker 1993) with a family zone including a chair bed refrigerator, computer hook-up, voice mail and TV/VCR
- ceiling-mounted nature scene and listening to nature sounds

This distraction can reduce blood pressure (Ulrich 1984) and increase patient and staff satisfaction (Berry et al. 2004; Lawson and Phiri 2000; Mazer and Smith 1993; Douglas and Douglas 2004 and 2005).

Music has been shown to enhance the impact of analgesic or anxiolytic (live and instrumental music has more impact than recorded and vocal music). In an experiment in NICU playing lullaby tapes with a woman’s voice ethnically matched to each child

at 80 db so as to mask the sound of the respirator, the experimental group left intensive care seven to 10 days earlier than the control group. (Mazer and Smith 1993)

Ulrich found that patient who were assigned a picture with landscape scene with trees and water reported less anxiety/stress and needed fewer strong doses of pain drugs than a control group assigned no pictures; another group of patients assigned an abstract picture, however, had worsened outcomes compared to the control group (Ulrich 1991). Many react negatively to chaotic art (Ulrich and Gilpin 2003).

A randomized prospective investigation found that adult patients undergoing a painful bronchoscopy procedure reported less pain if they were assigned to look at ceiling-mounted nature scene rather than a control condition consisting of a blank ceiling (Diette et al. 2003).

Research on patient suffering intense pain because of severe burns found that exposing patients to a videotape of scenic nature during burn dressing significantly reduced both anxiety and pain intensity (Miller et al. 1992).

2.2.2 There were suggestions of internal environments that are of importance:

Guidelines

Three sets of guidelines make recommendations for the furnishing and the design of the single room:

The Scottish Association of Community Hospitals and Scottish Partnership for PC, (2003) and the Scottish Partnership Agency for Palliative and Cancer Care (Cormie 1999) recommend single rooms with en suite facilities toilet and bath or shower, comfortable reclining chairs, easy access to telephone with adequate privacy and facilities to eat with family/ friends if preferred.

According to the Joint Commission on Accreditation of Healthcare Organizations, furniture and other partitions should be located to enhance privacy, and curtains are permissible in the ED if they provide adequate visual privacy and if stretchers and examination areas are spaced far enough apart to ensure auditory privacy.

The Department of Health and Children (Ireland) recommend:

- Orientation and views providing interest and stimulation.
- Sound containing partitions and doors with acoustic materials and floor coverings, curtains and other materials that do not reflect sound for specialist palliative care settings.
- In view of the possibility of unpleasant odours in bedrooms, bathrooms and WC's, and day areas, ventilation provided should be of high standard. It is desirable that natural ventilation should be used wherever possible, and every effort should be made to avoid draughts.

- Individual spaces should be created within these larger rooms, for example by use of furniture, room dividers.
- Each bedside should enjoy natural light and where possible a view to the outside. An arrangement where 2 beds are positioned directly opposite one another is generally to be avoided, again for reasons of privacy and dignity.
- Direct access to the outside from the ward is desirable, steps should be avoided at the threshold, and a safe balcony, terrace or other paved area should be provided.
- Storage space should be provided for the family.
- Artificial lighting including dimmable night lighting, reading lights at the bed and at the patient sitting area, as well as sufficient light to allow therapeutic procedures to be carried out in the room must be provided.
- A shower seat in each cubicle must be provided. Taps are to be chosen that are suitable for patients with reduced dexterity. The concealable vanity mirror should be fitted at a level that allows it to be used from a standing or sitting position.

It is recommended that single rooms should be up to 25m² each in floor area, including an en-suite bathroom; four bed rooms should be at least 60m², but it is accepted that facilities for visitors or family member to stay over night may be reduced; each bed should however, as a minimum, have a reclining armchair for the benefit of visitors.

At least one bedroom per ward must be equipped with relatively “low tech” systems to facilitate patient with reduced mobility or dexterity control over such things as communication (phone TV etc) environment (lighting, ventilation) and others.

Reviews of evidence

Consideration for impairment is part of the dignity of the patient: wheelchairs should be purchased to allow patient to be wheeled to the toilet rather than using commodes; every patient should have access to an area to wash and use a lavatory and shower that is private and clean. (Birrell et al 2006; Booth 2003)

In specialist palliative care settings, the beds must be bigger than a standard hospital bed (possibly 1.5 x width) to allow room for a partner/spouse to lie beside the patient. Widths of corridors, doorways, bedroom’s outdoor access, space outside on a patio, terrace or balcony and lifts should be designed of adequate size to provide room for a hospital bed, supportive equipment and seating for people accompanying the patient (International Expert Advisory Group, Ireland).

Control over the internal environment:

Ulrich and Zimring (2004) reported that the hospital room is noisy because of sounds from the nursing station, alarms, overheard pagers, and rattling supply carts that echo down the halls.

In general, studies of the effectiveness of noise-reduction measures suggest that environmental or design interventions are more successful than organizational interventions such as staff education (Gast and Baker 1989; Moore 1998; Walder et

al. 2000). Environmental interventions that have proven especially effective for reducing noise and improving acoustics in hospital settings include: installing high-performance sound-absorbing ceiling tiles, eliminating or reducing noise sources (for example adopting a noiseless paging system) and providing single-bed rather than multibed rooms.

Open bay areas should be abolished or modified and provided with sound-absorbing walls and ceilings, carpeted hallway for keeping noise to a minimum: new carpeting materials feature a polypropylene backing that “basically is welded to the floor” to allow all moisture to be extracted in case of spills (Lowers J. 1999; Nelson et al. 2005; Garros 2003).

In patient rooms, lights can be configured separately for patient, visitors and staff: a recessed light panel in the wall might allow a visitor to read on sofas or rockers adjustable in an otherwise dark room while the patient sleeps, and a light focused on a charting desk could let staff work without disturbing the patient.

It is much easier on the staff and on the hospital laundry to simply turn up the individual thermostat, rather than piling great numbers of blankets on top of cold patients (Hopkins 1994).

A homely design:

Adding a bulletin board and shelf for cards, photos and personal belongings in a convenient location putting them in patients’ view and off the bedside table, play a significant role in helping to maintain dignity (Birrell J et al 2006; International Expert Advisory Group, Ireland; Lowers J. 1999).

A “L”-shaped room design was intended to give patients a sense of their own space (Mc Taggart 1996; Weisman 1994; Chaudhury et al. 2003) with the equipment hidden behind curtains (Garros 2003).

Positive distraction

Several studies show that patients need less pain medication and are less stressed when they have music available: personal stereos with headphones are available on each floor, in surgery suites or in the emergency department to calm patients before and during procedures. (Lowers 1999)

Example

Surface and floor:

Brown and Gallant (2006) propose a private room square footage ranging from 270 to 400 ft², (inclusive of the bathroom) organized into 3 zones, patient, clinical and family. The family zone includes seating (with a cup holder like in cinemas, Heathcote, 2005) and access to a private phone, computer services and general “home away from home” amenities and perhaps sleeping accommodation (Merkel 2003) and can be curtained off to allow family who may be needed –for example to translate for the patient- but who should not watch the examination (Solovy 2002).

A window which can be made opaque at the flip of a switch facilitated by an electronically charged window enhances privacy. The sink and work counter should

be located in close proximity to the entry door for both access and convenience to nursing staff, physicians and others entering and exiting the patient room (Easter 2003).

White ceilings and white walls which appear to converge for bedridden new paraplegics should be avoided; this combination can be disorienting and threaten a patient's visual comfort (Schwartz 1992) but a transparent dome in the ceiling affording views of the constantly changing sky (Heathcote 2005) can be useful.

For frail persons, inaccessible window desks should be removed, and a movable storage cabinet should be added; frail people need a lightweight doors that can easily be opened and closed, a clothes rod with three adjustable heights, drawers that open easily and quietly with one hand; a floor moulding of a contrasting colour to provide visual contrast between wall and floor; window sheers to reduce glare (Hahn and al. 1995).

Interior design should reflect an understanding of specific populations and cultures, should respond to any cultural taboos, propensities, and beliefs concerning the use of certain colours, architectural elements, furniture placements and art images (Frasca-Beaulieu 1999).

Each patient room should have a "spirit place" where patients can display objects that are deeply meaningful to them and see them at any time. In addition to a room number, patients can be allowed to name their rooms (Bakken and Linton 1994).

Different colours of different rooms make them seem less institutional. Brown doors and corners guards changed to an aspen colour and changed the lighting to colour-corrected fluorescent tubes make it looked clean and the light shining out of them bright.

A widow seat can be provided in the room with a nurse-call pull cord, which can be placed in the patient's lap and vertical blinds which pull to one side instead of from the centre to allow for a better view of large trees. Over the window a curved valance can be installed for the healing aspect of the curvilinear spaces (Hopkins 1994).

Bathrooms should be placed on the side of the room away from the hallway to provide better visual observation of the patient from the hallway and easier entry for beds and equipment. A special bathtub shower unit with a deep base allows a toddler can have a bath or an older child a shower with a long hand-held hose (Acton et al. 1997).

In the bathroom, incandescent light should be installed and the walls should be painted a pale pink for reflectivity to enhance skin colour. Shower curtains should have clear liners with a touch of colour to preclude the patient from thinking the curtain was a wall (Hopkins 1994).

Sound, light control:

To avoid noise, put telephones at each bedside that light instead of ring (Acton et al. 1997), and put the ice machine in a remote location (Hopkins 1994).

Indirect lighting controlled by a dimmer switch allows for variable levels of light during changing periods. Small task light above the staff charting area and under-counter light at the sink in each room respects patient's rest. Switches for all lights should be placed at the entrance to each room and just steps from the bedside. A master switch for control of all light facilitates immediate darkness for emergent procedures (Brown 2001).

For lighting, all-electronic ballasts and higher-quality bulbs and fixtures (montages) can be used in order to reduce the amount of flicker, and use as much full-spectrum lighting as possible (Bakken and Linton 1994).

Lamps which swivels and incandescents to provide a choice in lighting for the patient should be provided. The side rail of the bed can act as a little command centre or control station for the patients, they can call the nurse and have a two-way conversation access TV, turn on or off either or both sections of the over bed light, and adjust the firmness of their mattress. An over bed table can open with two top trays (Hopkins 1994).

ED should have wide aisles and over sized rooms to accommodate family members with retractable doors and curtains for patient's privacy.

Instead of traditional waiting areas, patients and their family should be able to go directly to the larger patient rooms for registration and treatment. A bedside registration using portable computers allows the ED to use more space for treatment areas and less for paperwork. And glass sliding-door enclosures on one to three sides of each bay achieve a balance of privacy, visibility and flexibility (Greene 2002)

Too often ambulatory care design disregards personal space and privacy issues. Therefore, it is important to locate dressing rooms within or very close to examination and treatment rooms. It is also important to design private consultation areas where patients can discuss their medical problems and /or finances away from other patients or unrelated staff.

Tactile fabrics, wall coverings, sculpture, artwork, wood detailing, and children's play areas are elements that can add comfort to ambulatory care settings (Frasca-Beaulieu 1999).

Patients move in a logical process from the pre-op area to the operating suites to recovery without ever having to backtrack (Daily 2003). The spacious recovery units in outpatient surgery were designed to enhance privacy and comfort and from the second recovery bay patients can also enjoy a window view. In children's hospitals, the examination rooms should have oversized built-in banquettes for parents to sit with their children while they wait for the doctor (Simmons 2003)

2.2.3 Cost-effectiveness of appealing rooms and light exposure

Appealing rooms and light exposure have been reported to lower the cost by

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Decrease LOS

Increasing the market share

Decreasing the use of drug, minor complications

Decreasing the medication errors, falls

Evidence-based papers

Swan et al. (2003) investigated the effects of appealing and more costly hospital rooms on patient evaluations of healthcare providers and services. This study suggests that patient in appealing rooms rated their attending physician, the housekeeping and food service staff, and the food service and the hospital, more favourably than did patients in typical rooms, and had stronger intentions to use the hospital again, and would recommend the hospital to others, improving the hospital's competitive position.

But the authors point out that appealing rooms have some limits; there is limited market of persons able to pay extra for a room and another portion unable to choose a hospital.

In the study by Ulrich (1984), patients with views of nature went home three-quarters of a day sooner, had a \$500 lower cost per case, used fewer heavy medications, had fewer minor complications such as nausea, and exhibited better emotional well-being. Similarly, Walch et al (2005) in a study of surgical patients found that those assigned rooms with higher daylight exposure reported suffering less pain and actually took 20% fewer strong pain drugs. In the study by Lawson and Phiri (2000) conducted in England, psychiatric patients moved to refurbished wards that were mainly composed of single-occupancy rooms required lower levels of analgesia.

Reviews of evidence

Factors associated with medication errors include inadequate space for performing work and insufficient lighting (Nelson et al. 2005).

Finally, most falls that occur in hospital are due to slippery floors, poor placement of handrails and inappropriate door openings or furniture heights (Nelson et al. 2005).

2.3 Unit configuration and nurses station

2.3.1 There was good evidence of the importance of unit configuration and nurses station in respect of dignity and privacy of the patient

Connection to staff, through the shape of the unit, the ability to see staff easily

Evidence-based papers

The nurses' station should be between the reception and the waiting areas (Denner 2004).

NICU- Both the visibility and contacts between the nursing and medical teams could be improved by placing the nursing station and the physician work area adjacent to the patient rooms.

A pinwheel design with 10 to 12 rooms around the periphery of a physician/nurse work area allowed each infant room to have exposure to daylight and resulted in small patient groupings (pods)(Walsh et al. 2006).

Because most hospital floors are organised around a central nursing station, nurses spend most of their time away walking up and down the halls. In one study Hendrich found that on average nurses spend only about 30-40 minutes of their shifts actually giving care at the bedside (as cited by Mc Carthy, 2004).

A central multi-disciplinary station and decentralized nurse stations reduce the overworked nurse's travel time and increase efficiency, place nurse closer to the bedside.

Nursing mini-stations, like brightly lit alcoves in-between patient's rooms with a window for patient surveillance and a desk area with seating and a clinical integration station (a common work area with computing resources and small conference rooms) between every two rooms decrease patient falls by 75% in one hospital (Brown and Gallant 2006).

2.3.2 There were suggestion of the importance of unit configuration and nurses station

Guidelines

The Department of Health and Children (Ireland) recommend

- that the nurses' station should be within easy access and view for patients and the public and will be the focal point for supervision, care and communication on the ward; it should be so positioned so that the nurses can communicate easily with patients and have immediate and direct access to patients,
- that sheltered outdoor spaces should be created in and around the unit for the enjoyment of patients, staff and visitors and to assist orientation, to locate noise generating rooms away from those requiring quietness,
- that all patient areas be located on the one floor level, ideally ground floor, with communication with outside.

Reviews of evidence

NICU- The pod configuration allows less experienced nurses to learn in an isolated environment that removes distractions of the activity of other infants. The proximity of workstation to private rooms facilitates nurse's presence. In-house survey shows

increase in nurse satisfaction with the job, team member support and validation of individual opinions (Carlson et al., 2006).

Moving information and nurses desks to the front rather than the back of patient hallways also can cut down on visitors' traffic and noise, as can breaking up the functions of a central nurses' station to several substations closer to patient rooms (Lowers, 1999).

Pebble Project Partners opted for curving walls, a partially enclosed unit clerk area and a flat screen computer outside every patient room (Nelson et al., 2005).

Examples

The nurse station should be at the heart of the unit to create a centre, open and inviting space with café table or dining tables where patients could sit down with staff and go over their charts. (Dubbs 2006).

The nurse station should be built of varying heights, making staff visually accessible to adults and children (Simmons 2003).

Decentralised charting stations promote safety by enabling direct observation through windows of patients in single-bed rooms (Institute of Healthcare Mgt 2006) and low counters so the person sitting behind the desk can look in the face of the child who is standing there as well as the adult.

The family lounge situated on each bed floor is in full view of the main nursing station and gives parents an opportunity to read, relax, watch TV and even cook meals in the proximity and visibility of the nurse station that makes it easier for them to get away from their child's room (Acton et al. 1997).

Outside of the patient rooms, each pod has a "lollipop table" around which family and staff can talk (Hohenstein 2001).

Placement of large staff work areas outside of each patient room for activities such as rounds or consultations reduces the traffic flow at the bedside. Angled walls with small windows were added in areas where view was challenged. Audio stations at each bedside allow the nurse to communicate by one touch dealing to the front desk or the location of another staff member (Brown 2001).

2.3.3 Cost-effectiveness of the cluster of rooms and decentralized nurse stations

The cluster of rooms and the decentralized nurse station have been reported to lower the cost by

Reducing the overworked nurse's travel time

Increasing efficiency

Reducing staffing cost

Reducing patient falls

Evidence-based papers

Decentralized nurse station and multiple observation points reduce the nurse's travel time and increase efficiency. The added patient surveillance gained by placing nurses closer to the bedside has been shown to reduce patient falls up to 75% (Hendrich et al. 2004; Hendrich, Fay, and Sorrells 2002). A growing body of research suggests that most falls occur when patients try to get in or out of bed without the assistance of hospital staff.

Jones & Bullard (1993) showed that larger patient rooms that are capable of multiple uses, clustered in care suites, at least 10% reduction in annual staffing costs can result from cross-training and organization into systems.

According to Ulrich and Zimring's research (2004), the number of patient falls per day can decrease three times as a result of switching to single-bed rooms and incorporating decentralized nurse stations into the hospital's design. Moreover, Bilchik (2002) found a 62% decrease in medication errors in the new units attributed to the well-thought-out design of the medication room. Historically, architects have relegated medication rooms to small, and often dark, sections of supply, and equipment areas. New units have larger medication rooms with better lighting and acoustics to reduce distractions and improve work flow.

Reviews of evidence

Nelson et al. (2005) reported that several studies indicate that the type of unit layout influences the amount of time nurses spend walking.

2.4 Patients' and visitors' facilities outside the bedroom

2.4.1 There was good evidence of the importance of the patients' and visitors' facilities outside the bedroom in respect of dignity and privacy of the patient

Recreation and leisure,

Homely conference room, meditation room, waiting room

Evidence-based papers

Among the institutional factors of perceived conflicts and critical support during end of life decision-making, 27% of respondents commented on the need for a waiting room/family room, and 27% for a conference room. As they share their experiences, a natural support group often forms among the different families in the ICU, providing an empathetic camaraderie of the ICU waiting areas (Abbott et al. 2001).

Patients identified a need for facilities for recreation and leisure for themselves and their visitors (cinema, game room, cafes, crèche, and mobile hair salon) which support social interaction and feelings of normality, accommodation for prayer sessions and baby change facilities. The evidence suggests that this need was not met by day rooms, which were poorly used and perceived as sparse, insular and “empty places” (Douglas and Douglas 2004, 2005).

2.4.2 There was suggestion of the importance of the patients’ and visitors’ facilities outside the bedroom

Social and public spaces, smoking room, library,...

Guidelines

The Department of Health and Children (Ireland), recommend in specialist palliative care settings

- Separate accommodation provided away from the ward for relatives for the night. The provision of a single large day room is not recommended but two small ones are preferable to allow for greater flexibility in use. One of these rooms could be designated as a “quiet room” (for use by no more than 5 or 6 people at any given time) for complementary therapies free from outside distraction and capable of reasonable control in terms of acoustic attenuation, quality of light and degree of ventilation.
- A small flower room in which two people can work with simple facilities to deal with the large numbers of flowers received to prepare for displays and the like. It will require a sink and drainer, work surface, drawers, shelves and space for a bin.
- One interview room per ward should be capable of flexible use with a door wide enough to allow wheelchair or bed. The room should be large enough to accommodate approximately 10 people and should have a non clinical and comfortable character. A telephone point should be provided.
- Day care facilities for hairdressing and chiropody accommodated in separate spaces, access to an assisted bathroom, preferably with Jacuzzi type bath.
- A play area for children possibly adjacent to the in-patient accommodation or within waiting area.

International Expert Advisory Group, Ireland for specialist palliative care settings recommends

- a designated room for patients (not visitors) wishing to smoke with a state-of-the-art ventilation system

- the gardens and grounds of specialist palliative care units should have designated smoking areas with adequate litter bins provided
- resource/library facilities for staff should be separated to those for patients and their families and
- quiet private area for staff making phone calls should be provided or use of telephone headsets and microphones for dealing with telephone calls for staff working in close proximity with others be implemented.

Reviews of evidence

The design of a counselling area can indirectly affect the quality of the interaction between the patient and the healthcare provider, primarily in terms of its effect on communication. The key features that should be included in the design of the area are different levels of privacy (visual and auditory), “soft” interior decoration, and accommodation for people with disabilities. The space required for a counselling area is dependent upon the scope of services provided, approximately 100-130 square feet may be necessary (Allan et al. 1992).

Examples

La Maison Médicale Jeanne Garnier provides meeting spaces with leisure area, art-therapy studio...

The main lobby is a place to meet and gather, with a fountain, gift shop and stage and is a central memorable focal point from which all way access routes in the hospital originate (Acton et al. 1997).

In the Planetree movement, music therapy is accommodated, with space provided in the family and patient lounges for pianos (Bishop and Griffin, 2006). In a Children’s hospital, family lounges have kitchen and laundry facilities and a fully equipped business centre (Miller and Miller 2004).

Patient education centres should be provided on each floor offering brochures, books, videotapes and internet access (Berry et al. 2004).

In ICU, family members can access their loved one’s room directly from a peripheral (but restricted access) corridor, and where a glassed-in fountain sits in the middle of the dividing wall, providing a shared centre of reflection and peace for family members in the peripheral corridor (Hancock 2003).

2.4.3 Cost-effectiveness of the Patients’ and visitors’ facilities outside the bedroom

Example-opinion

Research has found cost savings of approximately \$90 000 per baby in NICU implementing family-centred design (nurse station, consultation rooms and family resources libraries) with a decrease of length of stay of 30 to 50%, and repeat hospitalizations and use of the emergency room reduced. These results were reported

to be linked with a unit design that was emotionally and physically supportive of families (Acton et al.1997).

2.5 Family care

2.5.1 There was good evidence of the importance of the facilities in support of family care

Spiritual care, breaking bad news,

Bereavement privacy, room to view...

Evidence-based papers

Important barriers to better EOLC included institution/ICU factors such as suboptimal space for family meetings (Nelson et al. 2006). The presence of the family members during the CPR is positive for the patient and for the bereavement: patient who survive have reported that they felt comforted and supported by the presence of family members; viewing and touching the body facilitate grief by confirming the death (Tsai 2002).

Among the most important features of delivering bad news, location of the conversation was ranked of intermediate importance by patients (Jurkovich et al. 2000) and the third greatest obstacle for nurses was the poor design of ED that do not allow for privacy of dying patients or grieving family members (Heaston et al. 2006); there is the same need in ICU after the death for a time alone with the body (Beckstrand et al. 2005).

Mothers whose children die need time, space and privacy with their dying child and their child's body after death. In a hospice while grandparents stayed in the family accommodation and cared for the other children, the parents stayed with the dying child taking turns to sleep and care for him or her.

Parents appreciate space and privacy to be with their child's body after death in a special bedroom with lowered temperature rather than at the hospital mortuary or the funeral premises because they knew that they could visit any time in an unhurried time and the special bedroom could be furnished with toys, photo and their child's duvet (Davies 2005).

2.5.2 There was suggestion of the importance of other facilities in service of the family care

Accommodation,

Transfer and storage of the body...

Guidelines

Recommendations for allowing the presence of the family members during the CPR including guidelines for implementing formal programs have been made by the Emergency Nurse Association in the US and by the Resuscitation Council in the UK and the American Heart Association.

The Scottish Partnership for PC and the NHS, clinical standards, 2002 recommend physical and practical resources be available to allow the nurse to take the patient to a “quiet area” for further questions and support; facilities to allow relatives to remain with very ill patients; and private surroundings for breaking news of diagnosis sensitively, with empathy.

The American Institute of Architects, 2006 (Bishop and Griffin 2006) and The Scottish Association of Community Hospitals and Scottish Partnership for PC 2003 and the Scottish Partnership Agency for Palliative and Cancer Care (Cormie 1999) healthcare guidelines include accommodating overnight family stays in a standard twin-sized mattress instead of a chair, family lounges for brief respites from critically ill loved one, opportunities for cooking family meals, baking a celebratory birthday cake or sharing a snack, and medical libraries with access to technology.

The Department of Health and Children (Ireland) 2005, 2006; SFASP 2001; Ministère de la Santé 2004; ANAES 2004; Assistance Publique Hôpitaux de Paris (APHP) 2001; Règlement APHP 99; CSP R 1112-68s- recommend facilities for spiritual and pastoral care:

- A space should be provided for multi-denominational use, as a chapel, prayer room or quiet room for individual contemplation. This room should be capable of accommodating approximately 10 to 12 people on a daily basis, possibly including children. It should be capable of enlargement to accommodate larger numbers on occasions. This is separate from the contemplation room. An integrated sound system linked to the wards is desirable, for the benefit of those too ill to leave their beds.
- In addition to general use, a dayroom may be used for discussions with families, for families to gather after bereavement or for a family member to stay overnight, if available and suitably furnished with access to garden, balcony, terrace. A toilet for patient use should be provided close to this room.
- The width of all doors (with no steps) should accommodate a bed and there should be strategically placed call bells,
- At an appropriate time after death, the body should be moved to the hospital mortuary where a viewing room will essentially be arranged as a conventional bedroom with a private room and WC; the body must be on a

stable surface and easily accessible at normal bed-height. Some family may need facilities for ritual washing of their relative's body (Good practices example a bench seat outside so that the relatives could sit there until they are ready to return to dealing with the practicalities of death.)

The Department of Health and Children (Ireland), 2005 good practices recommend:

- Having dedicated bereavement services offices rather than sharing accommodation with other services with a dedicated bereavement services waiting room or area away from the bustle of the hospital (peaceful and warm and looking different to the rest of the hospital).

The International Expert Advisory Group, Ireland Specialist PC settings recommend the location of a mortuary and viewing room within a SPC unit and a vestry/store with provision of a sink to facilitate the preparation for religious ritual and worship.

The transfer of the body to the mortuary from the unit should be between 2h and 10h after the death (Guide of practices and medico-legal obligations APHP 2001). The family should have 10 days to claim for the body (APHP 99; Code de la Santé Publique R 1112-68s).

If the temperature is above 17°C, the mortuary view room must be equipped of a refrigeration material and a ventilation of at least 1vol/hour during the presentation of the body (CLIN Paris Nord 2001).

Reviews of evidence

A space for initial counselling sessions for surviving friends and family in acute care centre and for displaying information and forms regarding emergency should be provided (Fauri et al. 2000)

In ED, when the family arrives, they must be shown a private room with a phone, and a special space should accommodate unexpected bereaved relatives inside the resuscitation room (Williams et al 2000).

There could be more bereavement facilities such as a quiet room connected to each block of wards. A less costly alternative is an official sign designed to alert staff that an office is being used to break bad news to relatives to prevent interruptions (Renshaw 1997)

Example

A bereavement room with an in-house phone with direct access to all the nursing units on the unit's floor, a pay phone, and a book shelf containing materials on grief and bereavement (Gaguski 1999).

When a patient's death is imminent in ED and active intervention is not appropriate, he is admitted to a side room of the short stay ward, this permits continuity of care by both medical and nursing staff, obviates the need for repeated intrusive examination and documentation and can offer privacy for patient and relatives (Pedley and Johnston 2001)

In a children's hospital, a bereavement closet in the unit with Bibles and prayer books from several faiths, rosaries, cameras, love stones, remembering hearts (2 parts) and stuffed animals. (Bucaro et al. 2005)

Giving bad news gracefully with comforting privacy: with enough room for everyone can have a chair, without the chairs being too close. Make sure the room is clean and has tissues and a telephone (Harrahill 2005).

2.6 External environment

2.6.1 There was good evidence of the importance of the external environment in respect of dignity and privacy of the patient

Four sub themes:

Admission, waiting areas,

Convenience and accessibility, way finding

Connection to the outside world through outdoor sitting and walking areas,

Ground and landscape designs,

Evidence-based papers

ED privacy and confidentiality are assured when patients check in with a clerk or a nurse several feet from where other patients or visitors may be sitting, with the addition of background music or the use of physical barriers to limit noise transmission.

Work desks should ideally be set back a little more from the patient care areas, and the space behind the desk made more suitable for student/resident presentations.

A five-foot plasma screen status board, that is updated every 60 seconds with patient information, using initials and diagnosis codes, may be strategically placed so that it is highly visible to the staff while somewhat obscured from general view (Mlinek 1997).

Some cancer treatment centres have been designed to overcome fear and depression by using attractive settings including a garden atrium, seasonal flowers, plants and pictures of plants in patient examination rooms (Swan et al. 2003).

Gardens has been shown to also reduce stress for instance by fostering access to social support and providing opportunities for positive escape and sense of control (Cooper et al. 1995, Ulrich 1999). Whitehouse et al. (2001) indicate that patients and family who use hospital gardens report positive mood change and reduced stress.

Douglas and Douglas (2005) identify four patient-centred external design indicators

- designs that support accessibility and travel movements through transitional spaces
- good landscape designs with seating and garden areas
- corridors which offer places to rest or access to the outside
- well positioned lifts and stairs making views and access to outside easy

2.6.2 There was suggestion of the importance of other external facilities

Three sub themes:

Dedicated parking spaces

Lighting

Waiting room, day room...

Guidelines

The Department of Health and Children (Ireland) recommend

- Dedicated car parking spaces for specialist palliative care settings, access and facilities for disabled people, signposting, a smoking area, the provision of landscaped areas, gardens, courtyards etc. The external design should be human scale
- An outdoor space for quiet retreat in the form of garden spaces to occupy and enjoy, or simply to view from inside; and that long corridors should be kept to a minimum, to avoid an institutional atmosphere. In addition a small sitting area should be provided for the enjoyment of patients and visitors preferably with natural light and a view outside
- It is highly desirable that facilities for those attending on a day basis should be located at entrance level. It is recommended that circulation routes for in-patients and day attendees should be segregated, insofar as this may be possible.

The Department of Health and Children (Ireland), 2005 good practices recommend:

- Dedicated parking spaces for bereavement services, free parking spaces outside the bereavement services building (where one exists), parking spaces outside the bereavement services building for older people and people who are disabled, a drop-off lay-by outside the bereavement services building.
- All site maps include the location of bereavement services identifying all the locations someone who has been bereaved may have to go to, a leaflet available at all the main entrances to the hospital showing the route to bereavement services. Locating bereavement services near a main entrance to the hospital or in a separate building; with labels, arrows or coloured wall and floor lines for bereavement services from every main entrance into the hospital, using the word “bereavement” at all times.

- Provision and maintenance of a garden of remembrance in the hospital grounds, of a secluded outdoor area next to the bereavement service office.

Reviews of evidence

The chairs in the day rooms could be put together in circles to facilitate better communication between patients. Having chairs with arm rests in casualty and other waiting areas would also assist an older person getting to their feet (Stratton-Age action for all older people Ireland).

Non glaring lighting, indirect lighting from the edges of ceiling or behind sconces, diffuses the light and creates a more natural effect, in addition of being more comfortable for gurney-bound patients travelling through the hallways.

Way finding like hallway handrails, colour coding, alignment with outside geography, landmarks and an atrium lobbies that are open several stories up can help visitors orient themselves through windows. Noise, brighter lights or natural light in more heavily used corridors can also provide a clue that public areas are nearby (Lowers 1999).

Carpman et al. (1984) suggest that directional signs should be placed at or before every major intersection, destinations and where a single environmental cue or a series of such cues convey the message that the individual is moving from one area into another. If there are no key decision points along a route, signs should be placed approximately every 150 feet to 250 feet.

Example

In ED, break-up the waiting room into conversation areas of several chairs or love seats so families can wait together with a bit of privacy. A discharge lounge allows patients to wait in comfort for a ride or a final prescription to be filled (Greene 2002).

Triage redesign to create two structurally and functionally distinct areas can provide improved ED patient confidentiality. A reception area designated “triage 1” where ED nurse would perform a rapid, chief complaint-based verbal assessment to establish triage priority, and an ED clerk would “quick register” the patient in the hospital registration system; triage II should be designed for nurses to perform a more confidential and comprehensive nursing examination, vital signs, and interview in any of the individual assessment areas. The triage I area has individual booths with sound barriers, microphones that amplify the patient’s voice into the staff region of triage I allow the patient to speak in low tones when providing information. (Laskowski-Jones et al., 2005)

Convenience and ease access are great advantages; information desks are required near the entrance. Small waiting rooms for different services with a receptionist nearby feel more personal and less overwhelming for patients than a large all-encompassing area. Preferably, an in-hospital ACF (Ambulatory Care Facilities) should have its own entrance and parking (Frasca-Beaulieu 1999). A pod arrangement is better than one big waiting room (Merkel 2003). Comfortable movable furniture positioned in small, flexible arrangements enhances social interactions (Sommer and Ross 1958, Holahan 1972).

It is desirable to provide a large waiting room with several different conversation and activities areas (TV, puzzle, reading areas...) and with a small vaulted ceiling and concealed fluorescent tubes and neon lighting around the inset perimeter so that the vault appeared as a skylight. The “sky” could be light or pale blue. Three sub waiting areas can be designed for the patients only after undressing in preparation for their treatment (Hopkins 1994).

Laminated “engaged” signs can be pinned to the curtains around patient’s beds, engaged signs for counselling and consultation rooms and toilets to stop unnecessary interruptions (Denner 2004).

There should be a secure place for a public phone to convey painful difficult messages (Lincourt 2002). Smoking facilities can be created similar to those in international airports (Perry 2002).

Way finding:

In children’s Hospitals, easy-to-follow signs should be placed at child height. Way findings should be intuitive, offering clues such as colour, texture, patterns, lighting and artwork for guidance and views to the outside. Gateways and footprints in the carpet are also entertaining ways of giving direction (Acton et al. 1997). Good multilingual signage (Perry 2002) should be provided.

The use of soffits and special lighting, such as pendants and sconces, can mark and highlight destinations, such as intersections or reception desks. A striking piece of furniture or artwork highlighted by accent lighting; an elegant spot lit console table and flowers arrangement that serves as memorable element at an intersection can create an extremely helpful landmark (Frasca-Beaulieu 1999).

Butterflies suspended from the ceiling every 25 feet help patients calculate the distance they have walked in the hallway. A marker board in the hallway also lets patient record how many laps or feet they walked (Hudson Thrall 2005).

Elderly signage should be constructed with large contrasting letters and be easily read from a distance (Frasca-Beaulieu 1999).

Floors and wings should be organized as “neighbourhoods” of patient rooms with their own colours and animal themes as well as numbers, which assists children and family members in way finding. Indoor water elements can create infection control issues, as can placing the water feature in the outdoor garden. A “main street” design leading in from the adjacent parking garage directly to the second level makes access easy (Miller and Miller 2004).

Avoiding linear corridors is desirable, as is trying to create places with seating and highlighting and artwork where patient can rest while encouraging their mobility out of the room (Dubbs 2006; de Villermay 1998). Spacious corridors provide porch-like areas which serve as meeting zones for patients and families (Lincourt 2002).

Pebble Project in Texas designed 17 different gardens for meditation, play, viewing water, outdoor dining and meetings. Waiting areas features are an indoor garden aquarium, kitchenette and lockers.

It is even possible to create a series of colour gardens, each colour corresponding to the colour of the energy Chakra system of the body. If a healer determines that a patient needs a little bit more blue, he or she could go out in the garden to experience the natural colour of the blue (Bakken and Linton 1994).

2.6.3 Cost-effectiveness of the way finding and floor surface design

Way finding and floor surface design have been reported to lower the cost by

Reducing the labour cost

Reducing the medication errors and falls

Reviews of evidence

Factors associated with medication errors include frequent interruptions or distractions.

Difficulty navigating hospitals is costly to patients, families and staff. In a study by Emory University, it was estimated that the annual cost of supplementing its formal way finding system exceeded \$200,000. This cost was attributable largely to time spent giving directions by hospital staff whose job assignments did not include that responsibility. Time spent giving directions by these individuals exceeded 4,500 staff hours over the course of a year (Nelson et al. 2005).

Finally, most falls that occur in hospital are due to slippery floors, and poor placement of handrails (Nelson et al. 2005).

2.7 Cost-effectiveness of evidence-based design (EBD): initial and operating costs of hospital

The high cost of construction projects leads hospital administrators to seek building solutions that will not become obsolete and require reinvestment within a decade of opening. The limited number of articles exploring the relationship between initial costs and operating costs of evidence-based design indicates that operating costs of such design cover the extra construction cost of hospitals within the first year of construction.

2.7.1 There was good evidence of the cost-effectiveness of the

Evidence-based papers

Hendrich et al. (2004) suggest that in single acuity-adaptable room design, the increase in patient days per bed, with a smaller bed base is significant and confirms such rooms allow more patient days in fewer beds. This has implications for long-

range building plans, suggesting smaller area requirements for physical plant if acuity-adaptable beds are used.

Ann Hendrich, senior vice president of the Indianapolis's Methodist Hospital/Clarian Health Partners, discovered that 30% of patients in her ICU didn't belong there. In this hospital, while the average cost of a traditional critical care unit is \$225 per square foot, they spent \$218. They spent the same amount of square foot but they spent it differently (Bilchik, 2002).

According to some authors (e.g., Bobrow & Thomas, 2000), even with higher initial costs of construction, furniture, maintenance, housekeeping, energy (heating, ventilation) and nursing, single occupancy can match the per-diem cost of multi-bed rooms because of higher occupancy rates. Occupancy of multi-bed rooms can reach up to a maximum of 80% to 85%, whereas single rooms have the potential to reach 100% occupancy.

Chaudhury et al. (2003) carried out a comparative assessment of initial costs of single versus double occupancy rooms. In this small pilot study single patient rooms were well evaluated in terms of area per patient. Based on the analysis of the nursing floor plan samples, gross area per bed can be considered a reasonable indicator of cost per patient for building construction. This approach yielded the following cost comparison: \$153,000 for single patient room option; \$134,000 for double patient room option.

Although cost of construction is an important factor in the consideration of single versus multi-occupancy rooms, room area and design of patient rooms, nursing unit configurations etc, it is relatively insignificant over the life time of the building. Efficient designs may have higher initial costs but these are more than offset if they contain or reduce operating costs.

Berry and associates (2004), concluded that building the facility with comprehensive evidence-based design (EDB) upgrades would add 5.3 % to the initial construction costs and estimated savings (cost reductions) and revenue gains (eg larger market share due to patient choices) in a conservative manner, and calculated that the one-time incremental costs of the EBD upgrades would be recaptured through operational savings and increased revenue in only one year (despite a deliberate effort to be conservative in evaluating the gains).

The cost savings and revenue gains linked to the EBD upgrades, importantly, would recur annually. The research concluded that the business case for using EBD to create better hospital is strong.

2.7.2 There was suggestion of the cost-effectiveness of the EBD:

Reviews of evidence

Operating costs are reduced in single patient rooms compared with multi-occupancy rooms due to reduction in transfer cost, higher bed occupancy rates and reduction in labour cost. However, this cost reduction can be better achieved when conversion to

single room is paired with other healing environment design principles (Chaudhury et al. 2003).

Example-opinion

Derek Parker, an architect member of the Centre for Health Design's board of directors, calculates that building a 300-bed hospital with larger, variable-acuity single rooms, decentralised nursing stations and other elements recommended by proponents of evidence-based design would add \$12 million to the \$240 million that such a facility typically cost to build in the USA today - an increase of roughly 5%.

He suggests that this sum can be recouped in the first year by improved staff performance and the reduction of expenses due to such things as patient falls, which typically cost \$10 000 each, patient transfers, which typically cost \$500-\$700 each, as well as hospital-acquired infections and medical errors. In addition revenues are likely to climb as new patients are drawn to the attractive new facility (McCarthy 2004). But White (2003) observed that individual rooms are expensive because they consume more space than multi-bed rooms.

Even with an equal number of square feet per bed space, the total square footage required for individual room is greater due to the presence of more walls, which take up space and limit circulation and flexibility, although this increased space requirement is modified a bit by the reduced need for certain other spaces, such as parent rooms and a room for breastfeeding mothers to pump.

3. CONCLUSION

These findings support previous literature reviews and studies, which have reported how functional environments that have patient-focused or supportive characteristics assist patients in dealing with stress of illness.

While the evidence linking the hospital design to patient satisfaction regarding his dignity and privacy is limited, much of the literature comprises observational studies and review articles that are qualitative and anecdotal. There appears to be little empirical evidence on how the built environment affects the dignity and the privacy of the patient. The diverse evidence has not previously been comprehensively reviewed.

The findings of this literature review demonstrate how evidence-based design can improve patient and staff satisfaction, medical outcomes, safety, cost efficiency, resource conservation and financial performance. The evidence appears to be strong that replacement hospitals improve operational performance for several years after opening. But for Hosking (2004), the question is how much of the improvement can be attributed to facility innovations and upgrades? This author believes that new facilities benefit from a halo effect.

Simply incorporating “better practice” facility elements does not necessarily lead to improved outcomes unless they are supported through management focus, cultural and behavioural change, performance measurement, and accountability over time.

Since many factors are interrelated, it is difficult to correlate operational savings, improved outcomes, or increased utilization to any one design enhancement or design feature. Although this review has identified some useful findings, more research is needed to strengthen the evidence base.

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