# Colour Design Schemes for Long-term Healthcare Environments

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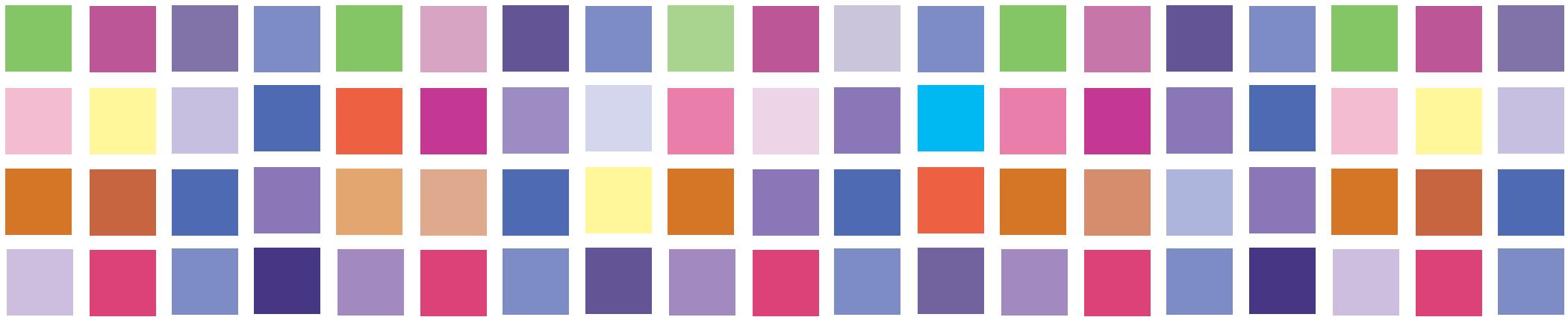
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Colour Design Schemes for Long-term Healthcare Environments

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Acknowledgements

Section 1

Background

Introduction   The development of any interior environment requires at some stage a decision regarding the colour design of that interior. In many cases, especially interiors in public spaces, choices regarding the colour scheme are not considered important or afforded a high priority. Developers of non-domestic interiors designed to acommodate the more vulnerable, fragile, unwell or disabled, are aware of the complexity of choosing colours to create the right effect, and may seek information to aid successful application. Healthcare personnel with experience in these environments often observe the impact that colour may have on the people in their care.

Colour has the potential to change spaces into interesting environments, to add stimulation in an otherwise monotonous space, and can even manage navigation or orientation for people with dementia. Every object, material and surface in an environment can contribute to the overal success of that space for users. Certainly it is known that under-stimulation is detrimental for the immobile or for those in long term healthcare environments (Fairweather and McConville 2000, Dalke 2007).

Little work has been done on what defines an environment as having visual comfort, incorporating accessibility and contrast. Yet contiguous spaces - a bedroom, corridor and dayroom - may be all that patients, service users, clients and residents experience; a sequence of these spaces maybe the only 'journey' they make.

Colour preferences have been established that do identify key issues for advice and generic colour application in long term healthcare environments for a wide range of users of these findings.

This Arts and Humanities Research Council funded research programme focused on examining current design practice in a group of representative long-term healthcare environments. The work also included establishing some results on generic colour preferences and experimental testing in real world refurbishments; all these methods provided some recommendations useful for those requiring more definitive guidance on the subject of colour application in environments..

Research Aims & Objectives

1 Determine, experimentally, how colour design could assist the achievement of pleasurable, high quality environments.

2 Determine generic design issues experienced by patients through interviews and extensive tests with a range of representative groups of staff, users and visitors on existing and refurbished long-term healthcare environments.

3 Use computer aided tools and software to identify successful strategies and key points of failure in colour design schemes within long-term care enviroments.

4 Audit the effects that colour design has on ambience, visual comfort, accessibility, efficiency and safety for the target groups in a range of environments.

5 Establish key functions in environments where improved ambience and visual comfort are attributable to colour design.

6 Conduct post-occupacy evaluation of long-term patients in the 'real world' environments

7 Initiate economical, creative and innovative solutions for colour design

8 Record for dissemination the research phases for the guidance document

Research Questions

1 Can generic issues on schemes for colour design be catalogued and demonstrated for use by professionals in a Design Guide?

2 Would improved ambience and comfort contribute to a sense of well being in long-term care environments? What would these interventions be?

3 Do performance perceptions affect the sense of well-being of people, e.g. visual adaptation when people move between interconnected confined spaces with different colour design schemes?

4 Can results on colour preferences be assessed in experimental studies ?

5 What are the preferences and effects of certain colour design combinations used in contiguous spaces?

Long-term healthcare environments, homes for the elderly and hospitals are all examples of institutional environments with limited circulation and access for the users of those buildings. Designers of these environments are aware of the complexity of using colour and lighting yet cannot access any readily available list of issues involved.

Previous information on colour design for environments relies on prescriptive colours and colour combinations to achieve recommended results (Aranyi and Goldman, Birren, Dilani, Mahnke). Practical application of colour design in these special environments has presented problems for users of current publications as many recommendations are rendered invalid due to lack of knowledge about user response to planned schemes.

- A gap exists in the literature on the effect of colour design when moving between adjacent, contiguous environments and how this could contribute to environments with limited circulation and access for users to achieve desired levels of interaction, functionality and aesthetics.

- Identifying the environmental factors affecting long-term care is a critically sensitive and complex task. Predicted 'ambience' has proven difficult to define yet is a prerequisite of much of the built environment. Little research has been done on the effect of colour design on transition between two spaces. Psychological effects of colour design combinations and the impact on environmental factors on people who may occupy restricted spaces has been compiled.

"monotonous environments may result in under-stimulation that may cause aggressive behaviour"

Previous research has shown that office workers were affected in their concentrations and accuracy by the colour of interiors (Kwallak). Prisoners were affected by being contained in all-white environments (Fairweather and McConville) and Mahnke suggests that monotonous environments may result in under-stimulation that may cause aggressive behaviour seen in prisons. Buildings require an assiduous application of colour design for confined interiors, essential for a sense of well-being or stress relief. Previous research using colour measurement methodology and environmental psychology have not been co-ordinated. Earlier qualitative research on the design of environments with occupants who are restricted in some way, traversing from one area to another, has revealed a complex set of variables which have been identified for further research (Dalke 2000).

Phases   The programme will determine the effects of colour design on ambience and visual comfort in long-term care environments. The research team will investigate key colour design factors involved in maintaining visual sensory stimulation and a sense of well-being for target group occupants of these environments.

Phase 1	Overview and literature review (3 months)
Milestone	Advisory Panel Meeting
Phase 2	Audits, data collection and design of experiments (4 months)
Milestone	Advisory Paper
Phase 3	Data analysis and pilot testing experiment methodology (6 months)
Phase 4	Designing 'Real World test' (6 months)
Phase 5	Real World Tests and Post-Occupancy Evaluation (12 months)
Phase 6	Evaluation (5 months)
Milestone	Advisory Panel Meeting
Phase 7	Dissemination (7 months)
Milestone	Draft Colour Design Scheme Guidance and Exhibition.
Phase 8	Dissemination document (3 months)
Milestone	Web site launch of document

Long-term healthcare environments (LTHEs)
Definition of LTHE

In attempting to define long-term healthcare environments it quickly becomes apparent how broad the sector is; long-term care refers to "support services which are provided over a prolonged period of time or on a permanent basis to adults who have difficulties associated with old age, long-term illness or disability" (Department of Health). The need for long-term health care is measured either by self assessment of limiting long term illness or failure to achieve activities of daily living, or by professional measures of functional ability. The phrase 'long-term' relates to 'ongoing' or 'permanent' (Sutherland, 1999) care, normally being longer than six weeks. Intermediate care is the term used to describe the intensive rehabilitation or treatment conducted over the shorter time frame of 1-6 weeks (Department of Health). The term 'care' can be used to refer to a wide diversity of service provision, from "residential settings such as nursing homes or in people's own homes over a prolonged period of time" (Department of Health) or to acute illness treatment in hospitals. Long-term health care environments essentially become the patient's home for a long period of time and in some cases for the rest of their lives (Foque & Lammineur, 1995) therefore the provision of pleasant environments that are stimulating and promote   well-being in this sector is increasingly important.

Characteristics of LTHEs which distinguish them from other environments

Typically, residents of long-term healthcare environments are incapacitated in some way. In many cases they are unable to walk unaided. This necessitates a high level of staffing in order to care for these individuals. In other cases residents may have other problems such as severe mental health problems which mean that they are potentially dangerous to society. For these reasons long-term healthcare environment residents are often unable, or not permitted, to leave the care establishment in which they are resident. In many cases the consequence of this is that people in this situation spend very long periods of time in very confined spaces. For example, residents in a nursing home may divide their time between only a couple of spaces such as a bedroom and bathroom, or day room and dining room.

Types of LTHE

There are three principle groups which occupy long-term health care environments: the elderly, those with long-term illnesses, and the disabled. The latter group can be divided into those with physical disabilities and those with mental or learning disabilities.

There is therefore a diverse range of groups occupying LTHEs. As a consequence LTHEs take many forms. The elderly may be cared for in hospitals, nursing homes, half-way

houses, community homes, residential care homes as well as of course in their own homes. Similarly, those with long term illnesses may be cared for in specialist hospital units (e.g. for cancer or AIDS treatment), mental health units or community homes, or in a domestic setting. Those suffering from disabilities, whether mental or physical, may be cared for in specialist residential care homes, hospital units, or at home.

Factors influencing people's experience of LTHEs

Residents in long term healthcare environments differ in many ways. Certain factors are likely to have a particularly important influence on how these people experience their physical surroundings.

Mobility

The extent to which residents can move around has a big influence on how they experience their surroundings. An extreme case would be a spinal injury patient able to look only at the ceiling. From a visual point of view the ceiling is that patient's environment. The mobility of a given patient may change radically over time. This is particularly true of degenerative conditions such as Multiple Sclerosis and Parkinson's Disease in which patients' mobility may become progressively more restricted.

Three levels of mobility might be distinguished:

- Very restricted. This would be patients unable to move from one position at all (such as in the example above) or those only able to move if someone moves them.

- Restricted. This would be individuals with only restricted mobility and would include those in wheel chairs, those requiring crutches, as well as the frail elderly.

- Unrestricted. Individuals in this category would have some condition requiring long term care but that does not impact upon their mobility. This would be true of many cases of mental illness and also possibly some types of cancer.

Mental State

The state of mental functioning of LTHE residents is likely to have an important influence on the way in which they experience their environment.

The following categories might be distinguished:

- Normal. These individuals have no learning disabilities, mental degeneration, or mental health problems. Their reason for being resident in a LTHE is likely to be due purely to physical disabilities.

- Those with learning disabilities. It should be borne in mind that there is too wide a range of types of mental illness within this category to deal with here in detail.

- Dementia patients. These individuals suffer from varying degrees of dementia and may be disorientated, unaware of where they are, and accordingly may ascribe different meanings to their surroundings.

- The mentally ill. These people may suffer from one or more of a number of mental illnesses. As with dementia patients this may have a significant impact on how they experience their surroundings. Mental health patients generally rate their environment less positively than do general health patients (Lawson & Phiri, 2003). This is probably not surprising as some of the mental health patients will likely be suffering from depression. Similarly, a schizophrenic may ascribe idiosyncratic significance to certain aspects of their surroundings.

Age group, gender and culture

The age group of the residents is likely to influence the way in which they perceive their surroundings. Different age groups have different requirements and expectations with regard to their environment. They will also ascribe diverse meanings and significance to features. This suggests, for designers, the importance of congruence between the environment which is provided and the target age group.

The most important age groups are as follows:

- Children
- Adolescents
- Young adult – middle aged
- Elderly

In the same way, people of different gender and from different ethnic backgrounds may have varying levels of environmental needs and expectations, and ascribe different meanings to their surroundings.

Pain Whether or not patients are in pain may have an influence on how they experience their surroundings. There are at least two possibilities. Patients in severe pain may be so preoccupied with this as to be unaware of their surroundings. This view would be consistent with Maslow's (1971) theory of the hierarchy of needs. According to this theory, the most basic needs of mankind, essential for survival, are the primary motivational focus. This includes food, water, sleep etc. Maslow's view is that it is only after these, and other, important needs have been met (such as for security and love), that individuals can focus on more intellectual or aesthetic matters. There is however anecdotal evidence to suggest that even those in severe pain may be aware of the aesthetic aspects of their surroundings. An important factor may be whether the pain is continuous or intermittent.

For practical purposes LTHE residents may be divided into the following groups:

■ No pain/ very low pain.

■ Moderate – severe pain: intermittent

■ Moderate – severe pain: constant (or nearly constant)

In considering the influence of these factors on individual's experience of LTHEs it should be borne in mind that they of course interact in particular individuals, so that a given individual may be for example elderly, unrestricted in movement, mentally ill, female and from an Islamic background. It is imperative that in designing environments the specific problems of each potential user group are kept in mind. The number of variables in this sector present a major challenge to those professionals who are responsible for providing long term healthcare environments.

A number of trends in healthcare design can be observed over the second half of the Twentieth Century. According to Verderber and Fine (2000) these changes in healthcare design have reflected a number of tensions: between large and small institutions, between compact and linear buildings, low-rise versus mid- or high-rise buildings, between centralised and decentralised approaches. At different times changing fashions in healthcare architecture and practice have meant that new healthcare facilities have differed on the above dimensions. From the 1960s, hospitals having radial corridors were popular. They were considered to have a number of advantages including being efficient for staff in that the distances which they had to walk were reduced and affording enhanced patient observation Verderber and Fine (2000). In time the radial design was replaced in popularity by "sawtooth" designs which were made up of triangular spaces which gave patients more privacy and which created fewer irregularly shaped spaces. In terms of the larger configuration of the hospital buildings in the earlier post-war period a popular design was the "matchbox-and-muffin scheme" which consisted of a base of supporting services with patient towers arising from it. The difficulty with this design was that it was very inflexible making later changes difficult. Partly for this reason the model which replaced it was that of a village with several smaller-scale buildings linked together. The decentralization of services within hospitals has given additional impetus to this model of hospital design. An interesting example of this is the National Hospital at the University of Oslo, Norway. The general layout of this hospital is low-rise, linear and expandable. There are separate in-patient, out-patient, and diagnostic and treatment zones. The overall concept for the site is modelled on an Italian hill town with the main entrance accessed from a "town square". Although some of the buildings are as much as five storeys high, because of the way in which they are arranged on the sloping site the overall effect is of a low-rise design.

In the 1990s the decentralisation of health services gathered momentum. This meant that services were both decentralised within one site as well as being moved to other sites within the community. This has given rise to new health care building types such as intermediate tier centres in which primary care services, e.g. general practitioners and ante-natal clinics are combined with services traditionally provided by outpatient clinics such as physiotherapy and radiography. Likewise, a number of specialised building types emerged, catering for groups with very specific needs, such as those with cancer or

dementia. From an architectural point of view the trend towards decentralised healthcare buildings is to be welcomed, in so far as it results in buildings which are less forbidding than the monolithic general hospital. It is also the case, certainly in the United States, that the building code regulations are less strict in the case of ambulatory care centres than they are with acute general hospitals, affording opportunities for more sensitive and progressive design Nesmith (1995).

It is also possible to identify changing priorities in health care environment provision over time. In the earlier post war era there was an emphasis on expanding the capacity of the healthcare sector and also on the incorporation of technological developments; in short, the main focus was functional. By the mid 1980s there was more focus on the aesthetic aspects of healthcare building design. This came about for two reasons. On the one hand, the important role of the environment on patient recovery was beginning to be recognised. At the same time the political climate was changing and there was a burgeoning of the private healthcare sector with an accompanying recognition of the role of the healthcare environment in attracting prospective patients. A related trend is a move from what might be called a staff-centred environment to a patient-centred environment. Until the late 1980s health care environments were designed from the point of view of the staff in the sense that functional and efficiency requirements were prioritised. The patient was afforded little importance. The recognition of the important role of the environment on patient recovery gave rise to renewed priorities, so that healthcare environments came to be designed from the point of view of the patient (Verderber & Fine, 2000).

Political and economic background to current LTH provision

By far the largest group requiring LTH are the elderly. The Royal Commission Report on Long-term Care (Sutherland, 1999) reported the numbers of older residents (all aged 65+) in residential and nursing homes and hospitals in the UK. In 1995 the figures stood at 288,750 residents in residential care homes, 157,500 residents in nursing homes and 34,100 long stay patients in NHS hospital wards. Altogether this gives an estimated total of 480,350 people relying on long-term care. Of course, in addition to those in LTH institutions, a large number of elderly people in need of long-term care are cared for by relatives or friends either in their own homes or in the homes of their carers. The full extent of this is not accurately known.

The cost of providing care for the elderly is considerable. For the year 1998/1999 the Department of Health National Service Framework for Older People calculated that this cost was 40% of the NHS budget of around £10 billion pounds, and 50% of the social services budget of around £5.2 billion pounds.

The financial strain of long-term care for this population group is set to increase even further because the percentage of elderly people (those aged 65+) within the British population is rising. The increase predicted in this age group is 57% between 1995 and 2031. The numbers of people in the very elderly population (aged 85 and over) will increase at an even greater rate, with a 79% increase during the same period (Sutherland, 1999). Thus long-term care will also need to increase, although of course, it is dependency rather than age alone that gives rise to the need of such care. The Royal Commission Report suggests that if all other factors remain constant, an expansion of about 61% in home care hours, community nurse visits and residential weeks, will be needed to service this growing older population.

Current practice in the design of LTHEs

The process through which a LTHE is procured, designed and built depends entirely on the political climate and economic circumstances. In the case of a private institution such as a nursing home the service provider concerned will approach an architect directly who will help them to develop a brief and specification and then prepare a suitable scheme. Broadly the same process will happen with a "traditional" NHS procurement. However, the advent of PFI (Private Finance Initiatives) means that, for example, an NHS hospital will prepare a brief which will then be made available to prospective private bidders who themselves will be responsible for having plans prepared and the work costed. The successful bidder will design and build the hospital which is then leased back to the NHS trust concerned, for a specified period of time. These different arrangements may have an important bearing on the quality of the design. PFIs have no incentive to design and build innovatively and are likely to build as cheaply as they can within the constraints of the brief to which they are contractually-bound.

Evidence for the role of healthcare environment design in promoting patient recovery and health

Until recently it was widely believed that the healthcare environment had no bearing on the recovery or sense of well-being of patients and that the only factor which mattered was the quality of the healthcare alone (Ulrich, 1992). Evidence is now accruing to demonstrate that healthcare environments can have a major influence on the speed of recovery of patients as well as their mental state; even more important perhaps is the fact that poor environments can hinder a sense of well-being which in turn impacts on recovery rates (Davidson, 1994; Ulrich, 1984; Verderber & Reuman, 1987; Lemprecht, 1996; Lawson & Phiri 2002). It has been suggested Devlin and Arneill (2003) that spending time in a health care environment might in fact be damaging to one's health.

At the most fundamental level this may be due to the spread of a 'superbug' such as MRSA as a result of poor standards of hygiene and nursing practice. Perhaps of more interest from the point of view of environmental design, is the fact that LTHEs have been found to be associated with considerable stress. There are several potential reasons for this. Firstly, it may result from a loss of control over themselves and their personal space. Barker (1984) suggested that stress may result from unwanted noise or smells, a sense of crowding due to the presence of many unfamiliar people, and lighting which interferes with circadian rhythms. Moreover, due to the fact that residents in LTHEs are often incapacitated in some way they are likely to have difficulty exercising control over their environment in terms of, for example, the opening and closing, of curtains to block out bright sunlight, or windows to regulate air quality and temperature. Likewise, the stress which care staff experience as perhaps an inevitable part of their work may be exacerbated by, for example, having to do paperwork in offices with no windows.

There is a view held by some health care design specialists that patients in hospitals are so preoccupied by their illness that they are unaware of their surroundings. While this may be true for a minority of patients who are extremely ill, research evidence suggests that this view is not true as a generalisation. Lawson and Phiri (2003) found patients to be highly sensitive and very articulate about their architectural surroundings. Patients or residents in health care environments often endure long periods of inactivity spent either lying in bed or sitting in a chair. They may receive only very brief and sporadic attention from doctors and slightly longer periods of personal care from nurses and therapists. This lack of distraction may mean that the occupiers of healthcare environments may be particularly sensitive to the effects of the environment on their

sense of well-being and, where relevant, their actual recovery.

Happily, there is now increasing awareness amongst health care providers of the influence of the physical environment on patient health and sense of well-being. The challenges in designing healthcare environments are considerable. Designers must first be sensitive to the type of healthcare environment which they are dealing with. While patients in a general hospital may derive a sense of security and confidence from an environment in which clinical technology is very visible (Dalke, 2004) this may not always be appropriate for most LTHEs in which individuals reside for prolonged periods. The environments must also be sufficiently adaptable that they can respond to change. This might be in terms of new technology or changes in treatment methods or in terms of changes in regulations or demographic trends (Allison & Hamilton, 1997).

Colour

Colour and design application strategies in heathcare environments should take into account the emotional and psychological factors which can affect a person's sense of well-being. These should include not only the personal likes and dislikes of the diverse user groups that LTHEs accommodate but also the proven clinical specifications for colour in environments. In the healthcare sector achieving a welcoming environment throughout the building, that is friendly and positive for all users and visitors and a space that boosts staff morale, is a role that colour design in interiors can achieve well.

The skilful use of colour can help to overcome the sensory deprivation caused by lack of visual stimulation associated with drab or monotonous environments. Diminishing control of oneself impacts on growing dependency; the amount of control one has on the immediate environment lessens. People in long term heathcare will have very different needs to those in shorter term hospital care; however some hospital patients will have experienced emotional upheavals, which makes them sensitive, and at the same time more receptive to, the emotional stimuli of colour and lighting. Recommendations on the usage of colour should also be applied carefully as over-use of certain colours such as green or blue for mental healthcare has produced results that showed these colours may exacerbate depression. Patients with mental health problems have shown that their reactions to specific colours such as green can be extreme (Ford 2002).

It has been known for a long time that colour can affect mood (Birren, 1978); whilst

colour itself is no cure, well designed colour strategies can create a therapeutic sense of well-being that inspires confidence. It appears to be wrong to pursue the search for the 'perfect' colour when the environments themselves can play any part in the way the colours are perceived; for example the orientation of the building can have a huge impact on the 'feel' of colour in spaces. Another contributory factor to the behaviour of colour is of course light and lighting. As the means by which we see colour, it is of major importance to develop schemes with the parameters of orientation and lighting in place. Contextual variables such as building materials used in construction, window positions or size of spaces, even the nearness of other buildings can dramatically affect colour appearance (Dalke et al NHS 2004 p20)

The design of colour schemes themselves is important for providing a variety of visual stimuli which becomes more vital as the users loose mobility. The fewer changes of environment from one space to another, the more the environment needs to be stimulating. For the totally immobile or those with considerable dementia, the design of their spaces needs to be carefully considered; one scheme is not a prescription for all. A change of colour between two contiguous rooms or spaces that a user may occupy is a simple and effective use of colour. The change can be anything from a different tone to an opposite colour. The application of principles of colour harmony may also be a useful device for building some visually stimulating schemes (Dalke 2004).

Colour harmony schemes can be produced with a single hue such as blue with a range of different types or strengths of that blue from pale to dark; used in a single space this would be harmonious as they are all related. One can also take two colours that are on opposite sides of the colour circle and use those two colours to build a colour scheme for two spaces that may be contiguous (Dalke et al NHS p21).

Colour and visual impairment

An important factor to assess when developing colour schemes is the need to understand the relationship between age and vision. In LTHC environments, visual impairment may be one of the disabilities affecting a very large number of service users. With normal vision deficiencies as part of the ageing process may come problems with light perception and adaptation; those with Alzheimer's Disease and deteriorating sight may have damage to that part of the brain that controls circadian rhythms. Bright light treatment has been successful for these user group (Van Someren E.J., Kessler, A.,

Mirmiran, M., Swaab, D. F., Biol. Psychiatry. 1997 May 1; 41(9): 955-963)

As we grow older the chances of developing some visual impairment increases. A gradual acceptance of sight loss as a part of growing older means that people fail to seek help or sometimes are not aware of decreasing visual acuity. A large number of people who are registered as blind do have some vision. Very few are totally without sight; in fact in the USA, three quarters of the legally blind population have some useful vision (CIE Lighting needs for the partially sighted: Commission Internationale de l'Eclairage, Vienna. 1997)

Gender has been seen to have some relationship to visual impairment. British statistics show that up to about the fifth decade legal blindness is most common in men (the ratio is about 55:45 men to women); this is mainly due to vision being attributed to genetic or trauma causes. After the age of about 60 it is about equal and owing to female longevity, elderly females outnumber males 60:40.(CIE 1997)

Visual impairment is often part of a multiple disability profile for the older service user of LTHEs. Many retinal disorders require high illumination, however intense illumination causes a glare and constriction of the pupil creating pain and further vision impairment. In one report on design guidelines for public transport completed in 1994 (Barham et al 1994 (Barham, P., Oxley, P., Shaw, T., & Gallon, C. (1994) Design guidelines for public transport infrastructure – Technical Report (Project Report 83). Berkshire: Transport Research Laboratory., it was established that approximately a quarter of all the disabled people in that survey had some degree of visual impairment. The likelihood of more than one disability therefore is high and is a complex factor for designers and architects to deal with.

In terms of visual impairment on the impact on issues of colour, one study carried out by Pacheco-Cutillas et al in 1999, found that for both ageing healthy subjects and people with glaucoma, there was a significant reduction in chromatic and achromatic sensitivities. The yellowing of the lens is also observed and to be expected as part of the ageing process, but it usually occurs gradually so is not so easy to identify. This can have a marked effect on the perception of colours with a low chroma or saturation especially those in the blue sector.

Colour preference research Colour can affect the light and atmosphere of a room. In some experiments carried out at Calmers University of Technology it was noted that yellow was not always a warm colour; it became colder in daylight. Colours became more vivid with a light dominated by the same hue; however a blue incandescent became gloomy. Blue appeared more lively in daylight, red and yellow more interesting in warmer incandescent light (Billger, M).'The experience of the painted room: The significance of light and colour combinations'. AIC 2004 Colour and Paints, Interim Meeting of the International Colour Association Proceedings).

There is a long tradition of research examining relationships between feelings/emotions and colours (Sharpe, 1981; Ball, 1965; Norman & Scott, 1952). In fact there are a large number of inconsistent findings in the literature on colour preferences probably attributable to a large degree to a number of methodological shortcomings of many studies (Norman & Scott, 1952). These methodological problems include the following:

- There has often been a lack of rigorous control of hue, saturation and brightness with the result that there is considerable confusion about precisely what colours were tested. This problem also makes the repetition of experiments impossible.

- Research findings have often not been treated statistically, with the result that many conclusions are based on what is essentially anecdotal evidence.

- In many studies the presentation sequence of colours was not considered as an important factor and counterbalanced, which is worrying given the claim by Nakashima (1909) that the order in which colours are presented may influence preference judgements.

- Rather obviously the lighting conditions in which colours are presented are likely to have a significant impact on the way in which they are experienced. The fact that lighting conditions have been different in studies is therefore an important concern.

- Finally, there is evidence that the size of experimental stimuli impact on preference judgements. Washburn, McLean & Dodge, (1934) found that subjects judged yellow and orange to be more pleasant when presented on small (5 x 5 cm) cards than on larger (25 x 25 cm) cards.

While it is a truism that many of the studies in this area are methodologically flawed it

must be acknowledged that this is a very difficult area to study for a number of reasons. There are a number of factors which potentially will have an important bearing on results but which are very difficult to control. These fundamental factors include the mood of experimental participants at the time of testing and the lighting conditions under which the experiment takes place. Another important factor is fashion which will of course always be changing and may to some extent be informing participants' preference judgements.

One early study to have systematically manipulated hue, saturation and brightness was carried out by Guilford (1934). When saturation and brightness were held constant he found that the colours blue, green and red were more preferred whilst yellow and orange were less preferred. A systematic examination of saturation and brightness found increasing levels of both saturation and brightness to be associated with increasing preference ratings. A study by Smets (1982) found that the rated pleasantness of colours were largely determined by saturation with brightness also playing a part. Interestingly her findings suggest that hue in itself has no effect on rated pleasantness.

Eysenck (1941) carried out a meta-analysis of a number of studies encompassing the responses of 21,060 subjects. From this he reported that the ordering of saturated colours from most to least preferred was blue, red, green, violet, orange, yellow. Although this study has been much cited and is often taken as evidence for a universal scale of colour preference it is fundamentally flawed on at least two counts. Firstly, it examined only saturated colours, no examination being made of the influence of brightness and chroma, secondly, there is no evidence that experimental conditions in the studies examined were comparable.

Granger (1955) examined colour preferences in a more systematic manner by constructing sets of stimuli in which each of the three dimensions of colour were varied in turn whilst controlling the remaining two. In contrast to Smets (1982) he found that hue was the dimension which had most impact on colour preference with 5B and 5Y (Munsell) being most and least preferred colours respectively. Background was also found to have a major impact on preference for colour with colours being rated as more pleasant the more that they contrasted with the background against which they were

seen. Up to a point, colours were also rated as more pleasant the more saturated they were. See also Garura (2004) for experimental studies of the effects of background colour on the way in which target colours are perceived.

Guilford and Smith (1959) also examined subjects' responses to colour with systematic manipulation of hue, saturation and lightness. In terms of hue, their findings are broadly in line with those of Granger (1955). They found the most pleasant colours to be in the blue-green regions, with the least pleasant colours being in the yellow-green regions. This was true irrespective of lightness. When examining lightness in isolation they found pleasantness tended to increase with increasing lightness. Likewise within a given hue the greater the saturation the greater the perceived pleasantness. They observed moreover that colours at the levels of lightness which could be most saturated were rated as most pleasant. Guildford and Smith cautioned against the use of these findings in informing the use of colour in real world situations. They state that more examples of hue and brightness need to be tested, as do colour combinations, the use of colour as applied to specific objects and the interaction of colour and texture.

The above studies illustrate one of the most important shortcomings of this type of research, specifically, that colours were examined in isolation. Moreover, in testing of this kind colours are usually examined against a "neutral" background of grey or black. This background may have differential effects on different colours and although correct in terms of providing a static backdrop, it bears no relation to the context of a 'real world' environment

The issue of colour combinations was addressed by Helson and Lansford (1970). In this study 125 colour chips were presented to subjects against 25 coloured backgrounds under 5 different illumination conditions. The colours represented the main regions from the Munsell hue dimensions combined with low, medium and high examples of value and chroma. Significantly, their findings showed that not just object colour but also background colour and the type of lighting influenced subjects' pleasantness judgements. In fact, the single most important factor in determining pleasantness judgements was not object colour but background colour. Helson and Lansford attributed this to contrast effects; the background colours which were most effective at enhancing pleasantness judgements were those having either high or low value and

very low chroma. They also found the best illumination sources to be cool white fluorescents and incandescent tungsten as well as a gender effect whereby men tended to prefer cool colours while women prefered warm colours. The most important factor in determining colour harmony was lightness contrast. The greater the lightness contrast the more pleasant the colour combination was rated to be. Helson and Lansford's findings have been replicated in a number of other studies (Reddy and Bennett (1985), Hopson, Cogan and Batson (1971).

Colour and Mood

One area of colour preference research which is of particular relevance to long-term care environments is that of the relationship between colour and mood. Those living in long-term care are likely to be vulnerable to negative affect as a result of being in pain, frustration at being incapacitated, or even from boredom. The evidence-based use of colour to enhance mood is therefore of great potential benefit to this group; generic colour scheme recommendations are a much needed asset to achieving a sense of well-being for these communities.

The question of whether there are reliable colour-mood associations has been the focus of a number of studies. In a study by Wexner (1954) subjects were given a list of adjectives which described a number of moods. Subjects were then required to select one of eight colours, presented on paper, which best described each of the moods. The findings did indeed appear to suggest there were definite associations between colour and mood tone although this was more true of some moods. Thus while "excitement" was found to be associated with red, no colour was consistently associated with "protective, defending". There is evidence to suggest that the associations between colour and mood tone may be culturally-relative (Murray and Deabler, 1957). When taking on board the findings from this study it appears that all colours are associated with all moods to some degree.

The findings from these and other studies which have examined the relationship between colour and emotion have been very effectively popularised through the architecture and design literature (Birren, 1982; 1973; 1959; 1950). This is highly regrettable as the relationship between colour and mood is a very complex one and the studies which have examined this issue are plagued with problems. The first difficulty, which is true of many other areas of colour research, is that there is little

methodological consistency across studies making valid comparisons impossible. Moreover, stimulus materials have tended to be too few in number, of a diverse nature, lacking in operational definitions, and varied only on the hue dimension. There are also considerable difficulties associated with the selection and number of adjective descriptors. There is, moreover, also a more fundamental problem in the assumption that mere verbal adjectives can evoke a particular emotional state.

Colour assessment in real and simulated environments

As the foregoing discussion illustrates, a lot of work on colour preferences has been carried out within the laboratory paradigm. While this work is of value it suffers from a number of important limitations. As noted above, the way colour is perceived is affected both by the background against which it is seen and the illumination conditions. Furthermore, experiments conducted pre-tv would have used coloured paper or card samples for testing in a laboratory whereas many colour experiments today are conducted with colours being presented on a monitor screen for ease of use. There is a distinct conflict here between the use of additive colour, the RGB of a monitor, and subtractive colour which is solid pigmentation giving rise to very different visual stimulation and sensation. This has obvious implications for the way colour is experienced in a real environment. Moreover, the last colour to be perceived by the retina will affect the way another colour is perceived due to after-image effects. Also the texture of a surface will affect the way in which a colour appears. Textured surfaces introduce shadow detail which affects colour appraisal. Another often overlooked factor is the "meaning" of an object or space. Thus the green colour of an apple may be rated as pleasant but the same apple coloured blue may be rated as very unpleasant, this being despite the widely found positive ratings for the colour blue. This issue has relevance when dealing with spaces and the meanings and use of those spaces. Thus, in a domestic context, a colour rated as pleasant for a bedroom may be rated as unpleasant for a kitchen. In fact, in experiments carried out for this research project, individuals asked to select colours for different spaces - bedroom, corridor, sitting room, articulated very detailed and different criteria for the selection of colour for each of these room types.

And the picture becomes even more complex when the factors of gender, age, culture, and fashions for particular colours are taken on board. This state of affairs is neatly summed-up by Wise and Wise (1988): "If there has been any lesson learned in the

history of colour research, it is that valid prediction of colour in context cannot be reliably made from highly reductionist laboratory experiments." Happily, a number of researchers have examined the use of colour in real-world contexts (Dalke 2004, 2004).

Inui (1969; 1967; 1966) examined the use of colours in a number of distinct real environments. Using the Munsell Colour System he found that warm colours of high value and low chroma are the most often encountered in Japanese interiors. This was true across different types of interiors. However, Inui (1966) found that the choice of colour did depend to a large extent on the type of room and the surface to which it was applied. He found that where red, green or blue hues were used in theatre foyers they tended to be at much higher chromas than in the average living room.

The choice of colour in real environments is often influenced by functional considerations. For example yellow is avoided in hospital maternity wards because it can make the identification of jaundice more difficult to detect in new-born babies. Blue bedlinen is often used in dermatology wards to mask the appearance of the orange treatment creams to alleviate patient stress. Much is made of the use of green in mental health institutions claiming the beneficial use of the colour for calming patients; however it has been reported that often patients dislike these colours (Dalke 2004). Certainly prescriptive recommendations for colour out of the particular context of type of environment or even of building orientation is dangerous. Cultural and marketing considerations are also important determinants of the use of colour.

Despite the large number of factors potentially influencing the choice of room colours there are a some very common patterns of usage. Generally, ceilings are mostly colourless, having high value and low chroma. Floors are for the most part very colourful with a modal value of 4 and chromas varying widely between 2 and 8. The most popular wall hues are in the 5YR-5Yregion. Values range widely between 7 and 4, and there is a strong chroma peak at 2 (Inui, 1966). This study revealed that the acceptability of colour schemes depended upon the type of room which was in question. The one exception to this was a colour composition with yellow-red and green as its dominant groups. This scheme was considered suitable for any type of room, irrespective of function. Other colour schemes were considered suitable for only certain specific types of rooms while still other schemes were considered unsuitable for any

type of room. Inui's findings are confirmed by a study carried out by Kunishima and Yanase (1995) which found that the preferred wall colours for living rooms were those which were warm in hue, high in brightness and low in saturation.

A study carried out in Sweden, using the Natural Colour System (NCS) required subjects to judge coloured walls in slides of a room perspective sketch on eight unipolar adjective scales. Room colours were judged more positively with increasing blackness and less positively as chromatic strength increased. The meanings of the other scales are not entirely clear, an obvious shortcoming of this study. Acking and Kuller (1972; 1976) conducted a study in which three full-scale rooms were painted in different colours. The first room was painted green with a low lightness value and a medium chroma value; the second room was painted a different green with a medium brightness value and a high chroma value while the third room was painted white with a high brightness value and low chroma value. There was no overall preference for any of the rooms. However, the white room was evaluated somewhat lower, but seen as most open and least complex.

Research conducted in the UK provides evidence to suggest that how pleasant an interior colour scheme is judged to be depends upon the function of the space concerned. Slatter and Whitfield (1977) showed subjects a perspective drawing of a room without furnishings which they described either as a bedroom or as a living room. Subjects were asked to select appropriate wall colours. Those subjects choosing a colour for a bedroom selected slightly more saturated yellows, yellow-reds and reds while those who believed they were selecting a colour for a living room chose more neutral colours. This finding highlights the issue that the pleasantness of a colour is context-dependant. Although examining questions of appropriateness rather than judged pleasantness, Whitfield and Slatter (1978a; 1978b) found that subjects' choice of colour was dependant upon the architectural style of a space. These researchers contend that this comes about due to different architectural styles being associated with certain "ideal" colour schemes which inform the choice of colours for these rooms.

Kuller (1979) argues that having an opportunity to exercise a sense of control over one's personal living space through selecting wall colour has a greater effect on residents' sense of well-being than any effects resulting from the selection of colours according to

hypothesised behavioural colour effects. For some long term healthcare environments such as a teenage cancer centre, this activity was an essential part of the care strategy. This point has obvious resonance for the LTHE sector and the role of the carers here is of critical importance in assisting patients customise their personal spaces.

Another important issue is that of Hawthorne effects. A very influential study by Schauss (1979) found the use of the colour pink in prisons to be associated with reduced aggression and muscular strength in inmates. However, a follow-up study (Pellegrini, Schauss and Miller, 1981) found that in fact this effect was due to the social message which the redecoration had sent to the inmates, which made them feel better treated and more valued. The effect on prisoners waned after a few months as they returned to their original state as they became accustomed to the colour.

There are two principal conclusions which can be drawn from these studies of the use of colour in real or simulated environments. Firstly, they underscore the limitations of basing real world colour schemes on findings from laboratory tests. In addition to this, the studies also suggest that appraisal of environmental colour seems to rely on cognitive appraisals between what is viewed and conceptualisations of what is usual or appropriate in the environment concerned, this being based on such factors as the use of the space and its architectural character. The appropriateness of environmental colour is also likely to be socio-culturally relative as well as subject to the vagaries of fashion.

The role of colour and design in achieving the psychological/ aesthetic requirements of a LTHE

Devlin (1992) describes a classic ward renovation study. Staff in this ward had requested more control over temperature in the ward, but because this was too expensive, they were instead allowed to make some aesthetic changes. This is worth noting as it may explain the limited positive effect of the environmental changes. All four wards were identical except for colour (Wards A and B were green while wards C and D were grey). Originally research staff wanted to keep two wards as a control, but the hospital renovated them anyway. Two months prior to renovation staff were asked to complete an Environmental Design Survey. The major part of this survey asked for ratings on 15 design features (including ventilation, dorm/ side bedroom/ bathroom privacy, furnishings and ward colour) on a 5-point scale. Additional questions focused on staff moral and ward stimulation. Ward renovations were carried out and included modest

aesthetic and functional changes including changes to wallpaper, carpet, furniture, curtains and plants. The two wards were also painted (Ward A was painted green/mauve, Ward B was painted peach/blue, and Wards C & D were painted mauve/blue). The survey was issued one month following completion. Behaviour mapping data was also collected on ward D (only on one ward), but showed no significant change after renovation, the changes that were made could have been attributed to seasonal variation. Survey results showed that the most uniformly positive addition to the wards were the plants. Paint and wallpaper colour, and lighting results did not show any significant improvement, though looking at staff comments this seems to be because not enough of the area had been covered in the new colour. The lack of significant improvement in the pre-post ratings for staff morale and ward stimulation may have been related to the nature of the wards and the patient population.

If a LTHE is very drab this may discourage visitors. The colour and design may also have an effect on the morale of staff and may promote or inhibit staff productivity. Studies have found patients in general prefer old to new buildings (Lawson & Phiri, 2003). This reflects a general preference for old buildings over new. More modern hospital buildings until recently were efficient and functional although in many cases, presented monotonous and under-stimulating spaces. Patients certainly do require a level of confidence from feeling that they are in an environment that is clinically and medically excellent. People have spoken about the need for a hospital to appear to be like a hotel, however this was not of universal agreement (Dalke 2004). Monotony hinders orientation and wayfinding in LTHE and it was found that colour had a real use in helping residents with dementia navigate the spaces they occupied (Ref Laura??). For residents of LTHE the main criteria for any refurbishment should be to enhance a sense of well-being by providing an ambient and comfortable setting for all users. One factor that affects colour constantly is the levels of lighting in healthcare environments; it is a major factor in how any building feels and is perceived by the users. Lighting can dramatically affect the functionality of the building; for example older residents will have varying degrees of visual impairment and therefore will find it difficult to adapt to a bright environment if coming from a darker area (CIBSE 2005).

People who are resident in LTHEs may be confined or restricted in the spaces which they occupy and may have access to as few as two contiguous spaces. These constraints of limited mobility require careful consideration when planning the total décor of the environments which these people occupy. Work undertaken on the refurbishment of prison environments recently has shown the importance of creating different colour schemes according to contiguous space plans where the colour of the cells were opposite colours to the areas where they spent time out of their cells (Dalke 2006).

Evidence for the role of colour in other environments in which movement is restricted

Visual impairment is a disability that can benefit greatly from the use of applied colour contrast to environments. The ageing process brings with it the increasing likelihood of lower vision. Most residents in LTH will be affected by low vision of some kind. It is often one of the disabilities that compounds dependency in multi-disability cases for many people in LTH. For users who learn the parameters of their environment without a change of scene, visual disability can be countered by the use of adequate contrast or the use of accent colours to make meaning of the building's infrastructure when in regular use. The variety and anomaly of certain eye conditions can present unusual problems; for example some people with Macular Disease have a problem differentiating red from black. It has also been established that the ageing lens can render a colour such as purple a dismal grey. These are a few examples of how the eye and brain can play havoc with the designers' schemes for environments in this sector.

Dementia will be a progressively important condition as the older population increases affecting the porvision of long term care environments . There is evidence that colour can be used to positive effect in long term care environments for people with severe forms of progressive dementia. A study by Cooper, Mohide and Gilbert (1989) examined the role of colour in a dementia ward in terms of promoting desired behaviour, discouraging undesired behaviour and enhancing the ambience of the ward. Desired behaviours included being able to find places such as bedrooms, washrooms and the activity area and remaining in the activity area for an appropriate period of time. Undesired behaviours included hovering around exits, straying into restricted areas, wandering into other patient's bedrooms, rummaging through other patient's wardrobes and chests, and patients relieving themselves in inappropriate areas.

The interventions which were carried out were restricted to the painting of walls and

woodwork. In order to discourage patients from leaving the ward or entering restricted nursing areas, the doors out of the ward and to restricted areas were painted cream, which was the same colour as the walls of the main corridor. The interiors of the restricted areas were painted pale colours so as not to attract attention. Wardrobe doors which had previously been painted bright colours were painted the same colour as the walls. The doors to patients' bedrooms and surrounding woodwork were painted in bright primary and secondary colours. Bedrooms were painted paler harmonising shades and tones of the colours used to paint their doors. Washroom doors were painted strong primary and secondary colours like the bedroom doors. The same colours were used behind toilets and washbasins. The door and adjacent walls leading into the activity area were painted bright saturated raspberry red. The activity room was painted cream/pale ochre opposite the long window wall, Kelly green on the short wall leading to the garden, and coral on the opposite short wall where the piano was placed.

The interventions were assessed for the most part through qualitative analysis. This was based on a questionnaire administered to staff prior to the intervention, in-depth staff interviews after the intervention and six questionnaires completed by family members visiting residents. The key findings were as follows. Each type of undesired behaviour, with the exception of patients wandering into others' bedrooms, decreased. There was no change noted in desired behaviour apart from longer stays in the activity area. Both staff and families found the environment less institutional and more cheerful after the interventions.

A distinction can be drawn between colour coding, the systematic use of colour as an association device, and colour cueing which is the non-specific use of colour as a signal. The findings of this study suggest that colour is more successful as a cue to reduce undesired behaviour than it is as a cue to promoting desired behaviour, at least in the case of ambulatory dementia patients. The results moreover suggest that colour can be used more effectively through cueing than through coding for this population. The introduction of bright colours into the ward was found to be mood-enhancing and desirable.

Factors other than colour influencing the experience of LTHEs

Light is fundamental to the way we experience colour. At the most fundamental level without light we can see no colour. However, lighting conditions can affect our experience of colour in more subtle ways. For example, different types of artificial lighting may be "warmer" or "cooler" and for this reason fundamentally alter the way in which we perceive colour.

Artificial lighting

Artificial lighting should be designed in such a way as to both support the functions and activities of the space concerned as well as to enhance the aesthetic qualities of that space. It is important that artificial lighting is adaptable in order to respond to different conditions (night/day, summer/winter) as well as different requirements and preferences from the users. In more specific terms, lighting can be used to provide an impression of enclosure or spaciousness or to create a sense of warmth.

Natural Light

A study by Heerwagen and Heerwagen (1986) investigated preferences for natural versus artificial light in office environments. Natural light was associated with greater visual comfort, enhanced office appearance and pleasantness and improved visual health and general health. When dealing with natural light it is important to allow for control in order for example to block out bright sunshine; some discomfort from glare is often mentioned by patients in healthcare environments as a cause for concern especially as it represents lack of control over personal space.

Noise

Noise is defined as unwanted sound. While it is very unlikely that levels of noise in healthcare environments are high enough to cause actual hearing damage the presence of noise is likely to cause considerable annoyance. This is perhaps especially likely given that many patients or residents may be feeling unwell and may be in pain. In view of this, noise may have a very negative effect on sleep which may in turn slow the recovery process (Simpson, Lee & Cameron, 1996). In general, noise annoyance may give rise to a feeling of loss of control which may in turn cause stress.

Noise can also cause stress amongst staff. Topf & Dillon (1988) found that sounds that disturb staff may be different from those that affect patients. In addition to the general noise on the ward, nursing staff also have to deal with telephones, the beeping of monitors for patients and a multiplicity of warning signals from equipment. A study by Cropp et al. (1994) found that staff were only able to accurately identify 50% of critical signals and 40% of non-critical signals from equipment.

The impact of noise depends very much on the function of the space. Noise in spaces where there is an expectation of activity and social interaction, such as a dayroom, may be perceived as less annoying than noise in a ward where patients may expect to be able to rest. Social spaces or other spaces where noise is generated that are in close proximity to sleeping/ working areas may create problems.

Noise can be reduced either through architectural/design initiatives or through altering behaviour. Noise can be reduced through the use of carpets, wall coverings, draperies and acoustic ceiling tiles or applying sound board. Sound proofing consulting rooms reinforces patients confidence in the health professional and disclosure on the part of the patient may increase (Shirvastava, 1999). The purchasing of quieter equipment may also help to alleviate the problem. Noise may also be reduced by closing doors when this is possible, reducing the volume on telephones, and dimming lights, which has the effect of lowering voices. There has been considerable debate in recent times, more especially in acute hospitals than in LTHEs, about the relative merits of single versus multiple-occupancy rooms. The type of rooms in which patients are accommodated is likely to have a significant impact on the noise levels which they experience. Indeed, Lawson and Phiri (2003) comment that private rooms provide a much quieter environment for patients than large multi-bed wards.

At the same time noise may have a positive function within LTHEs as visually impaired people rely on sounds and the direction of noise in order to navigate in large spaces. In other research (Dalke, 2004 (2)) visually impaired people prefer large spaces to be broken by hard or soft barriers such as screens and planters to orientate themselves by bounced sounds.

Privacy

There is considerable debate as to whether patients in healthcare environments should be accommodated in private rooms or on more traditional Nightingale wards. There is a trend towards providing more single rooms. In a study by Lawson & Phiri (2003) patients in single-bed spaces were compared with patients in four-bed spaces. There were no differences between the groups in terms of their perceptions of their overall ward experience, their overall treatment or whether the environment helped them to feel better. There were however significant differences between the two groups in terms of how they rated their own private bed space. (Argyle, 1987) Of the group

accommodated in single-bed spaces 71% gave their bed area the highest rating whereas of the group accommodated in the four-bed rooms only 33% gave the highest rating. The group in the single rooms also rated their bathroom and toilet area more highly with 48% giving the highest rating, as compared with 26%.

Sense of control

In their study of hospitals in the South of England, Lawson and Phiri (2003) found that although patients had control of artificial lighting they had very little control over temperature and air quality, blinds and curtains, and noise. This is regrettable in light of the evidence that lack of control can impact on wellness and cause stress, depression, passivity, elevated blood pressure and reduced immune system functioning (Ulrich 1991, 1992). Lack of sense of control can arise for many reasons. In addition to those cited by Lawson and Phiri (2003) a number of other factors may be associated with a lack of control including confusing way-finding cues, lack of privacy, noise, inability to choose what to watch on television, lack of a view out a window (Ulrich, 1992). Given that, by definition, residents in long term healthcare environments spend longer in these environments than patients in acute hospitals the importance of ensuring that these environments afford residents a sense of control is of corresponding importance.

Views from windows

Being resident in a healthcare environment is often associated with reduced access to outdoors. For this reason views from windows are potentially of considerable importance, particularly given that patients and other occupiers of healthcare environments are typically restricted in terms of movement, often spending a lot of time in bed. Views from windows therefore have the potential to provide distraction from what is often a monotonous hospital environment. There is evidence that designers may not give sufficient consideration to this issue when planning healthcare environments. Dalke (2004) found that in one new hospital windows in most wards were too high for the patients to see a beautiful landscape from their beds. The same author found that in one sheltered housing scheme residents had posted pictures of plants in recesses to mimic greenery outside a window.

There is evidence that the nature of the views from windows can have an influence on healthcare outcomes. In a carefully-controlled study Ulrich (1984) examined the effects of views on patients who were recovering from surgery. All patients in this study had undergone cholecystectomy, a common type of gall bladder surgery. The patients

occupied rooms which either looked out onto a small stand of trees or onto a brick wall. Data from 46 subjects was used, 23 in each of the wall and trees groups. The groups were matched on a number of factors including age, sex, smoking behaviour, and obesity. The data was taken from hospital records.

A number of outcome measures were examined. It was found that patients with window views of trees spent significantly less time in the hospital than those with wall views. Notes made by nursing staff during the recovery period were analysed. These were classified into positive and negative notes. It was found that patients with the brick wall view had significantly more negative notes written about them than patients with the tree view. There was however no significant difference in the number of positive notes written about the two groups. The amount of analgesics taken by the two groups was analysed. During the day of surgery and the next day there was no difference, probably because patients were either too drugged or in too much pain to attend to the window at all. In the period between two and five days post-operation the 'wall-view' group had significantly higher levels of analgesic use than the 'tree-view group'. There was again no difference in groups after five days when analgesic use was very low for all groups. In the case of anti-anxiety drugs there was no significant difference between the groups. However, the higher use of analgesics in the 'wall-view group' is likely to have reduced their need for anti-anxiety drugs. An analysis of post-surgical complications found no significant differences between the groups. In sum, this study found that what was crucially important was that a negative visual environment can hamper recovery. Whether a pleasant visual environment can actually improve health is less clear and has yet to be established.

While views of natural scenes are often highly rated in terms of pleasantness there may be cases where healthcare environment residents prefer a non-natural scene. In particular the preference for views of nature could be restricted to individuals under stress, such as those having undergone surgery. Residents in long term healthcare may, by contrast, suffer more from boredom and understimulation. In this case a view of a street or similar, in which there is activity to observe, may be preferred over a view of nature.

That windows may have a stress-relieving effect is also demonstrated by a study reported by Wilson (1972). This study examined patients following major surgery and

monitored the incidence of delirium and depression. Patients in intensive care units without windows had significantly higher rates of organic delirium than those in units with windows.

Verderber & Reuman (1987) suggest that views from windows provide a "perceptual and cognitive link with the external environment". This may help patients feel less isolated from the "real world" and be associated with an enhanced sense of wellbeing.

In their study of hospital environments Lawson and Phiri (2003) found that after privacy the most important issue to patients was that of views from windows. Both patients and staff like to have windows, particularly when the window offers attractive or interesting views. In one hospital study it was found that older people wanted to see everyday life going on outside so city centre units were just as interesting as rural scenes (Dalke 2004); in a conversation with an architect it was reported that in one residential care home the residents were clamouring for the views over the car park to watch the busy visitors arriving and departing the building (Cowan Associates 2004). Of course the presence of windows affords not just views beyond the immediate environment but also, potentially, fresh air and natural light, including sunlight. These other factors are dealt with in the appropriate sections of this document.

Air quality

Local temperatures may fluctuate due to the number of windows which if opened will bring in cool air, but if closed may allow for greenhouse effects generated by sunlight. Chemical and organic pollutants, such as those released from fabrics may vary in each room depending on its fleece factor and also shelf factor.

Visual noise

Certainly work undertaken in a hospital research project showed that levels of visual noise or clutter caused confusion in wayfinding, difficulty with communication, stress for staff in messy ward areas and visual discomfort for patients. Control of local customised signage to certain key places can do much to de-clutter the visual environment.

Odour

The ambient odour of a given space is an important and often neglected determinant of the way in which that is experienced (Spence, 2002). This is particularly true of healthcare environments which may have unfamiliar and unpleasant odours. These may greatly add to levels of anxiety experienced by patients/residents and visitors (Bell, 2001a; Holland, 2002). The way in which these odours are managed is therefore of considerable importance.

The perception of odour is one of the main determinants of the perception and acceptability of indoor air quality. Females have been found to be more susceptible to sick building syndrome (Skov, 1987) which may be related to the fact that they are generally more susceptible to odour (Spence, 2002). This has obvious implications for the design and management of long term healthcare environments in which there is a predominance of women, such as nursing homes.

People adapt to pleasant or neutral odours much quicker than they do to unpleasant odour. It has been suggested (Doty et al., 1984) that sensitivity to unpleasant odours does not diminish as quickly because it is an evolved early warning system and it is therefore important that people remain aware of them over a long time period.

There is evidence that people work more productively in the presence of pleasant ambient odours than unpleasant odours (Rotton, 1983). There is even evidence that they work more productively in the presence of pleasant odours than no odour at all. Warm et al. (1991) found that the periodic presentation of a lily of the valley or peppermint odour improved overall performance on a visual monitoring task by approximately 20% as compared to a control group who were tested in the absence of any odour.

Before introducing an odour to an environment it is essential to consider the population group who will experience it, and investigate whether their previous experience, association, or contact with that odour will in fact mean that they respond to the odour in a positive way. The negative associations of some odours may be unsurprising such as the fear that has been found to be triggered by eugenol, an odour associated with dentistry (Robin et al.,1998). The associations which other odours have may be less obvious. Loniewski (1991; cited in Bone & Jantrania, 1992) found that a group of elderly residents hated floral scents because it reminded them of funerals.

As with many environmental factors it is very important that people feel as though they have a sense of control or choice over the ambient odour. Indeed the way in which an odour is experienced may depend to some extent on the sense of control which individuals feel that they have over it.

Art The use of art in healthcare environments can have the effect of distracting patients from worry (Ulrich, 1992). In long term healthcare environments art may also help to relieve boredom. Ulrich contended that there were broadly three pictorial subjects which had a positive impact on the well-being of healthcare environment residents. These were scenes of nature, scenes of happy, laughing or caring human faces and, scenes of benign animals. By contrast psychiatric patients have been observed to find abstract scenes less comfortable. Of particular interest is the speed with which Ulrich found art to have stress-relieving properties. He observed that in as little as five minutes patients exposed to scenes of nature had reduced blood pressure and increased muscle relaxation. Ulrich (1992) reports another study which suggests that the stress-relieving properties of nature scenes depend upon their subject. In a study of open-heart surgery patients, subjects viewed either a nature scene featuring trees, a nature scene featuring water, an abstract picture or no picture. It was found that the subjects who had viewed the nature scene of water were less anxious than any of the other groups. Moreover, it was found that the patients who had viewed the abstract picture were more anxious than those who had viewed no picture. In research into personality and individual differences Zucherman, Ulrich, and McLaughlin (1993) found that the type of art which subjects liked best were of nature, were complex but free of tension, and were figurative, rather than abstract or expressionist.

Opportunities for rewarding social interaction Lawson & Phiri (2003) identify the opportunity for rewarding social interaction as being of critical importance in healthcare environments. Indeed they suggest that it may be the most important factor in determining the well-being of patients. This is likely to be especially true of residents in long-term care environments due to the length of time which they spend in the care environment. In the case of elderly care residents they may have few friends still living and those who are still living may be unable to visit due to health problems of their own. The way in which a LTHE is designed has potentially important implications for social interaction amongst residents and also between residents and carers. It is important both that residents have opportunities for privacy and that the environment supports and facilitates social interaction. Both these aims can be promoted by measures as simple as the considered arrangement of furniture. The more patients are suffering from mental il-health or disability the greater the issue of furniture placement or change. Work undertaken with cerebral palsy adults found

that a change of scene or furniture could cause high levels of stress (Dalke, H., Matheson, M., 2005)

The extent to which the LTHE is institutional or homely

It is often commented that healthcare environments are overly institutional and that this may add to feelings of stress and alienation amongst patients and residents. This issue is obviously of particular relevance to long term healthcare environments which often become the residents' permanent home. The Planetree Model, which was developed in the United States, is one fairly well known initiative to address problems of the soullessness of many healthcare environments. The principal objective of the Planetree Model is to create a more home-like environment for patients through designing the environment with elements typically associated with domestic interiors such as plants, books and soft furnishings. Other goals of this initiative are to train patients to be partners in their healthcare and to increase the satisfaction of nursing staff.

Few evaluation studies have been carried out on Planetree wards. However Martin et al. (1998) carried out a randomized control trial in which a 13-bed Planetree medical-surgical unit was compared with traditional units. Patients were interviewed at admission, at one week after discharge, at 3 months after discharge and at 6 months after discharge. It was found that Planetree patients were significantly more satisfied with their stay than those in the traditional units. This was true both in terms of the architecture and the technical aspects of their stay. Planetree patients were also more satisfied with the extent to which nurses were more involved with care and with their opportunities to see family and friends. The Planetree patients also learned more about self-care and illness. There were no differences in the involvement of physicians in the patients' care nor were there any differences in patients' perceptions in the control they had over their health. Overall, the findings from this study suggest that patients were more satisfied with their healthcare experience in the Planetree unit.

Another noteworthy evaluation study was carried out by Devlin (1995). In this study two Planetree units were compared with a traditional unit. Patients, nursing staff and visitors were asked to evaluate the environment. This evaluation was carried out using an instrument developed by Davidson (1994). Participants were asked to evaluate the environment in terms of "care", "being", "choice", "environment" and "communication" using a visual analogue scale. In addition, participants were asked

whether they thought that anything about the unit should be changed, and how responsive the unit was to their needs. The results of this study showed that one or more of the Planetree units were evaluated significantly more positively on care, being, environment, communication and responsiveness of the unit to their needs. Interestingly, irrespective of the type of unit the nursing staff rated both the quality of care and the extent to which patients had choice lower than either of the other groups of participants. There were no significant differences between the groups of patients in terms of the number of days which they spent in hospital, the number of visits which they reported receiving, or the number of visits which family and others reported making. Likewise there was no difference between the two types of unit, in the stress experienced by the nursing staff as assessed by the Health Professions Stress Inventory. Taken together, these findings suggest that the beneficial effects of the Planetree Model may be restricted to the influence they have on the patients' experience of their time in the healthcare environment.

Methodological Considerations

Research on healthcare environments

There has been remarkably little research carried out on health care environments. There are a number of explanations for this. According to Verderber & Fine (2000) the field of health architecture and architecture in general, has not fostered a tradition of research. As a consequence, important decisions about healthcare environment design are often based on flawed assumptions rather than empirical evidence Verderber and Refuerzo (1994). This is true of no area more than colour design (Dalke, 2004). Decisions about the use of colour in hospitals are very often made by ill-informed estates personnel and staff drawing on their own idiosyncratic intuitions about colour rather than on research evidence. The low level of importance afforded to the medical environment has meant that the area of environment-behaviour relations has received very little attention in medical and nursing research (Kolanowski, 1992). Moreover, due to problems with experimental control, carrying out research in health care environments is very difficult. Many of those studies which have been carried out have also been criticised on methodological grounds (Epstein, 2000; Rubin & Owens, 1996; Weber, 1996).

Post Occupancy Evaluation

The aim of Post Occupancy Evaluations (POEs) is to assess how successfully a building fulfils the functions for which it was built. It is a regrettable fact that few buildings are subject to POEs, from which architects and specifiers could inform their practices. There

are at least two reasons for this. Firstly, those involved with the procurement and financing of a particular building are often unlikely to be involved with designing any further buildings and so have no incentive to learn from any mistakes made. Another reason for the absence of POEs is that the costs of constructing a building often run considerably over budget leaving no funds for a POE. The infrequency of POEs means that mistakes are often made repeatedly in the construction of a particular building type.

Many POEs are conducted at one point in time, typically six months or a year, after a building is completed. This is bad research practice as it may be the case that the successfulness of a building may change over time. What is required is an ongoing series of POEs in order to monitor how the building functions over time.

Where they are available, the results from rigorously-conducted POE's represent a cumulative archive of design solutions; a tool kit that is available for designers beginning new projects with evidence of what to avoid, or the design solutions and elements that had worked well in the past and been beneficial to building users.

Ward Atmosphere Scale

The Ward Atmosphere Scale (Moos, 1973) has been used for many years to evaluate the psychosocial atmosphere of treatment environments. It is a 100-item true-false questionnaire used to assess both staff and patient perceptions of psychiatric inpatients' treatment environments along three dimensions: relationship variables, personal development, and system maintenance variables. Instead of measuring subjective perceptions of the environment such as well-being, it uses objective measures such as involvement, staff control, anger and aggression, and so on, to infer the environmental effects upon patients and staff. It has been shown to have good construct validity (through correlations with other established scales measuring dimensions of ward milieu) and good reliability (through correlation between test-retest scores).

Corey (1986) administered the scale two months prior to a refurbishment and then again two months after, a total of 14 weeks apart. Environmental changes were made to the paint colour, furniture arrangement and style, floor coverings, etc. The colour changes were from a few pale monotonous colours to 54 new colours drawn from orange, green, yellow and blue hues. No precise colour references were given. Complementary and contrasting colours were used on doors, in hallways, and in larger

areas. Patient rooms were painted in different shades of the same colour. Brightly coloured furnishings were selected. Statistical analysis compared the test-retest scores in order to assess the effect of the refurbishment. Taken as a whole, the environmental changes impacted favourably on staff and patient groups, but the design of the study did not permit an assessment of the impact of each aspect of the environmental changes in isolation.

Colour Research

The vast majority of the research conducted on colour preferences have been conducted within the experimental/ laboratory paradigm. Whilst experimental methods are the only type of methodology enabling researchers to identify with certainty the impact of specific variables on any observed effects, they are at the same time often constrained to short timescales and often have low external validity. The high level of control imposed on experimental studies means that the conditions in which variable effects are measured are often extremely artificial, and as such the findings are less generalisable to the real world. Instead it would be better to conduct field experiments, which increase the realism and generalisability, but at the same time still have enough control over the variables to enable inference of causality. If real-field environments are not possible due to time/monetary/ethical constraints or are simply unavailable, simulation methods are a good alternative. For example, a considerable amount of work has been done using simulations of car controls to simulate driving behaviour.

At the other end of the scale are correlational research methods, which unlike experimental methods cannot be used to identify causal relationships, but can be used to establish whether some kind of relationship exists. They also allow researchers to use the natural/everyday setting as a laboratory, so artificiality, generalizability and external validity issues are not a problem. They enable researchers to examine the relationships or correlations between naturally occurring situational variables.

An important issue when dealing with the effects of environmental changes is that of Hawthorne effects. These are psychological effects following environmental changes resulting not from the environmental changes per se but from the attention being afforded to the participants. To test for, and exclude the possibility of a Hawthorne effect, it is necessary to run two baseline capturing pre tests, to test whether there are fluctuations present due to the attention being given. If no change is found between

pre tests then you can be sure that any changes after administration of the independent variables will not be due to attention effects. See Raw (1993) for an example of this methodology having the format: before1, before2, intervention, after1 and after2.

In the research literature a wide variety of techniques have been used to measure well-being/ comfort/ aesthetic appreciation of the environment. The following are some of the more commonly used methods:

Semantic scales Semantic scales are often used as a way of measuring responses to environments, although there is a problem of lack of comparability across studies because different scales are used. Acking (1972) conducted a huge study, originally using more the 1,050 words describing the environment. From there he selected 78 words for a final semantic list, which were used to rate picture slides of various rooms using a 7-point scale. Finally they devised 5 factors from the semantic scales which were as follows:

1. Pleasantness Evaluation Factor - Pleasant, inviting, boring, repulsive, nerve-racking

2. Social Evaluation Factor – Expensive, fine, pretentious, poor, simple

3. Spatial Enclosedness Factor – Open, light, spacious, closed, dark, encumbered

4. Factor of Complexity – Motley, complex, composite, discrete

5. Factor of Unity – Unitary, whole, of pure style, badly thought-out, split

They found that here were positive significant correlations between blackness and social evaluation, lightness and openness and chromatic strength and complexity. The studies which have used this technique include Küller, et al. (1972) in which these scales were used in research on changing colours of three hospital rooms.

This was derived from ethological studies and measures of ward behaviour. This measure has proven effective in several studies of psychiatric patients and in assessing change amongst them, thus the positive effect of environmental factor change on psychiatric patients can be measured by valid tools and not evaluated merely by subjective impression (Gross, 1998).

Colour Design Schemes for Long-term Healthcare Environments

Colour Design Schemes for Long-term Healthcare Environments

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2003-2005

Contents

Acknowledgements

Section 1

Background

Introduction   The development of any interior environment requires at some stage a decision regarding the colour design of that interior. In many cases, especially interiors in public spaces, choices regarding the colour scheme are not considered important or afforded a high priority. Developers of non-domestic interiors designed to acommodate the more vulnerable, fragile, unwell or disabled, are aware of the complexity of choosing colours to create the right effect, and may seek information to aid successful application. Healthcare personnel with experience in these environments often observe the impact that colour may have on the people in their care.

Colour has the potential to change spaces into interesting environments, to add stimulation in an otherwise monotonous space, and can even manage navigation or orientation for people with dementia. Every object, material and surface in an environment can contribute to the overal success of that space for users. Certainly it is known that under-stimulation is detrimental for the immobile or for those in long term healthcare environments (Fairweather and McConville 2000, Dalke 2007).

Little work has been done on what defines an environment as having visual comfort, incorporating accessibility and contrast. Yet contiguous spaces - a bedroom, corridor and dayroom - may be all that patients, service users, clients and residents experience; a sequence of these spaces maybe the only 'journey' they make.

Colour preferences have been established that do identify key issues for advice and generic colour application in long term healthcare environments for a wide range of users of these findings.

This Arts and Humanities Research Council funded research programme focused on examining current design practice in a group of representative long-term healthcare environments. The work also included establishing some results on generic colour preferences and experimental testing in real world refurbishments; all these methods provided some recommendations useful for those requiring more definitive guidance on the subject of colour application in environments..

Research Aims & Objectives

1 Determine, experimentally, how colour design could assist the achievement of pleasurable, high quality environments.

2 Determine generic design issues experienced by patients through interviews and extensive tests with a range of representative groups of staff, users and visitors on existing and refurbished long-term healthcare environments.

3 Use computer aided tools and software to identify successful strategies and key points of failure in colour design schemes within long-term care enviroments.

4 Audit the effects that colour design has on ambience, visual comfort, accessibility, efficiency and safety for the target groups in a range of environments.

5 Establish key functions in environments where improved ambience and visual comfort are attributable to colour design.

6 Conduct post-occupacy evaluation of long-term patients in the 'real world' environments

7 Initiate economical, creative and innovative solutions for colour design

8 Record for dissemination the research phases for the guidance document

Research Questions

1 Can generic issues on schemes for colour design be catalogued and demonstrated for use by professionals in a Design Guide?

2 Would improved ambience and comfort contribute to a sense of well being in long-term care environments? What would these interventions be?

3 Do performance perceptions affect the sense of well-being of people, e.g. visual adaptation when people move between interconnected confined spaces with different colour design schemes?

4 Can results on colour preferences be assessed in experimental studies ?

5 What are the preferences and effects of certain colour design combinations used in contiguous spaces?

Long-term healthcare environments, homes for the elderly and hospitals are all examples of institutional environments with limited circulation and access for the users of those buildings. Designers of these environments are aware of the complexity of using colour and lighting yet cannot access any readily available list of issues involved.

Previous information on colour design for environments relies on prescriptive colours and colour combinations to achieve recommended results (Aranyi and Goldman, Birren, Dilani, Mahnke). Practical application of colour design in these special environments has presented problems for users of current publications as many recommendations are rendered invalid due to lack of knowledge about user response to planned schemes.

- A gap exists in the literature on the effect of colour design when moving between adjacent, contiguous environments and how this could contribute to environments with limited circulation and access for users to achieve desired levels of interaction, functionality and aesthetics.

- Identifying the environmental factors affecting long-term care is a critically sensitive and complex task. Predicted 'ambience' has proven difficult to define yet is a prerequisite of much of the built environment. Little research has been done on the effect of colour design on transition between two spaces. Psychological effects of colour design combinations and the impact on environmental factors on people who may occupy restricted spaces has been compiled.

"monotonous environments may result in under-stimulation that may cause aggressive behaviour"

Previous research has shown that office workers were affected in their concentrations and accuracy by the colour of interiors (Kwallak). Prisoners were affected by being contained in all-white environments (Fairweather and McConville) and Mahnke suggests that monotonous environments may result in under-stimulation that may cause aggressive behaviour seen in prisons. Buildings require an assiduous application of colour design for confined interiors, essential for a sense of well-being or stress relief. Previous research using colour measurement methodology and environmental psychology have not been co-ordinated. Earlier qualitative research on the design of environments with occupants who are restricted in some way, traversing from one area to another, has revealed a complex set of variables which have been identified for further research (Dalke 2000).

Phases The programme will determine the effects of colour design on ambience and visual comfort in long-term care environments. The research team will investigate key colour design factors involved in maintaining visual sensory stimulation and a sense of well-being for target group occupants of these environments.

Phase 1   Overview and literature review (3 months)
Milestone   Advisory Panel Meeting

Phase 2   Audits, data collection and design of experiments (4 months)
Milestone   Advisory Paper

Phase 3   Data analysis and pilot testing experiment methodology (6 months)

Phase 4   Designing 'Real World test' (6 months)

Phase 5   Real World Tests and Post-Occupancy Evaluation (12 months)

Phase 6   Evaluation (5 months)
Milestone   Advisory Panel Meeting

Phase 7   Dissemination (7 months)
Milestone   Draft Colour Design Scheme Guidance and Exhibition.

Phase 8   Dissemination document (3 months)
Milestone   Web site launch of document

Long-term healthcare environments (LTHEs)
Definition of LTHE

In attempting to define long-term healthcare environments it quickly becomes apparent how broad the sector is; long-term care refers to "support services which are provided over a prolonged period of time or on a permanent basis to adults who have difficulties associated with old age, long-term illness or disability" (Department of Health). The need for long-term health care is measured either by self assessment of limiting long term illness or failure to achieve activities of daily living, or by professional measures of functional ability. The phrase 'long-term' relates to 'ongoing' or 'permanent' (Sutherland, 1999) care, normally being longer than six weeks. Intermediate care is the term used to describe the intensive rehabilitation or treatment conducted over the shorter time frame of 1-6 weeks (Department of Health). The term 'care' can be used to refer to a wide diversity of service provision, from "residential settings such as nursing homes or in people's own homes over a prolonged period of time" (Department of Health) or to acute illness treatment in hospitals. Long-term health care environments essentially become the patient's home for a long period of time and in some cases for the rest of their lives (Foque & Lammineur, 1995) therefore the provision of pleasant environments that are stimulating and promote   well-being in this sector is increasingly important.

Characteristics of LTHEs which distinguish them from other environments

Typically, residents of long-term healthcare environments are incapacitated in some way. In many cases they are unable to walk unaided. This necessitates a high level of staffing in order to care for these individuals. In other cases residents may have other problems such as severe mental health problems which mean that they are potentially dangerous to society. For these reasons long-term healthcare environment residents are often unable, or not permitted, to leave the care establishment in which they are resident. In many cases the consequence of this is that people in this situation spend very long periods of time in very confined spaces. For example, residents in a nursing home may divide their time between only a couple of spaces such as a bedroom and bathroom, or day room and dining room.

Types of LTHE

There are three principle groups which occupy long-term health care environments: the elderly, those with long-term illnesses, and the disabled. The latter group can be divided into those with physical disabilities and those with mental or learning disabilities.

There is therefore a diverse range of groups occupying LTHEs. As a consequence LTHEs take many forms. The elderly may be cared for in hospitals, nursing homes, half-way

houses, community homes, residential care homes as well as of course in their own homes. Similarly, those with long term illnesses may be cared for in specialist hospital units (e.g. for cancer or AIDS treatment), mental health units or community homes, or in a domestic setting. Those suffering from disabilities, whether mental or physical, may be cared for in specialist residential care homes, hospital units, or at home.

Factors influencing people's experience of LTHEs

Residents in long term healthcare environments differ in many ways. Certain factors are likely to have a particularly important influence on how these people experience their physical surroundings.

Mobility

The extent to which residents can move around has a big influence on how they experience their surroundings. An extreme case would be a spinal injury patient able to look only at the ceiling. From a visual point of view the ceiling is that patient's environment. The mobility of a given patient may change radically over time. This is particularly true of degenerative conditions such as Multiple Sclerosis and Parkinson's Disease in which patients' mobility may become progressively more restricted.

Three levels of mobility might be distinguished:

■ Very restricted. This would be patients unable to move from one position at all (such as in the example above) or those only able to move if someone moves them.

■ Restricted. This would be individuals with only restricted mobility and would include those in wheel chairs, those requiring crutches, as well as the frail elderly.

■ Unrestricted. Individuals in this category would have some condition requiring long term care but that does not impact upon their mobility. This would be true of many cases of mental illness and also possibly some types of cancer.

Mental State

The state of mental functioning of LTHE residents is likely to have an important influence on the way in which they experience their environment.

The following categories might be distinguished:

■ Normal. These individuals have no learning disabilities, mental degeneration, or mental health problems. Their reason for being resident in a LTHE is likely to be due purely to physical disabilities.

- Those with learning disabilities. It should be borne in mind that there is too wide a range of types of mental illness within this category to deal with here in detail.

- Dementia patients. These individuals suffer from varying degrees of dementia and may be disorientated, unaware of where they are, and accordingly may ascribe different meanings to their surroundings.

- The mentally ill. These people may suffer from one or more of a number of mental illnesses. As with dementia patients this may have a significant impact on how they experience their surroundings. Mental health patients generally rate their environment less positively than do general health patients (Lawson & Phiri, 2003). This is probably not surprising as some of the mental health patients will likely be suffering from depression. Similarly, a schizophrenic may ascribe idiosyncratic significance to certain aspects of their surroundings.

Age group, gender and culture

The age group of the residents is likely to influence the way in which they perceive their surroundings. Different age groups have different requirements and expectations with regard to their environment. They will also ascribe diverse meanings and significance to features. This suggests, for designers, the importance of congruence between the environment which is provided and the target age group.

The most important age groups are as follows:

- Children

- Adolescents

- Young adult – middle aged

- Elderly

In the same way, people of different gender and from different ethnic backgrounds may have varying levels of environmental needs and expectations, and ascribe different meanings to their surroundings.

Pain Whether or not patients are in pain may have an influence on how they experience their surroundings. There are at least two possibilities. Patients in severe pain may be so preoccupied with this as to be unaware of their surroundings. This view would be consistent with Maslow's (1971) theory of the hierarchy of needs. According to this theory, the most basic needs of mankind, essential for survival, are the primary motivational focus. This includes food, water, sleep etc. Maslow's view is that it is only after these, and other, important needs have been met (such as for security and love), that individuals can focus on more intellectual or aesthetic matters. There is however anecdotal evidence to suggest that even those in severe pain may be aware of the aesthetic aspects of their surroundings. An important factor may be whether the pain is continuous or intermittent.

For practical purposes LTHE residents may be divided into the following groups:

- No pain/ very low pain.

- Moderate – severe pain: intermittent

- Moderate – severe pain: constant (or nearly constant)

In considering the influence of these factors on individual's experience of LTHEs it should be borne in mind that they of course interact in particular individuals, so that a given individual may be for example elderly, unrestricted in movement, mentally ill, female and from an Islamic background. It is imperative that in designing environments the specific problems of each potential user group are kept in mind. The number of variables in this sector present a major challenge to those professionals who are responsible for providing long term healthcare environments.

Brief synopsis of trends in healthcare buildings design

A number of trends in healthcare design can be observed over the second half of the Twentieth Century. According to Verderber and Fine (2000) these changes in healthcare design have reflected a number of tensions: between large and small institutions, between compact and linear buildings, low-rise versus mid- or high-rise buildings, between centralised and decentralised approaches. At different times changing fashions in healthcare architecture and practice have meant that new healthcare facilities have differed on the above dimensions. From the 1960s, hospitals having radial corridors were popular. They were considered to have a number of advantages including being efficient for staff in that the distances which they had to walk were reduced and affording enhanced patient observation Verderber and Fine (2000). In time the radial design was replaced in popularity by "sawtooth" designs which were made up of triangular spaces which gave patients more privacy and which created fewer irregularly shaped spaces. In terms of the larger configuration of the hospital buildings in the earlier post-war period a popular design was the "matchbox-and-muffin scheme" which consisted of a base of supporting services with patient towers arising from it. The difficulty with this design was that it was very inflexible making later changes difficult. Partly for this reason the model which replaced it was that of a village with several smaller-scale buildings linked together. The decentralization of services within hospitals has given additional impetus to this model of hospital design. An interesting example of this is the National Hospital at the University of Oslo, Norway. The general layout of this hospital is low-rise, linear and expandable. There are separate in-patient, out-patient, and diagnostic and treatment zones. The overall concept for the site is modelled on an Italian hill town with the main entrance accessed from a "town square". Although some of the buildings are as much as five storeys high, because of the way in which they are arranged on the sloping site the overall effect is of a low-rise design.

In the 1990s the decentralisation of health services gathered momentum. This meant that services were both decentralised within one site as well as being moved to other sites within the community. This has given rise to new health care building types such as intermediate tier centres in which primary care services, e.g. general practitioners and ante-natal clinics are combined with services traditionally provided by outpatient clinics such as physiotherapy and radiography. Likewise, a number of specialised building types emerged, catering for groups with very specific needs, such as those with cancer or

dementia. From an architectural point of view the trend towards decentralised healthcare buildings is to be welcomed, in so far as it results in buildings which are less forbidding than the monolithic general hospital. It is also the case, certainly in the United States, that the building code regulations are less strict in the case of ambulatory care centres than they are with acute general hospitals, affording opportunities for more sensitive and progressive design Nesmith (1995).

It is also possible to identify changing priorities in health care environment provision over time. In the earlier post war era there was an emphasis on expanding the capacity of the healthcare sector and also on the incorporation of technological developments; in short, the main focus was functional. By the mid 1980s there was more focus on the aesthetic aspects of healthcare building design. This came about for two reasons. On the one hand, the important role of the environment on patient recovery was beginning to be recognised. At the same time the political climate was changing and there was a burgeoning of the private healthcare sector with an accompanying recognition of the role of the healthcare environment in attracting prospective patients. A related trend is a move from what might be called a staff-centred environment to a patient-centred environment. Until the late 1980s health care environments were designed from the point of view of the staff in the sense that functional and efficiency requirements were prioritised. The patient was afforded little importance. The recognition of the important role of the environment on patient recovery gave rise to renewed priorities, so that healthcare environments came to be designed from the point of view of the patient (Verderber & Fine, 2000).

Political and economic background to current LTH provision

By far the largest group requiring LTH are the elderly. The Royal Commission Report on Long-term Care (Sutherland, 1999) reported the numbers of older residents (all aged 65+) in residential and nursing homes and hospitals in the UK. In 1995 the figures stood at 288,750 residents in residential care homes, 157,500 residents in nursing homes and 34,100 long stay patients in NHS hospital wards. Altogether this gives an estimated total of 480,350 people relying on long-term care. Of course, in addition to those in LTH institutions, a large number of elderly people in need of long-term care are cared for by relatives or friends either in their own homes or in the homes of their carers. The full extent of this is not accurately known.

The cost of providing care for the elderly is considerable. For the year 1998/1999 the Department of Health National Service Framework for Older People calculated that this cost was 40% of the NHS budget of around £10 billion pounds, and 50% of the social services budget of around £5.2 billion pounds.

The financial strain of long-term care for this population group is set to increase even further because the percentage of elderly people (those aged 65+) within the British population is rising. The increase predicted in this age group is 57% between 1995 and 2031. The numbers of people in the very elderly population (aged 85 and over) will increase at an even greater rate, with a 79% increase during the same period (Sutherland, 1999). Thus long-term care will also need to increase, although of course, it is dependency rather than age alone that gives rise to the need of such care. The Royal Commission Report suggests that if all other factors remain constant, an expansion of about 61% in home care hours, community nurse visits and residential weeks, will be needed to service this growing older population.

Current practice in the design of LTHEs

The process through which a LTHE is procured, designed and built depends entirely on the political climate and economic circumstances. In the case of a private institution such as a nursing home the service provider concerned will approach an architect directly who will help them to develop a brief and specification and then prepare a suitable scheme. Broadly the same process will happen with a "traditional" NHS procurement. However, the advent of PFI (Private Finance Initiatives) means that, for example, an NHS hospital will prepare a brief which will then be made available to prospective private bidders who themselves will be responsible for having plans prepared and the work costed. The successful bidder will design and build the hospital which is then leased back to the NHS trust concerned, for a specified period of time. These different arrangements may have an important bearing on the quality of the design. PFIs have no incentive to design and build innovatively and are likely to build as cheaply as they can within the constraints of the brief to which they are contractually-bound.

**Evidence for the role
of healthcare environment
design in promoting
patient recovery and health**

Until recently it was widely believed that the healthcare environment had no bearing on the recovery or sense of well-being of patients and that the only factor which mattered was the quality of the healthcare alone (Ulrich, 1992). Evidence is now accruing to demonstrate that healthcare environments can have a major influence on the speed of recovery of patients as well as their mental state; even more important perhaps is the fact that poor environments can hinder a sense of well-being which in turn impacts on recovery rates (Davidson, 1994; Ulrich, 1984; Verderber & Reuman, 1987; Lemprecht, 1996; Lawson & Phiri 2002). It has been suggested Devlin and Arneill (2003) that spending time in a health care environment might in fact be damaging to one's health.

At the most fundamental level this may be due to the spread of a 'superbug' such as MRSA as a result of poor standards of hygiene and nursing practice. Perhaps of more interest from the point of view of environmental design, is the fact that LTHEs have been found to be associated with considerable stress. There are several potential reasons for this. Firstly, it may result from a loss of control over themselves and their personal space. Barker (1984) suggested that stress may result from unwanted noise or smells, a sense of crowding due to the presence of many unfamiliar people, and lighting which interferes with circadian rhythms. Moreover, due to the fact that residents in LTHEs are often incapacitated in some way they are likely to have difficulty exercising control over their environment in terms of, for example, the opening and closing, of curtains to block out bright sunlight, or windows to regulate air quality and temperature. Likewise, the stress which care staff experience as perhaps an inevitable part of their work may be exacerbated by, for example, having to do paperwork in offices with no windows.

There is a view held by some health care design specialists that patients in hospitals are so preoccupied by their illness that they are unaware of their surroundings. While this may be true for a minority of patients who are extremely ill, research evidence suggests that this view is not true as a generalisation. Lawson and Phiri (2003) found patients to be highly sensitive and very articulate about their architectural surroundings. Patients or residents in health care environments often endure long periods of inactivity spent either lying in bed or sitting in a chair. They may receive only very brief and sporadic attention from doctors and slightly longer periods of personal care from nurses and therapists. This lack of distraction may mean that the occupiers of healthcare environments may be particularly sensitive to the effects of the environment on their

sense of well-being and, where relevant, their actual recovery.

Happily, there is now increasing awareness amongst health care providers of the influence of the physical environment on patient health and sense of well-being. The challenges in designing healthcare environments are considerable. Designers must first be sensitive to the type of healthcare environment which they are dealing with. While patients in a general hospital may derive a sense of security and confidence from an environment in which clinical technology is very visible (Dalke, 2004) this may not always be appropriate for most LTHEs in which individuals reside for prolonged periods. The environments must also be sufficiently adaptable that they can respond to change. This might be in terms of new technology or changes in treatment methods or in terms of changes in regulations or demographic trends (Allison & Hamilton, 1997).

Colour

Colour and design application strategies in heathcare environments should take into account the emotional and psychological factors which can affect a person's sense of well-being. These should include not only the personal likes and dislikes of the diverse user groups that LTHEs accommodate but also the proven clinical specifications for colour in environments. In the healthcare sector achieving a welcoming environment throughout the building, that is friendly and positive for all users and visitors and a space that boosts staff morale, is a role that colour design in interiors can achieve well.

The skilful use of colour can help to overcome the sensory deprivation caused by lack of visual stimulation associated with drab or monotonous environments. Diminishing control of oneself impacts on growing dependency; the amount of control one has on the immediate environment lessens. People in long term heathcare will have very different needs to those in shorter term hospital care; however some hospital patients will have experienced emotional upheavals, which makes them sensitive, and at the same time more receptive to, the emotional stimuli of colour and lighting. Recommendations on the usage of colour should also be applied carefully as over-use of certain colours such as green or blue for mental healthcare has produced results that showed these colours may exacerbate depression. Patients with mental health problems have shown that their reactions to specific colours such as green can be extreme (Ford 2002).

It has been known for a long time that colour can affect mood (Birren, 1978); whilst

colour itself is no cure, well designed colour strategies can create a therapeutic sense of well-being that inspires confidence. It appears to be wrong to pursue the search for the 'perfect' colour when the environments themselves can play any part in the way the colours are perceived; for example the orientation of the building can have a huge impact on the 'feel' of colour in spaces. Another contributory factor to the behaviour of colour is of course light and lighting. As the means by which we see colour, it is of major importance to develop schemes with the parameters of orientation and lighting in place. Contextual variables such as building materials used in construction, window positions or size of spaces, even the nearness of other buildings can dramatically affect colour appearance (Dalke et al NHS 2004 p20)

The design of colour schemes themselves is important for providing a variety of visual stimuli which becomes more vital as the users loose mobility. The fewer changes of environment from one space to another, the more the environment needs to be stimulating. For the totally immobile or those with considerable dementia, the design of their spaces needs to be carefully considered; one scheme is not a prescription for all. A change of colour between two contiguous rooms or spaces that a user may occupy is a simple and effective use of colour. The change can be anything from a different tone to an opposite colour. The application of principles of colour harmony may also be a useful device for building some visually stimulating schemes (Dalke 2004).

Colour harmony schemes can be produced with a single hue such as blue with a range of different types or strengths of that blue from pale to dark; used in a single space this would be harmonious as they are all related. One can also take two colours that are on opposite sides of the colour circle and use those two colours to build a colour scheme for two spaces that may be contiguous (Dalke et al NHS p21).

Colour and visual impairment

An important factor to assess when developing colour schemes is the need to understand the relationship between age and vision. In LTHC environments, visual impairment may be one of the disabilities affecting a very large number of service users. With normal vision deficiencies as part of the ageing process may come problems with light perception and adaptation; those with Alzheimer's Disease and deteriorating sight may have damage to that part of the brain that controls circadian rhythms. Bright light treatment has been successful for these user group (Van Someren E.J., Kessler, A.,

Mirmiran, M., Swaab, D. F., Biol. Psychiatry. 1997 May 1; 41(9): 955-963)

As we grow older the chances of developing some visual impairment increases. A gradual acceptance of sight loss as a part of growing older means that people fail to seek help or sometimes are not aware of decreasing visual acuity. A large number of people who are registered as blind do have some vision. Very few are totally without sight; in fact in the USA, three quarters of the legally blind population have some useful vision (CIE Lighting needs for the partially sighted: Commission Internationale de l'Eclairage, Vienna. 1997)

Gender has been seen to have some relationship to visual impairment. British statistics show that up to about the fifth decade legal blindness is most common in men (the ratio is about 55:45 men to women); this is mainly due to vision being attributed to genetic or trauma causes. After the age of about 60 it is about equal and owing to female longevity, elderly females outnumber males 60:40.(CIE 1997)

Visual impairment is often part of a multiple disability profile for the older service user of LTHEs. Many retinal disorders require high illumination, however intense illumination causes a glare and constriction of the pupil creating pain and further vision impairment. In one report on design guidelines for public transport completed in 1994 (Barham et al 1994 (Barham, P., Oxley, P., Shaw, T., & Gallon, C. (1994) Design guidelines for public transport infrastructure – Technical Report (Project Report 83). Berkshire: Transport Research Laboratory., it was established that approximately a quarter of all the disabled people in that survey had some degree of visual impairment. The likelihood of more than one disability therefore is high and is a complex factor for designers and architects to deal with.

In terms of visual impairment on the impact on issues of colour, one study carried out by Pacheco-Cutillas et al in 1999, found that for both ageing healthy subjects and people with glaucoma, there was a significant reduction in chromatic and achromatic sensitivities. The yellowing of the lens is also observed and to be expected as part of the ageing process, but it usually occurs gradually so is not so easy to identify. This can have a marked effect on the perception of colours with a low chroma or saturation especially those in the blue sector.

Colour preference research

Colour can affect the light and atmosphere of a room. In some experiments carried out at Calmers University of Technology it was noted that yellow was not always a warm colour; it became colder in daylight. Colours became more vivid with a light dominated by the same hue; however a blue incandescent became gloomy. Blue appeared more lively in daylight, red and yellow more interesting in warmer incandescent light (Billger, M).'The experience of the painted room: The significance of light and colour combinations'. AIC 2004 Colour and Paints, Interim Meeting of the International Colour Association Proceedings).

There is a long tradition of research examining relationships between feelings/emotions and colours (Sharpe, 1981; Ball, 1965; Norman & Scott, 1952). In fact there are a large number of inconsistent findings in the literature on colour preferences probably attributable to a large degree to a number of methodological shortcomings of many studies (Norman & Scott, 1952). These methodological problems include the following:

- There has often been a lack of rigorous control of hue, saturation and brightness with the result that there is considerable confusion about precisely what colours were tested. This problem also makes the repetition of experiments impossible.

- Research findings have often not been treated statistically, with the result that many conclusions are based on what is essentially anecdotal evidence.

- In many studies the presentation sequence of colours was not considered as an important factor and counterbalanced, which is worrying given the claim by Nakashima (1909) that the order in which colours are presented may influence preference judgements.

- Rather obviously the lighting conditions in which colours are presented are likely to have a significant impact on the way in which they are experienced. The fact that lighting conditions have been different in studies is therefore an important concern.

- Finally, there is evidence that the size of experimental stimuli impact on preference judgements. Washburn, McLean & Dodge, (1934) found that subjects judged yellow and orange to be more pleasant when presented on small (5 x 5 cm) cards than on larger (25 x 25 cm) cards.

While it is a truism that many of the studies in this area are methodologically flawed it

must be acknowledged that this is a very difficult area to study for a number of reasons. There are a number of factors which potentially will have an important bearing on results but which are very difficult to control. These fundamental factors include the mood of experimental participants at the time of testing and the lighting conditions under which the experiment takes place. Another important factor is fashion which will of course always be changing and may to some extent be informing participants' preference judgements.

One early study to have systematically manipulated hue, saturation and brightness was carried out by Guilford (1934). When saturation and brightness were held constant he found that the colours blue, green and red were more preferred whilst yellow and orange were less preferred. A systematic examination of saturation and brightness found increasing levels of both saturation and brightness to be associated with increasing preference ratings. A study by Smets (1982) found that the rated pleasantness of colours were largely determined by saturation with brightness also playing a part. Interestingly her findings suggest that hue in itself has no effect on rated pleasantness.

Eysenck (1941) carried out a meta-analysis of a number of studies encompassing the responses of 21,060 subjects. From this he reported that the ordering of saturated colours from most to least preferred was blue, red, green, violet, orange, yellow. Although this study has been much cited and is often taken as evidence for a universal scale of colour preference it is fundamentally flawed on at least two counts. Firstly, it examined only saturated colours, no examination being made of the influence of brightness and chroma, secondly, there is no evidence that experimental conditions in the studies examined were comparable.

Granger (1955) examined colour preferences in a more systematic manner by constructing sets of stimuli in which each of the three dimensions of colour were varied in turn whilst controlling the remaining two. In contrast to Smets (1982) he found that hue was the dimension which had most impact on colour preference with 5B and 5Y (Munsell) being most and least preferred colours respectively. Background was also found to have a major impact on preference for colour with colours being rated as more pleasant the more that they contrasted with the background against which they were

seen. Up to a point, colours were also rated as more pleasant the more saturated they were. See also Garura (2004) for experimental studies of the effects of background colour on the way in which target colours are perceived.

Guilford and Smith (1959) also examined subjects' responses to colour with systematic manipulation of hue, saturation and lightness. In terms of hue, their findings are broadly in line with those of Granger (1955). They found the most pleasant colours to be in the blue-green regions, with the least pleasant colours being in the yellow-green regions. This was true irrespective of lightness. When examining lightness in isolation they found pleasantness tended to increase with increasing lightness. Likewise within a given hue the greater the saturation the greater the perceived pleasantness. They observed moreover that colours at the levels of lightness which could be most saturated were rated as most pleasant. Guildford and Smith cautioned against the use of these findings in informing the use of colour in real world situations. They state that more examples of hue and brightness need to be tested, as do colour combinations, the use of colour as applied to specific objects and the interaction of colour and texture.

The above studies illustrate one of the most important shortcomings of this type of research, specifically, that colours were examined in isolation. Moreover, in testing of this kind colours are usually examined against a "neutral" background of grey or black. This background may have differential effects on different colours and although correct in terms of providing a static backdrop, it bears no relation to the context of a 'real world' environment

The issue of colour combinations was addressed by Helson and Lansford (1970). In this study 125 colour chips were presented to subjects against 25 coloured backgrounds under 5 different illumination conditions. The colours represented the main regions from the Munsell hue dimensions combined with low, medium and high examples of value and chroma. Significantly, their findings showed that not just object colour but also background colour and the type of lighting influenced subjects' pleasantness judgements. In fact, the single most important factor in determining pleasantness judgements was not object colour but background colour. Helson and Lansford attributed this to contrast effects; the background colours which were most effective at enhancing pleasantness judgements were those having either high or low value and

very low chroma. They also found the best illumination sources to be cool white fluorescents and incandescent tungsten as well as a gender effect whereby men tended to prefer cool colours while women prefered warm colours. The most important factor in determining colour harmony was lightness contrast. The greater the lightness contrast the more pleasant the colour combination was rated to be. Helson and Lansford's findings have been replicated in a number of other studies (Reddy and Bennett (1985), Hopson, Cogan and Batson (1971).

Colour and Mood

One area of colour preference research which is of particular relevance to long-term care environments is that of the relationship between colour and mood. Those living in long-term care are likely to be vulnerable to negative affect as a result of being in pain, frustration at being incapacitated, or even from boredom. The evidence-based use of colour to enhance mood is therefore of great potential benefit to this group; generic colour scheme recommendations are a much needed asset to achieving a sense of well-being for these communities.

The question of whether there are reliable colour-mood associations has been the focus of a number of studies. In a study by Wexner (1954) subjects were given a list of adjectives which described a number of moods. Subjects were then required to select one of eight colours, presented on paper, which best described each of the moods. The findings did indeed appear to suggest there were definite associations between colour and mood tone although this was more true of some moods. Thus while "excitement" was found to be associated with red, no colour was consistently associated with "protective, defending". There is evidence to suggest that the associations between colour and mood tone may be culturally-relative (Murray and Deabler, 1957). When taking on board the findings from this study it appears that all colours are associated with all moods to some degree.

The findings from these and other studies which have examined the relationship between colour and emotion have been very effectively popularised through the architecture and design literature (Birren, 1982; 1973; 1959; 1950). This is highly regrettable as the relationship between colour and mood is a very complex one and the studies which have examined this issue are plagued with problems. The first difficulty, which is true of many other areas of colour research, is that there is little

methodological consistency across studies making valid comparisons impossible. Moreover, stimulus materials have tended to be too few in number, of a diverse nature, lacking in operational definitions, and varied only on the hue dimension. There are also considerable difficulties associated with the selection and number of adjective descriptors. There is, moreover, also a more fundamental problem in the assumption that mere verbal adjectives can evoke a particular emotional state.

Colour assessment in real and simulated environments

As the foregoing discussion illustrates, a lot of work on colour preferences has been carried out within the laboratory paradigm. While this work is of value it suffers from a number of important limitations. As noted above, the way colour is perceived is affected both by the background against which it is seen and the illumination conditions. Furthermore, experiments conducted pre-tv would have used coloured paper or card samples for testing in a laboratory whereas many colour experiments today are conducted with colours being presented on a monitor screen for ease of use. There is a distinct conflict here between the use of additive colour, the RGB of a monitor, and subtractive colour which is solid pigmentation giving rise to very different visual stimulation and sensation. This has obvious implications for the way colour is experienced in a real environment. Moreover, the last colour to be perceived by the retina will affect the way another colour is perceived due to after-image effects. Also the texture of a surface will affect the way in which a colour appears. Textured surfaces introduce shadow detail which affects colour appraisal. Another often overlooked factor is the "meaning" of an object or space. Thus the green colour of an apple may be rated as pleasant but the same apple coloured blue may be rated as very unpleasant, this being despite the widely found positive ratings for the colour blue. This issue has relevance when dealing with spaces and the meanings and use of those spaces. Thus, in a domestic context, a colour rated as pleasant for a bedroom may be rated as unpleasant for a kitchen. In fact, in experiments carried out for this research project, individuals asked to select colours for different spaces - bedroom, corridor, sitting room, articulated very detailed and different criteria for the selection of colour for each of these room types.

And the picture becomes even more complex when the factors of gender, age, culture, and fashions for particular colours are taken on board. This state of affairs is neatly summed-up by Wise and Wise (1988): "If there has been any lesson learned in the

history of colour research, it is that valid prediction of colour in context cannot be reliably made from highly reductionist laboratory experiments." Happily, a number of researchers have examined the use of colour in real-world contexts (Dalke 2004, 2004).

Inui (1969; 1967; 1966) examined the use of colours in a number of distinct real environments. Using the Munsell Colour System he found that warm colours of high value and low chroma are the most often encountered in Japanese interiors. This was true across different types of interiors. However, Inui (1966) found that the choice of colour did depend to a large extent on the type of room and the surface to which it was applied. He found that where red, green or blue hues were used in theatre foyers they tended to be at much higher chromas than in the average living room.

The choice of colour in real environments is often influenced by functional considerations. For example yellow is avoided in hospital maternity wards because it can make the identification of jaundice more difficult to detect in new-born babies. Blue bedlinen is often used in dermatology wards to mask the appearance of the orange treatment creams to alleviate patient stress. Much is made of the use of green in mental health institutions claiming the beneficial use of the colour for calming patients; however it has been reported that often patients dislike these colours (Dalke 2004). Certainly prescriptive recommendations for colour out of the particular context of type of environment or even of building orientation is dangerous. Cultural and marketing considerations are also important determinants of the use of colour.

Despite the large number of factors potentially influencing the choice of room colours there are a some very common patterns of usage. Generally, ceilings are mostly colourless, having high value and low chroma. Floors are for the most part very colourful with a modal value of 4 and chromas varying widely between 2 and 8. The most popular wall hues are in the 5YR-5Yregion. Values range widely between 7 and 4, and there is a strong chroma peak at 2 (Inui, 1966). This study revealed that the acceptability of colour schemes depended upon the type of room which was in question. The one exception to this was a colour composition with yellow-red and green as its dominant groups. This scheme was considered suitable for any type of room, irrespective of function. Other colour schemes were considered suitable for only certain specific types of rooms while still other schemes were considered unsuitable for any

type of room. Inui's findings are confirmed by a study carried out by Kunishima and Yanase (1995) which found that the preferred wall colours for living rooms were those which were warm in hue, high in brightness and low in saturation.

A study carried out in Sweden, using the Natural Colour System (NCS) required subjects to judge coloured walls in slides of a room perspective sketch on eight unipolar adjective scales. Room colours were judged more positively with increasing blackness and less positively as chromatic strength increased. The meanings of the other scales are not entirely clear, an obvious shortcoming of this study. Acking and Kuller (1972; 1976) conducted a study in which three full-scale rooms were painted in different colours. The first room was painted green with a low lightness value and a medium chroma value; the second room was painted a different green with a medium brightness value and a high chroma value while the third room was painted white with a high brightness value and low chroma value. There was no overall preference for any of the rooms. However, the white room was evaluated somewhat lower, but seen as most open and least complex.

Research conducted in the UK provides evidence to suggest that how pleasant an interior colour scheme is judged to be depends upon the function of the space concerned. Slatter and Whitfield (1977) showed subjects a perspective drawing of a room without furnishings which they described either as a bedroom or as a living room. Subjects were asked to select appropriate wall colours. Those subjects choosing a colour for a bedroom selected slightly more saturated yellows, yellow-reds and reds while those who believed they were selecting a colour for a living room chose more neutral colours. This finding highlights the issue that the pleasantness of a colour is context-dependant. Although examining questions of appropriateness rather than judged pleasantness, Whitfield and Slatter (1978a; 1978b) found that subjects' choice of colour was dependant upon the architectural style of a space. These researchers contend that this comes about due to different architectural styles being associated with certain "ideal" colour schemes which inform the choice of colours for these rooms.

Kuller (1979) argues that having an opportunity to exercise a sense of control over one's personal living space through selecting wall colour has a greater effect on residents' sense of well-being than any effects resulting from the selection of colours according to

hypothesised behavioural colour effects. For some long term healthcare environments such as a teenage cancer centre, this activity was an essential part of the care strategy. This point has obvious resonance for the LTHE sector and the role of the carers here is of critical importance in assisting patients customise their personal spaces.

Another important issue is that of Hawthorne effects. A very influential study by Schauss (1979) found the use of the colour pink in prisons to be associated with reduced aggression and muscular strength in inmates. However, a follow-up study (Pellegrini, Schauss and Miller, 1981) found that in fact this effect was due to the social message which the redecoration had sent to the inmates, which made them feel better treated and more valued. The effect on prisoners waned after a few months as they returned to their original state as they became accustomed to the colour.

There are two principal conclusions which can be drawn from these studies of the use of colour in real or simulated environments. Firstly, they underscore the limitations of basing real world colour schemes on findings from laboratory tests. In addition to this, the studies also suggest that appraisal of environmental colour seems to rely on cognitive appraisals between what is viewed and conceptualisations of what is usual or appropriate in the environment concerned, this being based on such factors as the use of the space and its architectural character. The appropriateness of environmental colour is also likely to be socio-culturally relative as well as subject to the vagaries of fashion.

The role of colour and design in achieving the psychological/ aesthetic requirements of a LTHE

Devlin (1992) describes a classic ward renovation study. Staff in this ward had requested more control over temperature in the ward, but because this was too expensive, they were instead allowed to make some aesthetic changes. This is worth noting as it may explain the limited positive effect of the environmental changes. All four wards were identical except for colour (Wards A and B were green while wards C and D were grey). Originally research staff wanted to keep two wards as a control, but the hospital renovated them anyway. Two months prior to renovation staff were asked to complete an Environmental Design Survey. The major part of this survey asked for ratings on 15 design features (including ventilation, dorm/ side bedroom/ bathroom privacy, furnishings and ward colour) on a 5-point scale. Additional questions focused on staff moral and ward stimulation. Ward renovations were carried out and included modest

aesthetic and functional changes including changes to wallpaper, carpet, furniture, curtains and plants. The two wards were also painted (Ward A was painted green/mauve, Ward B was painted peach/blue, and Wards C & D were painted mauve/blue). The survey was issued one month following completion. Behaviour mapping data was also collected on ward D (only on one ward), but showed no significant change after renovation, the changes that were made could have been attributed to seasonal variation. Survey results showed that the most uniformly positive addition to the wards were the plants. Paint and wallpaper colour, and lighting results did not show any significant improvement, though looking at staff comments this seems to be because not enough of the area had been covered in the new colour. The lack of significant improvement in the pre-post ratings for staff morale and ward stimulation may have been related to the nature of the wards and the patient population.

If a LTHE is very drab this may discourage visitors. The colour and design may also have an effect on the morale of staff and may promote or inhibit staff productivity. Studies have found patients in general prefer old to new buildings (Lawson & Phiri, 2003). This reflects a general preference for old buildings over new. More modern hospital buildings until recently were efficient and functional although in many cases, presented monotonous and under-stimulating spaces. Patients certainly do require a level of confidence from feeling that they are in an environment that is clinically and medically excellent. People have spoken about the need for a hospital to appear to be like a hotel, however this was not of universal agreement (Dalke 2004). Monotony hinders orientation and wayfinding in LTHE and it was found that colour had a real use in helping residents with dementia navigate the spaces they occupied (Ref Laura??). For residents of LTHE the main criteria for any refurbishment should be to enhance a sense of well-being by providing an ambient and comfortable setting for all users. One factor that affects colour constantly is the levels of lighting in healthcare environments; it is a major factor in how any building feels and is perceived by the users. Lighting can dramatically affect the functionality of the building; for example older residents will have varying degrees of visual impairment and therefore will find it difficult to adapt to a bright environment if coming from a darker area (CIBSE 2005).

People who are resident in LTHEs may be confined or restricted in the spaces which they occupy and may have access to as few as two contiguous spaces. These constraints of limited mobility require careful consideration when planning the total décor of the environments which these people occupy. Work undertaken on the refurbishment of prison environments recently has shown the importance of creating different colour schemes according to contiguous space plans where the colour of the cells were opposite colours to the areas where they spent time out of their cells (Dalke 2006).

Evidence for the role of colour in other environments in which movement is restricted

Visual impairment is a disability that can benefit greatly from the use of applied colour contrast to environments. The ageing process brings with it the increasing likelihood of lower vision. Most residents in LTH will be affected by low vision of some kind. It is often one of the disabilities that compounds dependency in multi-disability cases for many people in LTH. For users who learn the parameters of their environment without a change of scene, visual disability can be countered by the use of adequate contrast or the use of accent colours to make meaning of the building's infrastructure when in regular use. The variety and anomaly of certain eye conditions can present unusual problems; for example some people with Macular Disease have a problem differentiating red from black. It has also been established that the ageing lens can render a colour such as purple a dismal grey. These are a few examples of how the eye and brain can play havoc with the designers' schemes for environments in this sector.

Dementia will be a progressively important condition as the older population increases affecting the porvision of long term care environments . There is evidence that colour can be used to positive effect in long term care environments for people with severe forms of progressive dementia. A study by Cooper, Mohide and Gilbert (1989) examined the role of colour in a dementia ward in terms of promoting desired behaviour, discouraging undesired behaviour and enhancing the ambience of the ward. Desired behaviours included being able to find places such as bedrooms, washrooms and the activity area and remaining in the activity area for an appropriate period of time. Undesired behaviours included hovering around exits, straying into restricted areas, wandering into other patient's bedrooms, rummaging through other patient's wardrobes and chests, and patients relieving themselves in inappropriate areas.

The interventions which were carried out were restricted to the painting of walls and

woodwork. In order to discourage patients from leaving the ward or entering restricted nursing areas, the doors out of the ward and to restricted areas were painted cream, which was the same colour as the walls of the main corridor. The interiors of the restricted areas were painted pale colours so as not to attract attention. Wardrobe doors which had previously been painted bright colours were painted the same colour as the walls. The doors to patients' bedrooms and surrounding woodwork were painted in bright primary and secondary colours. Bedrooms were painted paler harmonising shades and tones of the colours used to paint their doors. Washroom doors were painted strong primary and secondary colours like the bedroom doors. The same colours were used behind toilets and washbasins. The door and adjacent walls leading into the activity area were painted bright saturated raspberry red. The activity room was painted cream/pale ochre opposite the long window wall, Kelly green on the short wall leading to the garden, and coral on the opposite short wall where the piano was placed.

The interventions were assessed for the most part through qualitative analysis. This was based on a questionnaire administered to staff prior to the intervention, in-depth staff interviews after the intervention and six questionnaires completed by family members visiting residents. The key findings were as follows. Each type of undesired behaviour, with the exception of patients wandering into others' bedrooms, decreased. There was no change noted in desired behaviour apart from longer stays in the activity area. Both staff and families found the environment less institutional and more cheerful after the interventions.

A distinction can be drawn between colour coding, the systematic use of colour as an association device, and colour cueing which is the non-specific use of colour as a signal. The findings of this study suggest that colour is more successful as a cue to reduce undesired behaviour than it is as a cue to promoting desired behaviour, at least in the case of ambulatory dementia patients. The results moreover suggest that colour can be used more effectively through cueing than through coding for this population. The introduction of bright colours into the ward was found to be mood-enhancing and desirable.

Factors other than colour influencing the experience of LTHEs

Light is fundamental to the way we experience colour. At the most fundamental level without light we can see no colour. However, lighting conditions can affect our experience of colour in more subtle ways. For example, different types of artificial lighting may be "warmer" or "cooler" and for this reason fundamentally alter the way in which we perceive colour.

Artificial lighting

Artificial lighting should be designed in such a way as to both support the functions and activities of the space concerned as well as to enhance the aesthetic qualities of that space. It is important that artificial lighting is adaptable in order to respond to different conditions (night/day, summer/winter) as well as different requirements and preferences from the users. In more specific terms, lighting can be used to provide an impression of enclosure or spaciousness or to create a sense of warmth.

Natural Light

A study by Heerwagen and Heerwagen (1986) investigated preferences for natural versus artificial light in office environments. Natural light was associated with greater visual comfort, enhanced office appearance and pleasantness and improved visual health and general health. When dealing with natural light it is important to allow for control in order for example to block out bright sunshine; some discomfort from glare is often mentioned by patients in healthcare environments as a cause for concern especially as it represents lack of control over personal space.

Noise

Noise is defined as unwanted sound. While it is very unlikely that levels of noise in healthcare environments are high enough to cause actual hearing damage the presence of noise is likely to cause considerable annoyance. This is perhaps especially likely given that many patients or residents may be feeling unwell and may be in pain. In view of this, noise may have a very negative effect on sleep which may in turn slow the recovery process (Simpson, Lee & Cameron, 1996). In general, noise annoyance may give rise to a feeling of loss of control which may in turn cause stress.

Noise can also cause stress amongst staff. Topf & Dillon (1988) found that sounds that disturb staff may be different from those that affect patients. In addition to the general noise on the ward, nursing staff also have to deal with telephones, the beeping of monitors for patients and a multiplicity of warning signals from equipment. A study by Cropp et al. (1994) found that staff were only able to accurately identify 50% of critical signals and 40% of non-critical signals from equipment.

The impact of noise depends very much on the function of the space. Noise in spaces where there is an expectation of activity and social interaction, such as a dayroom, may be perceived as less annoying than noise in a ward where patients may expect to be able to rest. Social spaces or other spaces where noise is generated that are in close proximity to sleeping/ working areas may create problems.

Noise can be reduced either through architectural/design initiatives or through altering behaviour. Noise can be reduced through the use of carpets, wall coverings, draperies and acoustic ceiling tiles or applying sound board. Sound proofing consulting rooms reinforces patients confidence in the health professional and disclosure on the part of the patient may increase (Shirvastava, 1999). The purchasing of quieter equipment may also help to alleviate the problem. Noise may also be reduced by closing doors when this is possible, reducing the volume on telephones, and dimming lights, which has the effect of lowering voices. There has been considerable debate in recent times, more especially in acute hospitals than in LTHEs, about the relative merits of single versus multiple-occupancy rooms. The type of rooms in which patients are accommodated is likely to have a significant impact on the noise levels which they experience. Indeed, Lawson and Phiri (2003) comment that private rooms provide a much quieter environment for patients than large multi-bed wards.

At the same time noise may have a positive function within LTHEs as visually impaired people rely on sounds and the direction of noise in order to navigate in large spaces. In other research (Dalke, 2004 (2)) visually impaired people prefer large spaces to be broken by hard or soft barriers such as screens and planters to orientate themselves by bounced sounds.

Privacy

There is considerable debate as to whether patients in healthcare environments should be accommodated in private rooms or on more traditional Nightingale wards. There is a trend towards providing more single rooms. In a study by Lawson & Phiri (2003) patients in single-bed spaces were compared with patients in four-bed spaces. There were no differences between the groups in terms of their perceptions of their overall ward experience, their overall treatment or whether the environment helped them to feel better. There were however significant differences between the two groups in terms of how they rated their own private bed space. (Argyle, 1987) Of the group

accommodated in single-bed spaces 71% gave their bed area the highest rating whereas of the group accommodated in the four-bed rooms only 33% gave the highest rating. The group in the single rooms also rated their bathroom and toilet area more highly with 48% giving the highest rating, as compared with 26%.

Sense of control

In their study of hospitals in the South of England, Lawson and Phiri (2003) found that although patients had control of artificial lighting they had very little control over temperature and air quality, blinds and curtains, and noise. This is regrettable in light of the evidence that lack of control can impact on wellness and cause stress, depression, passivity, elevated blood pressure and reduced immune system functioning (Ulrich 1991, 1992). Lack of sense of control can arise for many reasons. In addition to those cited by Lawson and Phiri (2003) a number of other factors may be associated with a lack of control including confusing way-finding cues, lack of privacy, noise, inability to choose what to watch on television, lack of a view out a window (Ulrich, 1992). Given that, by definition, residents in long term healthcare environments spend longer in these environments than patients in acute hospitals the importance of ensuring that these environments afford residents a sense of control is of corresponding importance.

Views from windows

Being resident in a healthcare environment is often associated with reduced access to outdoors. For this reason views from windows are potentially of considerable importance, particularly given that patients and other occupiers of healthcare environments are typically restricted in terms of movement, often spending a lot of time in bed. Views from windows therefore have the potential to provide distraction from what is often a monotonous hospital environment. There is evidence that designers may not give sufficient consideration to this issue when planning healthcare environments. Dalke (2004) found that in one new hospital windows in most wards were too high for the patients to see a beautiful landscape from their beds. The same author found that in one sheltered housing scheme residents had posted pictures of plants in recesses to mimic greenery outside a window.

There is evidence that the nature of the views from windows can have an influence on healthcare outcomes. In a carefully-controlled study Ulrich (1984) examined the effects of views on patients who were recovering from surgery. All patients in this study had undergone cholecystectomy, a common type of gall bladder surgery. The patients

occupied rooms which either looked out onto a small stand of trees or onto a brick wall. Data from 46 subjects was used, 23 in each of the wall and trees groups. The groups were matched on a number of factors including age, sex, smoking behaviour, and obesity. The data was taken from hospital records.

A number of outcome measures were examined. It was found that patients with window views of trees spent significantly less time in the hospital than those with wall views. Notes made by nursing staff during the recovery period were analysed. These were classified into positive and negative notes. It was found that patients with the brick wall view had significantly more negative notes written about them than patients with the tree view. There was however no significant difference in the number of positive notes written about the two groups. The amount of analgesics taken by the two groups was analysed. During the day of surgery and the next day there was no difference, probably because patients were either too drugged or in too much pain to attend to the window at all. In the period between two and five days post-operation the 'wall-view' group had significantly higher levels of analgesic use than the 'tree-view group'. There was again no difference in groups after five days when analgesic use was very low for all groups. In the case of anti-anxiety drugs there was no significant difference between the groups. However, the higher use of analgesics in the 'wall-view group' is likely to have reduced their need for anti-anxiety drugs. An analysis of post-surgical complications found no significant differences between the groups. In sum, this study found that what was crucially important was that a negative visual environment can hamper recovery. Whether a pleasant visual environment can actually improve health is less clear and has yet to be established.

While views of natural scenes are often highly rated in terms of pleasantness there may be cases where healthcare environment residents prefer a non-natural scene. In particular the preference for views of nature could be restricted to individuals under stress, such as those having undergone surgery. Residents in long term healthcare may, by contrast, suffer more from boredom and understimulation. In this case a view of a street or similar, in which there is activity to observe, may be preferred over a view of nature.

That windows may have a stress-relieving effect is also demonstrated by a study reported by Wilson (1972). This study examined patients following major surgery and

monitored the incidence of delirium and depression. Patients in intensive care units without windows had significantly higher rates of organic delirium than those in units with windows.

Verderber & Reuman (1987) suggest that views from windows provide a "perceptual and cognitive link with the external environment". This may help patients feel less isolated from the "real world" and be associated with an enhanced sense of wellbeing.

In their study of hospital environments Lawson and Phiri (2003) found that after privacy the most important issue to patients was that of views from windows. Both patients and staff like to have windows, particularly when the window offers attractive or interesting views. In one hospital study it was found that older people wanted to see everyday life going on outside so city centre units were just as interesting as rural scenes (Dalke 2004); in a conversation with an architect it was reported that in one residential care home the residents were clamouring for the views over the car park to watch the busy visitors arriving and departing the building (Cowan Associates 2004). Of course the presence of windows affords not just views beyond the immediate environment but also, potentially, fresh air and natural light, including sunlight. These other factors are dealt with in the appropriate sections of this document.

Air quality

Local temperatures may fluctuate due to the number of windows which if opened will bring in cool air, but if closed may allow for greenhouse effects generated by sunlight. Chemical and organic pollutants, such as those released from fabrics may vary in each room depending on its fleece factor and also shelf factor.

Visual noise

Certainly work undertaken in a hospital research project showed that levels of visual noise or clutter caused confusion in wayfinding, difficulty with communication, stress for staff in messy ward areas and visual discomfort for patients. Control of local customised signage to certain key places can do much to de-clutter the visual environment.

Odour

The ambient odour of a given space is an important and often neglected determinant of the way in which that is experienced (Spence, 2002). This is particularly true of healthcare environments which may have unfamiliar and unpleasant odours. These may greatly add to levels of anxiety experienced by patients/residents and visitors (Bell, 2001a; Holland, 2002). The way in which these odours are managed is therefore of considerable importance.

The perception of odour is one of the main determinants of the perception and acceptability of indoor air quality. Females have been found to be more susceptible to sick building syndrome (Skov, 1987) which may be related to the fact that they are generally more susceptible to odour (Spence, 2002). This has obvious implications for the design and management of long term healthcare environments in which there is a predominance of women, such as nursing homes.

People adapt to pleasant or neutral odours much quicker than they do to unpleasant odour. It has been suggested (Doty et al., 1984) that sensitivity to unpleasant odours does not diminish as quickly because it is an evolved early warning system and it is therefore important that people remain aware of them over a long time period.

There is evidence that people work more productively in the presence of pleasant ambient odours than unpleasant odours (Rotton, 1983). There is even evidence that they work more productively in the presence of pleasant odours than no odour at all. Warm et al. (1991) found that the periodic presentation of a lily of the valley or peppermint odour improved overall performance on a visual monitoring task by approximately 20% as compared to a control group who were tested in the absence of any odour.

Before introducing an odour to an environment it is essential to consider the population group who will experience it, and investigate whether their previous experience, association, or contact with that odour will in fact mean that they respond to the odour in a positive way. The negative associations of some odours may be unsurprising such as the fear that has been found to be triggered by eugenol, an odour associated with dentistry (Robin et al.,1998). The associations which other odours have may be less obvious. Loniewski (1991; cited in Bone & Jantrania, 1992) found that a group of elderly residents hated floral scents because it reminded them of funerals.

As with many environmental factors it is very important that people feel as though they have a sense of control or choice over the ambient odour. Indeed the way in which an odour is experienced may depend to some extent on the sense of control which individuals feel that they have over it.

Art The use of art in healthcare environments can have the effect of distracting patients from worry (Ulrich, 1992). In long term healthcare environments art may also help to relieve boredom. Ulrich contended that there were broadly three pictorial subjects which had a positive impact on the well-being of healthcare environment residents. These were scenes of nature, scenes of happy, laughing or caring human faces and, scenes of benign animals. By contrast psychiatric patients have been observed to find abstract scenes less comfortable. Of particular interest is the speed with which Ulrich found art to have stress-relieving properties. He observed that in as little as five minutes patients exposed to scenes of nature had reduced blood pressure and increased muscle relaxation. Ulrich (1992) reports another study which suggests that the stress-relieving properties of nature scenes depend upon their subject. In a study of open-heart surgery patients, subjects viewed either a nature scene featuring trees, a nature scene featuring water, an abstract picture or no picture. It was found that the subjects who had viewed the nature scene of water were less anxious than any of the other groups. Moreover, it was found that the patients who had viewed the abstract picture were more anxious than those who had viewed no picture. In research into personality and individual differences Zucherman, Ulrich, and McLaughlin (1993) found that the type of art which subjects liked best were of nature, were complex but free of tension, and were figurative, rather than abstract or expressionist.

Opportunities for rewarding social interaction Lawson & Phiri (2003) identify the opportunity for rewarding social interaction as being of critical importance in healthcare environments. Indeed they suggest that it may be the most important factor in determining the well-being of patients. This is likely to be especially true of residents in long-term care environments due to the length of time which they spend in the care environment. In the case of elderly care residents they may have few friends still living and those who are still living may be unable to visit due to health problems of their own. The way in which a LTHE is designed has potentially important implications for social interaction amongst residents and also between residents and carers. It is important both that residents have opportunities for privacy and that the environment supports and facilitates social interaction. Both these aims can be promoted by measures as simple as the considered arrangement of furniture. The more patients are suffering from mental il-health or disability the greater the issue of furniture placement or change. Work undertaken with cerebral palsy adults found

that a change of scene or furniture could cause high levels of stress (Dalke, H., Matheson, M., 2005)

The extent to which the LTHE is institutional or homely

It is often commented that healthcare environments are overly institutional and that this may add to feelings of stress and alienation amongst patients and residents. This issue is obviously of particular relevance to long term healthcare environments which often become the residents' permanent home. The Planetree Model, which was developed in the United States, is one fairly well known initiative to address problems of the soullessness of many healthcare environments. The principal objective of the Planetree Model is to create a more home-like environment for patients through designing the environment with elements typically associated with domestic interiors such as plants, books and soft furnishings. Other goals of this initiative are to train patients to be partners in their healthcare and to increase the satisfaction of nursing staff.

Few evaluation studies have been carried out on Planetree wards. However Martin et al. (1998) carried out a randomized control trial in which a 13-bed Planetree medical-surgical unit was compared with traditional units. Patients were interviewed at admission, at one week after discharge, at 3 months after discharge and at 6 months after discharge. It was found that Planetree patients were significantly more satisfied with their stay than those in the traditional units. This was true both in terms of the architecture and the technical aspects of their stay. Planetree patients were also more satisfied with the extent to which nurses were more involved with care and with their opportunities to see family and friends. The Planetree patients also learned more about self-care and illness. There were no differences in the involvement of physicians in the patients' care nor were there any differences in patients' perceptions in the control they had over their health. Overall, the findings from this study suggest that patients were more satisfied with their healthcare experience in the Planetree unit.

Another noteworthy evaluation study was carried out by Devlin (1995). In this study two Planetree units were compared with a traditional unit. Patients, nursing staff and visitors were asked to evaluate the environment. This evaluation was carried out using an instrument developed by Davidson (1994). Participants were asked to evaluate the environment in terms of "care", "being", "choice", "environment" and "communication" using a visual analogue scale. In addition, participants were asked

whether they thought that anything about the unit should be changed, and how responsive the unit was to their needs. The results of this study showed that one or more of the Planetree units were evaluated significantly more positively on care, being, environment, communication and responsiveness of the unit to their needs. Interestingly, irrespective of the type of unit the nursing staff rated both the quality of care and the extent to which patients had choice lower than either of the other groups of participants. There were no significant differences between the groups of patients in terms of the number of days which they spent in hospital, the number of visits which they reported receiving, or the number of visits which family and others reported making. Likewise there was no difference between the two types of unit, in the stress experienced by the nursing staff as assessed by the Health Professions Stress Inventory. Taken together, these findings suggest that the beneficial effects of the Planetree Model may be restricted to the influence they have on the patients' experience of their time in the healthcare environment.

Methodological Considerations

Research on healthcare environments

There has been remarkably little research carried out on health care environments. There are a number of explanations for this. According to Verderber & Fine (2000) the field of health architecture and architecture in general, has not fostered a tradition of research. As a consequence, important decisions about healthcare environment design are often based on flawed assumptions rather than empirical evidence Verderber and Refuerzo (1994). This is true of no area more than colour design (Dalke, 2004). Decisions about the use of colour in hospitals are very often made by ill-informed estates personnel and staff drawing on their own idiosyncratic intuitions about colour rather than on research evidence. The low level of importance afforded to the medical environment has meant that the area of environment-behaviour relations has received very little attention in medical and nursing research (Kolanowski, 1992). Moreover, due to problems with experimental control, carrying out research in health care environments is very difficult. Many of those studies which have been carried out have also been criticised on methodological grounds (Epstein, 2000; Rubin & Owens, 1996; Weber, 1996).

Post Occupancy Evaluation

The aim of Post Occupancy Evaluations (POEs) is to assess how successfully a building fulfils the functions for which it was built. It is a regrettable fact that few buildings are subject to POEs, from which architects and specifiers could inform their practices. There

are at least two reasons for this. Firstly, those involved with the procurement and financing of a particular building are often unlikely to be involved with designing any further buildings and so have no incentive to learn from any mistakes made. Another reason for the absence of POEs is that the costs of constructing a building often run considerably over budget leaving no funds for a POE. The infrequency of POEs means that mistakes are often made repeatedly in the construction of a particular building type.

Many POEs are conducted at one point in time, typically six months or a year, after a building is completed. This is bad research practice as it may be the case that the successfulness of a building may change over time. What is required is an ongoing series of POEs in order to monitor how the building functions over time.

Where they are available, the results from rigorously-conducted POE's represent a cumulative archive of design solutions; a tool kit that is available for designers beginning new projects with evidence of what to avoid, or the design solutions and elements that had worked well in the past and been beneficial to building users.

Ward Atmosphere Scale

The Ward Atmosphere Scale (Moos, 1973) has been used for many years to evaluate the psychosocial atmosphere of treatment environments. It is a 100-item true-false questionnaire used to assess both staff and patient perceptions of psychiatric inpatients' treatment environments along three dimensions: relationship variables, personal development, and system maintenance variables. Instead of measuring subjective perceptions of the environment such as well-being, it uses objective measures such as involvement, staff control, anger and aggression, and so on, to infer the environmental effects upon patients and staff. It has been shown to have good construct validity (through correlations with other established scales measuring dimensions of ward milieu) and good reliability (through correlation between test-retest scores).

Corey (1986) administered the scale two months prior to a refurbishment and then again two months after, a total of 14 weeks apart. Environmental changes were made to the paint colour, furniture arrangement and style, floor coverings, etc. The colour changes were from a few pale monotonous colours to 54 new colours drawn from orange, green, yellow and blue hues. No precise colour references were given. Complementary and contrasting colours were used on doors, in hallways, and in larger

areas. Patient rooms were painted in different shades of the same colour. Brightly coloured furnishings were selected. Statistical analysis compared the test-retest scores in order to assess the effect of the refurbishment. Taken as a whole, the environmental changes impacted favourably on staff and patient groups, but the design of the study did not permit an assessment of the impact of each aspect of the environmental changes in isolation.

Colour Research

The vast majority of the research conducted on colour preferences have been conducted within the experimental/ laboratory paradigm. Whilst experimental methods are the only type of methodology enabling researchers to identify with certainty the impact of specific variables on any observed effects, they are at the same time often constrained to short timescales and often have low external validity. The high level of control imposed on experimental studies means that the conditions in which variable effects are measured are often extremely artificial, and as such the findings are less generalisable to the real world. Instead it would be better to conduct field experiments, which increase the realism and generalisability, but at the same time still have enough control over the variables to enable inference of causality. If real-field environments are not possible due to time/monetary/ethical constraints or are simply unavailable, simulation methods are a good alternative. For example, a considerable amount of work has been done using simulations of car controls to simulate driving behaviour.

At the other end of the scale are correlational research methods, which unlike experimental methods cannot be used to identify causal relationships, but can be used to establish whether some kind of relationship exists. They also allow researchers to use the natural/everyday setting as a laboratory, so artificiality, generalizability and external validity issues are not a problem. They enable researchers to examine the relationships or correlations between naturally occurring situational variables.

An important issue when dealing with the effects of environmental changes is that of Hawthorne effects. These are psychological effects following environmental changes resulting not from the environmental changes per se but from the attention being afforded to the participants. To test for, and exclude the possibility of a Hawthorne effect, it is necessary to run two baseline capturing pre tests, to test whether there are fluctuations present due to the attention being given. If no change is found between

pre tests then you can be sure that any changes after administration of the independent variables will not be due to attention effects. See Raw (1993) for an example of this methodology having the format: before1, before2, intervention, after1 and after2.

Scales for the measurement of environmental evaluation

In the research literature a wide variety of techniques have been used to measure well-being/ comfort/ aesthetic appreciation of the environment. The following are some of the more commonly used methods:

Semantic scales Semantic scales are often used as a way of measuring responses to environments, although there is a problem of lack of comparability across studies because different scales are used. Acking (1972) conducted a huge study, originally using more the 1,050 words describing the environment. From there he selected 78 words for a final semantic list, which were used to rate picture slides of various rooms using a 7-point scale. Finally they devised 5 factors from the semantic scales which were as follows:

1. Pleasantness Evaluation Factor - Pleasant, inviting, boring, repulsive, nerve-racking

2. Social Evaluation Factor – Expensive, fine, pretentious, poor, simple

3. Spatial Enclosedness Factor – Open, light, spacious, closed, dark, encumbered

4. Factor of Complexity – Motley, complex, composite, discrete

5. Factor of Unity – Unitary, whole, of pure style, badly thought-out, split

They found that here were positive significant correlations between blackness and social evaluation, lightness and openness and chromatic strength and complexity. The studies which have used this technique include Küller, et al. (1972) in which these scales were used in research on changing colours of three hospital rooms.

Behavioural Environment Assessment Technique

This was derived from ethological studies and measures of ward behaviour. This measure has proven effective in several studies of psychiatric patients and in assessing change amongst them, thus the positive effect of environmental factor change on psychiatric patients can be measured by valid tools and not evaluated merely by subjective impression (Gross, 1998).

Section 2

Site Audits

Background

Galsworthy House is located in a suburban neighbourhood in west London. The building faces south east and is set within walled and wooded grounds on the edge of Richmond Park.

Galsworthy House is registered for 70 beds but they usually have a maximum of 66 residents. At the moment there are 62 single rooms and 2 double rooms. Some residents stay for only a few weeks for convalescence or respite care.

Most residents are privately funded. There was one resident, funded jointly through private funds and the NHS. Following the Care Act 2000 every new resident must have an assessment when they arrive. This did not used to be mandatory.

Residents come to the home either through self-referral or referral by a health professional. Potential long term residents come to the home initially for a 4-6 week trial period.

There are six common rooms in the home: a dining room, four day rooms and a conservatory.

The home is staffed by 42 unqualified care assistants, 18 qualified nurses, 6 visiting professionals (such as physiotherapists, doctors) and 29 other staff (cleaners, kitchen staff etc).

KINGSTON ELEVATION S.E.

RICHMOND ELEVATION N.W.

GARDEN ELEVATION S.W. FACING TOWARDS "THE RUSSETS"

FACING TOWARDS "FARMLIGHT" KITCHEN ELEVATION N.E.

Galsworthy Nursing Home

In general this home cares for elderly people with physical disabilities.

At present there are 56 female residents and 9 male residents.

35 - 40% of the residents are purely physically disabled. 30% have a cognitive impairment, hearing problems, sight problems, or are confused. There are a number of residents who have suffered a stroke.

There are no residents who are registered blind, but cataracts are very common. Although they take patients with senile dementia, they do not take those with Huntingdon's disease or Alzheimer's disease.

The largest group amongst the residents is females over the age of 85 with dementia. Alzheimers can start as early as 55 years old. The residents with more serious dementia stay on the top floor. Many of these people have other extreme physical disablities. They do not go down to the dining room to eat as this would confuse them. They eat their meals either in their room or in the Forsyte Room.

Description of the site

From the car park at the front of the building two steps lead to the main entrance which is a round, centrally placed portico. There is wheelchair access which is to the left through the gardens. Inside, the entrance hall is lit by a large chandelier. There are two rooms on either side of the entrance hall. On the right side is the Soames Room (library). On the left is the Fleur Room (drawing room). Two windows to the south east side of this room look out onto the car park. There is also a large bow window on the south west side of the room. This looks out onto foliage. In the centre of the north west wall is a large fireplace with a mirror over it. The room has a mid-tone blue carpet with a large pale pink pattern. The walls are a pale, cool pink with ornate pale green mouldings. Curtains have a blue, pink and green floral pattern with tasselled pelmets. There are blue chairs, two off-white chairs and two red sofas. The room is decorated by a few large plants, flowers and vases. Prints of late nineteenth century paintings decorate the walls. The room is lit by two chandeliers.

The entrance hall leads to a square atrium. This atrium is supported by pillars on the south east side, rises through all three storeys and is topped by a cupola. Trompe l'oeil paintings of clouds and vases of flowers decorate the upper levels of the atrium walls near the cupola. At the front of the atrium is the centrally placed reception desk. On the left is the staff office. Toilets are on either side of the

atrium. Wheelchair access to the lower corridor is to the right. The carpet in the entrance/atrium area is turquoise with a small, regular pattern. The walls are cream in colour and painted to represent stone. There are a few plants.

On the north west side of the atrium, three steps lead to the lower corridor. This has the same blue-green carpet as the entrance hall. The walls are pale yellow and cream regency stripe. Below the dado rail, walls are dark green. The lower corridor is lined with Victorian paintings of local areas such as Richmond, botanical prints of flowers and plants and Impressionist prints. Skirting boards and other woodwork are painted very pale green.

Residents' rooms open off either side of this corridor. At the end of the south west leading corridor are some large pastel pictures of garden scenes as it leads to the garden pavilion. The garden pavilion has windows on three sides and looks onto the garden and a fountain (which was not working on the day of our visit, possibly because the water might freeze at this time of year). French doors open onto the paved walkways of the garden. The garden pavilion has a paler green carpet with the same pattern as that of the lower corridor and atrium. The room is furnished with wicker chairs, sofas and tables and a blue orthopaedic chair. Blinds have a large, floral print. Walls are painted a very pale yellow. There are three plants.

At the north east end of the lower corridor is the dining room. This room has a brown linoleum floor and pale yellow painted walls, pink and green floral curtains and matching green chairs. French doors open onto the garden walkway. The dining room is a long room separated into three sections by partial divisions. The south west section of the dining room is painted pale green in contrast to the yellow of the other two sections.

Stairs in the centre of the lower corridor lead to the middle corridor. Stairs have the same cream/pale yellow stone effect walls as the atrium. The middle corridor has green carpet like that of the entrance hall, yellow regency stripe walls which are painted yellow beneath the dado rail. Paintings/prints of idyllic rural scenes and a few more modern watercolours line the walls. A wooden handrail and small wooden occasional tables line the walls.

In the centre of this corridor is the Richmond room. This is a communal room for residents. It has a red patterned carpet and cream walls with red and cream patterned wallpaper below the dado rail. Curtains are yellow and red striped. The

room is furnished with armchairs and a large dining table along the south west wall. French doors on the north west wall open onto a balcony.

Stairs to the second floor are at each end of the middle corridor. The upper corridor has the same colour scheme as the lower corridor. In the centre of this corridor is the Forsyte Room. This room has the same green patterned carpet as the corridor. It has off-white walls. Below the dado rail, walls are papered with a subtle beige patterned wallpaper. There is a dormer window in the north west wall which is decorated with a painted motif of fruit and flowers. The view is of trees and a distant road. The room is furnished with chairs and decorated with tapestry pictures.

Staff areas did not appear to have as high a quality of provision as those of the residents; this could affect staff morale. Overall the interiors in the building are obviously of a high quality. No expense has been spared on furnishings, achieving a sense of comfort and elegance not seen in many other etsablishments.

Interviews

The top three management issues which the Operations Manager came across relate to staffing, the patient environment and food.

The operations manager is very aware that Galsworthy House is the residents' home. He thinks that it is important that residents have some choice about the décor of their bedrooms particularly as they do not have a choice about the décor of the common areas. Some residents have a choice about whether to have their rooms painted green, rose or blue. They buy high quality furnishings because they do not want to have to replace them so often.

In decorating the home there is a general theme of rural colours. Regency stripes have caused some residents to have a migraine.

Carpet patterns can cause confusion to the residents especially at threshold changes. Some residents perceive changes in patterns as steps. This has caused falls and confusion. However, people do like pattern in carpets.

The main criteria in choosing carpeting, was ease of cleaning and a colour/pattern that would not show spillages. The requirement for carpeting as opposed to hard, easy maintenance flooring is that residents and their visitors expect a sense of high quality. A pastel green was chosen, which everyone loved, but it was very hard to clean and showed footprints. 'It looked scruffy'. The green carpet was then replaced with a rose carpet from the same manufacturer. (Mrs L in Room 16 still has a green carpet). The rose carpet was found to be easier to clean and did not to show up spillages/footprints etc. Steve says 'we have also experimented with blue carpet'.

Galsworthy is not tied in to any particular specialist supplier. However, they tend to use the same supplier for every refurbishment. A carpet in this home may need to last up to 6 years. Carpets are always replaced before a new resident comes into the room unless the carpet is not damaged and is less than 6 months old.

The minimum room size in this home is 10m. The average room is 12m.

On the top floor many of the rooms have sloping ceilings. The residents in these rooms are the ones with ions expect a sense of high quality.less mobility or who are most cognitively impaired. The rooms that are particularly bad for space and lighting are rooms 53, 61, 62. The sloping ceiling reduces the amount of day light in the rooms and makes the use of lifting equipment difficult. Moreover, the staff

find that the rooms with sloping ceilings have an effect on the residents. These rooms feel oppressive and claustrophobic. There are currently plans to change the pitch of the roof in order to make the ceilings less sloping. These rooms also have some light boxes for residents who may suffer from S.A.D.

The installation of hearing loops is being considered. New TVs with larger screens have been bought recently and very large wall-mounted flat screens had been considered, but it was decided against them.

The residents rejected announcements of day and time on the TV systems. Such a system was thought to be too hospital-like.

Twenty or more residents attend some sort of social entertainment every day. Music is particularly popular, as it appears to eliminate class boundaries. Interactive activities relating to people's history are also successful.

Interview with Sister

She said emphatically that colour related to room size perception and that the schemes mattered a lot to the staff as well. Some schemes were not chosen with staff involvement and so there were some colours that staff did not like. There may be good reasons for the schemes but they weren't informed beyond the fact that the Interior Design firm had specified colours which matched the age of the building and so the 'heritage' look colours were used. She did not approve of the pale green carpet which had caused so many maintenance problems. Her main point of interest was that the classical music played for patients on the upper floor who were more cognitively impaired appeared to have a marked positive effect on their disposition.

Interview with two carers

They felt very strongly that the dark Green colour up to the dado rail on the ground floor was a big mistake as it made the corridor appear very dark and dismal. They particularly liked the yellow generally and the colour that was used on the upper floors, a bright and cheerful colour. They didn't like the colour in the Dining Room and wanted the Light Green to be used at the other end as well instead of the nondescript Cream. The floor was also not to their liking although they felt that was because it did not co-ordinate with the walls perhaps because it was laid after decorating was completed. They would have liked the Staff Room to be much more interesting with the lighting and décor upgraded. They said something was wrong with it but they didn't quite know what. At a glance it appears that lighting is not successful in that room.

Interview with staff

Females
53 & 59

Q1. How long have you been working here?

9 Months

Q2. Do you think the Colour and Design of the environment is important to the health and sense of well-being of your patients/residents?

We think colour is paramount!

Q3. Have you noticed anything related to the colour of objects, aspects of the environment?

I used to work here 3 years ago and came back last spring. Pleased to see that a refurbishment had taken place. It was still clean. Schemes chosen for the place were practical. From the practitioners point of view it works. We maintain it. We saw that two rooms had been chosen to be alternate pink and green rooms. This was not successful. The pale green was very unsuccessful. Smooth pile and very new so it showed every footprint. We feel the Dado rail below should be painted below to be able to afford maintenance such as repaint job.

Q4. How often does the building get repainted?

Lighting here is not ideal. Recessed lights on the top floor are not sufficient and the chandeliers when dimmed are OK and at a better level of illumination. People had to buy standard lamps or table lamps to supplement the lighting and make it more adaptable to tasks such as reading. Room 57 on the top floor has a light box to improve the lighting levels and that makes a difference as those rooms are darker. The light box is a big panel on the wall which probably contains fluorescent daylight striplights.

Q5: How often do the patients/residents's rooms get repainted?

The rooms get refurbished if a resident passes away after they have occupied it for more than 6 months. Otherwise the carpets get shampooed. You should go and see the blue carpet in Room 39 – everyone likes that. There is no rolling programme of refurbishment. Most people are happy for the flooring to remain pink. We found out that the wall paper was £50 a roll. Handrails had to be fitted as part of the National Care Standard. The schemes were at least not monotonous and you can change the look of the rooms with fabrics.

Q6. How often does the flooring get replaced?

Ad Hoc – see above.

Q7. Date of last refurbishment:

Ongoing all the time.

Q8. Who makes decisions about colour schemes?

The owners make the decisions about schemes as they seem to know what is required. Only a couple of staff have the input on decisions.

Q9. Did you notice anything about how the patients/residents felt after the last refurbishment?

We noticed that when the Richmond Room was redecorated that the residents liked the colours and the curtains very much.

Q10. Do you think the colour of objects in the environment effects your patients/residents in anyway?

N/A

Q11. If yes, how?

N/A

Q12. Do you have any suggestions for improvement of the existing environment?

A changing rolling refurbishment pro-gramme would be good. In fact the furniture needs looking at really badly. We would like to see new furniture. Chairs without high wings but with a flat back. The seats should be comfortable and washable with hygiene from crumbs seen as a top priority. We don't feel enough is being done each year.

Q13. Have you noticed anything related to lighting?

The lighting on the top, middle and lower ground floor are fine. We had a chandelier which was being cleaned. And that made a difference.

Q14. Do patients/residents receive medical treatment in their room?

N/A

Q15. Do you change the lighting for medical treatments?

N/A

Q16. Are the patients/residents encouraged to personalise their space?

They do personalise their own space but often do so with nursing staff.

Q17. Do you think being able to personalise their sapce has any effect on your patients/residents?

The nursing say that this does make a big difference.

Q18. What other things apart from colour do you think influences you patients/residents health and makes them feel good?

It would be nice to have more 'microburst' fragrances, installed in some areas which do make the place feel better. These fragrances are emitted in periodic "puffs". If they emitted fragrance constantly the fragrance would be habituated to.

Q19. Do you think patients/residents are affected by the type of room. e.g. single, twin or dormitory?

N/A

Q20. If yes, how?

N/A

Q21. Do visitors comment on the establishment in general?

N/A

Q22. How do you feel about the decoration of the patients/residents rooms-from your point of view?

N/A

Q23. Do you get asked your opinion when it comes to choosing colour schemes for linen, rugs, flooring, pictures or wall colours?

Staff have not always been involved with the choice of colour schemes or materials which is a shame. Some big mistakes have been made e.g. the green carpet and carpet in itself is a big problem needing cleaning so often and sometimes washing everyday which has to be done if residents have accidents. Staff would like more linoleum to make cleaning easier.

Q24: How do other places you have worked at compare to this one?

I worked at another establishment not far away and recommend you visit there to see a very different side to this type of care. It certainly is not as nice as here and I used to work there so know it well.

Individual resident interviews

R1 Miss A, Room 37.

Female
Age: 91
Illness/Disablility: physical disability only. Cannot walk. Uses wheelchair. Arrived in Galsworthy after being in hospital following a bad fall in her home. She is slowly going blind. She suffers from a cataract and a bleeding retina.

R2 Mrs M, Room 12.

Female
Age: 92
Illness/Disablility: physical disability only. Fairly able although fragile. Rather slow to move around but reasonably fit to get about on one level.

R3 Mrs N, Room 27.

Female
Age: 92
Illness/Disability: stroke, couldn't manage at home after this.

R4 Mrs F, Room 38.

Female
Age: 84
Illness/Disability: Heart problems. Uses a wheelchair (stroke).

R5 Major S, Room 12A

Male
Age: 85
Illness/Disability: Old age, blind in one eye, broke his leg.

R6 Mrs G, Room 34

Female
Age: 90
Illness/Disability: Uses a zimmer frame to walk.

Q1. How long have you been receiving care/treatment in this establishment?

R1: 1 year 2 months.
R2: April/June 2003 after her husband died.
R3: 1 year.
R4: 2 years.
R5: 17 months.
R6: 2 years.

Q2. How long have you been staying in this particular room/ward?

R1: 1 year 2 months.
R2: April/June 2003.
R3: 1 year.
R4: 2 years.
R5: 17 months.
R6: 2 years.

Q3. Are you able to leave your room/ move about the place?

R1: I cannot walk and need to use a wheelchair. I have to ring for assistance if I want to leave my room. They arrange entertainment for us. I have a weekly bath but I stay in my room. I also can do inter-visit but don't wander outside. I usually exercise in the long corridor. I also visit the room with the piano in, on the ground floor.
R2: Yes - Fairly able to move around.
R3: I can still walk and look after

myself in most ways. I can choose where to go.
R4: I require a wheelchair to move around.
R5: I am able to leave my room whenever I want.
R6: I do as I like. I can walk easily with my zimmer frame.

Q4. Apart from your room, where else do you go? Do you have a daily routine?

R1: I have meals in my room except on Sundays when I meet some other residents I am friendly with in the dining room. I find it noisy in the dining rooms and getting settled in the wheelchair to sit at the table is a 'hassle', so I prefer to have meals in my room. 'The staff don't like you wandering'. But sometimes I take my zimmerframe to walk up the corridor to the Richmond room to get some exercise. In the summer, on Thursdays, the staff take the residents to the garden. This takes a lot of organisation. Daily routine: I try to get up early. I have breakfast at 8:50 breakfast in my room. 11am the room is cleaned. Bath once a week. I am not allowed to bathe in my own bath as I cannot get out of it myself. I take my bath in a bathroom along the corridor.
R2: I enjoy going to the Blue Room and

the Library. I go to lunch every day in the Dining Room. They have lovely comfortable chairs there. I go sometimes to the Conservatory.

R3: I have breakfast in my room; lunch in the dining room; evening meal in my room. When there is communion in the Richmond Room I go to that. I go to the music room for entertainment, five days a week. Sometimes I play ludo or there is a quiz. There is nothing for entertainment on Saturday or Sunday. My daily routine is to have breakfast in my room then to go for a walk around, down the corridor. I visit my neighbour and then go downstairs to the dining room for lunch. I know quite a lot of people on the ground floor. In the afternoon I go to the music room for the entertainment and then have tea and cake. I have supper in my room.

R4: I have breakfast in bed. Then I go for a manicure. I have lunch in the dining room then in the afternoon I go to the drawing room for the entertainments followed by tea. I have supper in the upstairs day room.

R5: I go to the dining room for lunch. As my room is on the ground floor I don't normally go to the Richmond room. I go to the library and to the drawing room. I walk along to the sun room for exercise, but I don't sit there. I have visitors between once and three times a week. They take me out for lunch. Most of my time is spent in my room watching television.

R6: I have breakfast in bed. I go to the dining room for lunch. Sometimes I go to the Richmond room but I don't like to sit up too long so I go back to my room. I often take a walk down the corridor. Most of my time is spent in my room. I don't feel that I have a great deal in common with the others.

Q5. Is it easy for your to find your way around? Did it take a long time to find your way around when you first came to stay here?

R1: Orientation was fine when I first arrived. I have never been on the 3rd floor. I heard that there are people with 'mental trouble'.

R2: Yes

R3: I don't recall when I first arrived here because I was unwell. I had been in Queen Mary's hospital for ten days. It took me some time to get my head together when I first arrived here. I find it easy to find my way around now. I use the lift to go downstairs. I have never been upstairs.

R4: I settled in quickly. I still forget

the number of my room, but I can find it.

R5: It took me a normal amount of time to find my way around. Where I go is quite limited, only the ground floor really. If I go upstairs it is in the lift.

R6: It didn't really take me long to find my way around. It isn't really very big and it's easy to find your way around.

Q6. Do you like the décor or fittings of your room?

R1: The linen and curtains are provided by the nursing home. I like them. They are nice. The curtain pattern matches the bedlinen. I have a view onto the yard, which I like. I am pleased to be on this side of the building away from the 'traffic in the corridor'. Wall colour was light blue-green, balanced well with the carpet which was rose coloured. I used to have pale blue and apricot in my own home.

R2: I like the plain colours of the walls in my room.

R3: Yes, I like everything about my room. Pink is a pretty colour. It is also a restful and cosy colour. Blue is a receding colour. On the whole this home is very well appointed.

R4: Yes, I like the way my room is dec-orated. It's very comfortable here. A home from home. I was asked about the décor in the Richmond room by Mrs Trinder (the owner).

R5: I'm not very fussy about these sorts of things. I was in the army so I just take what comes.

R6: Yes, I like my room a lot.

Q7. What don't you like about the décor or fittings of your room?

R1: I would like more wardrobe space. I also find it too dark in the room. I would prefer apricot carpet, like I used to have in my own house. I don't think patterns are suitable. I had the carpet washed twice during my stay here so far.

R2: I don't like the chandeliers.

R3: Nothing

R4: Nothing

R5: Nothing

R6: Nothing. You don't need much

Q8. Do you have far to go to the nearest bathroom? Do you like the bathroom?

R1: I have an en-suite bathroom. It is very good. I am not allowed to bathe in my own bath as I cannot get out of it myself. I take my bath in a bathroom along the corridor which is nice and large.

R2: No I have a bathroom in my room and can use it fairly easily except for bathing.

R3: I have a toilet attached to my room. There is a bathroom at the end of the corridor. II don't ever use my private bath – it's too difficult to get into. I use the special (Parker) bath.

R4: No, I don't have to go far. I go in a wheelchair. I am washed down daily in the en suite bathroom. I have a bath once a week.

R5: I have an en suite bathroom but I can't get in and out of the bath so I use the special communal bathroom. This is about 35 yards from my room.

R6: I have an en suite bathroom attached to my room. There is a bath and toilet. I like the way it's decorated. It's quite neat. There is everything that I want.

Q9. Do you have any suggestions for improvement of the existing environment?

R1: Yes, better lifts. Only one of the lifts takes my wheelchair so they are too small. This house is very hot. We have no control over the central heating.

R2: Lights are too bright.

R3: No, I'm quite happy in here.

R4: No, it's perfect. There is a nice outlook in the upstairs room which encourages me to come in here.

R5: Not really.

R6: No improvements needed.

Q10. Do you think that the colour/ design affects your sense of well-being?

R1: I arrived after hospital and was happy to arrive to comfort and a refuge. This is a nice place to be.

R2: The colours of this room are pleasant.

R3: I have to look upon it as my home. My own home. I don't like anything too dark. I don't like green. I wouldn't mind a light golden yellow or a light blue.

R4: Yes, I think that colour and design does affect my sense of well-being.

R5: I don't have a strong view on this.

R6: N/A

Q11. Have you noticed anything related to the colour of furnishings or aspects of the environment such as…

R1: The curtain pattern matches the bedspread. Pale Blue linen with blue flowers. The bureau is old and my own. On the floor is a pink carpet and the walls are a pale Aqua which I like.

My pictures from home are on the walls. The bed linen is white. 'I like it. I have always had white bed linen in my house.' 'One of the pillows is stuffed with straw though'

R2: I like my pictures which my son-in-law has made of me as a young woman when I sang a lot.

R3: The bed could be improved. The pillows are uncomfortable. The linen is okay. The tableware is nothing special but okay. It has to go into the dishwasher. The curtains are fine. They vary from room to room. They match the bedspread. The pictures belong to me.

R4: The bed linen is white, which I like. It is changed daily. The tableware is white and my curtains are green.

R5: It is as expected. No specific comments to make.

R6: N/A

Q12. Do you have any comments regarding the lighting of your room or other rooms you visit?

R1: It is too dark in this room. I have brought my own halogen desklamp for reading and writing. There is a bedside lamp supplied and a chandelier. The chandelier can be dimmed; I like low lights. I have it very low at night. We are visited in the night. The nurses see if we are asleep and have left the TV on.

My window faces south east, so I get the morning sun. I don't get any sun in the evening. People on the other side of the building have a view into the park and get the evening sunlight. In my house I could move to another room to get sunlight.

R2: N/A

R3: There is not enough room on the wall to have a dimmer switch for the chandelier. I need to use the lamp by my bed. First thing in morning the nurse puts on the main light which is too bright. I have to pull the curtain when the sun comes into my room later in the day.

R4: I have the light on low during the night. The door isn't shut during the night.

R5: There are curtains to block out the natural light. The main light isn't bright enough, it is difficult to read. I am blind in one eye. I have three spotlights that belong to me.

R6: The lighting is okay. I find the main light and the lamp to be sufficient. I can't open the window myself I have to have help. I can control the lamp from my bed but I have to get up to control main light.

Q13. Have you personalised your space? If not, would you like to?

R1: Yes. Some of the furniture is my own and the pictures.

R2: My room has quite a few things that are from my home. Mostly paintings and photographs.

R3: Yes.

R4: Yes.

R5: Yes.

R6: Yes.

Q14. What objects/ items have you brought with you to personalise your room?

R1: I have brought photos. I have brought a lot of books. A mirror, two pictures. One I made myself and the other one I bought in France. I used to live in France with my parents.
I brought some furniture: A book-case/writing bureau, a chest of drawers, a wardrobe, an armchair. All the furniture is mine, except the bed and the table that goes over the bed. I could have brought my own bed, but you can't vacuum under it. It was too low. All the pictures are mine. I sold most of my belongings such as jewellery, pictures and books. I brought a halogen desklamp for reading.

R2: I brought a chair and bedside table a lamp and a music centre.

R3: I have brought paintings and plants. Everything else belongs to the home. I had the option of bringing furniture if I had wanted to.

R4: I brought photographs of family, but not furniture.

R5: Half of the furniture in my room is my own. I brought them in order to have places to put things rather than to personalise the space but it's nice to have familiar things around me. I brought the most useful things. I brought chairs that had been in the family for years and bookcases to put things in. I also brought photographs of my family.

R6: I brought photographs and pictures of Africa.

Q15. How do you spend your time?

R1: I used to read and write a lot. Now I cannot read, but I still write letters. I watch TV in the evenings. We do some painting in here sometimes.

R2: I can't concentrate any more but like music.

R3: I watch television. No one here has Sky television. I read the newspapers.

R4: I go to the entertainments in the drawing room. I listen to music in my

bedroom. I love music. I read a little bit. I don't talk much to the other residents.

R5: I watch television and read. I don't socialise much with the other residents but a little bit with staff.

R6: Reading and socialising with visitors and staff. Otherwise there's no one here for her.

Q16. Which rooms do you really like and why?

R1: My favourite room is the library in which we can have tea. The music room Fleur, is downstairs and a pretty blue room.

R2: Everyone says they like the Blue Room or Library where we can have tea.

R3: I like the Blue Room and the library. They are the most official rooms. The décor is elegant and nice such as the curtains. I like the traditional, original elements.

R4: I like the Blue Room best. I am always happy if a pianist is coming.

R5: I like the Blue Room and the Library.

R6: I don't really go to any other rooms.

Q17. Which rooms do you not like and why?

R1: I don't dislike any of the rooms.

R2: I don't dislike any of the rooms.

R3: I wouldn't go into anyone's private room.

R4: None in particular

R5: None in particular

R6: I don't really go to any other rooms.

Q18. What kind of flooring do you like best?

R1: I like apricot coloured carpet like I used to have in my own house so I don't mind the pink. Plain carpets are fine but I think that patterns don't show the bits.

R2: I like the pink carpets in here.

R3: Carpet is better to walk on.

R4: Carpets are my preference.

R5: I prefer carpets because they are traditional and I especially like plain carpets.

R6: I like the carpets but I don't find any type of flooring difficult to walk on.

Q19. Do your friends/ visitors comment on the environment?

R1: My family is pleased with the environment. You don't have many friends at 90. I do have 4 or 5 excellent friends here in the nursing home though.

R2: They all like the place and my room.

R3: They all think that it is very nice. They think that my room is particularly nice.

R4: They say they like it.

R5: They say that the home has a sociable feel. They don't comment on the environment.

R6: They really like it. They think that it is the best, or better than other places.

Q20. Have you spent any time in other similar healthcare environments? How do they compare to this one?

R1: No, I have never been in a home before.

R2: No.

R3: No, I have never been in a home before.

R4: I was briefly in a home in Kingston but I don't remember it because I wasn't well.

R5: I went to the Duke of York's on top of Richmond hill. It was alright but it was funded for non-commissioned ranks in the services and I didn't feel that I fitted in. I prefer to be here because it is more convenient for visitors.

R6: No, I've never been to another nursing home.

Other comments:

R3: There are complaints about the food.

R5: When there are entertainments there can be difficulties parking.

R6: This is a lovely place.

Richmond room

A group of the service users were interviewed in the Richmond Room. 4 Females of various ages with a range of illnesses and physical disabilities

Q1. What were your first impressions the very first time you visited here?

Very nice; Likes bedrooms.

Q2. Is it easy to find your way around? Did it take a long time to find your way around when you first came here?

N/A

Q3. How easy is it for you to leave your room/move around the place?

N/A

Q4. Apart from your room, where else do you go?

I go to the Blue Room; I like the Blue Room; Like the Blue Room; In this room (Richmond Room) I like the way they sit us in groups facing one another sometimes.

Q5. Do you notice anything about the colour of the rooms that you use?

Pale Yellow walls are nice and the red carpet.

**Q6. Do you like the decor or fittings in your room?**

Books are good to see.

Q7. What don't you like about the decor or fittings in your room?

I like the things in my room; the curtains are good.

**Galsworthy
Floor plans**

SECOND FLOOR PLAN

FIRST FLOOR PLAN
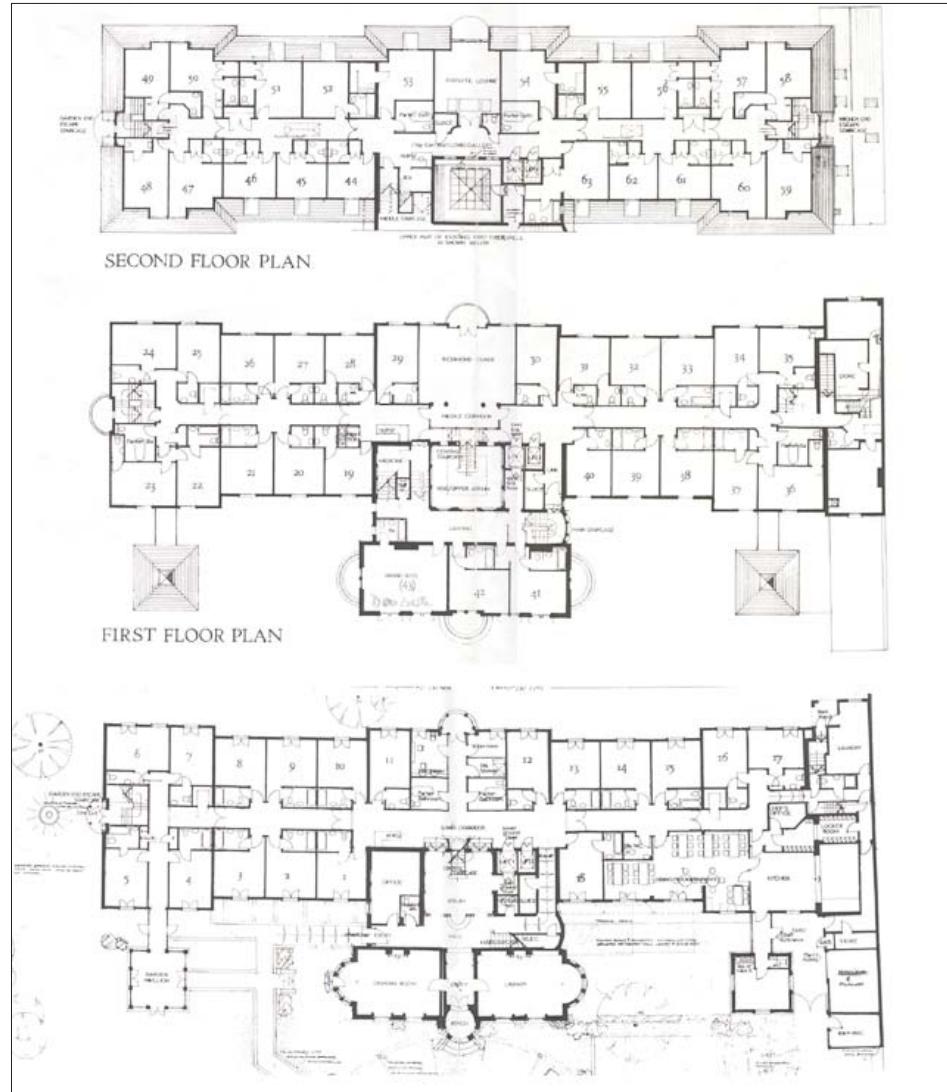
On Site Data Collection

The team worked throughout the site on all three floors undertaking data collection at key points within the building interviewing the residents and staff. Colour measurements of surfaces, lighting Lux levels, log of luminaires used, a photographic record of communal areas and a plot of the windows in the building were collected. The research aims were to gain as much information as possible from all the site audits to assess critical design issues and provide a snapshot of LTHE interiors.
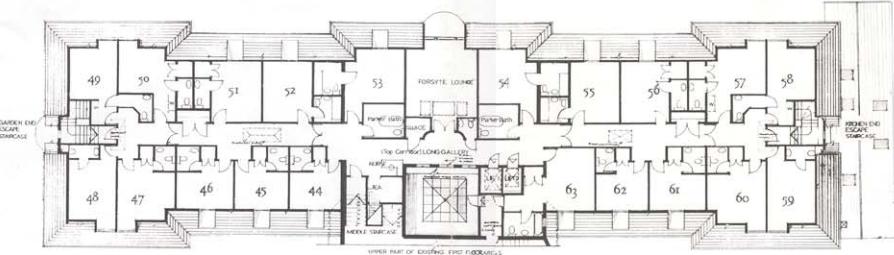
SECOND FLOOR PLAN

FIRST FLOOR PLAN

Colour Measurements
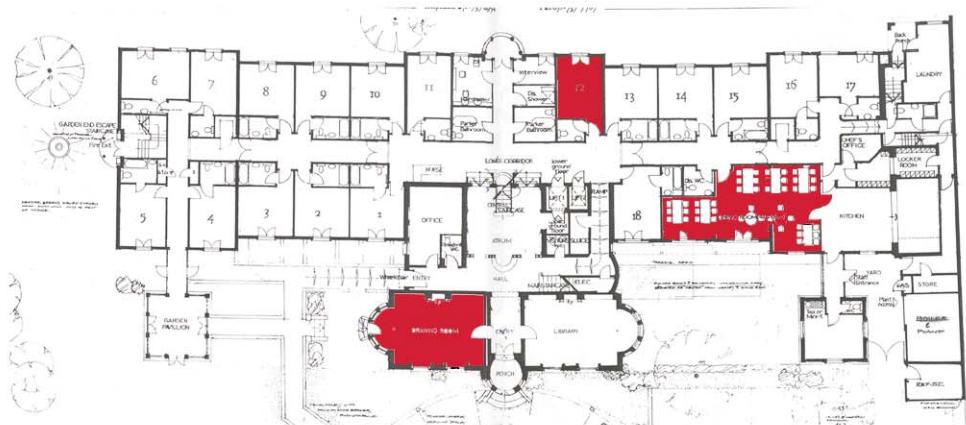
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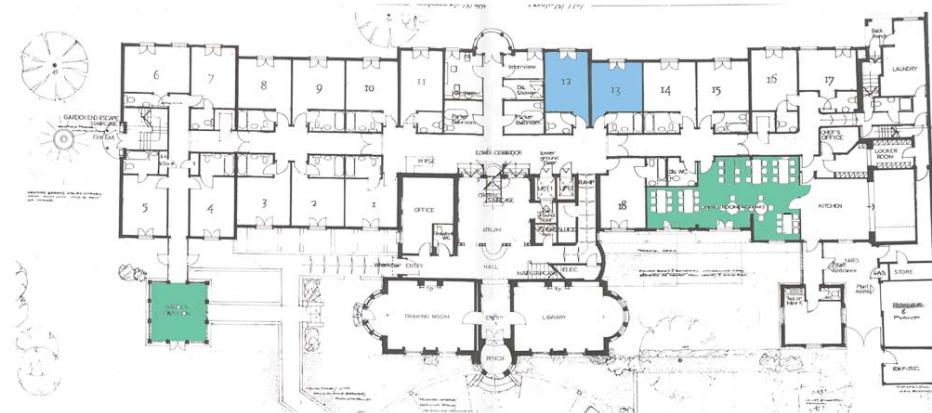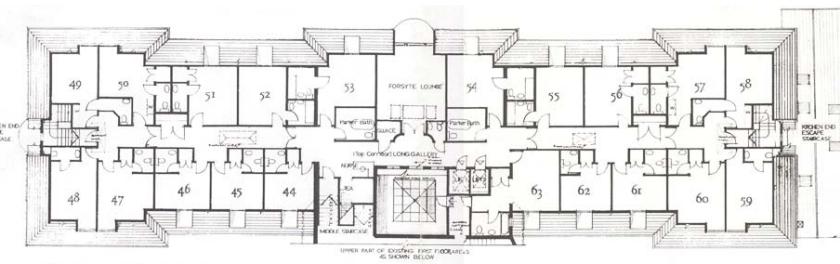
FIRST FLOOR PLAN

Interviews

Residents

Staff
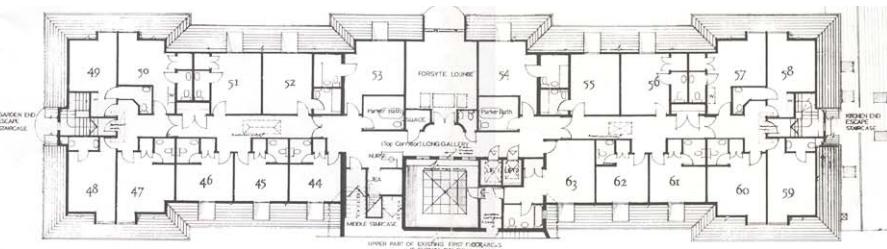
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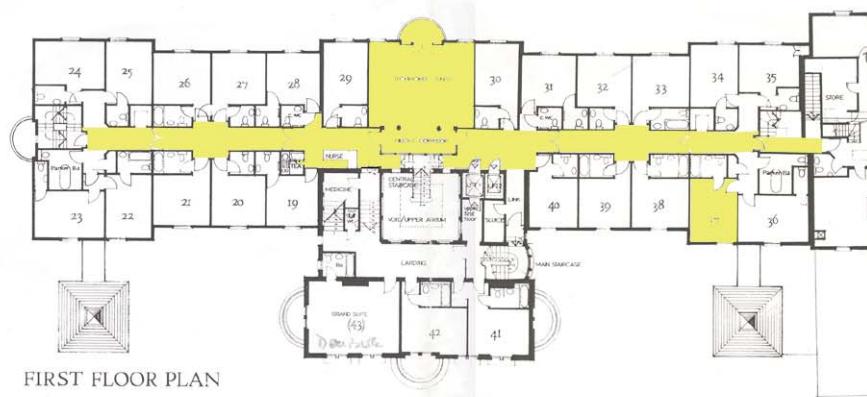
FIRST FLOOR PLAN

Lighting Lux Levels
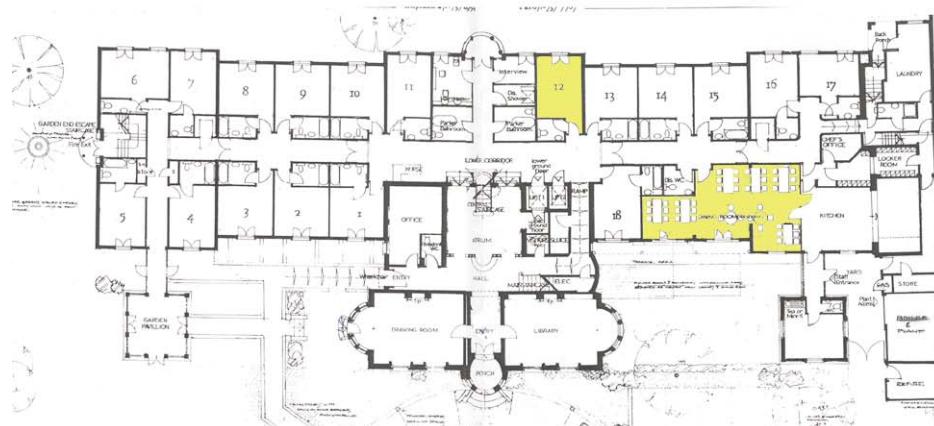
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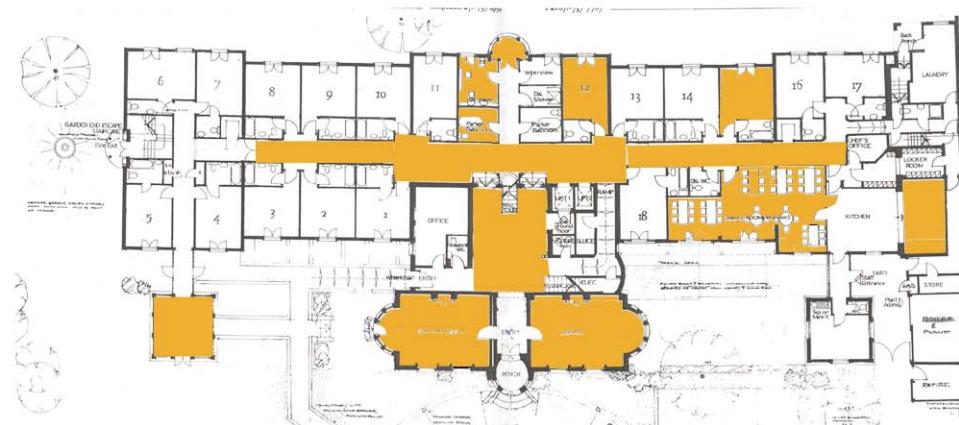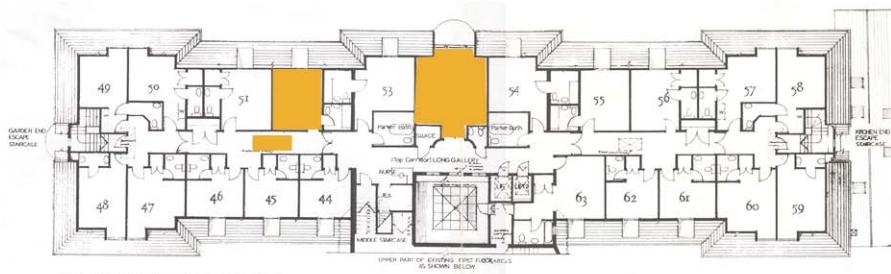
FIRST FLOOR PLAN

Photographic Audit
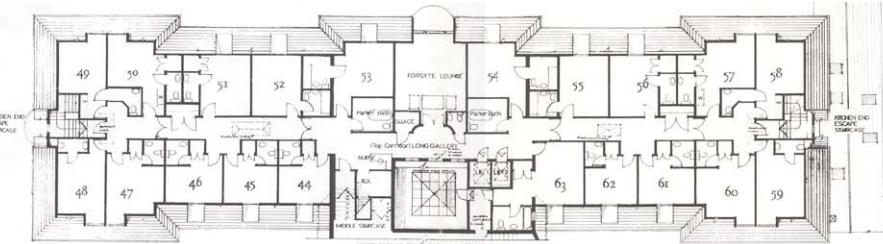
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FIRST FLOOR PLAN
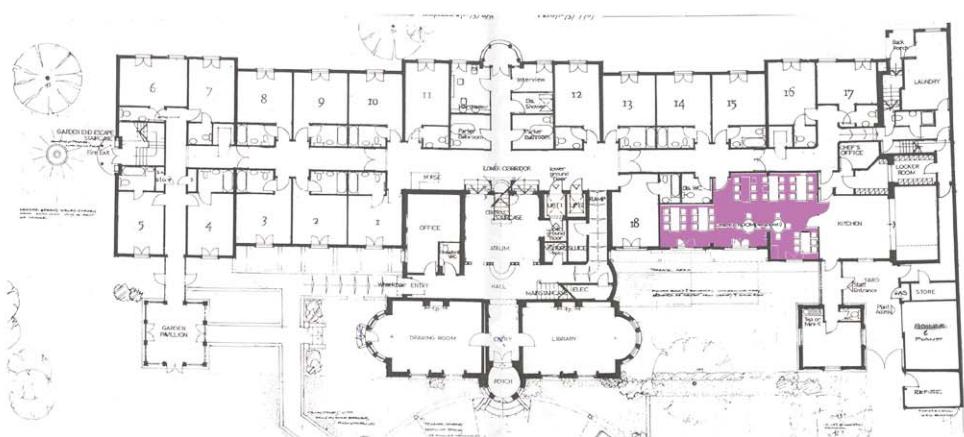
Windows

Visual journey
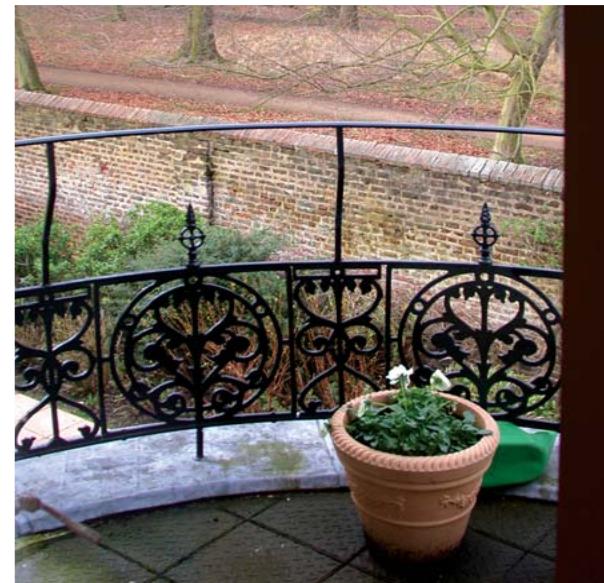
**Lounges**
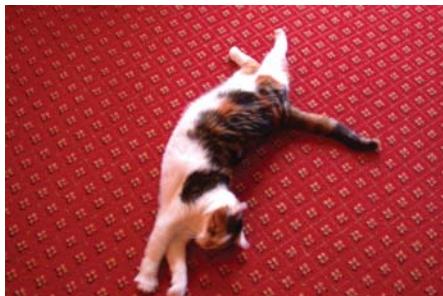
Dining room

Resident's Bedrooms
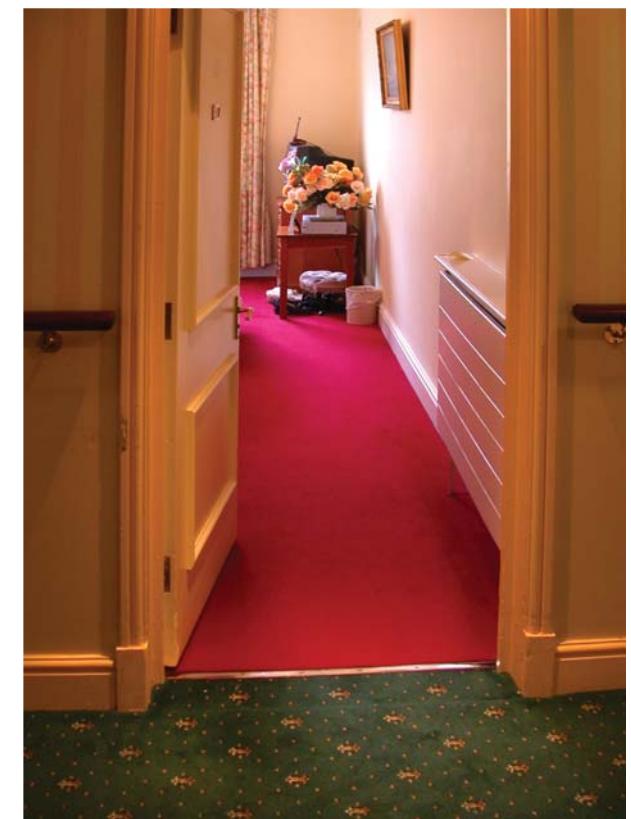
Colour Measurements

Bedroom (37)	L	a	b	Material/Texture	Comment	Personal/Inst
Ceiling					white	Instit.
Walls	91	-5	1.55	Emulsion		Instit.
Skirting	87	0.18	6.48	Eggshell		Instit.
Floor	34	24	7.70	Smooth carpet		Instit.
Bedlinen					White	Instit.
Furniture				Dark wood		Personal
Curtains	80	0.91	5.63			Instit.
Paintings					2 paintings	Personal
Room 12						
Ceiling					White	
Walls	93	-.13	+16.56	Emulsion	Aqua blue	
Floor	36	26	14	Carpet	Rose Pink	
Rooms?						
Floor	17.31	34.62	16.46	Smooth carpet	Red carpet	Instit.
	33.14	-4.37	16.15	Smooth carpet	Blue carpet	Instit.
Walls	91.91	-1.61	15.81	In bedroom with blue carpet	Cream wall	Instit.
Blue Room						
Walls	90	4	3			Instit.
Floor	44	-3	-8			Instit.
Sofa	27	34	10	Background colour to sofa		Instit.
Richmond Room						
Ceiling	89.67	3.4	15.3		Same colour as wall	Instit.
Walls	89.67	3.4	15.3	Paint	Upper wall	Instit.
	78.19	6.39	26.09	Wallpaper-main	Yellow	Instit.
	67.96	19.73	27.37	Wallpaper-pattern	Red flowers	Instit.
Dado	88.80	-0.32	5.52	Painted wood		Instit.
Skirting	94.01	-0.78	6.8			Instit.
Door	93.18	-0.85	6.32			Instit.
Floor	21.95	36.46	19.58	Pattered carpet	Main: red	Instit.
	50.76	-0.78	6.8		Yellow	Instit.
Chair cover	15.57	-1.68	-7.70	Fabric	Blue	Instit.
Chair arms	61.13	14.83	44.35	Wood		Instit.
Large table	51.1	19.35	30.24	Wood		Instit.
Luminaires					Gold	Instit.
Window frame	93.34	-0.42	5.04			Instit.
Curtains	76.07	4.51	28.69	Lined, single sided	Main: yellow	Instit.
	67.96	19.73	27.37	Red matches the wallpaper	Stripes: red	Instit.

Colour measurements with a spectrophotmeter were undertaken to make a record of the colour of all surfaces. CIELab colour space was used for these measurements.

Paintings					none	Instit.
Dining room						
Ceiling				paint	White	Instit.
Walls	95.42	-1.18	11.39	matt paint	Off-white NE 1/3 of the room	Instit.
	92.34	-1.93	25.94	matt paint	Yellow central	Instit.
	91.53	-12.4	16.09	matt paint	Green- SW 1/3	Instit.
Dado	82.30	-5.22	13.2			
Floor	52.87	7.27	20.97	lino	Imitation stone blocks	Instit.
	63.28	4.98	22.37	lino	Other shade in lino	
Tablecloth	96.68	1.55	17.13	Cloth	Pattern woven	Instit.
Chairs	46.05	-13.9	14.54	Textured matt cloth		Instit.
Chairs	62.87	10.87	32.18	Wood	Arms and legs of chair	Instit.
Curtains	90.38	-0.22	17.07	Fabric	Base colour	Instit.
	62.84	30.61	9.4	Fabric	Pattern	Instit.
	66.63	-14.9	14.41	Fabric	Pattern	Instit.
	69	-17	10	Fabric	Edging	Insitit.
Corridor outside Richmond Room						
Wall-upper	83.4	1.52	24.2	Striped wallpaper	Slightly textured	
Wall-lower	81.75	4.12	27.6	Striped wallpaper		
Wall-lower	81.76	6.03	35.89	Satin finish paint		
Dado	81.32	7.42	41.08	Paint		
Skirting	81.15	7.33	40.35	Paint		
Floor	26.33	-11.2	3.63	Carpet	Base Colour	
	43.96	-1.74	14.78	Carpet	Small pattern. Impossible to measure each colour	
Table	42.3	18.89	36	Fake Wood		
Table 2	20.07	15.56	26.24	Wood	Dark wood (old)	
Hand rail	19.06	16.63	13.71	Wood	All along wall	

Lighting
Dining Room

Time - 2:52pm

Overcast sky, rain.

Other Comments: artificial ights were on even though there was sufficient daylight available from large french doors and windows. Luminaires could create shadows on the walls

Luminaire Type	No	Lamp Type	Comments	On/Off	Dimming	Control	Control Location
Pendant Downlight	5	incandescent	Stained glass shade. (white /green)	All on except one	Yes	Staff	Wall switch

Lux Level Measurements
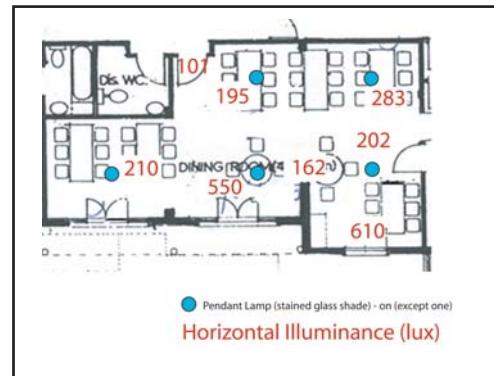
Position of luminaires

Time - 1:30 pm
Overcast sky

Luminaire Type	No	Lamp Type	Comments	On/Off	Dimming	Control	Control Location
Chandelier	1	Incandescent, 5 candle bulbs	uplighting	off	Yes	Resident/Staff	Wall switch
Desklamp	1	halogen	Residents own	off	No, but 2 settings	Resident	Switch on base
Bedside Lamp Standard	1	Incandescent		off	No	Resident	Switch on base

Lux Level Measurements
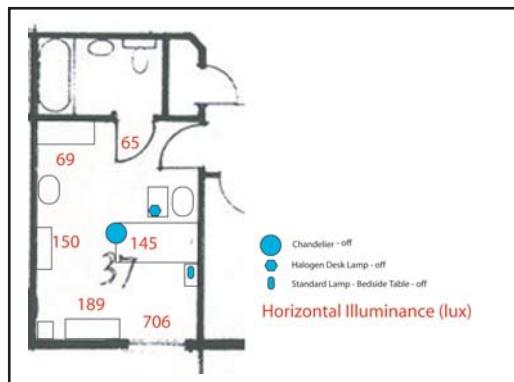
Position of luminaires

Lighting 1:43pm
Richmond Room Overcast sky, rain

Luminaire Type	No	Lamp Type	Comments	On/Off	Dimming	Control	Control Location
Chandelier	4	Incandescent, 5 candle bulbs	uplighting	On	Yes	Staff	Wall switch
Freestanding uplighter	1	Incandescent	Near wall in corner	Off	?	Staff	Footswitch

Lux Level Measurements

RICHMOND LOUNGE

700   530   625
187   190
88
75   75

● Chandelier - on
▮ Free-standing Uplighter - off

Horizontal Illuminance (lux)
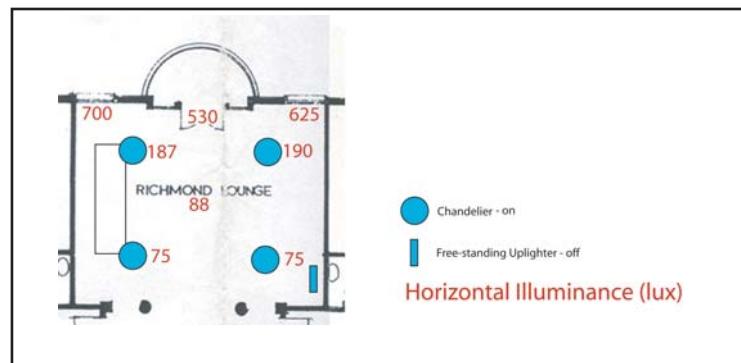
Lighting
Corridor

Outside the Richmond Room 2:18 pm
Overcast sky, rain.

Other Comments: Very dark and gloomy.

Luminaire Type	No	Lamp Type	Comments	On/Off	Dimming	Control	Control Location
Recessed Downlighter	? plan	halogen	Above every door and nurses station	All on	?	Staff	Wall switch high up
Surface mounted downnlighter	20	Compact fluo-rescent	Spacing 2-3 m	All on	?	Staff	Wall switch high up

Lux Level Measurements
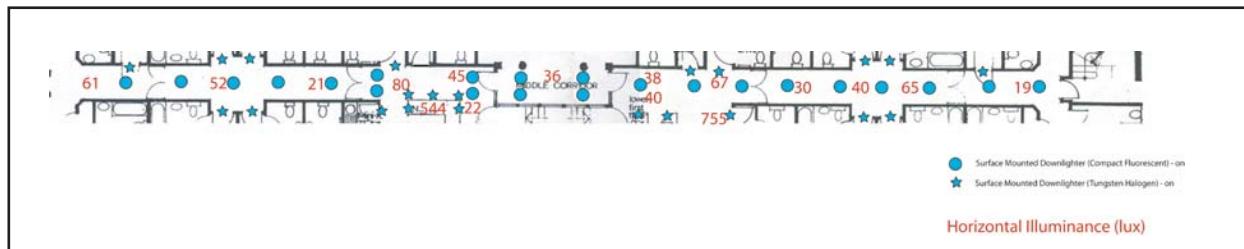
Position of luminaires

Windows
Position of windows

Dining Room

No	Orientation	Comments	Size m²	Treatment	Glazing	View	Control	Open/closed
1	E	French doors	6.24	Lined heavy curtain	single	Car park	Staff	closed
2	E	French doors	6.24	Lined heavy curtain	single	Car park	Staff	closed
3	E	French doors	2.99	Lined heavy curtain	single	Car park	Staff	closed

Bedroom (room 37)

No	Orientation	Comments	Size m²	Treatment	Glazing	View	Control	Open/closed
1	SE		3	Lined heavy curtain		Trees Rooftop Car park	Staff/ Resident	closed

Richmond Room

No	Orientation	Comments	Size m²	Treatment	Glazing	View	Control	Open/closed
1	W		2.5	Lined heavy curtain	single	Park	Staff	closed
2	W	French doors	7.14	Lined heavy curtain	single	Park, balcony, potted plants, wall with ivy	Staff	closed
3	W		2.5	Lined heavy curtain	single	Park	Staff	closed

Windows

Each of the residents at Galsworthy has his or her own private room which affords both visual privacy and the opportunity to be alone, if desired, and allows residents to have private conversations. However, residents in wheelchairs who are unable to move themselves and who spend their time in the common areas may have difficulty having a private conversation. There are a number of common meeting areas within Galsworthy, with social events being organised for weekday afternoons. This allows all residents an opportunity for social contact. The locating of bathrooms conveniently and discretely is important for resident dignity. All bedrooms have private bathrooms or shower rooms which ensures discrete access for most residents. For those who are not able to access a conventional bath Parker bathrooms are available. The location of these is not perhaps as discrete as they might be particularly on the top floor where the Parker bathrooms are visible at the end of the corridors.
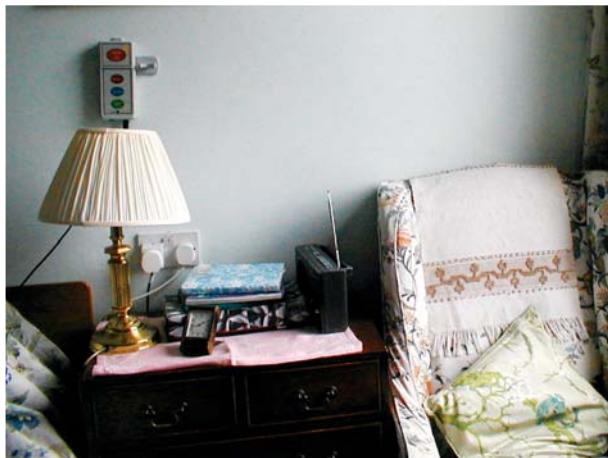
Views

All of the residents' private bedrooms have windows allowing natural light. Both the sky and the ground are visible to most residents although on the top and ground floor it would be necessary to be sitting next to the window in order to see both the sky and ground. The views outside are of gardens and parkland with trees and lawns. They are consequently calming and also, by virtue of their complexity, interesting. They do not however afford particularly good views of everyday life. The only people visible are visitors arriving or leaving the home, or people walking in Richmond Park. In the same way, patients who are immobile do not have especially good opportunities to see things going on. The staff room was the one place that had a poor ambience with only a very small window offering no views at all of interest, nor the sky or ground.

Outdoors and nature

Galsworthy House is situated within extensive and attractive garden grounds. This in principle affords the opportunity for residents to spend time out of doors in a leafy, quiet, landscaped environment which is furnished with suitable and comfortable furniture. Whilst ambulatory residents may enjoy regular walks around the gardens, the difficulties of monitoring non-ambulatory residents whilst outside means that in practice they are taken out
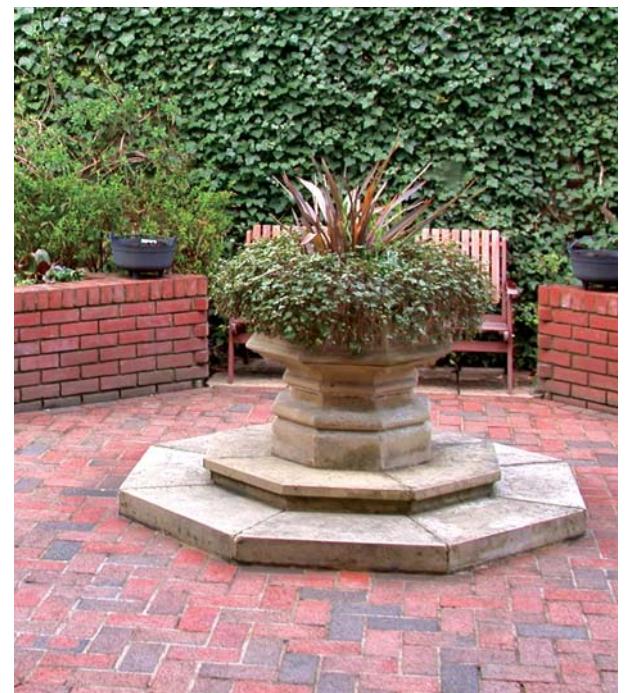
only occasionally, this being perhaps once a week during summer. The garden grounds may also perhaps be used by staff during breaks, although we have not established whether they are permitted to do so.

The artificial lighting in resident's bedrooms consists typically of a ceiling light as well as a lamp next to the bed. This offers some variety of lighting patterns for day and night and for summer and winter although not as much as might be desirable. In most rooms residents are able to control the artificial lighting from their beds, although a few rooms lack this facility. It is possible for ambulatory residents to control the sunlight and daylight by closing curtains. Those with mobility problems however would need to seek the assistance of a member of staff.

The same is true in the case of temperature which can be controlled by adjusting the thermostat on the heater in the resident's rooms. Again, residents with mobility problems may have difficulty with this. Whether residents can easily open and close windows and doors also depends upon how mobile they are. The fact that all windows can be opened ensures that all residents have the opportunity for fresh air. For the most part the design layout minimises unwanted noise in resident areas, although there are two bedrooms which are located close to the kitchen and may as a consequence be exposed to some noise, as well as perhaps cooking odours.

The common rooms have a range of artificial lighting patterns, but like the bedrooms, these are not as flexible in this respect as might be desired. In all areas, the artificial and natural lighting as well as the temperature and the opening and closing of windows and doors can be easily controlled by the staff. The staff room is situated next to the kitchen and so may be exposed to some noise.

Legibility of place

When you arrive at Galsworthy House it is obvious where the entrance is. Inside the building it is relatively easy to understand the way that the building is laid out, although the fact that the floors are split level does cause some confusion. As a consequence it is fairly easy to wayfind through the building and it is obvious how to find your way out of the building. This is aided to some extent by the fact that different parts of the building have different characteristics. The hierarchy of places within the building is fairly logical with the public spaces generally being grander than the private spaces. In part as a consequence of this it is fairly obvious which spaces are public and which private.

Appearance   The appearance of the interior is particularly successful in a number of ways. It feels homely, and has a variety of colours and textures. The use of blue in only the lounge and one bedroom appeared to be a talking point for many of the service users especially those with dementia. Visiting the 'Blue Room' became the highlight of the day . There are not many hard floors but this is appropriate for this environment both in terms of the preferences of older people and in terms of safety in the event of falls. The floor coverings generally work reasonably well although there has been a problem with a pale green carpet which tended to get dirty. There is also a dark green carpet which is perhaps rather too dark. The environment feels clean and tidy. There is also good provision for plants and flowers and for art. The way in which residents are able to have and display personal items works well.

The interior is not so successful in terms of giving a feeling of being light and airy. Some of the corridors in particular are rather dark. The views from the interior while attractive tend all to be very similar.

The ceilings do not look particularly interesting but it is not usual for a lot of effort to be put into ceilings, so this should not be considered a shortcoming.

Facilities for residents

The bathrooms at Galsworthy House are well-appointed, having seats, handrails, non-slip mats, a shelf for toiletries and somewhere to hang clothes within easy reach. Residents have a choice of a bath or shower and assisted (Parker) or unassisted bathrooms. There are spaces where religious observances as well as live performances and social events take place. Both the private and common areas are appropriately furnished. Patients have facilities to order drinks and they can easily make and receive phone calls, there being a private phone line in each room.

There are, however, no vending machines for use by either staff or residents, although residents are able to purchase chocolate bars etc. from the main office. There are no facilities for residents' relatives or friends to stay overnight, but this is not a facility which one would typically expect to find in a nursing home.

Facilities for staff

Staff are provided with a locker in which to securely store belongings and clothes. How convenient the locker room is for changing is not known. Those staff who are engaged in administrative work which requires them not to be disturbed by residents would appear to have a convenient place in which to work. These staff also have access to ICT facilities. There is a staff room which allows staff to

relax away from residents and visitors. However this room is dark and generally unpleasant. Snacks and meals are available to staff but not all of the time. No banking facilities are available to staff.

Accessibility   The main entrance to Galsworthy House is not accessible by wheelchair users. However, an alternative entrance is provided close by. The main entrance is not especially accessible to persons with visual impairments. The reception desk is too high to be used by wheelchair users. There are two lifts, both in the centre of the building. Residents are usually accompanied when using the lift. The provision for visually impaired people is generally not of a high standard. The signage should all be of good contrast, be well lit and at an appropriate height, but this is only true to some extent. Stairs do not have contrast nosing nor are there good contrast details in such things as sanitary ware and door handles. However, flooring is of good quality and is not visually disturbing as would be the case if it was shiny or brightly patterned.

See Analysis of Summary and Conclusions.

Church Farm Residential Care Home is situated in the village of East Wittering, West Sussex, in a semi-rural setting at the rear of an industrial estate.

Church Farm is a BUPA residential home for long-term care. The residents are not on the whole the severe or acutely ill but are a

Background

mixture of ageing people who cannot cope on their own or are significantly disabled from post-operative conditions or are long-term residents due to physical weakness.

Many residents are there by self assessment but some have been referred by clinicians. A small number receive daily or weekly medical care such as dressing of wounds or medical screening and assessment for ongoing illness. It is a mixed community although, as in many institutions for the elderly, the percentage of men is low. The population is around 80+. Most rooms are single-bedded with three double rooms for couples. Common spaces shared by everyone are the dining room, day room with TV, conservatory and sun room. There is a combination of mostly unskilled care staff with qualified nurses, supplemented by visiting nurses and medical professionals.

The mobility of patients broke down into 10% mobile, 15% semi-mobile, 60% wheelchair users, 10% immobile, 5% prone or bedridden. The general health

status of residents was not audited on this visit as the purpose was to talk to a single patient and gain a snapshot of her immediate environment. The general refurbishment of the home was not discussed for similar reasons but it appeared to have been upgraded around three years ago.

Profile of a resident

The main purpose for the visit was to carry out a case study with one resident. She was 86 years old and partially immobile living in Room 51 on the ground floor. The weather that day was overcast. The interview started at 9.30 and was completed at 11.30. This lady was probably a fairly typical resident of such a home being disabled, mostly by pain from post-shingles many years ago. Extreme vasculitis with an ulcerated leg rendered her partially immobile but semi-ambulant. She moved to the home 4 months ago with her husband who had been suffering post-operative complications from bone cancer. He decided he could no longer cope with her disablement as well as his own. To ensure that they both received adequate care he booked them both into this BUPA home.

One month after moving to the home he died leaving her to carry on living in the home. When asked about her ability to move around the building she reported that she was able to go to the dining area although rarely sat generally with other residents in the Day Room. She had occasionally met up with a couple of other people whom she had got to know in the lounge but did not use the conservatory at all. On a couple of occasions her family had visited and taken her out to a local pub for a meal and she had been out with another resident to the pond in front of the building

to watch the geese and ducks.

When asked about finding her way round she stated that she did not seem to have any difficulty with that. When asked about the room the only comment was that it and others appeared to be rather small. The size was in fact 11 feet by 13 feet approximately. The colour of the room appeared to be unimportant. The room décor and fittings were pleasant and reasonably homely and left enough space for her to make it appear to be modifiable by more personal belongings. She had even moved her computer into the room. There were no adverse criticisms about these issues. The room had a washroom and toilet and a bathroom was not far away. She had no further suggestions for improvements for the existing environment. When asked about the colour or design and the sense of well-being in the room she stated that it did make her

feel good despite her constant state of pain and disability.

She did comment on one thing that she obviously liked and picked out which were the tie-backs on the curtains; a feeling of the quality which she had found important in her own home. The flooring was seen to be of a high quality and the artwork around the building and in her room were also appreciated as being of a high standard. In terms of the types of illumination in her room, she felt she needed more local control and also would have liked a standard lamp on the other side of the room so she could switch off the main overhead incandescent light. In terms of personalising her space, apart from her computer she had brought with her very little of her personal effects from her home. Mostly photographs mounted and on the wall with a couple of pictures of her family and a picture of her war-time wedding. The other precious items brought with her were two ginger cats, which were perfect guests and much appreciated by staff and other residents. Her time was mostly spent resting and reading, watching films on TV and also using her computer for the occasional emails to friends and family. She was not keen on going to the larger communal rooms as she felt it made her more conscious of being in an institutional environment but did not express

any dislike for other rooms. The flooring, which was carpet, was seen to be of good quality and liked very much. Friends, family and visitors all stated that they also liked the room. She had never been in any other residential home before.

The room was well lit with adequate provision for daylight penetration. Two walls had windows and glazing. 2 x 0.50 square metres windows facing south west and one patio window 2.60 square metres facing north west.

The room contained two wall mounted filament bulbs with shades which were by the single bed. There was one pendant light with a filament bulb and a small bedside light with incandescent lamp and shade. She did have some control over lighting although no dimming facility. She stated that she would have liked a standard lamp on the other side of the room by the TV set. Lux levels in the room ranged from 75 lux by the door to 1800 lux by the main sliding windows at 12.0..

Window treatments in the room were of a high quality; heavy, yellow slub 'silk' type fabric lined curtains were used on all the windows with tie backs, which added a sense of luxury to the décor. Apart from these curtains which would normally be drawn at night the windows were not screened further with nets or blinds. This afforded a generous

view out.

It was possible to get very pleasant views of sky and gardens from a seated position in the chair although from the bed an unrestricted view was not totally possible. Landscaped gardens just outside her door created a relaxed environment visible to the bottom of the patio windows. Immediately outside a nurse had planted two large flowerpots with bright early spring flowers.. Trees, shrubs and grass outside at a distance provided a suitable engaging vista.

The approach to the building, beyond the industrial estate, is very well landscaped with a pond and geese and ducks to complete the 'country' feel - residents await the arrival of ducklings with anticipation. There are ample areas around the entrance where residents can sit and walk if they are able. The orientation of the building was broadly a rectangular footprint which faces North East.

Description of the site The entrance is poorly marked and not obvious on approaching the building. The building is badged but the reception area is not well sign-posted at all. Corridors are narrow and dark with black architraves, which appeared depressing. The width of the passageways is not enough to allow two people to walk side by side or walk supported by an assistant; it is just wide enough for a wheelchair. General layout of the site is fairly logical walking from the reception area although the dining room feels a bit too near the busy entrance which is not very relaxing. Wayfinding is not very easy and is actually dependent on assistance from staff around the building. New visitors to the site could easily get lost from the main reception area onwards although the building is not large so disorientation for visitors would not be for long.

The main communal areas provided the landmarks of the site. The dining area or conservatory and TV room were all the largest spaces compared with the narrow passageways which funnelled pedestrian traffic through the building. This meant there was always a sense of arrival at a destination.

Art scattered throughout the building was intermittent but of a high quality. Prints and original work with local landscapes featured heavily and were framed to a good standard.

The main focal points of the site were the attractive external landscapes viewed through most windows around the building. Courtyards and areas of grass and trees were very pleasant and enhanced the building. There is a reasonable sized conservatory room where residents can sit although on two visits no-one occupied that room. The nearest buildings were industrial ex-farm buildings which were adequately screened from view.

Church Farm Residential Home Floor plan

Church Farm Residential Home floor plan showing Dayroom, Dining Room, Corridor, and Bedroom.
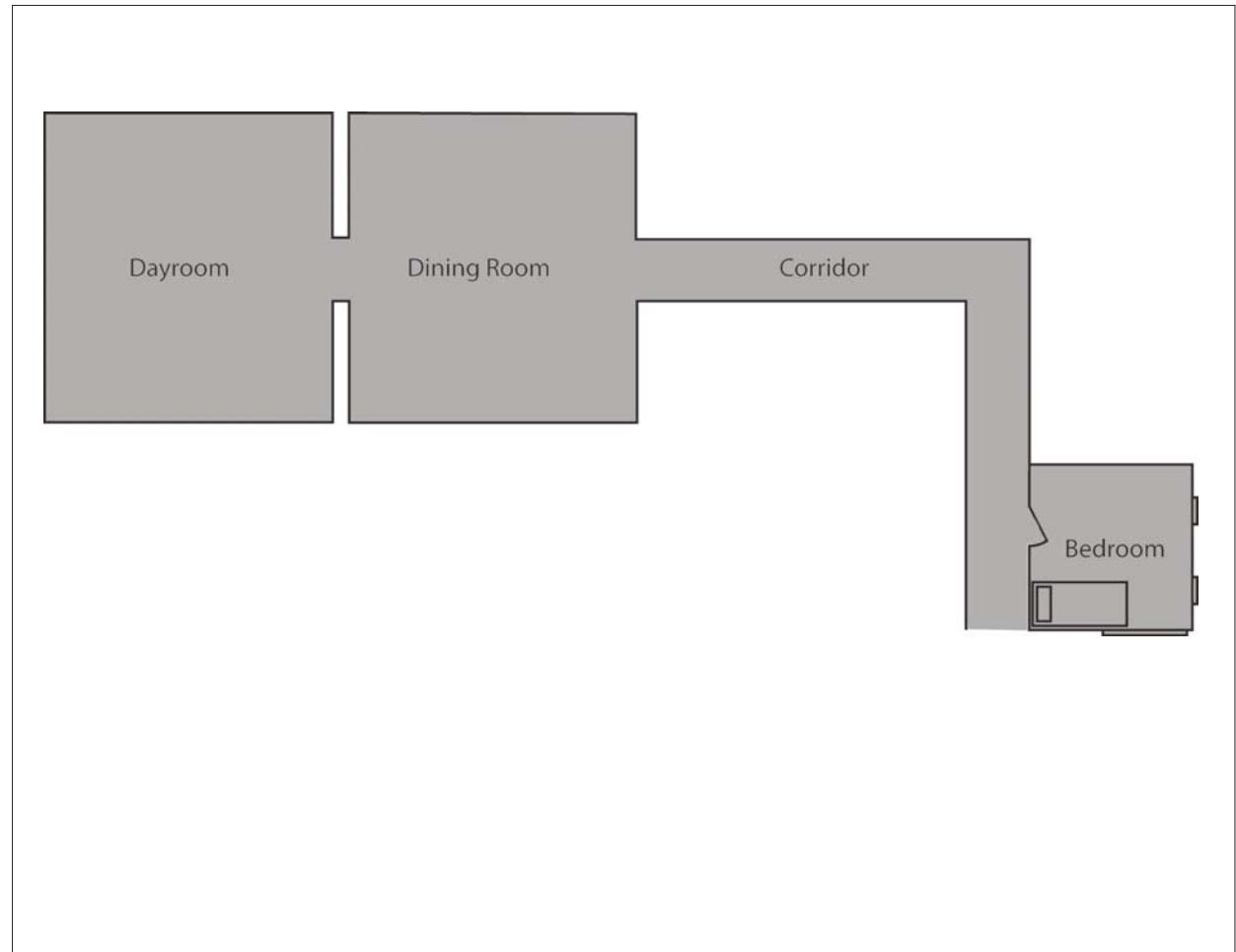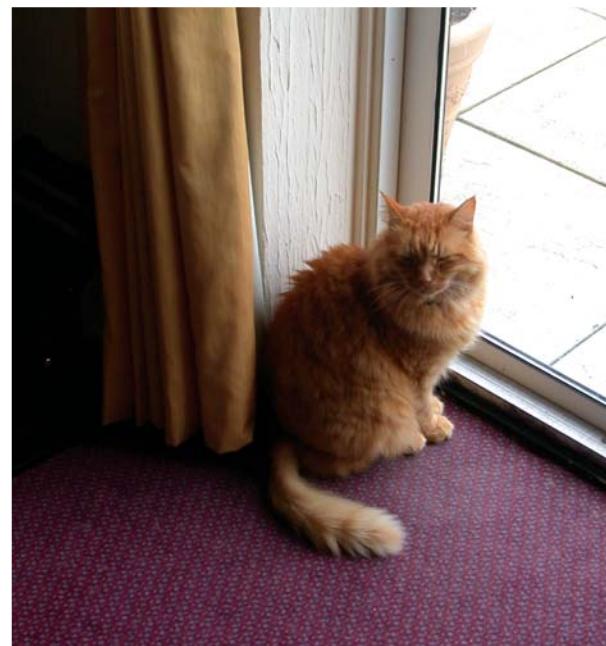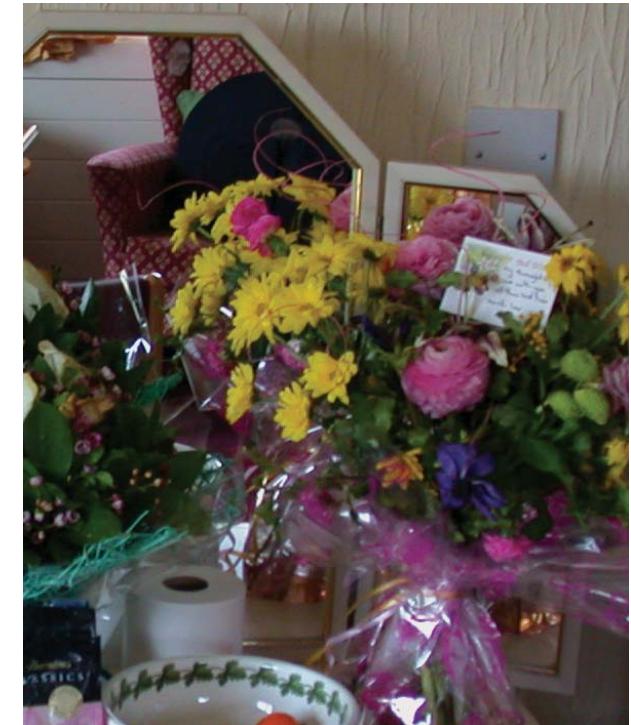
Colours and materials

The room was rated by the interviewer as "3" in terms of visual noise. Athough there was some clutter around it was generally not too visually disturbing or chaotic. The ceiling was white and all the walls were a Magnolia silk finish paint. There was no dado rail at all in the room but the skirting and architrave was a very dark wood stained finish which was almost black. The floor was a patterned carpet which appeared to withstand a certain amount of soiling and wear without looking shabby. The overall colour of the carpet was a dark pink with small detail design in grey.

All the bedlinen was a matching pink, slightly lighter than the carpet colour. A dark pink duvet and pillow finished off the co-ordinated textiles. The furniture consisted of two winged armchairs which were a pink and cream design, two small chests of drawers finished in an eggshell Magnolia, one wardrobe painted Magnolia and a single bed. The door to the bedroom was a very dark stained wood that was practically black. Lampshades matched the pink bedlinen but there was no other relief from the use of any accent colours except the yellow curtains. The window frame like the door was a dark - almost black - stained wood which contrasted highly with the yellow curtains. The only piece of equipment in the room was a walking frame. A computer, computer table and chair were placed by the door. Her own possessions consisted largely of several small paintings and many family photographs. The main photograph of importance in the room was one of her and her husband on their wedding day placed at an angle on the opposite side of the room on a chest.

Summary
Church Farm Residential Home
08/04/04

Personal Space

With the exception of three rooms designed for couples, the bedrooms at Church Farm are for single occupancy. For this reason, residents were able to have visual privacy and can have private conversations. This also allows them to be alone, should they so wish. There were a number of common rooms at Church Farm, namely a dining room, day/television room and conservatory affording residents opportunities to be with others. Unfortunately these rooms are located together which does not cater for a variety of locations to visit.

The dining/living room area was used as a through-way to some of the main parts of the building. This resulted in reduced privacy for residents using this space. Eating in the dining area was a more public affair than this resident preferred. As far as toilets and bathrooms are concerned, although these were located discretely for some residents, they were some distance from their rooms for other residents.

Views

All of the residents' rooms have at least one window affording views of both sky and ground. The views outside are of the grounds around the home and are both calming and interesting. Unfortunately however they do not allow the residents to see everyday life which means that residents who are not mobile are unable to see life going on outside.

Outdoors and Nature

Church Farm has good provision for using outdoor space. Residents have access to usable landscaped areas with some furniture although there were no benches. Being in the country the outdoor areas are quiet and have an abundance of plants, vegetation and nature including a pond and geese.

Comfort and control

The lighting, both in the residents' private spaces and in the common spaces was not efficient or effective leaving some areas a little dull and even depressing. There was inadequate flexibility in the way the rooms could be lit. In particular the resident interviewed wanted a standard lamp in her room. Overall there was enough artificial light in the building but it was too intense in patches so that the effect was to bleach the environment with light. The artificial lighting was not designed so as to be easy for the residents to control. This was a serious shortcoming. It was however possible for the residents to control the

natural light only by closing curtains, as there were no blinds. Although possible it is not easy for residents to control either the heating or to open windows. It is therefore possible for residents to have no fresh air until they were helped by care assistants For the most part the design layout minimises unwanted noise in patient areas.

Legibility of place

In general, wayfinding at Church Farm is poor. When arriving at the building it is not at all obvious where the main entrance is. It is not easy to understand the way that the building is laid out nor is there a logical hierarchy of places within the building. Similarly, it is not entirely clear which places are public and which private or where to go to find a member of staff as there are no central nursing stations. The building feels more or less the same throughout which again is an impediment to wayfinding. When leaving the building it is not obvious where to find the way out.

Appearance

Resident's private rooms feel homely, this perhaps being attributable in part to the fact that they are permitted to bring some of their own possessions with them to the home if there is room. Unfortunately the interior of the building does not have a light or airy feel due to the fact that the corridors are very narrow and have little natural light. Although it is kept clean and tidy there is little variety in terms of colours and textures within the building making it feel slightly monotonous. This is alleviated to some extent by the generous use of art and plants.

Carpeting has been used throughout the building which although often preferred by elderly residents with ambulatory difficulties does potentially have certain
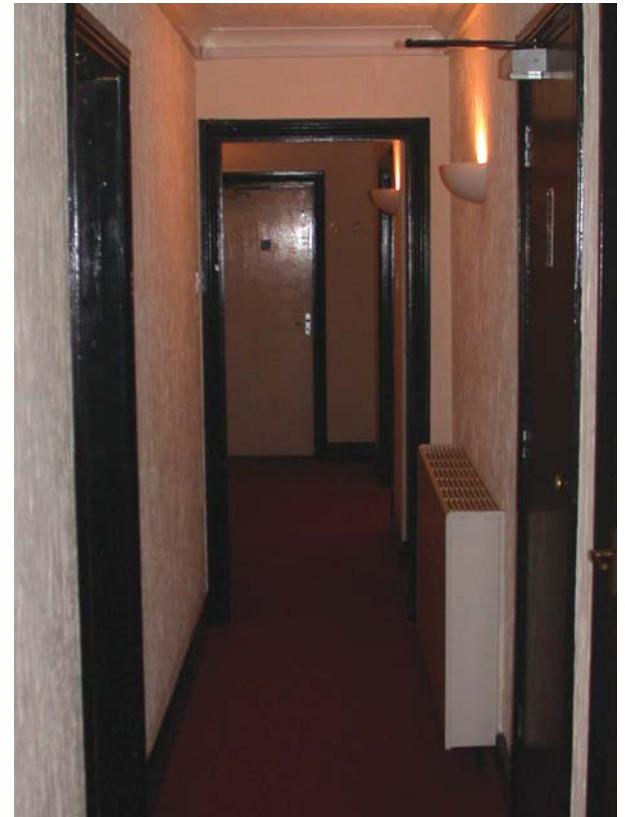
drawbacks in terms of hygiene. The views from some of the windows although pleasant do not offer much variety.

Facilities

Residents at Church Farm have a choice of a bath or shower and unassisted or assisted bathrooms. The bathrooms, however, are poorly equipped for the generally infirm user group often lacking seats, handrails and non-slip mats. Although not designed specifically for this purpose there is a space where either religious observances or live music and social events can take place. Both the residents' private spaces and the common spaces are appropriately furnished with easy chairs, tables and desks. This resident's room had a telephone allowing her to make and receive phone calls easily. There are no facilities in residents' rooms to make hot drinks. Likewise there are no facilities for patients' relatives or friends to stay overnight.

Accessibility

In view of the fact that a large proportion of the residents at Church Farm have ambulatory difficulties, often accompanied by sensory deficits, the design of the building is remarkably poor in terms of accessibility. As noted above, the entrance to the building is not obvious which may be a problem for the visually impaired. For wheelchair users there is a ramp and on entering the building the reception desk is accessible for such individuals. It is a particularly difficult building for the visually impaired due to the poor signage which is not of sufficient contrast, is badly lit and not placed at an appropriate height. There is no audio information to supplement the visual signs. Likewise there is insufficient visual contrast with sanitary ware and door handles. The flooring at Church Farm is however of good quality and is not visually disturbing being neither shiny or brightly patterned. The carpeting is the same in the corridors and private rooms. Had these differed this would have provided a cue for visually impaired residents when they entered a private space.
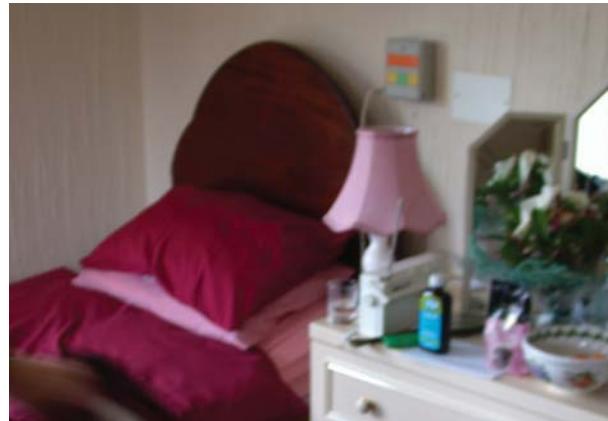
The building was in a setting that had a rural feel although many aspects of the interior were gloomy, institutional and cramped.

No data measurementswere taken on this site

See Analysis of Summary and Conclusions.

19/08/04

The RHN was founded in 1854 and moved to the present site in 1865. The main building of the hospital is Georgian and pre-dates this move. There are a total of 260 beds between the treatment and long-term care wards of the hospital. Patients are accommodated in a mixture of single and shared rooms. There are a total of 700 staff in the hospital.

Background

The Royal Hospital for Neuro-disability (RHN) is an institution which aims to "meet the needs of people with complex neurological disabilities resulting from damage of the brain or other parts of the nervous system"(from the RHN Mission Statement).The RHN is both a hospital and a home in that it provides both treatment and long-term care.

Profile of residents

The RHN specialises in treating the most severe cases of neuro-disability. All patients are over 18 years of age and have profound disability as a result of neurological damage or disease. Patients may either be at the hospital in order to receive long term care, short term care, rehabilitation, respite or day care. Patient diagnoses include multiple sclerosis, Parkinson's disease, Huntingdon's disease and spinal injury/paralysis. A typical stay for a patient with brain injury would be 9-12 months. Care programmes are tailored to the needs of each patient. The hospital is made up of a number of specialist units. Patients may be moved between a number of units during their time at the hospital.

accessed from the car park and affords easy access for wheelchair users. The reception is spacious and well decorated with a number of period features. The proportions in this older part of the hospital are very grand with spacious rooms and very high ceilings. On account of the scale of this building and perhaps the fact that it has been built at different times the layout is complex and wayfinding is as a consequence rather challenging. However no visitors or patients are unnacompanied. There are many pictures on the walls of the common spaces within the building many of which are paintings which have been painted by patients.

Description of the site

The hospital is situated in a suburban area of South West London within spacious tree-lined grounds. The grounds afford opportunities for the patients and staff to be outdoors. The hospital consists of one main building which has been extended a number of times over the years together with a few ancillary buildings.

The main building was originally built as a hunting lodge in the 18th century. It is now a very large U-shaped building with the main façade facing north-west over the main road. The main entrance is

Interviews

Staff member 1: Male.

Staff member 2: Female, Care assistant.

Staff member 3: Female, Ward Sister.

Q1. How long have you been working here?

S1: 7 months
S2: 13 months
S3: 18 years

Q2. Do you think the colour and design of the environment is important to the health and sense of well-being of your patients/residents?

S1: Yes, definitely. From my own experience I know that the environment has a major influence on a sense of wellbeing. My office is in the basement and is very dark. I think that it is also very important for the patients here to experience a change of environment.

S2: Yes it matters. The environment should be welcoming. Dark places can be gloomy.
S3: N/A

Q3. Have you noticed anything relating to the colour of objects or aspects of the environment?

S1: N/A

S2: The bed linen is all white. There are also burgundy and green throws/blankets. The curtains are floral, all the same and not lined. The furniture is quite old. The flooring has been slightly damaged by chairs digging into it. The walls would benefit from being re-painted.

S3: The bed linen is all white. These are crisp and nice. There are also coloured bedcovers. They have to respect hospital policies on fire retardant materials. Curtains: patients can choose their own but they have to be purchased through appropriate department and manufacturers. Patients are allowed to bring their own furniture into their rooms (and occasionally common spaces) in order to make the environment more homely. Bedsteads, however, have to be standard. The flooring is quite old. Only certain types of flooring are appropriate due to wheelchairs.

The wall colours have been changed to match the floor colours. The floor is buffed so that it becomes shiny but no one has complained. Patients are given choice as regards paintings. There are nice paintings in the corridors.

Q4. How often are refurbishments carried out?

S1: N/A

S2: There has been very little painting done for a long time. Two of the rooms were recently re-painted in preparation for new Huntingdon's patients arriving.

S3: Refurbishment is done as and when needed. Rooms are usually re-painted when the occupant changes or if the occupant really feels that they want their room updated.

Q5. Who makes the decisions about the colour schemes?

S1: N/A

S2: Patients choose their own colours.

S3: Patients are given the choice of which colour to paint their rooms. Some patients have a strong preference, others do not. The nursing staff facilitate the choice. One gentleman painted his bright blue. I found it a bit too much but he liked it.

Q6. Did you notice anything about how the patients/residents felt after the last refurbishment?

S1: After the day centre was refurbished some patients were disorientated. It tends to be the case that the more awareness patients have the more disorientated they were.

S2: N/A

S3: The garden room (where the interview took place) was recently refurbished. Only a few patients were involved but it was designed with the other patients in mind as well. Most patients feel that the garden room is relaxing and soothing. They hadn't felt this way before it was refurbished.

Q7. Do you have any suggestions for improvement of the existing environment?

S1: Some wards need work. The homelier they are the better. Some rooms are very personalised whilst others are not. With televisions it's important that the nursing staff don't just switch them on but also help the patients to choose the correct channel. It is important to think of patients as people. Sometimes the nurses don't give enough thought to them.

S2: The hospital would benefit from more recreational activities.

S3: Some room colour schemes are not so pleasant and so could benefit

Q8. Have you noticed anything related to lighting?

S1: N/A

S2: None of the patients complain about the glare on the floor.

S3: Because it is their home and because of policies we have to have normal lighting. Patients can bring their own lamps from home. Where necessary it is possible to have technology to allow a patient to control all of the lights in a room using a mouthpiece.

Interview with Art Therapist

The art therapist is based in a large high-ceilinged room which she feels very lucky to have. Access is a very important issue in this case. It is assumed that patients will use wheelchairs. The table heights in the art room can be adjusted.

The art therapist works on a referral basis. Patients come once or twice a week for 12 weeks. Patients come to the art room on programmes with specific targets. There is a defined clinical reason for them to come to the art room.

The role of the art therapist is now to monitor or to encourage rehabilitation. Her work with patients used to be more leisure-focussed. Somebody else works with patients who have plateaued.

Different parts of the hospital have different roles. For example, the Draper's Ward deals with rehabilitation.

The art therapist finds that pottery is an effective vehicle for promoting manual dexterity because it involves moving from gross to fine movements. Sometimes basic physical activities such as finger painting can be enjoyed. Some types of art, such as painting a still life scene require the patients to look up and down repeatedly. Another important aspect of art therapy is that it requires patients to verbalise their choices.

The art room also provides relief from the monotony of the patients' wards by allowing the patients to spend time in a different environment and an environment that is generally perceived to be more fun. The fact that the art room is a different environment from the ward can also be used to reinforce behaviour management through providing positive reinforcement in an environment different from the ward. Some patients want to paint landscapes but may lack the skill or dexterity to do this. The therapist will encourage them to take a step back and think about colour. For some patients colour is the primary expressive medium. For patients with severe mobility problems marbling is a very useful technique

because it's very immediate and requires no dexterity. Some patients tend to exhibit colour perseveration in which they use the same colour or colours over and over again. The therapist will try to encourage them to use other colours. Sometimes there is pressure on the patients to achieve something in the time available and this is regrettable because it can be fun to take time over things sometimes.

The patients tend to have very short concentration spans. Twenty minutes is usually the maximum time a patient can concentrate on one task. Longer term projects tend to work better in pottery. An important role of the art therapist is to match the activity to the patient.

Sometimes patients' work is framed and displayed around the hospital, although there have been cases when it has not been appreciated.

Individual patient interviews

Patient 1: Chatsworth ward, Female

Illness/Disabliliy: Wheelchair-bound as a result of an accident, appeared to be cognitively unimpaired.

Patient 2: Andrew Reed ward, Male

Illness/Disabliliy: Suffering from Parkinson's disease. Serious communication problems but appeared nonetheless to be cognitively unimpaired. He also suffered from very severe and constant muscle spasms.

Q1. How long have you been receiving care/treatment in this establishment?

P1: 7 years
P2: 2.5 years

Q2. How long have you been staying in this particular room/ward?

P1: 6 years
P2: 2.5 years

Q3. Are you able to leave your room/ move about the place?

P1: Areas visited: main building, assembly room, De Lancy Lowe Room, chapel, gardens, terrace.

P2: Day room, sit outside (just down outside this ward), the large common rooms downstairs, on Tuesdays and Wednesdays I go there for face to face music, shop, café.

Q4. Apart from your room, where else do you go? Do you have a daily routine?

P1: I come into the garden room, or if the weather is good the terrace, for coffee in the morning. I go to the main building for lunch. I don't have lunch in the dining room here because I dislike the space. I do piano practice or exercise in assembly rooms. Sometimes there are "shops" set-up in the assembly rooms so I might buy things there. This place is like being in a small village. Then I would probably go back to my room to meditate and make a few phone calls. Then tea in the garden. I would spend the evening in the garden perhaps socialising with friends and family or listening to the radio.

P2: N/A

Q5. Is it easy for you to find your way around? Did it take a long time to find your way around when you first came to stay here?

P1: It wasn't easy at first, very bewildering. It's so enormous. It

took a long time to get bearings and become able to choose what to do. So much is thrown at you. I now love this space. I enjoy the fact that it is a big site because it offers variety.

P1: N/A

Q6. Do you like the décor or fittings of your room?

P1: It is very important to a sense of well-being. Some of the rooms upstairs could benefit from upgrading and some of the smaller rooms on Chatsworth ward..

P2: Nothing in particular apart from on T.V. screens. Something needs to be changed. I don't like the design of the ward. I particularly don't like the day room, it's a bit boring. It's better if the window is open. It would be better to separate areas within the ward by painting them different colours. The colours may affect the mood. More bold colours needed.

Q7. What don't you like about the décor or fittings of your room?

P1: Good bright yellow. Has been re-done recently.

P1: N/A

Q8. What don't you like about the décor or fittings of your room?

P1: N/A

P2: I didn't bring many pictures into my own room due to security issues and damage.

Q9. Do you have any suggestions for improvement of the existing environment?

P1: I have been involved in bringing about a number of improvements to the environment. The tablecloth on the table in the hallway was changed to William Morris pattern pvc because is was always dirty. The walls in the garden room have been changed from pink to green.

P2: Tools to help people with hearing impairments. My favourite colours are strong ceramic colours, reds and yellows for my room. I like good surface qualities.

Q10. Do you think that the colour/ design affects your sense of well-being?

P1: N/A
P2: N/A

Q11. Have you noticed anything related to the colour of furnishings or aspects of the environment such as…

P1: The bed linen is white. I am happy with white but I dislike the "Sunlight" laundry labels on the linen and towels. There is very little by way of decorations apart from my own. The crockery is bearable but boring. I wouldn't like anything garish. White with blue would be nice. As far as furniture is concerned the hall table has been changed. The flooring is quite good being wheelchair friendly etc. The wall colours are good. The pictures were all higgledy-piggledy. We re-hung them and got rid of some. There are awful brown trays which makes food look unappealing.
P2: N/A

Q12. Do you have any comments regarding the lighting of your room or other rooms you visit?

P1: There was strip lighting in the garden room. This was changed to halogen spots on my instigation. The lighting in the corridors is still bad.
P2: N/A

Q13. Have you personalised your space? If not, would you like to?

P1: Yes, I have personalised my space
P2: N/A

Q14. What objects/ items have you brought with you to personalise your room?
P1: Furniture and pictures
P2: N/A

Q15. How do you spend your time?

P1: N/A
P2: N/A

Q16. Which rooms do you really like and why?

P1: The library. I really like the blue colour.
P2: N/A

Q17. Which rooms do you not like and why?

P1: De Lancy Lowe room. The main building can look very cold in the winter.
P1: N/A

Q18. Do your friends/ visitors comment on the environment?

P1: They say the ward has improved a lot since the changes that I have been involved with.
**P2:** N/A

Q19. Have you spent any time in other similar healthcare environments? How do they compare to this one?

P1: I was at the spinal injuries unit at Stanmore for a year. It was very different, very congested, with 12 people to a ward. I was also at Charing Cross for another 8 months. Hospitals seem to be getting gradually better.

P2: N/A
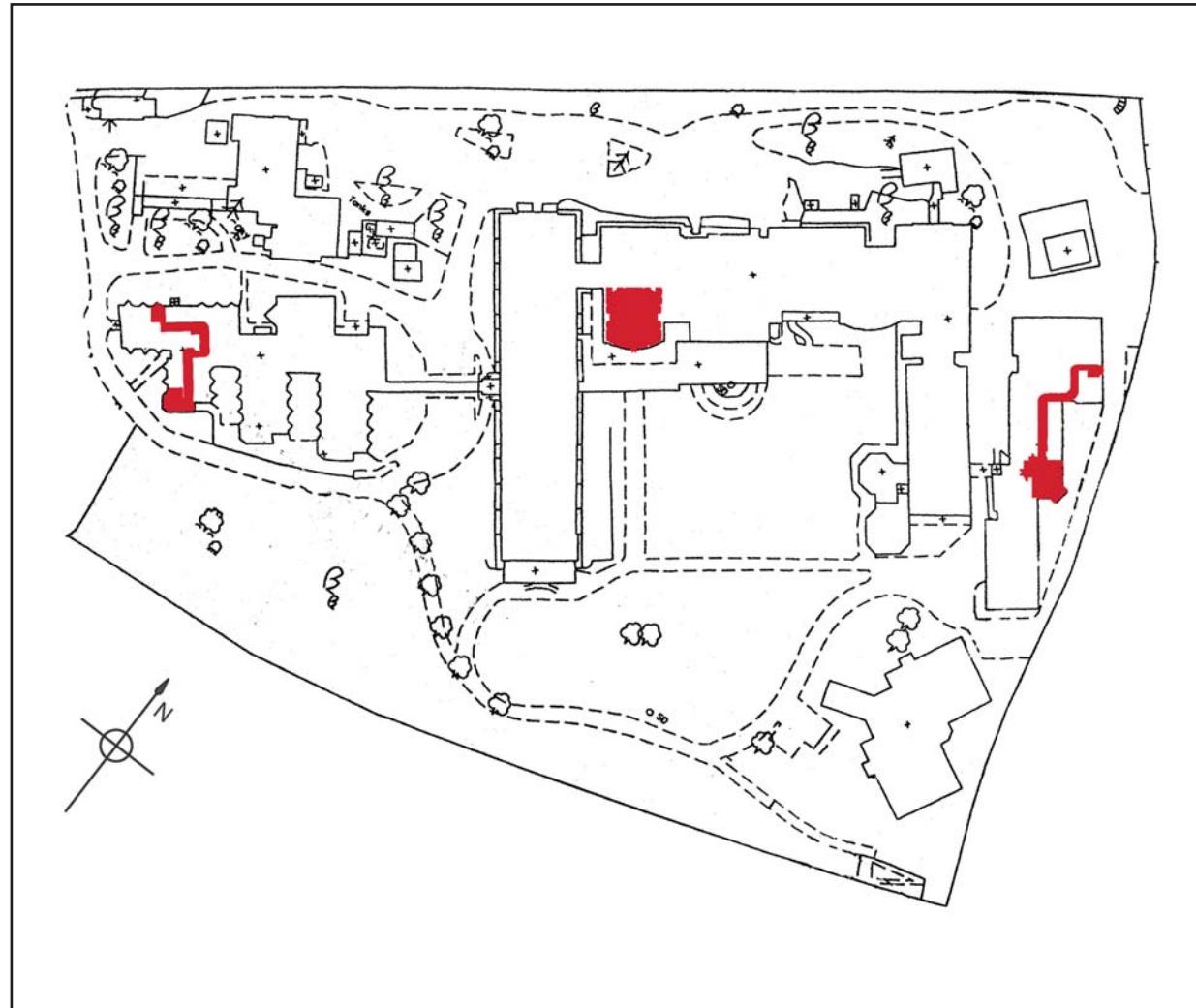
This plan shows the three areas where the audits and interviews were undertaken on the site:

Chatsworth Unit

Andrew Reed Ward

De Lancey Lowe Room
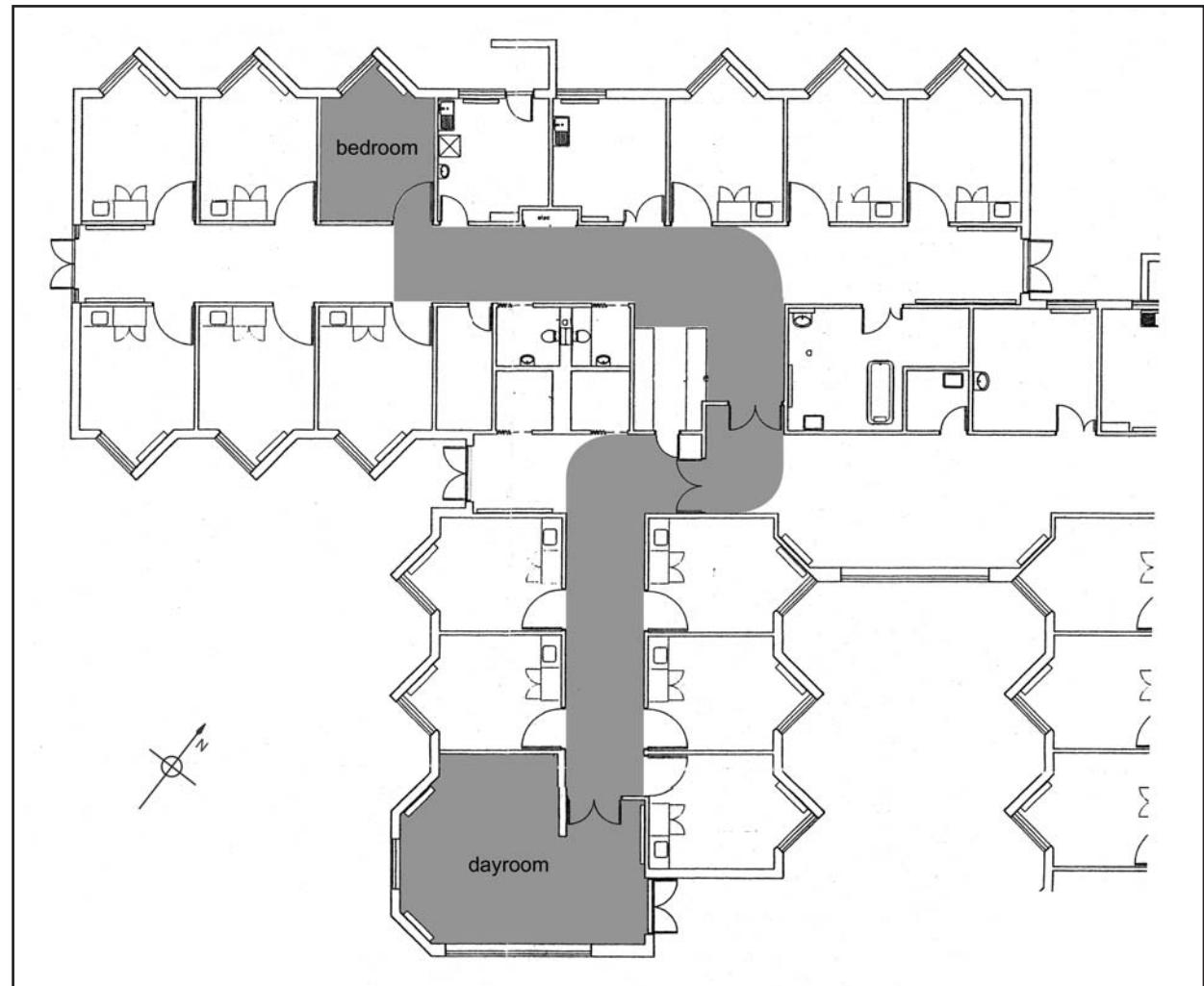
This ward provides service and care to those patients with severe neurological disability. They may have been assessed as able to influence their daily living (make choices and therefore retain a degree of independence and control) despite their profound physical disability and have potential to benefit from single room accommodation offered by this area. The research team focused on investigating the typical 'journey' a service user would make.
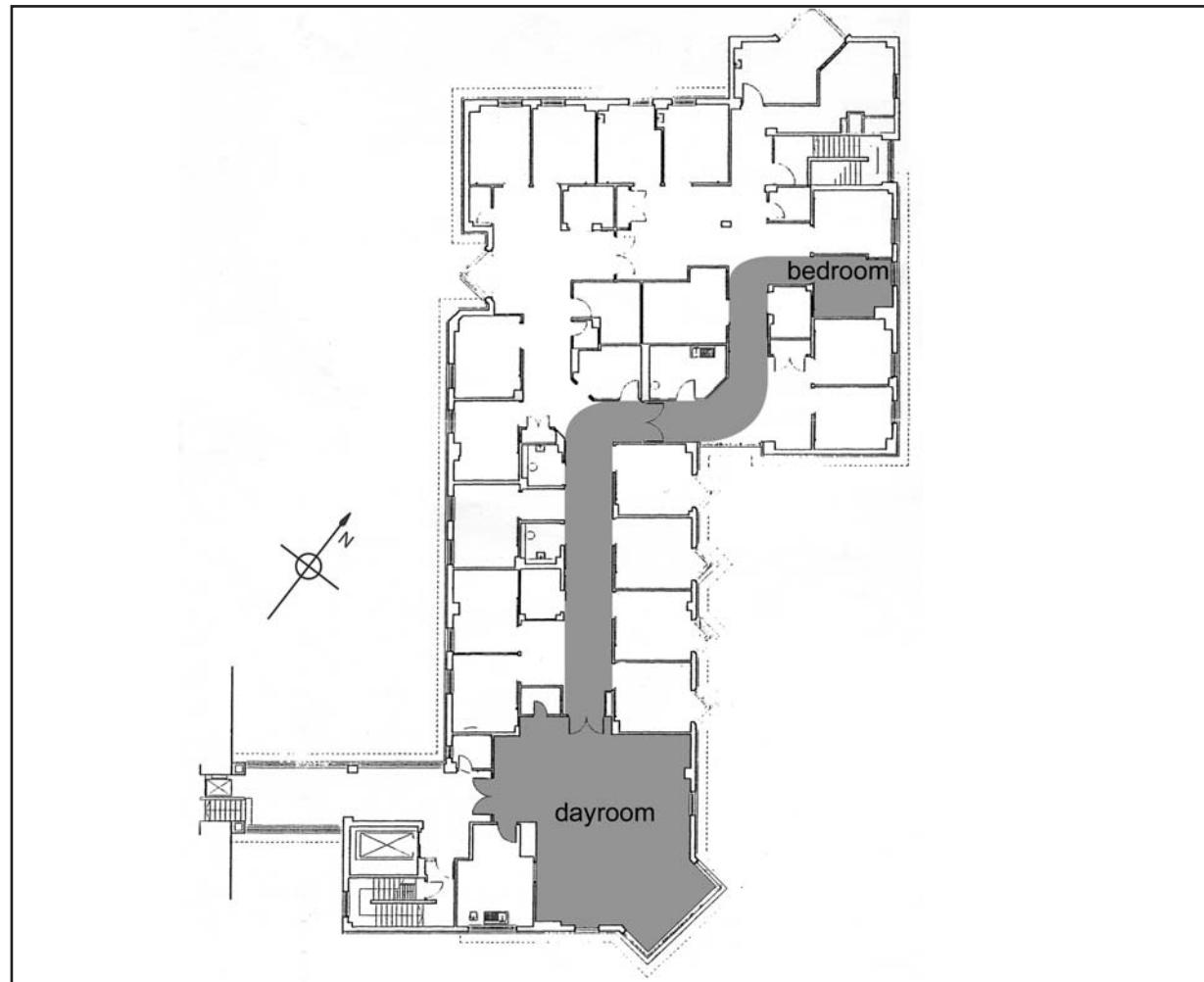
This ward cares for patients with the mid to late stages of Huntington's disease following setting and implementation of a disability management programme.

Royal Hospital for Neuro Disabilities De Lancey Lowe Room
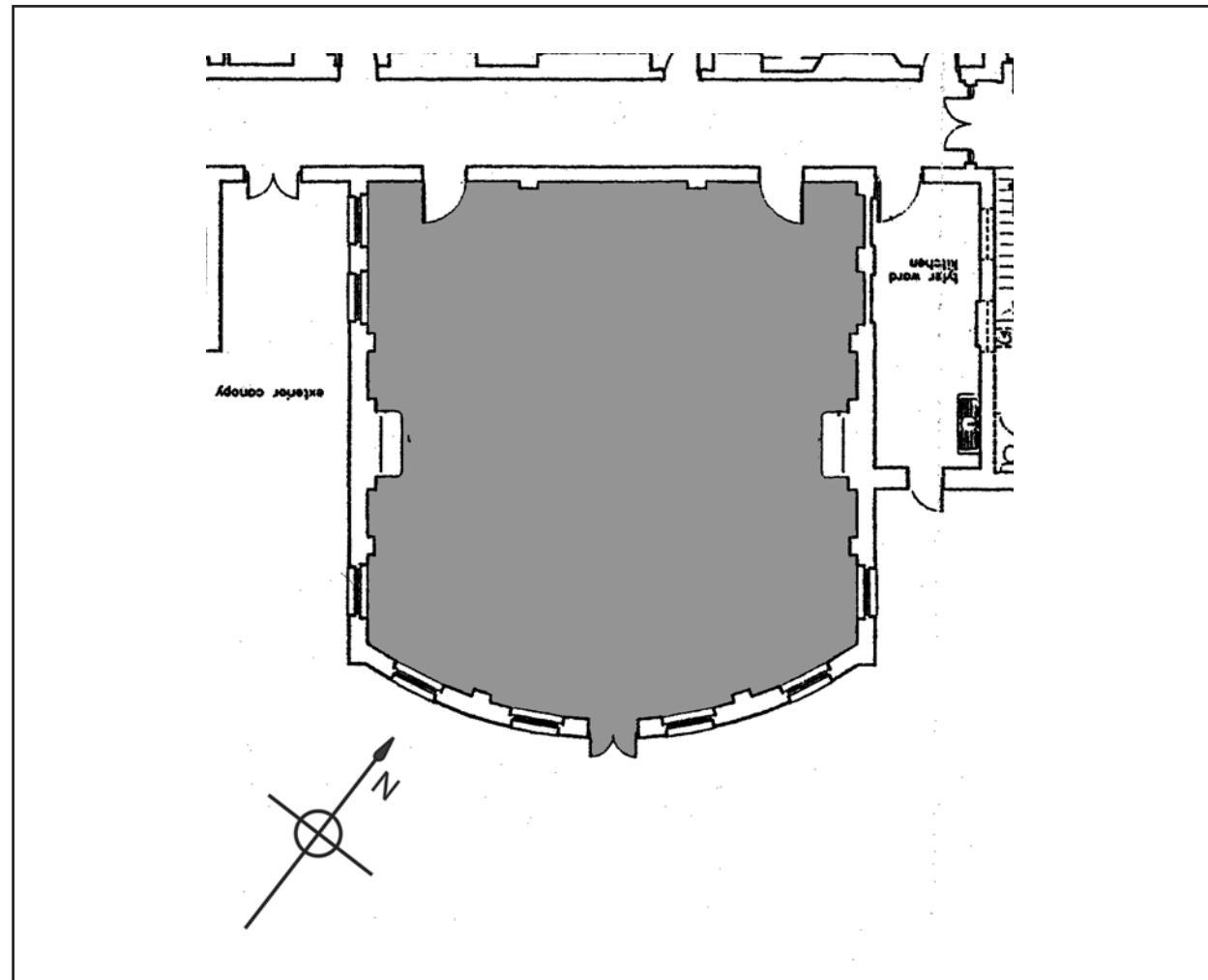
The De Lancey Lowe Room is a central resource for the site used by staff visitors and service users as a meeting place. The library is extensive and fills this impressive room which is of significant architectural interest.

Visual journey
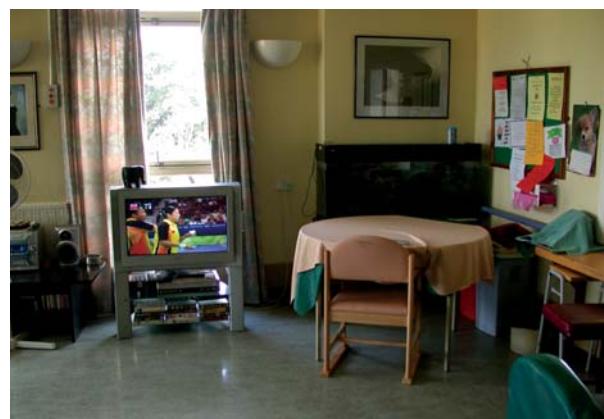
Colour Measurements

Ward 1 Bedroom	L	a	b	Material/Texture	Comment
Walls	93	5	67	Matt Paint	One smaller space wall
	93	**6**	**65**	Matt Paint	
	64	20	72	"bumper" skirting	
Dado	84	21	87		Only one wall, small area
Winow Sills	71	51	69		
Skirting	11	0.95	244	Blade Skirting board	
Floor	76.63	20.84	81.56	Hard, Shiny flooring- slightly variegated colour	
Bed Linen	83	17.62	79.61	Coarse woven top blanket	
	92	3	294	White sheet	
Furniture	80	20	84	Chest of drawers	
	60	31	70	Other chest of draw- ers- fake wood	
Tiles	88	11	86	Above sink	
Bed Head	56	37	200	terquoise plastic	

Walls	83	14	88		Doors- lowers half
	49	16	260		Blue hand rails
Dado	88	22	90	Textured wall paper	
	86	38	82	Dado rail	
Window Sills	70	51	67		
Skirting	64	20	73	"bumper" skirting	
Floor	60	13	95	Marbled effect	
Window frame	82	17	88		
Paintings					Landscape photography,
Other				Mirror on lower wall	

Ward1 Dayroom	L	a	b	Material/Texture	Comment
Walls	89	21	91	Matt paint	
Skirting				As room	
Floor				As room	
Furniture	69	26	70	Table cloth on large round table x4	
	71	52	69	Counter top	
	71	53	69	Counter front	
	67	23	57	Chair	
	42	14	263	Chair	
Window frame	70	51	69		
Paintings					Photographs of Princess Diana, waterfalls etc.

Ward 2 Corridor	L	a	b	Material/Texture	Comment
Walls	93	19	104	Matt paint	
Doors				White and silver metallic	
Skirting				black	
Floor	77	23	82	Tiling in check pattern	
	56	23	93	Tiling in check pattern	
	56	23	93	Tiling in check pattern	
	35	27	52	Floor boarders next to walls	
Ward 2 Wash room	L	a	b	Material/Texture	Comment
Wall tile	66	25	92		
Floor	42	12	100		
Cutain	54	24	97		
Wall	88	4	113		
Ward 2 Dayroom	L	a	b	Material/Texture	Comment
Walls	90	32	105	Matt paint	
Skirting				black	
Floor	77	23	82	Tiling in check pattern	
	56	23	93	Tiling in check pattern	

Recreation room	L	a	b	Material/Texture	Comment
Walls	86	19	93	Matt paint	
	100	0	0	White Plaster	
	25	13	236	Fire place tiles	
Dado	75	25	101	Dado main colour	
	78	24	94	Dado panels	
Floor	43	16	65	Carpet main colour	Darker brown small patterns
Furniture	14	14	35	Shiny wood	Round table x 5
	35	25	33	Upholstered cha	
	32	43	61	Wooden benches under window	
	26	28	55	Piano	
Curtains	61	31	79		
Paintings					Two paintings of De Lancys
Other room contents				Darker green architrave and ceiling ouldings on dirty white vaulted ceiling	

Lighting

11.15am
Cloud and sunshine

Ward 1 Bedroom

Luminaire Type	No	Lamp Type	Comments	On/Off	Dimming	Control	Control Location
Wall mounted uplighter	1	Naked bulb visible from bed			Patient: yes Staff: no	Patient: yes Staff: yes	
Pendant Downlighter	1	Bulb			Patient: yes staff: no	Patient: yes Staff: yes	
Flourescent tube	1	Small (above wash hand basin)			Patient: yes Staff: no	Patient: yes Staff: yes	

Ward 1 Dayroom Andrew Reed

Luminaire Type	No	Lamp Type	Comments	On/Off	Dimming	Control	Control Location
Surface Mount. Downlighter	1	Above nurses station					
Wall Mounted Uplighter	7	Only ones by nurses station were on					
Pendant Downlight	4						

Corridor

Luminaire Type	No	Lamp Type	Comments	On/Off	Dimming	Control	Control Location

4.00pm
Cloud and sun
Orientation: South-East

De Lancey Lowe Room

Luminaire Type	No	Lamp Type	Comments	On/Off	Dimming	Control	Control Location
Wall mounted uplighter	6	Each light had 5 light bulbs					
Pendant Downlighter	4	Each down-lighter had 18 lamps on it					
Lamp standard small/large	1	Free standing floor lamp by piano					

Chatsworth Unit Route

Lux Levels Light Measurements

2205

bedroom

154

166   326   164   1133

1092

386

136   107   128

500

155

1086

229

1088

604

1500   dayroom

1960

Horizontal Illuminance (lux)
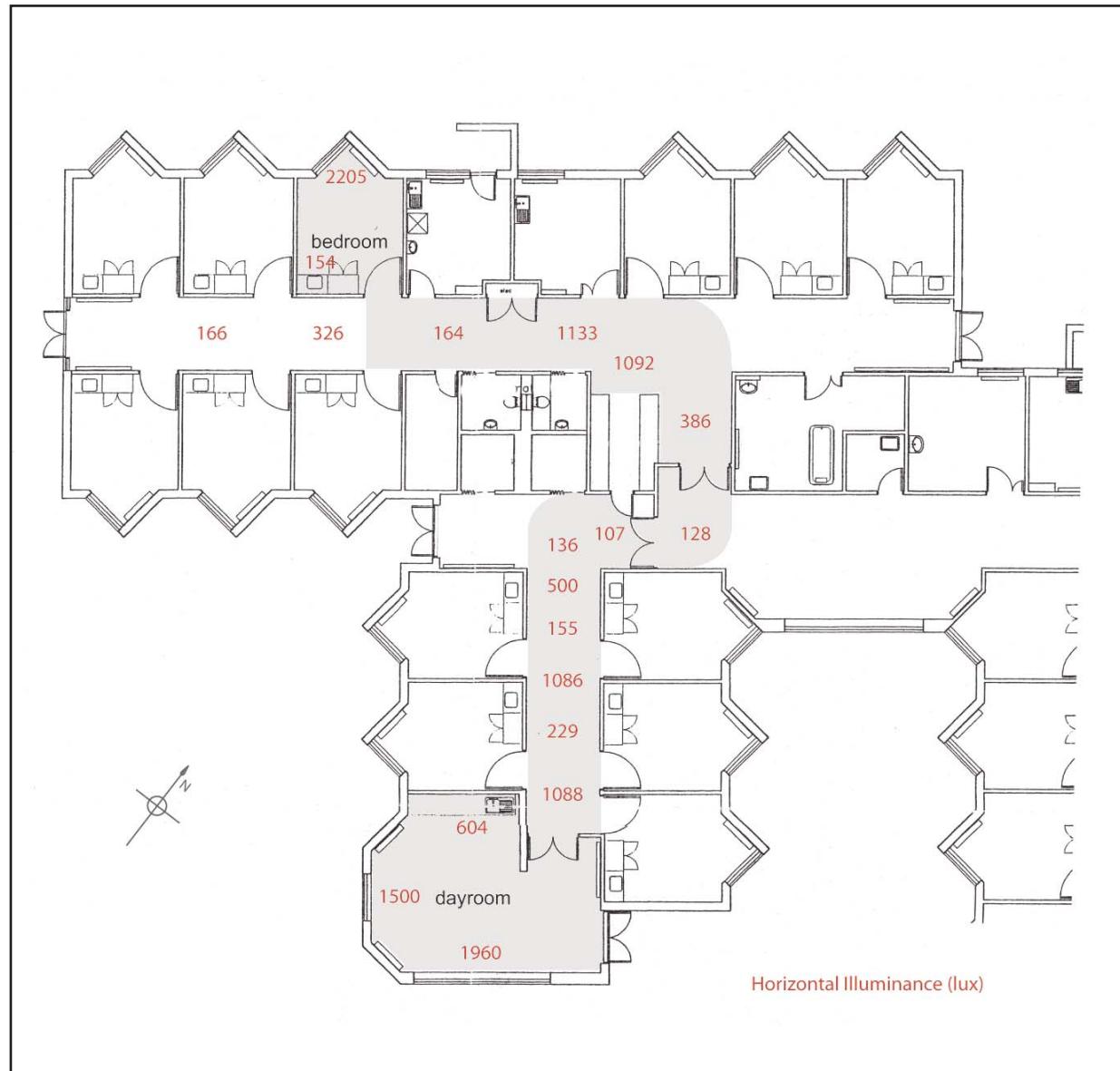
Royal Hospital for Neuro Disabilities

Andrew Reed Ward

Lux Levels Light Measurements
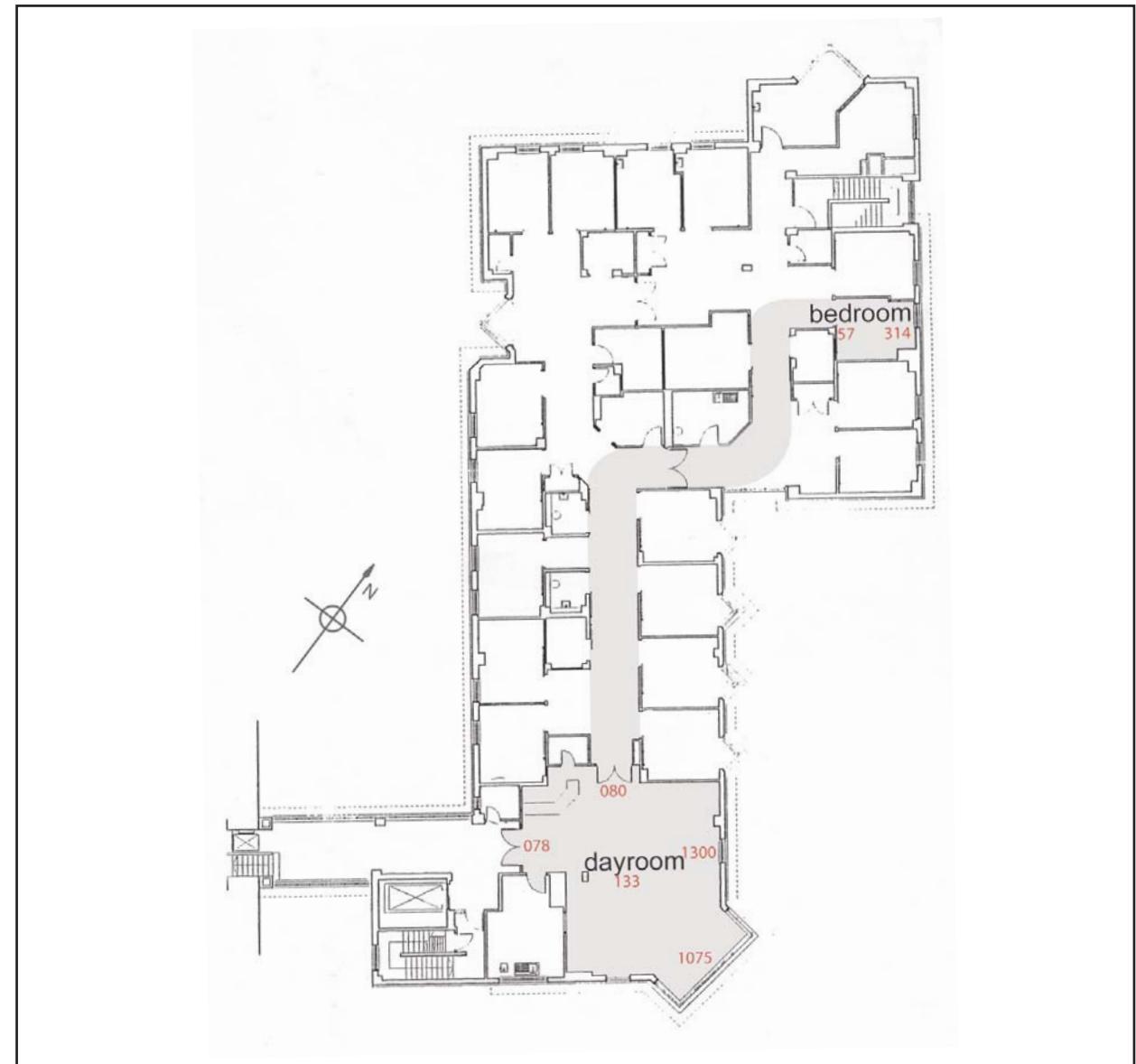
Royal Hospital for Neuro Disabilities

De Lancey Lowe Room

Lux Levels Light Measurements
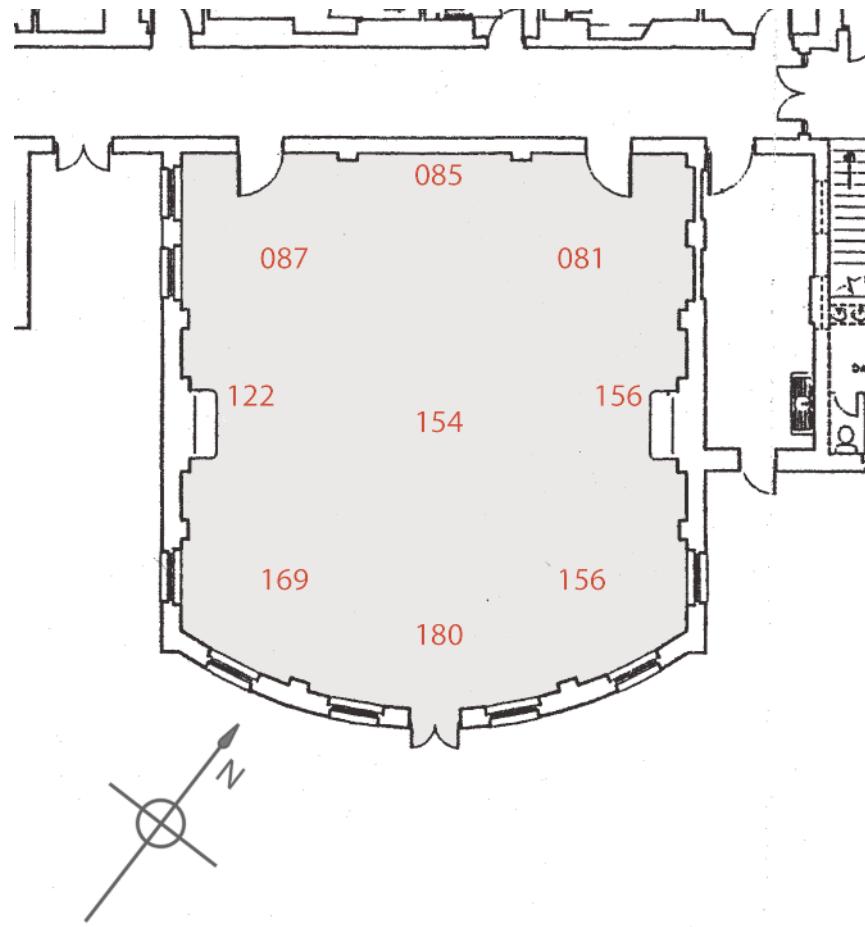
Position of luminaires

Windows
Position of windows

**Ward 1 Dayroom
Andrew Reed**

No	Orientation	Comments	Size m²	Treatment	Glazing	View	Control	Open/closed
1	NE		2.42	Unlined curtain		trees-panoramic		
2	E		16.64	Unlined curtain		trees-panoramic		
3	SE		2.42	Unlined curtain		trees-panoramic		

Ward 1 Bedroom

No	Orientation	Comments	Size m²	Treatment	Glazing	View	Control	Open/closed
1	NE	Tilt window, 4cm opening of window. Radiator below window sill	0.32	Lined curtains, floral fabric, quite thin, can see the light through them		Tree, sky, looking at a red brick apartment block about 50m away		

**Ward 2 Bedroom
Chatsworth Unit**

No	Orientation	Comments	Size m²	Treatment	Glazing	View	Control	Open/closed
1	W							

Ward 2 Dayroom

No	Orientation	Comments	Size m²²	Treatment	Glazing	View	Control	Open/closed
1	SE		10.44					
2	SW		2.44					

De Lancey Lowe Room

No	Orientation	Comments	Size m²	Treatment	Glazing	View	Control	Open/closed
1	SE		3.84	Lined		Gardens		
2	SE		3.84	Lined		Gardens		
3	SE		5.18	Lined		Gardens		
4	SE		3.84	Lined		Gardens		
5	SE		3.84	Lined		Gardens		

Windows
Position of windows

Personal Space

The RHN is a very large site. For the purposes of the site audit we examined only two wards. Where applicable, ASPECT (see Analaysis of Summary and Conclusions) has been completed with specific reference to these wards. Staff questions were answered with reference only to staff areas, even although of course staff spend a great deal of time in areas also occupied by patients.

In both of the wards examined all patients had private rooms. As a result patients could choose to have visual privacy or a private conversation. Likewise they could choose to be alone. As well as their private bedroom patients also had access to at least one day room within the ward as well as a number of common rooms and other facilities in the main building of the hospital. There was therefore ample provision of places for patients to be with others. Residents rooms did not have private bathrooms making access to a toilet/bathroom less convenient than would otherwise have been the case. Toilets and bathrooms are located relatively discretely.

Views
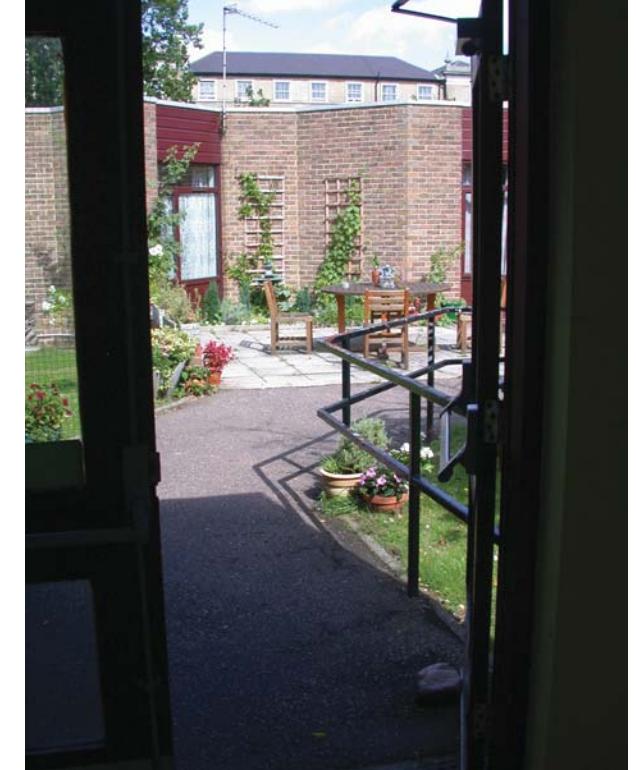
Each patient bedroom has a window affording natural light, views of the sky and, usually, views of the ground. The views outside are calming but not particularly interesting and they do not for the most part offer views of everyday life. As a result, patients with mobility problems have difficulty seeing everyday things going on. Many of the staff areas are internal rooms. These lack natural light and deprive staff of views the sky and ground.

Outdoors and nature

The outdoor areas at the RHN are spacious and attractive. They are useable landscaped areas which are provided with suitable and comfortable furniture. They are also quiet with opportunities to see plants, vegetation and nature. The only caveat to this is that patients with severe mobility problems will need help to get outside and some patients will need to be supervised whilst outside. This will restrict to some extent patients' use of outside space. Those who cannot get out as much as they would like for the most part still have views of plants, vegetation and nature from inside the building. The two wards studied were situated so as to benefit from views of the attractive grounds. Other areas of the hospital, particularly those overlooking the main road would not be as well situated.

Comfort and control

The lighting in the patients' rooms was such as to provide almost sufficient variety of artificial lighting patterns appropriate for different conditions (day and night, summer and winter). Those in the other areas examined were less adequate in this respect. It was possible both for staff and patients to control the artificial lighting. It is also possible for both patients and staff to control sun light and day light, although those patients with severe mobility problems may have some difficulties. As far as the control of the temperature is concerned we could not find any thermostat in the patients' bedrooms but it is assumed that staff are able to control temperature to some extent, whether in individual rooms or larger areas. Both windows and doors can be opened allowing fresh air into patient rooms. Again, patients with severe mobility problems may have difficulties with this. For the most part, the design layout seemed to minimise unwanted noise in both patient and staff areas.

Legibility of place

The entrance is located on the side of the building and is not very obvious to someone unfamiliar with the site. The building is very large and has been built at different times with different areas having different characters. As a consequence it is rather difficult to understand the way the building is laid out and wayfinding is not easy. This means that it is often not obvious how to find your way out of the building. There is a fairly logical hierarchy of places within the building, with it being fairly obvious which are public and which are private areas. More positively, nursing stations are positioned in fairly obvious locations within the wards allowing nursing staff to be found easily.

Appearance

Patients are permitted to bring personal items in to the hospital to personalise their spaces. In practice this is something which is done only by the more able patients with the result that the homeliness of the patients' rooms depends to a large extent on the severity of their illness. The main building of the hospital is built on a very grand scale and is as a consequence very light and airy. This was less true of the wards which we examined in depth. Whilst there is a good variety of textures used in the hospital the use of colour is slightly monotonous. The interior has some, although limited, variety of views.
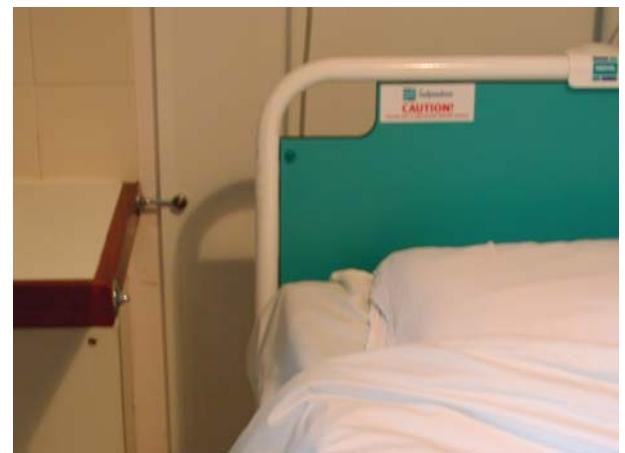
The interior is clean and tidy and has good provision for art, plants and flowers. Floors are covered in suitable material and ceilings are treated appropriately.

Facilities for residents

The hospital is provided with a good range of facilities. Patients can have a choice of a bath or a shower and assisted and unassisted bathrooms. There are a number of common spaces where religious observances as well as live performances and social events can take place. Both the patients private rooms and the common rooms are appropriately furnished, although the relatively small size of the patients' private rooms means that there is room for only a few pieces of furniture. Patients who are able have facilities to make drinks and all patients have the option of a private telephone in their rooms. There are also facilities for patients' friends and relatives to stay overnight. No vending machines for snacks were seen but there is a café open during the day.

Facilities for staff

The hospital provides good facilities for staff. There is a convenient place for staff to change and securely store belongings and clothes. Where necessary, staff have easy and convenient access to IT as well as convenient places to concentrate on work without being on demand. There are places for staff to rest and relax which are segregated from patient and visitor areas. Although no banking facilities were observed there are some limited opportunities to shop for essentials within the site.

Accessibility

The entrance is accessible to wheelchairs, although it is not as obvious as it might be for visually impaired people. The reception desk is accessible to wheelchair users. Lifts are easily operated and accessible. In other respects the site did not have good provision for those with visual impairments. Signage was not of sufficient contrast, was not sufficiently well lit, and was not at an appropriate height. No audio information was available. Although the flooring was of good quality and was not brightly patterned it was very shiny in places. Stairs did not for the most part have contrast nosing. Contrast details such as sanitary ware and door handles did not contrast sufficiently with backgrounds to facilitate use by visually impaired people.

See Analysis of Summary and Conclusions.

St Lukes Hospital is a psychiatric hospital in Middlesbrough in the North East of England. The site is made up of a large 19th Century building with later additions and alterations. The building faces South West and is surrounded by spacious lawned grounds.

Background

The hospital is funded by the NHS. Although it is possible for individuals to self-refer to community services, in order to be admitted to this hospital it is necessary to be referred by a health professional. The facility deals exclusively with adult mental health. Although some service users are long-term, many are acute. Some patients may go home at weekends. Service users typically have planned leave prior to discharge. There have, according to one nurse manager, been considerable improvements in community care in recent years enabling many service users to return to the community where otherwise it would be necessary for them to remain in hospital.

Profile of residents

There are a total of 250 beds in the hospital. Of the acute service users 60% are male. Of the long-stay service users 80% are male and of the elderly service users 30% are male. Many of the beds, even in the long-stay wards are in dormitories.

Around 5% of the service users are wheelchair users and 10% have visual impairments (not including the elderly service users). There is a Forensic Secure Unit on the site housing the service users with severe mental health needs.

Description of the site

The main entrance leads to a network of corridors giving access to the wards, common spaces and administrative offices. In the centre of the main building is a recreation hall which has recently been the focus of a comprehensive renovation scheme. (See Real World Projects)

Many of the beds, even in the long-stay wards are in dormitories. According to the regulations, the maximum number of beds permitted in a room is 5. Some wards are segregated, male or female, whilst other wards are mixed. In addition to the bed areas there are a number of common spaces within the hospital. These include: the recreation hall, day rooms, smoking rooms, quiet rooms located within wards and a prayer room, children's visiting room, and a hairdresser available for use by the whole hospital. There is also a pleasant courtyard garden centrally located within the site which is available for use by service users and staff.

The Canterbury Ward is typical of the wards in the hospital. It is an adult long-stay ward. All service users in this ward are male, with the youngest being 38 years old. There are a total of 14 beds in the ward. The ward is made up of two main dormitories with additional smaller bedrooms. There is also a large day room, a dining room, a smoking room/conservatory, toilets/bathrooms and staff areas.

Interviews

Interview with Staff

Two members of staff were interviewed:

Staff member 1:
Female, nurse, 51 years old
Staff member 2:
Male, nurse, 44 years old

Q1. How long have you been working here?

> **S1:** 5 years.
> **S2:** 17 years.

Q2. Do you think the Colour and Design of the environment is important to the health and sense of well-being of your patients/residents?

> **S1:** Yes, it makes a difference. This ward does feel very homely.
> **S2:** Yes, it's important. It feels nice here. The main day room is especially nice. Being an old building it has character and everyone knows each other.

Q3. Have you noticed anything related to the colour of objects or aspects of the environment?

> **S1:** The bedspreads are different for each patient which makes the dormitories feel less institutional. The ward manager buys ornaments at car boot sales. This also helps to make the environment seem more homely. The hard flooring in the dormitories is very successful. There had been carpet before but this was hard to maintain and had an unpleasant smell. There are a lot of pictures around. There is an occupational therapy department which works with patients who are interested in art. I like the pale colour schemes in the ward.
> **S2:** The ward manager is keen to make the place look nice. The duvet covers being different makes the place seem less institutional.

Q4. How often are referbishments carried out?

> **S1:** Regularly.
> **S2:** Two years. There isn't a problem with patients trashing the place wilfully.

Q5. When was the ward last refurbished?

> **S1:** N/A
> **S2:** 3-4 years ago.

Q6. How often does the flooring get replaced?

> **S1**: It was replaced about two years ago.
> **S2:** About every 3-4 years.

Q7.Who makes decisions about colour schemes?

S1: The ward manager lets all staff participate in the decision-making. The patients are not at all interested.
S2: The ward staff work as a team.

Q8. Did you notice anything about how the patients/residents felt after the last refurbishment?

S1: Some would notice that some things had changed, like new chairs in the dining room and it would maybe cheer them up a little.
S2: Not really, although the new chairs in the day room were noticed. They are a focal point.

Q9. Do you have any suggestions for improvement of the existing environment?

S1:
S2: It might be a good idea to change the colour schemes more often as this might stimulate the patients. It would be interesting to see if settees would work in the day room. Patients may lie on them and fall asleep which wouldn't be a good thing.

Q10. Have you noticed anything related to lighting?

S1: It is adequate. It is also fine at night: the wall lights are quite cosy.
S2: I think that the fluorescent lights are a bit institutional.

Q11. Are patients/residents encouraged to personalise their own space?

S1: They are allowed to. The extent to which they do differs a lot between patients.
S2: Some do, some don't. Men are much less into personalisation than women.

Q12. What other things apart from colour do you think influences your patients/residents health and makes them feel good?

S1: N/A

S2: Music, quizzes, OT. With psychiatric patients the challenge is often to make them feel relaxed.

Q13. How do the other places you have worked at compare to here?

S1: N/A

S2: There is more emphasis on the appearance and atmosphere of the environment now. He remembers some wards which had concrete floors.

Interview with Service users

Two patients were interviewed:

P1. Male, plays piano.
P2. Male, has interest in architecture and art.

Q1. How long have you been receiving care/treatment in this establishment?

P1. (Not sure, was in Durham ward before Canterbury.)
P2. 2 years.

Q2. How long have you been staying in this particular room/ward?

P1. 5 year.
P2. 2 years.

Q3. Are you able to leave your room/ move about the place?

P1. Yes, moves around the building.

P2. Wanders around the hospital, outside as well.

Q4. Apart from your room, where else do you go? Do you have a daily routine?

P1. Canteen, recreation hall, MIND Centre on Grange Road, local shops, likes to be a disc jockey, plays piano.
P2. Canteen.

Q5. Is it easy for you to find your way around? Did it take a long time to find your way around when you first came to stay here?

P1. Yes, he finds it easy to find his way around.
P2. He forgets his way sometimes.

Q6. Do you notice anything about the colour of the rooms that you use?

P1. Ginger. Apple green.
P2. Doesn't notice or care

Q7. Do you like the décor or fittings of your room?

P1. Yes.
P2. N/A

Q8. Do you have far to go to the nearest bathroom? Do you like the bathroom?

P1. Not far to go.
P2. Not far to go.

Q9. Do you have any suggestions for improvement of the existing

environment?

P1. More parties, they have birthday parties here.

P2. More art on the walls.

Q10. Do you think that the colour/ design affects your sense of well-being?

P1. He likes all the spaces
P2. N/A

Q11. Have you noticed anything related to the colour of furnishings or aspects of the environment such as…

P1.N/A
P2. He likes the different duvet covers in the bedrooms. There are nice pictures in the main hospital. He likes drawing.

Q12. Do you have any comments regarding the lighting of your room or other rooms you visit?

P1. N/A
P2. N/A

Q13. Have you personalised your space? If not, would you like to?

P1. N/A
P2. N/A

Q14. What objects/ items have you brought with you to personalise your room?

P1. N/A

P2. Pictures, books, something about film stars.

Q15. How do you spend your time?

P1. All sorts of things. He likes music a lot. Old fashioned music. He plays the keyboard.
P2. Sits, watches TV, likes having a chat.

Q16. Which rooms do you really like and why?

P1: N/A

P2: Main day room.

17. Which rooms do you not like and why?
P1: N/A
P2: There aren't any rooms he doesn't like.

Q18. What kind of flooring do you like best?

P1: Hard flooring/lino because it's easier to keep clean.
P2: N/A

Q19. Do your friends/ visitors comment on the environment?

P1: Other patients visit. He would like his Auntie to visit.
P2: They like it.

Q20. Have you spent any time in other similar healthcare environments? How do they compare to this one?

P1: Lived in Durham ward. Preferred Durham. Canterbury is a bit cold, Durham was warmer.
P2: Hasn't spent time anywhere else.

St Lukes Hospital Canterbury Ward Floorplan
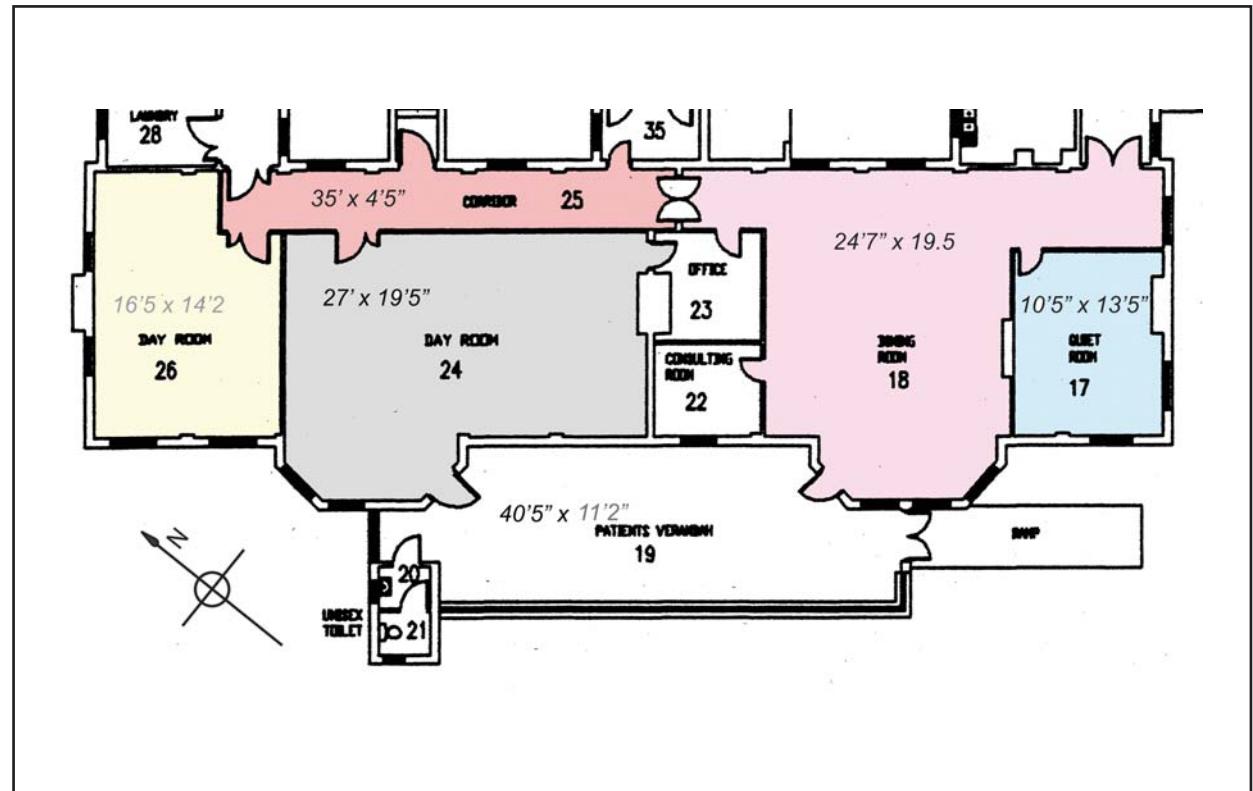
Visual journey

The staff at St Luke's identified a need for the refurbishment of the hall pictured above. The space was the centre of this very large mental healthcare site and a focus for all social events; the cafeteria right was not able to provide the right facilities where service users were able to meet visitors. The research team embarked on a design refurbishment programme for the NHS Trust which was completed recently. See 'Real

CANTERBURY WARD

Lux Levels - Horizontal Illuminance

- ● Surface Mounted Downlighter (Compact Fluorescent) - on
- ▬ Fluorescent tube - on
- ◖ Surface Mounted Wallwascher - on
- ★ Surface Mounted Nightlight - off
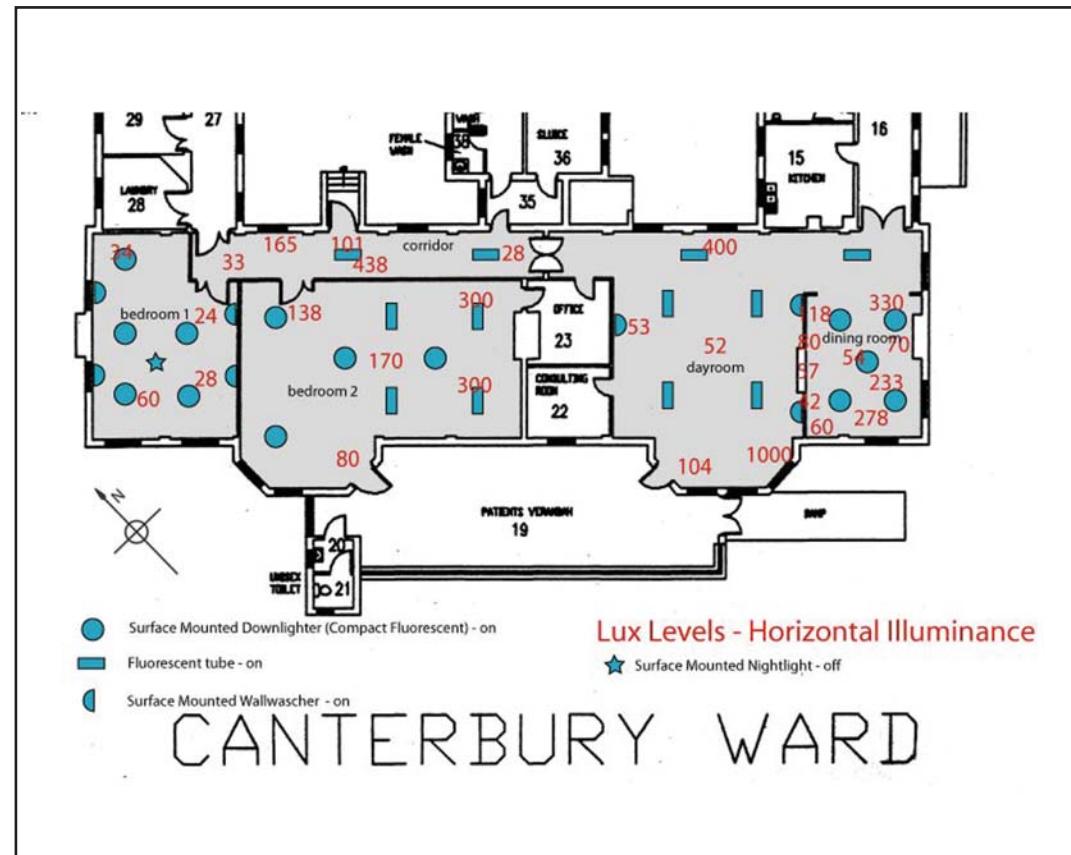
Lighting
Dayroom

12.40pm
Sunny
Orientation: South

Luminaire Type	No	Lamp Type	Comments	On/Off	Dimming	Control	Control Location
Wall mounted uplighter	3						
Flourescent tube	5						

Lux Level Measurements
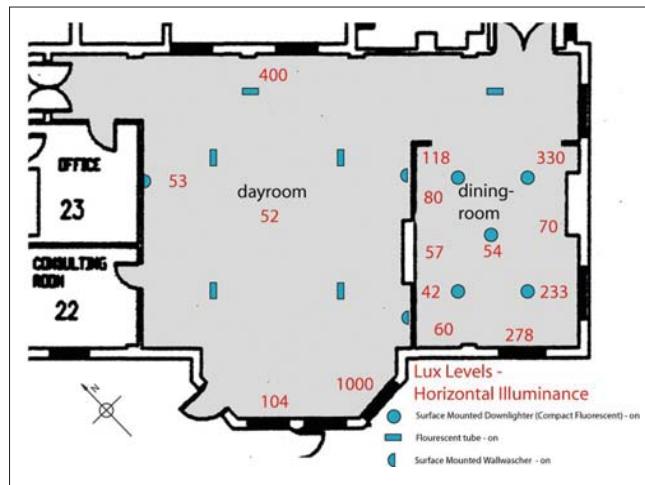
Position of luminaires

Lighting

Dining Room

3.30pm
Cloud and sun.
Orientation: South-east

Luminaire Type	No	Lamp Type	Comments	On/Off	Dimming	Control	Control Location
Recessed downlight	5						

Lighting
Bedroom 1/Room 26

11.55am
Sunny.
Orientation: South-west

Luminaire Type	No	Lamp Type	Comments	On/Off	Dimming	Control	Control Location
Wall mounted uplighter	4		Above beds				Above beds
Recessed downlighter	5						
Flourescent tube	1	Nightlight					
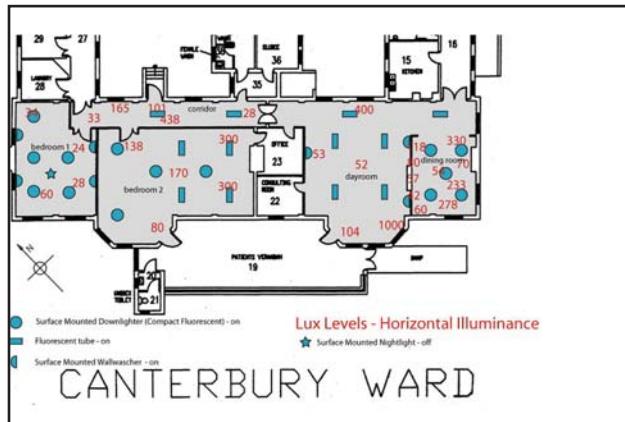
Lux Level Measurements

Position of luminaires

Lighting

Bedroom 2/Room 24

12.25pm
Sunny
Orientation: South-west

Luminaire Type	No	Lamp Type	Comments	On/Off	Dimming	Control	Control Location
Recessed downlighter	4						
Flourescent tube	4						

Lux Level Measurements
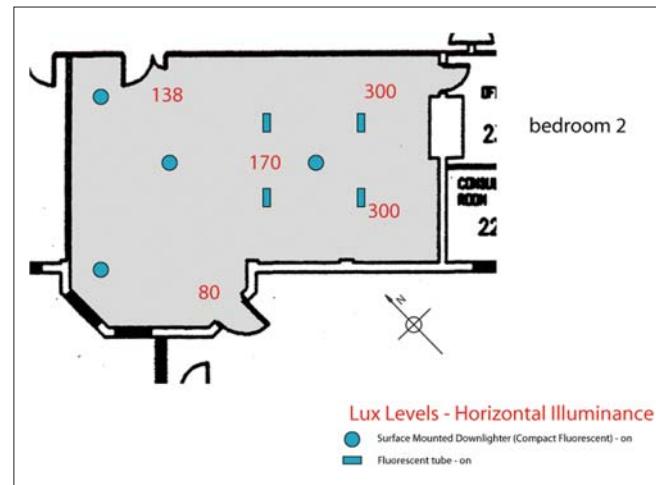
Position of luminaires

Lighting
Corridor

12.10pm
Sunny
Orientation: North-east

Luminaire Type	No	Lamp Type	Comments	On/Off	Dimming	Control	Control Location
Flourescent tube	2						
Flourescent tube	1	Nightlight					

Lux Level Measurements

corridor

Lux Levels - Horizontal Illuminance

Flourescent tube - on
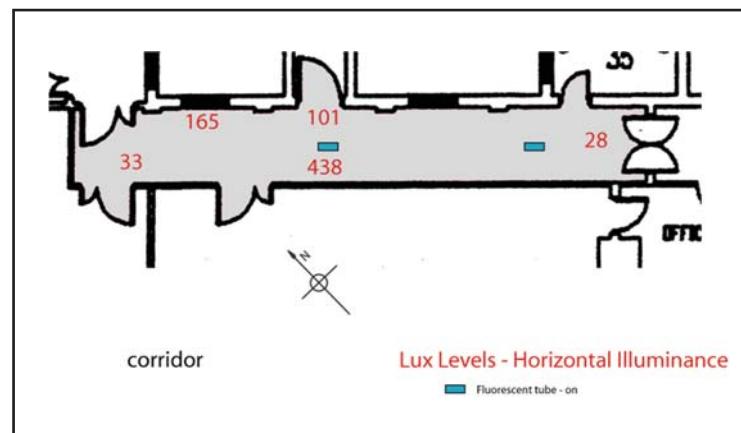
Position of luminaires

Windows

Corridor

No	Orientation	Comments	Size m²	Treatment	Glazing	View	Control	Open/closed
1	NE		1.125	curtains				
2	NE		1.125	curtains				
3	NE	Above door		curtains				

Bedroom 1

No	Orientation	Comments	Size m²	Treatment	Glazing	View	Control	Open/closed
1	SW		2	Net curtains	Simple	Not really		
2	SW		2	Net curtains	Simple	Not really		
3	NW		2	Net curtains	Simple	Not really		
4	NW		2	Net curtains	Simple	Not really		

Bedroom 2

No	Orientation	Comments	Size m²	Treatment	Glazing	View	Control	Open/closed
1	SW		2					
2	W		2					

Dining Room

No	Orientation	Comments	Size m²	Treatment	Glazing	View	Control	Open/closed
1	SE		2					
2	SE		2					
3	SW		2					

Dayroom

No	Orientation	Comments	Size m²	Treatment	Glazing	View	Control	Open/closed
1	NE		2	Vertical blinds				
2	NE		2	Vertical blinds				
3	S		2	Vertical blinds				
4	SW		2	Vertical blinds				
5	W	Glass panel door						

Position of windows

Personal Space

The sleeping accommodation took the form of dormitories occupied by four or five patients. Although curtains can be drawn around the beds there are no chairs in the dormitories; safer care for all the service users is a priority. It was not easy for patients to spend time on their own with visual privacy or to have a private conversation with a another person. It is probably intentional as the staff may consider this to be a negative activity for this particular user group. The Canterbury ward has a large day room, a conservatory-style room, a smoking room and a dining room so patients have opportunities to be with others there. The toilets and bathrooms are situated centrally within the ward making them convenient. On account of the layout of the ward they are also discrete.

Views The window in one of the dormitories was in the corner of the room. In view of the fact that there are curtains that can be pulled around each bed this means thet other residents in the dormitory may be unable to see out of the window. This was the case on the day that we visited. There are adequate windows in all of the common spaces which afforded staff and patients views of the ground and the sky. There is a window in the staff tea room but not in either of the staff offices. The views outside are for the most part pleasant with views of some grass or greenery..

Outdoors and nature

The hospital is situated in spacious, lawned grounds which afford service users opportunities to be outside. There are some quiet landscaped areas which service users and staff use. The attractive grounds also allow both patients and staff to easily see plants, vegetation and nature.

Comfort and control

The artificial lighting in all areas did provide some variety of lighting patterns appropriate for day and night and summer and winter. there was not as much variety as would be desirable. It was possible for staff to control the lighting but not quite so easy for service users, particularly if confined to their bed. It was easy for both staff and service users to control sunlight and daylight. Service users had little control of the temperature. It was not particularly easy for service users to open windows and doors but staff could do this. Nonetheless service users are able to have fresh air. The layout of the site appeared to be very successful in terms of minimising unwanted noise both for service users and staff.

Legibility of place

When you arrived at the site it is easy to identify the entrance. However, due to the complexity of the external layout of the site it is not easy to understand navigation within the building and it was not immediately possible to find the way out. More positively, there is a logical hierarchy of places within the building and it is clear which areas are private and which public, with different parts of the building having different characters. It is also fairly obvious where to go to find a member of staff and, due to the comprehensive use of signage within the building, wayfinding through the building is relatively easy.

The interior of the site has a variety of colours and to a greater degree a variety of textures. Despite this, service users' spaces do not feel homely. This may be because so many service users have few or no personal possessions, even though they are permitted to have these. It seems that some have either a lot of personal items or none.

Appearance   According to one nurse manager, male and female patients' bed areas look very different. The interiors are clean and tidy and the building has good provision for art, plants and flowers. The floors are covered in suitable material but the ceilings are not designed to look interesting or have good lighting.

Facilities for residents   There are places within the hospital where both religious observances and live performances and social events can take place. Although service users do not have easy chairs, tables or desks in their private spaces these are available in the common rooms. It is possible for patients to make and receive phone calls but only in the nurses' office which is not particularly convenient and there may also be an issue of privacy. They have occupational and industrial therapy facilities available.

Facilities for staff There is an office for staff to concentrate on thier administration work but this is in the middle of the ward with the result that they are likely to be disturbed. There are places for staff to get snacks and meals but these are not particularly convenient. The staff room for the ward is located away from the main patient areas allowing staff to rest and relax without interruption

Accessibility The site does not score well in terms of accessibility. The entrance and reception desk is not very accessible to wheelchair users and visually impaired people. Stairs do not have contrast nosing. However, the flooring is of good quality and not visually disturbing and the signage is of adequate contrast, well lit and recption desks are at an appropriate height.

See Analysis of Summary and Conclusions.

Swanbank Court is a sheltered housing development in Fulham in West London under Fulham and Hammersmith Borough Council. It was built in 1981 and consists of 34 one bedroom flats. The site is on the edge of the river Thames and all of the flats have particularly pleasant river views.

There are a total of 34 residents at Swanbank Court, six of whom are male. The residents are all over 60 years of age and are typically elderly and frail, some with a disability. The site caters for those with the ability to maintain independent living in a sheltered environment.

Swan Bank Court has ample off-street parking for visitors. All the flats have central heating and are linked by internal heated corridors. The complex is arranged over four floors and has three lifts. Each floor has a strong colour theme which is visible from the street. The development is equipped with a launderette and guest room for overnight visitors. The development also has two communal lounges and a large garden with raised planting boxes overlooking the river.

The service users generally seem to be very pleased with the quality of the accommodation provided by the development. The only criticism made of it was that it could be noisy due to aircraft, train and road-traffic noise from a busy road through to Putney.

Interviews

The project team did not undertake sets of interviews with the residents as this was innappropriate for this site visit. However an audit was conducted of the interior and disucssion did take place with several residents of the buillding on an ad hoc basis while they were using the communal facilities.

The manager was a 38 year old female. She had been in post for only three weeks so had a limited knowledge of the development.

How long have you been working here?
Three weeks.

Do you think the colour and design of the environment is important to the health and sense of well-being of the service users?
Yes, I believe that it is important. Pastel colours tend to relax the residents whilst bold colours tend to make the residents more aggressive towards each other.

Have you ever noticed anything related to the non-decorative aspects of the environment which has an effect on the feel of the environment?
Temperature is important. If it is too low the residents don't like it. There is little flexibility in the lighting of communal spaces. This could perhaps benefit from being improved.

How often do the service users' rooms get refurbished or repainted?
They are allowed to organise this themselves so it is up to them. The Council have a commitment to paint three rooms every five years. Otherwise the Council only do repairs.

How often does the flooring get replaced?
Very rarely. Some of the flooring in the communal areas is 20 years old.

When was the last refurbishment?
Because it is a large site refurbishment is ongoing.

Do you have any suggestions for the improvement of the existing environment?
Change flooring and introduce more colour into the gardens.

Are service users permitted to personalise their space?
Yes, they each have their own self-contained flat which they are allowed to personalise however they wish.

What other things apart from colour do you think influences the service users health and makes them feel good?
Social contact. They use the social spaces

quite a lot. They also appreciate the pleasant river views and being near pubs and public transport.

Do visitors comment on the establishment?
They comment that they like the location.

How do other places you have worked in compare to this one?
It was better. Presented to a higher standard. However, in the last place I worked there was green around the windows which looked really institutional.

Is it easy to find your way around? Did it take a long time to find your way around when you first came to work here?
It is not difficult to find your way around the site.

Do you think that the place is homely?
Yes, adequately so.

N.B. No further formal interviews were undertaken.

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**Swanbank Court
Ground Floor Plan**
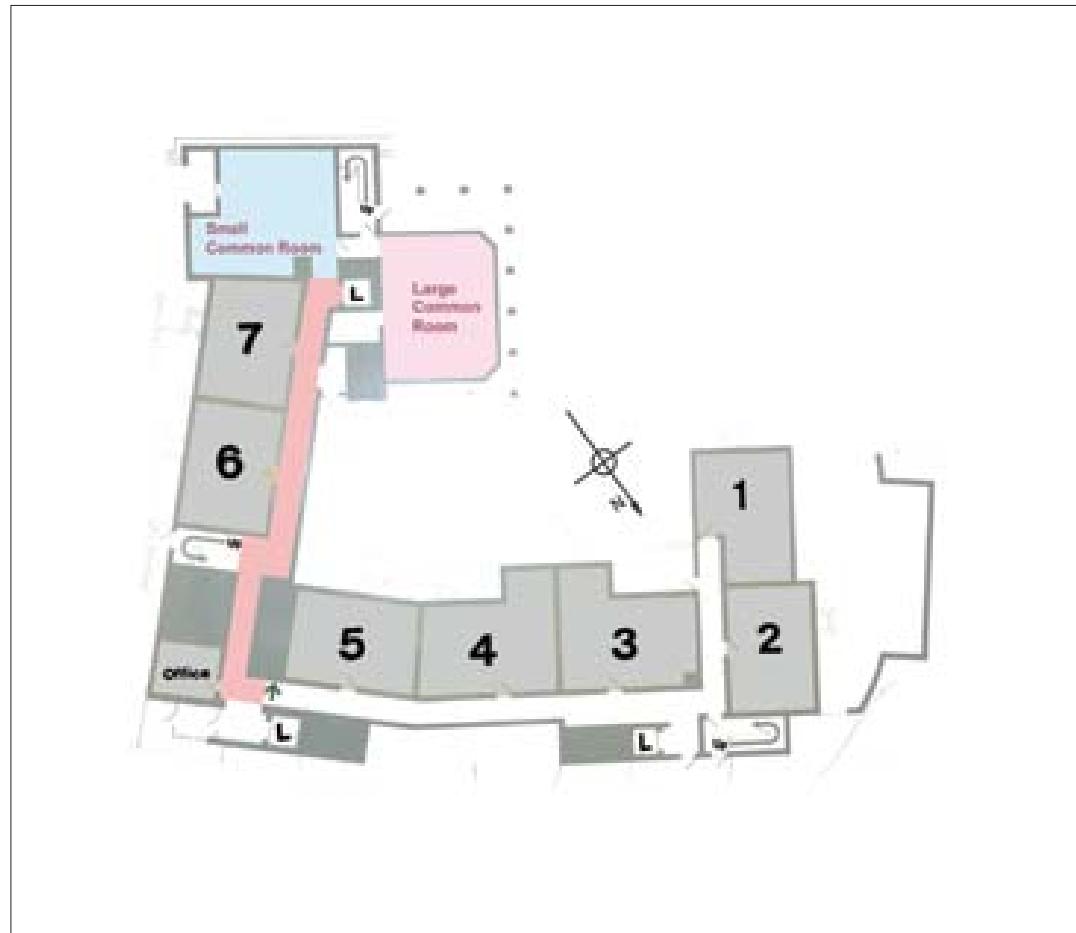
**Swanbank Court
Ground Floor Route**
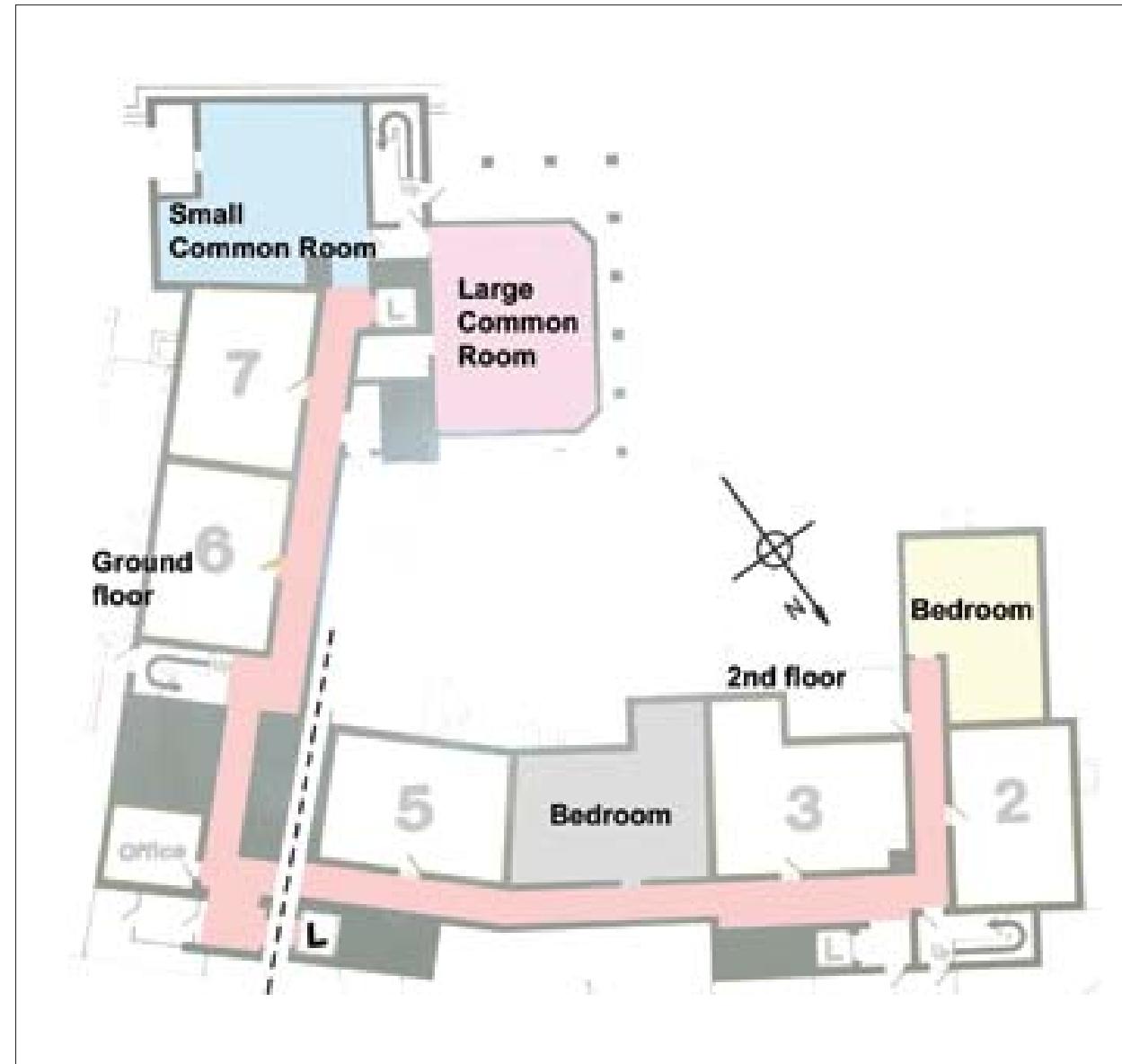
Visual journey
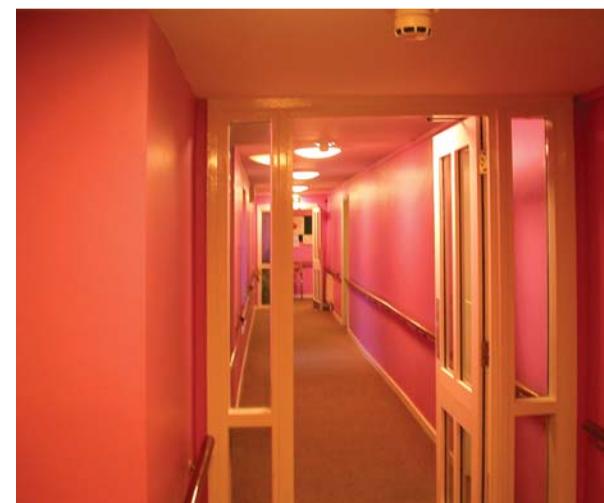
Corridors on four floors

Seating in corridors

Large common room

Front doors

Residents' flats

Communal facilities
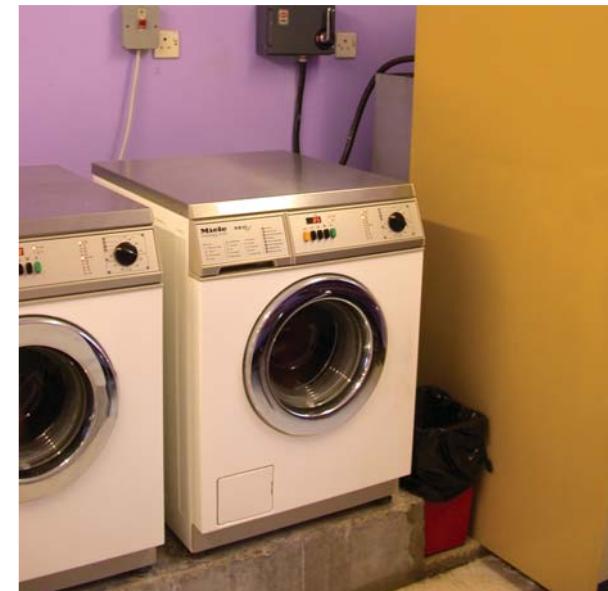
Views out
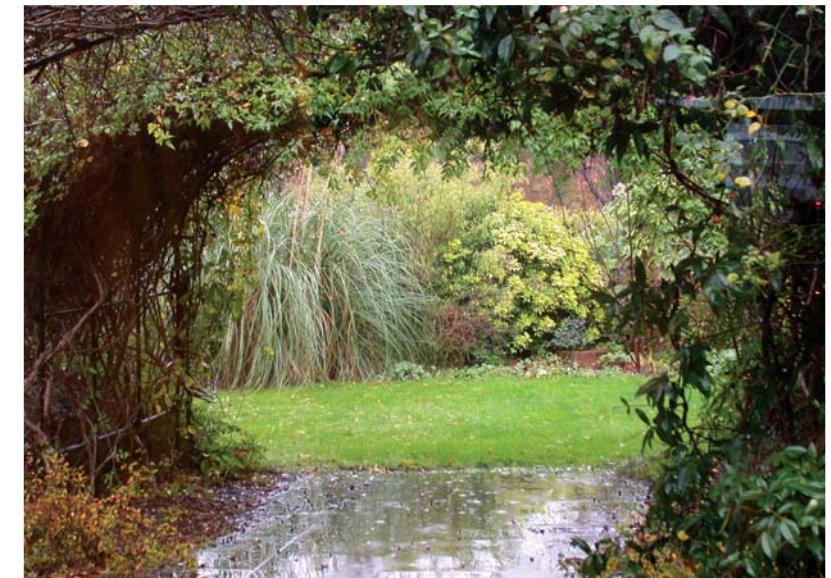
Large dinner/ community room	L	C	H	Material/Texture	Comment
Walls	34	34	26		Accent wall
	90	**26**	**87**		Under windows
Window Sills	92	5	102		White
Skirting	92	5	102		
Floor	34	15	69	Tufted	
Furniture	44	42	67		Table
	54	25	43		Chair 1
	51	25	71		Chair 2
	13	17	55		Piano
Lighting	70	0	109	Plastic	
Curtains	64	29	81		
	81	15	92		
Paintings	29	14	134		
Little community room	**L**	**C**	**H**	**Material/Texture**	**Comment**
Walls	91	27	86		Yellow
	96	3	99		White
Skirting	92	4	100		
Floor	41	15	69	Tufted	
Pillow	76	19	85		
	59	15	110		
	61	24	47		

Little community room	L	C	H	Material/Texture	Comment
Furniture	62	39	70	Wood	Table
	53	26	45	Fabric	Chair
	51	28	70	Fabric	Armchair
	36	21	63	Fabric	Sofa
	62	13	82	Fabric	Sofa
	72	13	84		Wardrobe
	36	13	63		Wardrobe
Corridor ground floor	**L**	**C**	**H**	**Material/Texture**	**Comment**
Walls	71	26	333		Purple
Corridor first floor				**Material/Texture**	**Comment**
Walls	74	37	40		Orange
Corridor second floor				**Material/Texture**	**Comment**
Walls	89	48	89		Lemon yellow
Corridor third floor				**Material/Texture**	**Comment**
Walls	78	28	215		Light blue/Terquoise
Lift				**Material/Texture**	**Comment**
Walls	32	41	35		Red

Swanbank Court

Lux Level Measurements

Lux Levels -
Horizontal Illuminance
Surface Mounted Downlighter - on

165

12

13

7

Jp
78

150

23

70
33

Lux Levels -
Horizontal Illuminance
Surface Mounted Downlighter, set of three bulbs each lamp - on

109   72

Large 218
Common
Room

66   147

Lux Levels -
Horizontal Illuminance
Surface Mounted Downlighter - on
Flourescent tube - on
Surface Mounted Spotlight

180

21

Small
Common Room
26

238   29

Up

Luminaires

Windows

Summary and Conclusions

Although no interviews were undertaken here, apart from one with the manager, information was gathered informally on people's likes and dislikes. Some of the residents did volunteer to help with colour preference testing and that provided opportunites for discussion about the building interior.

One strong response was that the colour schemes in communal areas such as corridors were too strong and bright; the four floors had a colour on each to define the floors from one another. Interestingly it was noticeable that many of the interiors of the flats were very neutral and pale, more so than had been seen in other establishments with older residents or service users. This may have been due to the overpowering level of colour in main thoroughfares; residents at Swan Bank Court were able to organise the decoration of personal spaces more easily than service users in other long-term healthcare environments.

The lighting needed to have more controls for local, personal dimming and reduction. Overall the lighting provision in communal areas was high and bright and to a visitor this appeared to be successful at creating a welcoming homely environment. The residents though made more comments about strength of illumination than anything else.

Most windows in the establishment looked out onto views of the river or well designed and tended gardens; sadly this was a rarity for many other buildings visited. Windows were not too high, often starting at near ground level; allowing a large amount of light to reach the floors and rooms. On the side of the building not facing the river residents could watch the regular to and fro of people going to work and travelling to the local commuter station. Most corridors had a chair near a window so sitting and watching daily life going on outside was easy.

The mobile library came on a regular basis and was appreciated by those able to use it. There appeared to be a very healthy social scene and preparations for Xmas were underway as we departed. A large part of the building's ground floor was dedicated to community activities, from a large dining room to a laundry room. A lift fitted with a bench, served all floors.

Largely the community at Swan Bank Court were very positive and vocal about the quality of the site and its facilities. Although not a long-term healthcare environment for the immobile, there were examples here of best practice which could be learned from and implemented in those kinds of buildings.

Herlev Hospital, University of Copenhagen
28/04/06

This skyscaper hospital pinnacle, designed by architects Gehrdt Bornebusch, Max Bruel and Jorgen Selchau has a height of **383 ft/116.73 m**. It was one of Denmark's tallest buildings and decorated in the 1970s. The Copenhagen University Hospital at Herlev was designed internally and decorated by the late visual artist Poul Gernes. Many experts in the field of contemporary art maintain that the hospital contains Denmark's largest artistic decoration of a public space.

Background

Poul Gernes transformed this building into one of the first polychrome hospitals in the world (Gernes 2003). The foyer of the hospital contains 56 paintngs executed by Gernes and his wife Aase Seidler Gernes.

The building presents a vision of the integration of colour, form and function; Gernes used colour freely across all surfaces in every direction, had colour everywhere and different colours in simple and clear motifs. These were patterns and symbols which were very easy to recognise at a distance such as checkerboards or bulleyes. His aim was to make the foyer a beautiful place that was inviting and welcoming. He was a lone wolf but for him this project was an issue of applied art '...art that possessed a utilitarian function'. Poul Gernes abhored white walls as they did not provide 'counter-

play' for the viewer. It remains a hospital which is an outstanding work of art where the building and visual art are integrated on every level.

The imaginative use of colour made this a particularly interesting case study in the context of this research project. The decoration today is exactly as it was when it was originally executed in the early 1970s. The hospital takes care to maintain the interior decoration and colour schemes. Gernes's designs were not only for the interior decor but also for beds, equipment and even curtains. They have all been sustained, repaired or restored to their original state. Those present agreed that – remarkably - the decoration did not feel dated. All were generally in pristine condition; the original art work was completed using enamel paints on treated fireproof boards.

A tour of the hospital by Ulrikka Gernes, daughter of the late designer, one of the hospital architects and several other members of staff gave insight to the scale of the work.

The In-Patient Tower has 25 stories and on each floor there are 48 beds. The decoration of each floor of the hospital followed the same pattern. An elaborate system of colours for the doors around the hospital established a coding system related to the function of that space behind the door.

The floor which the team were invited to visit was the Haematology Ward. Gernes had a clear philosophy about colour; The rooms facing North were to be painted in "cool" blue tones. As one moves around the building to the South the colours become warmer, with yellows and oranges used in the South-facing rooms. Yellow hues were suitable for East-facing rooms and soft peach and apricot for West-facing spaces. Poul Gernes believed that north light brought out the best in cool colours while a warm, southern light brought out the best in warm colours. This practice went against much conventional guidance on colour application; brightening up darker cooler corners of a building would in many instances be treated with a warmer hot colour. His belief was that mixing a cool northern light with warmer wall colours or vice versa, would render the spaces murky and dull.

The nurse who showed us around said that she preferred working in the East and South rooms with the warmer colour schemes (yellows and oranges). However, these rooms also tended to have better views so it may have been the views rather than the colours which made her like these

rooms. In a similar way, patients tended not to like being put into a blue room but these rooms overlooked the Chapel where patients were taken should they die whilst at the hospital. The chapel was the same colour as these rooms, downstairs in the same quarter of the building, and maybe why the patients did not appreciate those colours.It is not possible to know whether it was the proximity to the Chapel or the colour which the patients were keen to avoid.

The nurse liked the fact that there were different colours in the different rooms – she would not like all the rooms to be painted in hot colours. She felt that it is right to have cool colours to the North and warm colours to the South and said that it felt balanced like this.

Another principle which Poul Gernes espoused was that there shouldn't be any doubt about what a colour is, e.g. it should be identifiable as a green, or a blue. For this reason only pure colours were used throughout the hospital.

Being a tall building with unobstructed open aspects from all of the windows, the patient rooms are very light. The staff room, by contrast, is located in the middle of the building with no natural light. Gernes chose to keep the lighting in these spaces very low. Moving from the bright patient rooms into these relatively dark spaces, one feels the contrast more acutely. This contrast is surprisingly liked by the nurses as it provides an entirely different environment, and therefore a demarcation between work and relaxation spaces.

We observed a novel use of colour as a wayfinding aid. From the front entrance of the hospital, the pathway to the ophthalmology outpatients service was marked on the floor by means of a contrasting coloured lines, red, white and blue. By following this line (into the lift) the patient would find their way to the appropriate part of the hospital and floor.

In some of the corridors, the walls were painted a neutral colour while the ceilings were painted a more intense colour. This is an unusual strategy but one which we felt worked well as an aid to navigation and orientation. It also affords more interesting views for those prone on hospital beds.

One innovative feature of all the in-patient bedrooms were the curtains. Gernes designed these himself with a logical and functional approach to 'design for purpose'. Printed with large sections of flowered ornamental patterns, they were able to control daylight entering the room; different lighting or shading could be achieved by gathering the curtains to use the darker printed sections, or the lighter more transparent sections; these would be

able to control the daylight entering the window to graduate the light penetration.

Some of the blue bedrooms have new beds, i.e. beds different from those in place when the decorative scheme was first executed. This may be the first departure from Gernes's schemes.

Several of the bathrooms appeared to be too small when nurses are accompanying patients.

Part of the remit for the interior design was that the colours and art work would reduce the time spent in hospital by patients. According to the architect in residence, patients spend 20% less time in this hospital than in other hospitals in Denmark.

It was felt that wayfinding around the hospital was not always easy, no doubt in part due to the large scale of the building.

Overall, we found the hospital to be very uplifting, engaging, interesting and well maintained. Its unique artistic quality is difficult to match by any other building visited by the team.

See results of the audit under Summary and Conclusions

Visual journey

Entrance and Foyer Areas

Foyer Corridors

Washrooms

Ground Floor Corridors
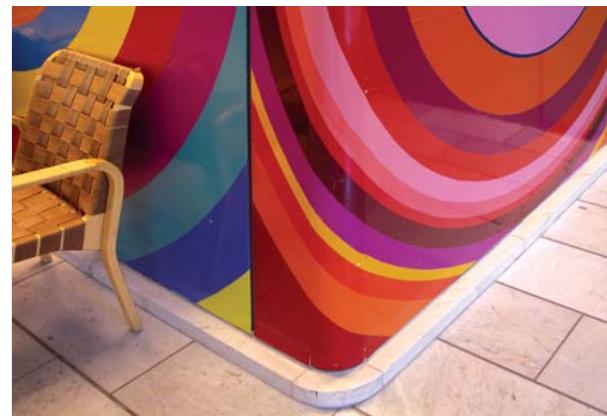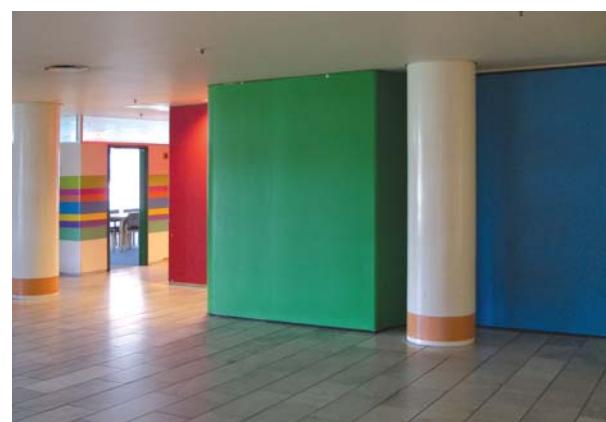
Signage and Navigation Aids
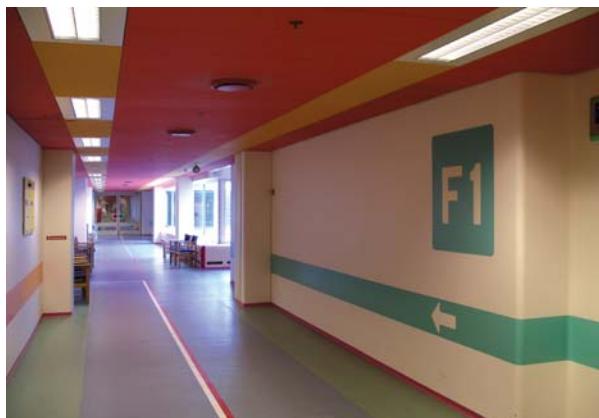
Doors and Lifts
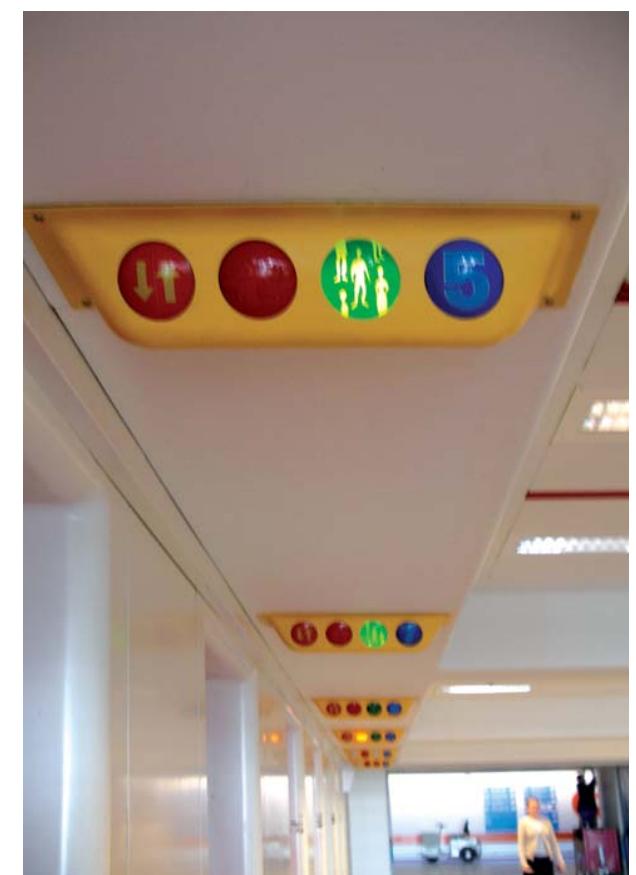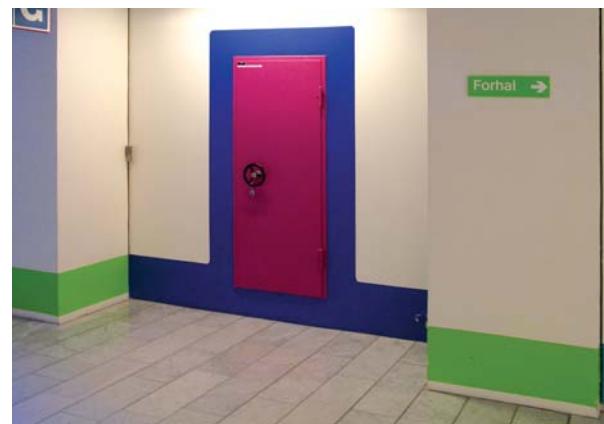
Colour Coding and Orientation

Wayfinding for Visually Impaired Patients

Ward Interiors

Poul Gernes Textile Design

Personal Space

In the ward that we visited (Haematology) patients were accommodated either in rooms with three beds, two beds, or one bed. The beds had curtains which could be drawn around them. Patients could therefore have visual privacy, if to varying degrees. Those in single rooms could have a private conversation in their rooms while those in shared rooms, provided they were mobile, could go to the day room. In the same way, all patients, providing they were mobile or had a single room, could choose to be alone. As far as opportunities to be with others are concerned, mobile patients could go to the day room, and those in shared rooms would be with their room mates. The rooms were generally larger than most UK spaces; this applied to single rooms more than shared spaces.

Toilets and bathrooms were located throughout the ward and were convenient for the bedrooms. It was felt, however, that they were not located particularly discretely

Views

All patients' bedrooms around the whole building had large windows, affording panoramic views of the city, one of the benefits of a tower format. The windows allowed all the patients to see the sky, although not the ground, grass and trees if bedridden. There were two main staff areas, one of which had a large window while the other was located in the core middle of the building and had no natural light at all. As with the patients' spaces, from the windowed staff room the staff have panoramic views of the City, sky but again not the ground. Although the view seemed to be probably calming, being so far from the ground means that patients cannot see views of everyday life or of things going on, particularly important for non-mobile patients. For this reason the views arguably lack some interests that may afford distraction.

Outdoors and nature

Being built as a tower block, the wards at Herlev Hospital do not connect well with outdoor life. Patients and staff cannot easily see plants, vegetation and nature. They do not have easy access to quiet, external areas. It appeared moreover that what land did exist around the hospital had not been landscaped in such a way as to make it usable by, and attractive to, patients and staff. There was no provision of suitable and comfortable furniture outside.

Comfort and control

The bedrooms were provided with curtains which allowed both patients - assuming they were mobile - and staff to easily exclude sun light and day light. In fact these were of an innovative design by Gernes. It appeared that the temperature could easily be controlled by the staff but not by the patients (opening of windows/doors and fresh air). The design layout minimises unwanted noise in the patient areas. However, one of the two staff areas was situated adjacent to the ward reception desk and as such staff using this area were not separated from the noise and activity of the reception.

Legibility of Place

This is a very large hospital site which appears to have been built all at the same time and which, as a consequence, has a similar look and feel throughout. Despite several methods of navigation and wayfinding with colour coding it was not an easy building to find one's way around or to understand the way the building is laid out. Upon arrival at the building, the main entrance was not signed in an obvious way and the name of the hospital not evident at all. This is particularly problematic for a general hospital where people might be arriving in need of urgent medical attention. It was not felt that there was a logical hierarchy of places within the building or that it was clear which spaces are public and which are private. However it was felt that it was fairly obvious where to go to find a member of staff. For example, there was an information desk in the middle of the main foyer. To some extent, different parts of the building have different characters. The use of colour was very helpful in this regard. However it was felt that on leaving the hospital the way out was not obvious.

Appearance

The interior of the hospital was rated very highly by staff and users. It was clean and tidy, with ample provision for art, plants and flowers. There were limited opportunities for patients to personalise their spaces through the display of personal items. For the most part the interior felt light and airy, although the windowless staff rooms detracted from this to some extent. The use of colour is, of course, exemplary. Some people commented however, that there was a lack of variety in the textures of the materials used. Unusually for a hospital the treatment of ceilings was innovative and interesting. Finally, the floors in the hospital were for the most part hard, which is preferred by wheelchair users and are easier to keep clean than carpeting. Some areas could have been softer which might have given the building a less institutional ambience.

Facilities

The facilities are as would be expected from a general hospital. The common spaces are provided for with easy chairs, tables and chairs. There were neither facilities for patients to make drinks or vending machines which were easily accessible. There was however a space in which religious observances could take place.

Staff

The staff areas were rated highly. They had convenient places to change and to securely store belongings and clothes, as well as to get snacks and meals. Staff could rest and relax in places away from patient and visitor areas. Staff also had convenient places to concentrate on work without being on demand all the time, as well as having easy and convenient access to IT facilities.

Accessibility In general, the hospital was not rated highly for accessibility. The entrance to the hospital is level and so is suitable for wheelchair users. However, on entering the hospital, the information desk is not at an appropriate height for someone in a wheelchair to communicate face to face with reception or assistance staff. Nor are the lifts particularly accessible or easy to operate.

For those with visual impairments the entrance to the hospital was not sufficiently obvious. The signage, however, was of reasonably good contrast, quite well lit, and at an appropriate height. Unfortunately there was no contrast nosing on the stairs. Sanitary ware and door handles did not contrast sufficiently with their backgrounds to assist visually impaired users. Likewise there was no audio information to assist visually impaired people around the building. Flooring was found to be of good quality though and was not visually dazzling or disturbing through being for example too shiny or brightly patterned.

See Analysis of Summary and Conclusions.

This audit was a short visit over one afternoon - the research team were invited by a company that develops medical equipment and furniture for people with age related problems, to see this exceptional example of a resolved and cohesive design project. No element of the building was poorly designed. From the main gate and concourse right through to the sensory gardens at the rear of the site where residents might do some gardening, the interiors worked together and were sensitively realised. The Meucon building was known as an example of best practice in this sector. It had a considerable reputation in long tern heathcare and a large waiting list for applications for residency. Due to the short duration of the visit no interviews were conducted with staff other than the Director. A visual audit was undertaken - see Visual Journey.

Audit Report

The Meucon Home is a long-term healthcare environment set in a residential area in Vannes, southern Brittany, France. The house is a unique example of collaboration between a large team and the expert management of the Director of the house. His experience with developing previous establishments was used effectively in this project. He created a team, able to influence the sensory design issues needed to care for residents with dementia.

The main structure of the site is a set of small 'house' units. Each with a strong character

and sense of comfortable ambience, both optimistic and caring. In observing each house in succession one was aware of the design concepts boldly carried out with freshness and modernity. Each house used a strong key colour with a diffused version of that colour throughout the building. This was apparent from the start of the journey. The main door of each 'house' was the strongest tone of the key colour making a striking, memorable entrance to each unit.

Colour not only marks the beginning of the journey through the building but carries on through the interior in many ingenious ways. The colour is used in different levels of strength or chroma as bands of colour on walls, handles and skirtings. Even the enclosed small courtyards and the sculptures or objects displayed reference the key colour in some way. These spaces may have one

wall painted in a key colour to contrast with foliage or piece of sculpture. Although a strong device, colour does not feel like it used for basic coding; colour is used for sheer enjoyment and enhancement of the environment.

Light seems to penetrate the houses from all directions; a carefully planned orientation of the buildings is evident. This sense of colour, light and design keeps up its momentum all the way through the site. A strategy carries on out to the landscaped gardens at the rear of the building. Each house forms a 'U' shape around the landscaped gardens. The landscaping is very imaginative; it was designed for maximum fragrance, tactility, and acoustic effects. Water features and visually contrasting materials created a strong effect. Throughout the site gardens' a series of coloured pathways ran in curves in and around the foliage, stones and textures. Residents were seen to be walking energetically and confidently on these contrastingly marked paths despite some suffering from severe dementia.

Spaces were either personal or social; there were large lounge seating areas where all the residents could sit in groups or singly in comfortable non institutional chairs. The care staff seemed at ease and relaxed, sitting interacting with the residents on board games or assisting with eating and caring for their needs.

The final observations from the site visit were that an enormous effort had been made to create a successful environment that worked for all; staff morale was extremely high at the time visited.

Design was a major priority both inside and outside the building. The landscape design encouraged secure independence giving the residents stimulating visual colour and contrast as well as sensory experiences with the interlocking pathways and borders of fragrant, tactile planting.

**Visual Journey
Reception and Cafe Area**

Main Corridor

Interior and Exterior Colour Schemes

Resident Room

Seating
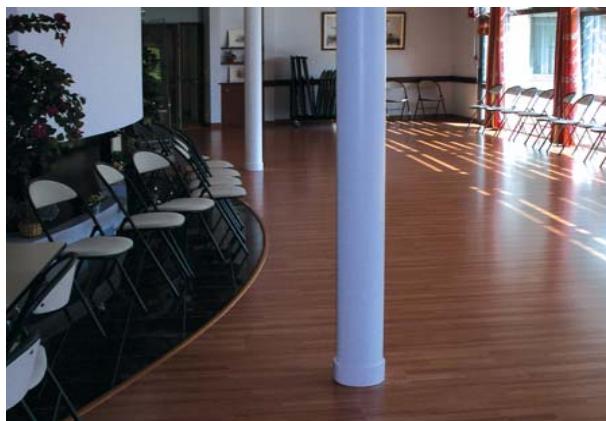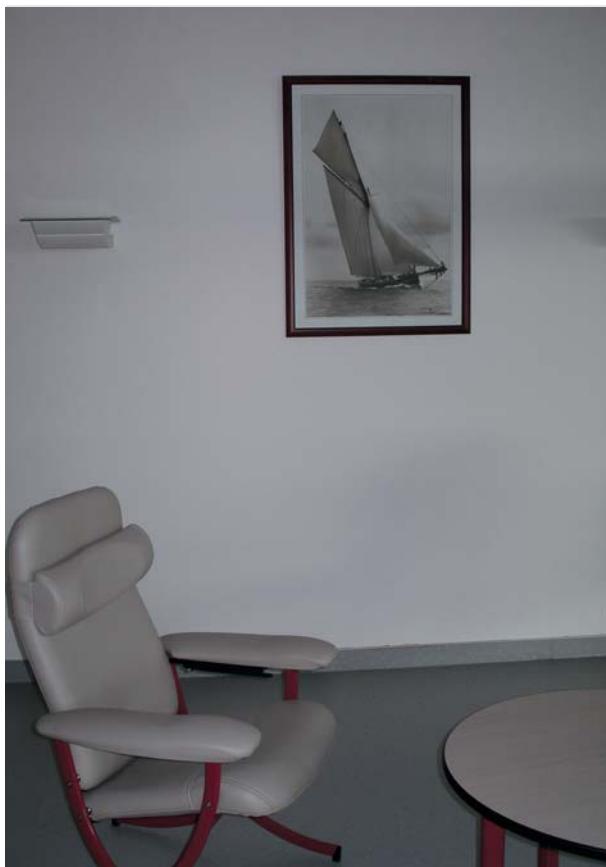
House Colour Schemes
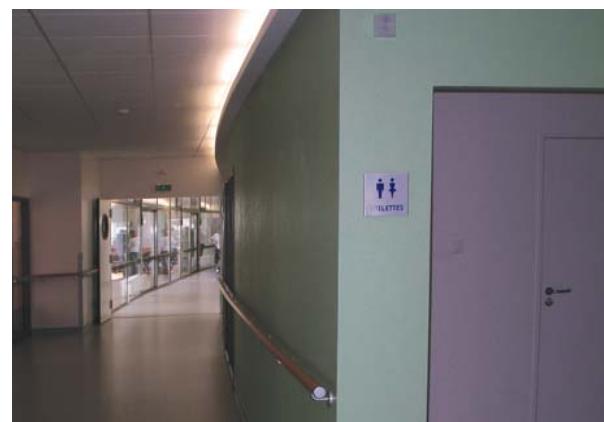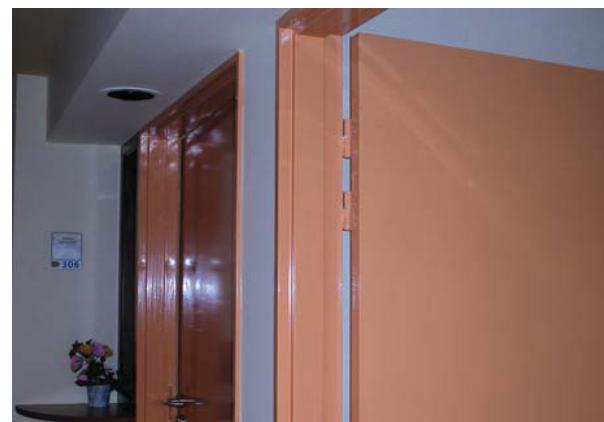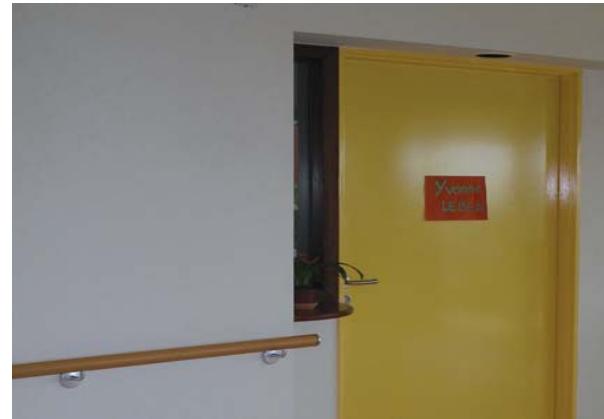
Views of the Gardens

Coloured Garden Pathways

Landscape Schemes

Accessible Containers

Seating

Exit Gate

Analysis of Summary and Conclusions

ASPECT Audit Methodology

ASPECT is a staff/patient environment calibration tool, first published by the NHS (NHS Estates 2001); it has been improved and adapted in recent years as AEDET EVOLUTION(**www.doh.gov.uk**). This project, assessing a range of long term health care environments, required a tool for evaluating these types of buildings. ASPECT was selected as an important audit tool. It had to be modified by the research team, for use particularly in these kinds of spaces where a detailed and accurate qualitative judgement was needed. All but one audit, Audit 02, were undertaken by a team of at least three people. Producing an objective piece of research-based evidence from a range of qualitative assessments was required.

Where possible, each of the audit sites was evaluated by means of this ASPECT questionnaire. Each of the items on the questionnaire was assigned a score between 1 and 6, with the best score being 6 and the poorest score being 1. Those questions which were not applicable were assigned a score of 0.

The scores were entered into the Summary Table. For each of the nine sections the scores for each site were summed and then divided by the number of questions in the section excluding those which had been assigned a score of 0.

This produced an average score for each site for each of the sections. Letter marks were then assigned to the scores for each site for each section according to the following scheme: was

A   5.00 – 6.00

B   4.00 – 4.99

C   3.00 – 3.99

D   2.00 – 2.99

E   1.00 – 1.99

The same principles were applied to calculating the overall scores for each site. In this case the average scores for each of the sections were summed and then the total was divided by nine, being the number of sections. This produced the overall average score for each site. Letter marks were then assigned as before.

0 = not applicable, 1 - 6 = not true - certainly true	Site 01 Galsworthy	Site 02 Church Farm	Site 03 Neuro disability	Site 04 St Lukes	Herlev Copenhagen
1 PRIVACY, COMPANY AND DIGNITY					
1.1 Patients can choose to have visual privacy	6	5	5	2	6
1.2 Patients can have a private conversation	6	6	6	1	6
1.3 Patients can be alone	6	6	6	1	6
1.4 Patients have places where they can be with others	6	3	6	6	5
1.5 Toilet/bathrooms are located conveniently	6	3	4	4	6
1.6 Toilets/bathrooms are located discretely	5	5	5	6	3
Total	35	28	32	20	32
Divided by	6	6	6	6	6
Average	5.83333	4.66666	5.33333	3.33333	5.33333
Letter	**A**	**B**	**A**	**C**	**A**

0 = not applicable, 1 - 6 = not true - certainly true	Site 01 Galsworthy	Site 02 Church Farm	Site 03 Neuro disability	Site 04 St Lukes	Herlev Copenhagen
2 VIEWS					
2.1.1 There is a window in patients' rooms	6	6	6	3	6
2.1.2 There is a window in staff rooms	3	0	4	0	3
2.2.1 Patients can easily see the sky	5	6	6	4	6
2.2.2 Staff can easily see the sky	5	0	1	5	5
2.3.1 Patients can easily see the ground	4	6	5	4	1
2.3.2 Staff can easily see the ground	5	0	1	5	1
2.4 The outside view is calming	6	5	6	4	6
2.5 The view outside is interesting	6	5	3	5	3
2.6 There are views of everyday life	4	1	2	1	1
2.7 Patients who are not mobile can see things going on	3	1	3	3	1
Total	47	30	37	34	33
Divided by	10	7	10	9	10
Average	4.7	4.28571	3.7	3.77777	3.3
Letter	**B**	**B**	**C**	**C**	**C**

0 = not applicable, 1 - 6 = not true - certainly true	Site 01 Galsworthy	Site 02 Church Farm	Site 03 Neuro disability	Site 04 St Lukes	Herlev Copenhagen
3 OUTDOORS AND NATURE					
3.1 Patients have access to outdoors	4	6	5	5	1
3.2.1 Patients have access to usable landscape areas	4	6	6	3	1
3.2.2 Staff have access to usable landscape areas	6	0	6	3	1
3.3 Outdoor spaces are provided with suitable and comfortable furniture	6	4	5	0	1
3.4.1 Patients can easily see plants, vegetation and nature	6	6	6	5	1
3.4.2 Staff can easily see plants, vegetation and nature	6	0	2	5	1
3.5 Patients have access to quite external areas	4	5	5	5	1
Total	36	27	35	26	7
Divided by	7	5	7	6	7
Average	5.14285	5.4	5	4.33333	1
Letter	**A**	**A**	**A**	**B**	**E**

0 = not applicable, 1 - 6 = not true - certainly true	Site 01 Galsworthy	Site 02 Church Farm	Site 03 Neuro disability	Site 04 St Lukes	Herlev Copenhagen
4 COMFORT AND CONTROL					
4.1.1 There is a variety of artificial lightning patterns appropriate for day/night, summer/winter - for sleeping areas	4	3	5	4	
4.1.2 There is a variety of artificial lightning patterns appropriate for day/night, summer/winter - for other areas	3	3	4	4	
4.2.1 Patients can easily control the artificial lightning	4	2	6	5	
4.2.2 Staff can easily control the artificial lightning	6	0	6	6	
4.3.1 Patients can easily exclude sun light and day light	5	5	5	6	6
4.3.2 Staff can easily exclude sun light and day light	6	0	6	6	6
4.4.1 Patients can easily control the temperature	3	2	1	2	1
4.4.2 Staff can easily control the temperature	6	0	6	0	6
4.5.1 Patients can easily open windows/doors	4	2	6	2	
4.5.2 Staff can easily open windows/doors	6	0	6	4	
4.6 Patients can have fresh air	6	6	6	4	
4.7.1 The design layout minimises unwanted noise in patient areas	5	4	5	6	6
4.7.2 The design layout minimises unwanted noise in staff areas	2	0	5	6	4
Total	60	27	67	55	29
Divided by	13	8	13	12	13
Average	4.61538	3.375	5.15384	4.58333	2.23076
Letter	B	C	A	B	D

0 = not applicable, 1 - 6 = not true - certainly true	**Site 01** Galsworthy	**Site 02** Church Farm	**Site 03** Neuro disability	**Site 04** St Lukes	**Herlev** Copenhagen
5 LEGIBILITY OF PLACE					
5.1 When you arrive at the building, the entrance is obvious	6	1	3	6	1
5.2 It is easy to understand the way the building is laid out	4	1	1	1	1
5.3 There is a logical hierarchy of the places in the building	4	2	5	5	1
5.4 When you leave the building, the way is obvious	6	1	1	1	1
5.5 It is clear which places are private and which are public	5	2	5	6	2
5.6 It is obvious where to go to find a member of staff	3	2	4	5	4
6.7 Different parts of the building have different characters	5	2	5	4	3
5.8 Wayfinding throughout the building is easy	5	3	3	5	1
Total	38	14	27	33	14
Divided by	8	8	8	8	8
Average	4.75	1.75	3.375	4.125	1.75
Letter	**B**	**E**	**C**	**B**	**E**

0 = not applicable, 1 - 6 = not true - certainly true	Site 01 Galsworthy	Site 02 Church Farm	Site 03 Neuro disability	Site 04 St Lukes	Herlev Copenhagen
6 APPEARANCE					
6.1 Patients' spaces feel homely	5	5	5	1	1
6.2 The interior feels light and airy	4	2	4	3	4
6.3.1 The interior has a variety of colours	6	1	3	4	6
6.3.2 The interior has a variety of textures	5	2	4	5	4
6.3.3 The interior has a variety of views	5	3	4	4	6
6.4.1 The interior looks clean	6	5	6	5	6
6.4.2 The interior looks tidy	6	6	5	5	6
6.5.1 The interior has provision for art	5	6	6	5	6
6.5.2 The interior has provision for plants and flowers	5	5	6	5	6
6.6 Ceilings are designed to look interesting	4	3	5	1	6
6.7 Patients can have and display personal items in their own space	6	6	6	6	4
6.8 Floors are covered with suitable material	5	4	6	5	6
Total	62	48	60	49	61
Divided by	12	12	12	12	12
Average	5.16666	4	5	4.08333	5.08333
Letter	**A**	**B**	**A**	**B**	**A**

0 = not applicable, 1 - 6 = not true - certainly true	Site 01 Galsworthy	Site 02 Church Farm	Site 03 Neuro disability	Site 04 St Lukes	Herlev Copenhagen
7 FACILITIES					
7.1 Bathrooms are provided with seats, hand rails, non-slip mats, a shelf for toiletries and somewhere to hang clothes within reach	6	1	6	0	
7.2 Patients can have a choice of bath/shower and assisted/unassisted bathrooms	6	5	6	0	
7.3 There is a space where religious observances can take place	6	3	6	6	6
7.4 There is a place where live performances and social events can take place	6	3	6	6	
7.5.1 There are easy chairs, tables and desks in the patients' private spaces	5	6	4	1	0
7.5.2 There are easy chairs, tables and desks in the patients' common spaces	6	4	5	6	6
7.6 Patients have facilities to make drinks	6	2	6	0	1
7.7 Patients can easily make and receive phone calls	6	6	6	2	0
7.8 There are easily accessible vending machine for snacks	1	1	0	0	1
7.9 There are facilities for patients' relatives/friends to stay overnight	1	1	6	0	0
Total	49	32	51	21	14
Divided by	10	10	9	5	4
Average	4.9	3.2	5.66666	4.2	3.5
Letter	B	C	A	B	C

0 = not applicable, 1 - 6 = not true - certainly true	Site 01 Galsworthy	Site 02 Church Farm	Site 03 Neuro disability	Site 04 St Lukes	Herlev Copenhagen
8 Staff					
8.1 Staff have a convenient place to change and securely store belongings and clothes	5	0	6	0	5
8.2 Staff have convenient places to concentrate on work without being on demand	6	0	6	3	6
8.3 There are convenient places where staff can speedily get snacks and meals	5	0	6	1	6
8.4 Staff can rest and relax in places segregated from patient and visitor areas	2	0	6	6	6
8.5 All staff have easy and convenient access to IT	6	0	6	0	6
8.6 Staff have convenient access to basic banking facilities and can shop for essentials	0	0	5	0	0
Total	24	0	35	10	29
Divided by	5	0	6	3	5
Average	4.8	0	5.83333	3.33333	5.8
Letter	B		A	C	A

0 = not applicable, 1 - 6 = not true - certainly true	**Site 01** Galsworthy	**Site 02** Church Farm	**Site 03** Neuro disability	**Site 04** St Lukes	**Herlev** Copenhagen
9 ACCESSIBILITY					
9.1 The entrance is accessible by wheelchair users and visually impaired people	2	2	4	1	3
9.2 Reception desks are accessible for wheelchair users	3	5	5	1	1
9.3 Lifts are easily operated and accessible	2	0	6	0	1
9.4 All signage is of good contrast, well lit and at an appropriate height	2	1	2	6	4
9.5 Audio information is available	0	1	0	0	1
9.6 Flooring is good quality and not visually disturbing e.g. shiny or brightly patterned	5	4	3	6	6
9.7 Stairs have contrast nosing	0	0	0	1	1
9.8 Contrast details such as sanitary ware and door handles are evident to assist visually impaired users	1	1	4	0	1
Total	15	14	24	15	18
Divided by	6	6	6	5	8
Average	2.5	2.33333	4	3	2.25
Letter	**D**	**D**	**B**	**C**	**D**

Summary Table Comparing 5 Sites

	Site 01 Galsworthy	Site 02 Church Farm	Site 03 Neuro disability	Site 04 St Lukes	Herlev Copenhagen
1. Opportunities to be alone and with others and location of bathrooms and toilets	A	B	A	C	A
2. What is seen from the window	B	B	C	C	C
3. Opportunities to spend time outside	A	A	A	B	E
4. Opportunities to exercise control over the lightning, temperature, air quality and noise levels	B	C	A	B	D
5. Orientation within the building	B	E	C	B	E
6. Aesthetic aspects of the environment	A	B	A	B	A
7. Amenities	B	C	A	B	C
8. Provision for those with sensory and/or motor impairments	B		A	C	A
9. Accessability	D	D	B	C	D
OVERALL					
Total of Averages	42.40824	29.01071	43.06217	34.76944	30.24743
Divided by	9	9	9	9	9
Overall Average	4.71202	3.22341	4.78468	3.86327	3.36082
Overall Letter	B	C	B	C	C

Legend: A = excellent, B = very good, C = acceptable, D = unacceptable, E = fail

Section 3

Experimental study of colour preferences

Preferences for surround colour for long-term healthcare environments

Long-term healthcare refers to support services which are provided over a prolonged period of time or on a permanent basis to individuals who have difficulties associated with disability, long-term illness or old age. By convention, long-term care is taken to refer to a period of six weeks or more. The environment in which such care is delivered varies widely from care delivered in an individual's own home to the more usual institutional settings, such as hospitals and care homes.

Typically residents in long-term healthcare are incapacitated in some way. They may have mobility difficulties and be unable to walk unaided, or have multiple disabilities. Some may have mental health problems which mean that they are dangerous to themselves or to society. For these and other reasons those in receipt of long-term healthcare may be either unable or not permitted to leave the care environment in which they live. A corollary of this is that residents in long-term care environments often spend their lives in very confined surroundings, inhabiting only a limited number of spaces. For example, a resident in a nursing home may make a relatively limited journey between a bedroom, bathroom, corridor and day room, never venturing beyond these few spaces.

Until relatively recently it was widely believed that the healthcare environment itself had no bearing on the health or sense of well-being of patients or residents and that the only factor which mattered was the quality of the healthcare (Ulrich, 1992). However, evidence has been accruing from the acute healthcare sector to demonstrate that healthcare environments can have a major influence on the speed of recovery of patients as well as on their mental state (Davidson, 1994; Ulrich, 1984; Verderber & Reuman, 1987; Lemprecht, 1996). While the effects of the environment on patients may to a large extent be unconscious there is evidence that patients may be highly sensitive and articulate about their surroundings (Lawson & Phiri, 2003). Given that residents in long-term healthcare environments spend prolonged periods in highly restricted spaces it is likely that the effects of the environment will be felt even more intensely than is the case with acute care. This is particularly true as residents in long-term care may endure long periods of inactivity either lying in bed or sitting in a chair and may receive only brief and sporadic attention from doctors and slightly longer periods of personal care from nurses and therapists.

The way in which the long-term care environment is designed is therefore of critical importance.

It is widely believed that colour can have an important effect on mood (Sharpe, 1981). For example, monotonous environments are known to be detrimental to those in prison (Fairweather & McConville, 2000). If colour schemes are designed with care they have the potential to improve the quality of long-term healthcare environments and, importantly, can do this in a cost-effective way.

Although there is a long tradition of studies investigating the psychology of colour, the widespread inconsistency in the findings makes drawing any clear conclusions very difficult. These inconsistencies are probably attributable to a large degree to a number of methodological shortcomings of many studies (Norman & Scott, 1952; Wise & Wise, 1988). For example, it is often the case that studies fail to rigorously control the three dimensions of colour: hue (whether a colour is blue or green etc.), brightness (the relative proportions of black and white in a colour), and saturation (the intensity of a colour, determined by the amount of pigment). The result is that there is considerable confusion about precisely what colours

were tested. This problem also makes the repetition of experiments impossible. Other problems with colour research include a failure to treat data statistically, failure to randomise or counterbalance presentation of colours, and failure to control lighting conditions. Studies have also been criticised for a lack of ecological validity and it has been argued that more "real world" testing is required.

As discussed at some length in the literature review, many studies of colour preference have suffered from significant shortcomings. With previous research in mind, the broad aim of the present study was to examine preference for surround (i.e. wall) colour for rooms typical of those found in long-term healthcare environments. The test was restricted to surround colour with the complicating factors of colour combinations and accent walls being omitted.

In earlier work by the Colour Design Research Centre the acceptability of surround colour was assessed by means of model "rooms". These were each constructed from three pieces of cardboard (two size A2 and one size A3) and when viewed in close proximity, filling the total field of vision, provided a convincing analogue of a full-size room. For this earlier work two hues from the

NCS colour system , Y20R and R90B, were examined. In each case 44 permutations of saturation and brightness were presented to subjects who were asked to judge whether each colour was "acceptable", "unacceptable", or that they were "not sure". The results of this study provided evidence, for these two hues, for the levels of saturation and brightness which subjects found to be "acceptable" for "surround colour", colour on all the walls of a room (Dalke, H., Stott, L. 2006).

The present study extended this earlier work in two ways. Firstly, we examined whether the findings for surround colour acceptability based on these two hues would generalise to other hues. To this end we selected a total of ten hues (including the two used in the earlier work) from around the NCS colour circle, selected in order to provide a good range of hues with no obvious visual gaps. For each of the ten hues nine combinations of saturation and brightness were selected, being representative of those found to be acceptable for Y20R and R90B. These were the same across all ten hues. This gave rise to a total of 90 colours (10 hues x 9 saturation/brightness combinations).

The present study also extended the earlier work by examining preference for colour in the types of rooms typical of long-term healthcare environments. Three types of rooms were selected as being most representative of those rooms occupied by residents of long-term care: bedrooms, corridors and day rooms. In view of the fact that many residents in long-term care inhabit only a very small number of spaces the colours chosen for the totality of the environment (i.e. bedroom, corridor and day room) was of interest as was the way in which these spaces related to each other as they would be experienced in a journey beginning in the bedroom, travelling through the corridor and into the day room. "Artist's impressions" of the rooms were created by hand-drawing images based on photographs of real environments. For each of the three types of rooms (1 (bedroom), 2 (corridor) and 3 (day room)) three example images showing different styles of room layouts were created (A, B and C), producing a total of nine room images (1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C). Figure 1 illustrates the three bedroom images i.e. images 1A, 1B and 1C.

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[1] Subjects were asked to rate how convincing they found the paradigm out of a maximum score of 5. The mean score of subjects was 3.84.

[2] The Swedish Natural Colour System (NCS) is one of a number of widely-used colour classification schemes.

Using Photoshop the walls in each of the nine rooms were flood-filled with each of the 90 colours. This produced a total of 810 coloured image cards (CISs). In order to minimise the potential confounding effects of additional colours within the images all colours other than those used for walls were neutral and held constant across the CISs. For all images the floor was coloured grey, the ceiling white, and the furniture and furnishings cream, the latter selected as being close to the natural colour of wood. Figure 2 illustrates one of the CISs.

Uncoloured images of bedrooms A, B and C.

Fig 1
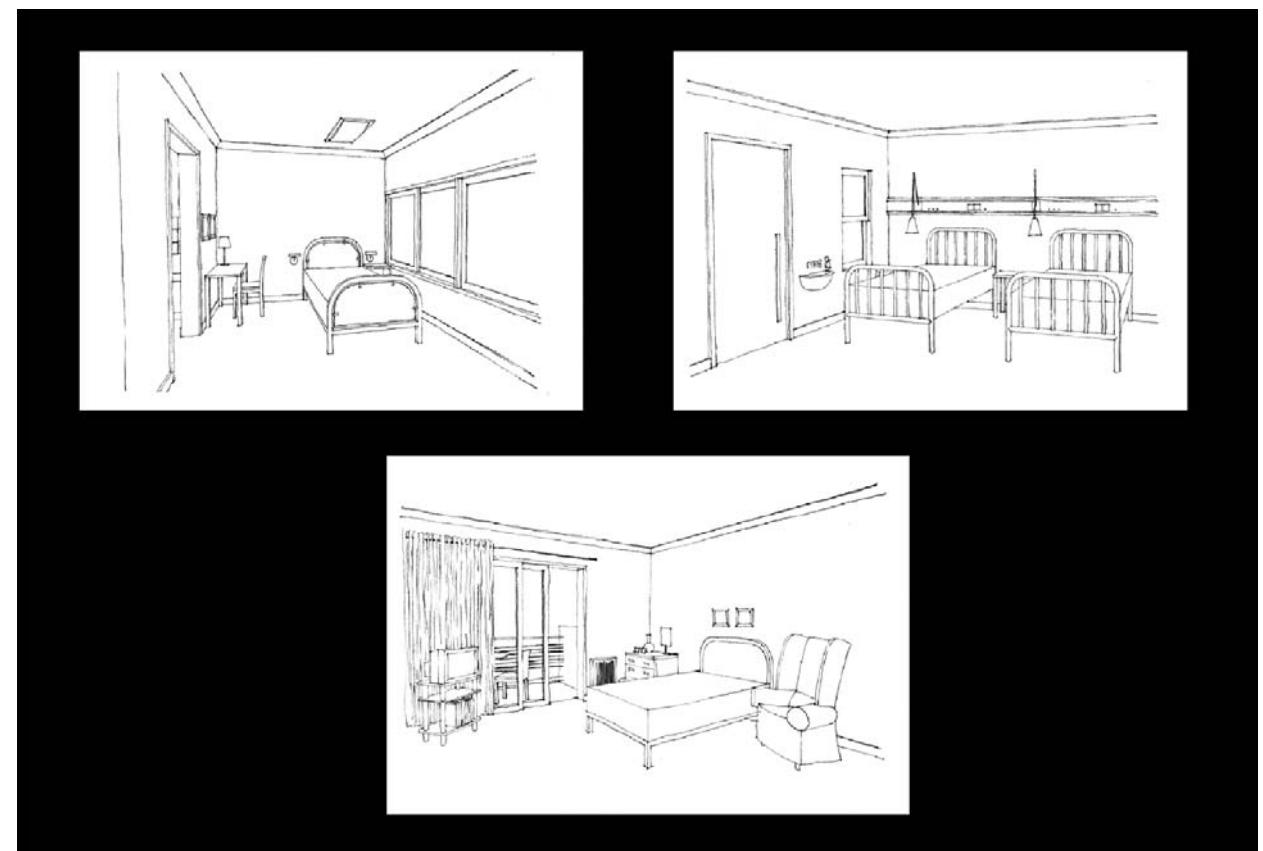
NCS Colours selected for the experimental study

10 hues and 9 shades

	Y20R	Y60R	R	R30B	R60B	R90B	B10G	B50G	G	G60Y
0505							B20G* 0505			
0520										
0540					R50B* 0530					
1010										
1030										
1050					R50B* 1040					
2005							B20G* 2005			
2020										
3010										

*These colours were selected from the next colour hue group as the colour reference was not available in NCS colour space. The colour patches above are only a representation of the colours.

Fig 2

Coloured image cards: The 810 images were printed onto cards which were approximately 124 mm x 93 mm. These were measured with a spectrophotometer to check final colour output and accuracy to ensure that the test colour was exactly the same as the NCS colour sample selected for the testing set. This is known as ICC profiling. The coloured image cards were kept in separate piles for each of the nine rooms (i.e. bedrooms A, B & C, corridors A, B & C and day rooms A, B & C). The ordering of the CISs within each pile was random.

Grey backgrounds: A piece of grey foam board was placed on a table to provide a neutral background against which participants could sort through the CISs without background colour affecting visual appraisal of the CISs.

Grey easel: Constructed from grey foam board this provided a place for subjects to put preferred cards which allowed them to easily see how the different colours worked together (Fig. 5).

Board with black and white images of all nine rooms.

Pens were provided for subjects to sign the consent form.

Printed materials: Verbal instructions; Subject Information Sheet and Consent Forms; subject record sheets to record responses.

A total of 112 subjects were tested. Of these 56 were male and 56 were female. The average age was 54.46 years. The sample was stratified by age with a total of 8 males and 8 females being tested from each of the following age bandings: 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80+ (See Fig.3).

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Demographic characteristics of participants.

Fig 3

	18-29	30-39	40-49	50-59	60-69	70-79	80+	TOTAL
Female	8	8	8	8	8	8	8	56
Male	8	8	8	8	8	8	8	56
TOTAL	16	16	16	16	16	16	16	112

Procedure

Tables were arranged so that the subject could sit next to a table with the easel and a table with the grey board where they could sort through the images. The experiment took place in good natural light between 10.00 and 14.00 each day. The experimenter began by explaining what the experiment involved and then gave the subject the Subject Information Sheet and Consent Form. The subject then read the Information Sheet and signed the Consent Form. They were then asked to look at the three uncoloured images of bedroom styles and asked to select the bedroom style (A, B or C) which they found easiest to imagine themselves in. The rationale in offering the subjects this choice was that it would allow them to select a room which they could readily imagine themselves in, thereby increasing the ecological validity to the task. The subjects were next asked to select one of the corridor styles followed by one of the day room styles. These choices were recorded and the research assistant then gave the experimenter the piles of CISs corresponding to the subject's choice of rooms, A, B or C. The experimenter then flicked through the CISs for the bedroom in order to give the subject a preliminary idea of the range of colours available and then asked the subject to sort through the cards selecting the three images having the wall colours which they would most like to live with (Figure 4).

The selection process

The easel to view three preferred colour choices of the journey.

The participant was further requested to articulate any thoughts that they had during the sorting and selection procedure.

The method which the subject used was recorded together with any other thoughts or comments they articulated during their sorting and selecting. Typically, subjects began by eliminating those colours which they definitely did not like. Subjects then selected their three "preferred" colours from those that remained. Those "preferred" colour choices which were shortlisted but ultimately not chosen were recorded by the research assistant. Having made their choice of three preferred bedroom wall colours their choice was placed onto the easel by the experimenter (See Figure 5). This allowed easy reference to these colours during the rest of the experiment.

This sequence of events was repeated for the corridor and day room, in each case subjects being required to choose preferred CICs of rooms with colours which they liked as surround colour. The only difference was that when selecting colours for the corridor and day room subjects were asked to take into account the colours which they had selected for the bedroom, and corridor where appropriate. Subjects were asked to keep in mind a journey that they might take beginning in the bedroom, travelling along the corridor and into the day room considering the way in which the colours in the three spaces would work together. They were asked to select colours in order to make up their preferred journey between the three spaces.

Once the subjects had picked out their "preferred" colours for each of the three spaces and these had all been placed on the easel the experimenter asked the subject which of the three combinations of colours (i.e. a bedroom, corridor, day room combination) was their overall "most preferred" scheme. Subjects were permitted to re-order the cards and change the cards in order to create their most preferred combination. The three schemes (each of three cards) were recorded, and the "most preferred" of these.

Subjects were thanked for their participation and given a token of appreciation..

For the purposes of analysis the Preferred and Most Preferred data were totalled. As noted above, for the Preferred selection each subject selected two bedroom-corridor-dayroom schemes, this totalling six room-selections for each subject. For the Most Preferred selection, each subject selected one bedroom-corridor-dayroom scheme, this totalling three room-selections for each subject. There were therefore a total of nine data points per subject and, given that there were 112 subjects, there was a maximum possible number of data points of 1008. In fact there was some missing data so that the total number of data points was 982.

The data was analysed in two ways. Firstly a chi square analysis was carried out on the frequency counts of subjects' responses in terms of the three dependant variables: Hue, Brightness, Saturation, and the three independent variables: Room Type, Age and Gender. Room Number was not included in the analysis as the different room layouts were not of particular interest and had been included merely to give subjects an opportunity to select a room which they could identify with (see above).

In addition, a logistic regression analysis was carried out. This allowed the significant levels of the different variables to be identified as well as whether they were negatively or positively significant. It also allowed an investigation of whether there was a three-way interaction of Hue, Brightness and Saturation.

The 112 subjects were able to make three choices for each of the room types – bedroom, corridor and dayroom, a maximum of 1008 choices. However, not all subjects specified all their choices for each of the room types and as a result only 982 data points were recorded.

The choices thus made were analysed using chi-squared tests of association (Agresti 2002). From contingency tables of frequency counts of subjects' responses, a chi-squared test of association between two factors was conducted. The factors considered were hue, brightness value, chroma saturation with each other and also with each of room type, age and gender. Room style, A, B or C, was not included in the analysis as the different room layouts were not of particular interest and had been included merely to give subjects an opportunity to select a room which they could identify with as explained above.

In addition, logistic regression modelling (Agresti, 2002) was carried out to identify which factors could predict whether a colour (defined by hue, brightness value, chroma saturation) would be chosen or not. Here, the outcome variable was whether chosen (i.e. "preferred") or not, and the explanatory variables were the three colour constituents: hue, Brightness value, chroma saturation. Separate analyses were performed for each of bedrooms, corridors and dayrooms and also for the combination of all room types. This methodology also allowed investigation of two or three-way interactions between hue, brightness value and chroma saturation.

See Appendix A for the full paper in preparation for submission to the Journal of Environmental Psychology

Results This section provides the test results of hue only for preferred colours in Bedrooms, Corridors and Dayrooms. The results also show these hue preferences in terms pf a 'journey' from a bedroom through to a dayroom; the overall conclusion is that people do prefer paler colours. NCS S 0505 was on the whole the most popular saturation and chroma level of all the colours tested. However people have shown some preference for colours with a slight increase in chroma to 20 and not 10 the point in between 05 and 20.

The other notable significance which came from the analysis was the obvious lack of preference for colours such as B50G, G and G60Y as hues for domestic environments.

Further details on the corelation of Hue, Saturation, Chroma, Gender and Age can be seen in Appendix A.

Top Bedroom Colours

1ST 0520 R90B

2ND 0505R30B

3RD 0505Y60R

4TH 0505R50B

3RD 0520 R50B

3RD 0505 B10G

3RD 00505R90B
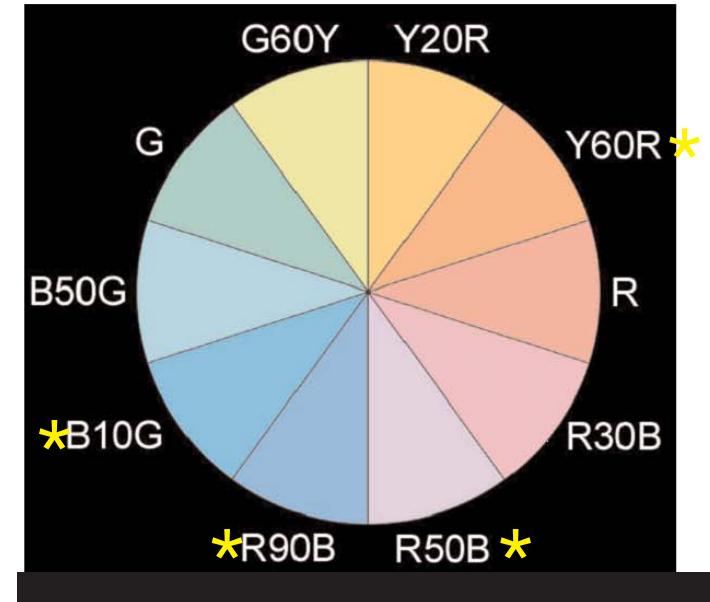
**Most Popular Colour Groups
Bedroom**

Top Corridor Colours

1ST 0505 R30B
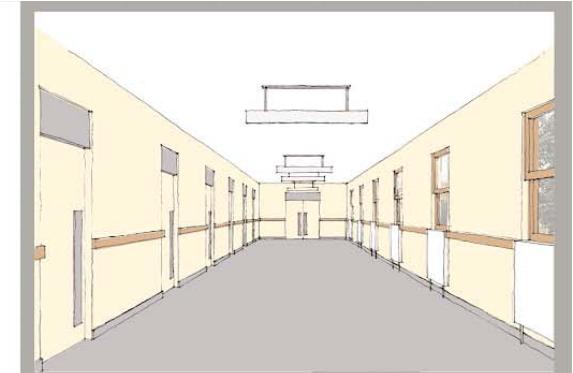
2ND 0505 Y60R
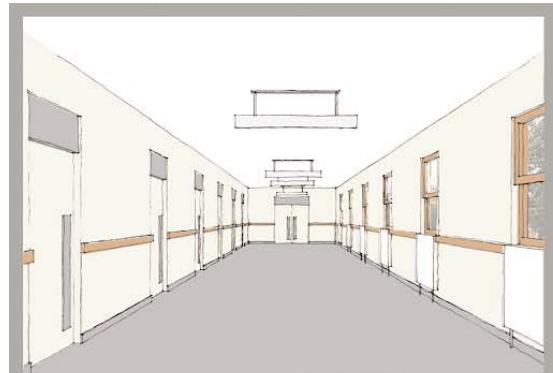
3RD 0505 R50B
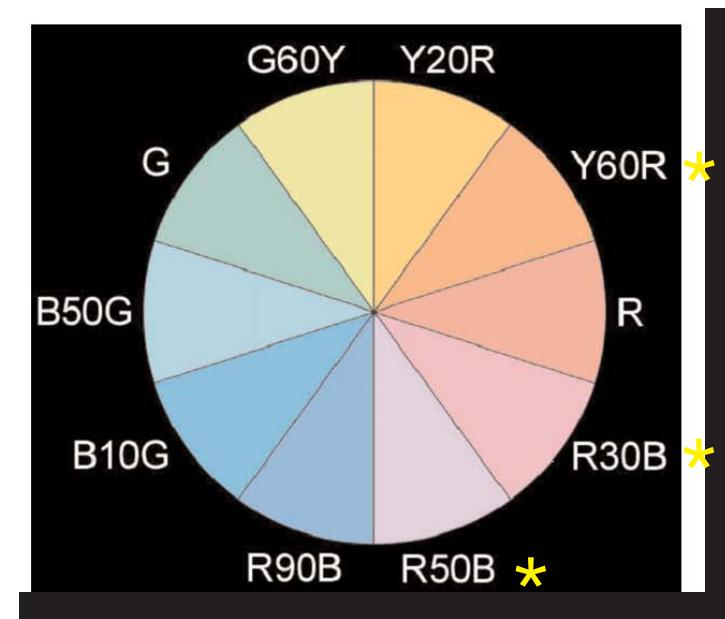
**Most Popular Colour Groups
Corridor**

Top Dayroom Colours

1ST 0505 Y20R

2ND 0505 R90B

3RD 0505 Y60R

3RD 0505 R

3RD 0520 R
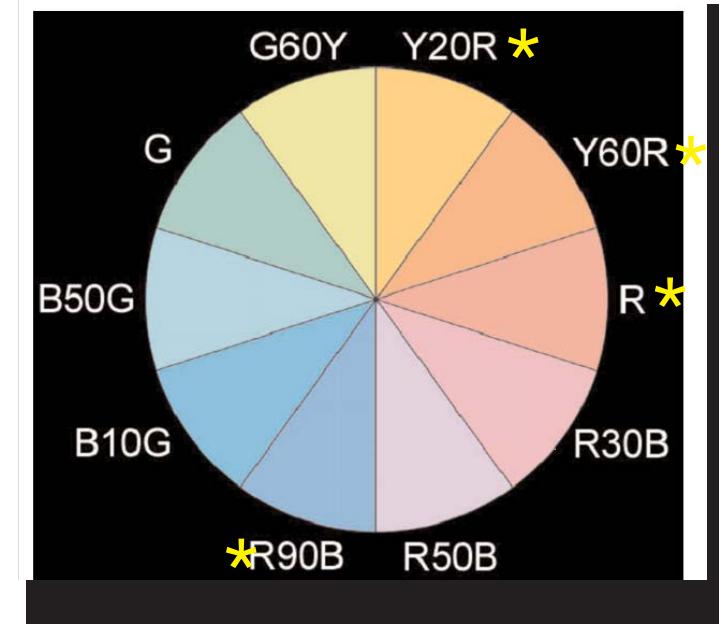
**Most Popular Colour Groups
Dayroom**

During preference testing all comments made by participants as they sorted through the cards were recorded by the research team. These comments were then grouped together by hue. All the comments made about a particular colour were then reviewed and the key findings summarised. The summaries for each colour can be found below.

There appears to be a large negative response bias whereby people were more likely to report reasons for not choosing a colour than they were to give reasons why they have chosen a colour. It may be that they feel a greater need to justify their rejected colours than the chosen colours; they also had instinctive reactions which required very little prior thought and those were the most common types of responses recorded.

The most frequent comment was that a colour is too strong/intense. This is consistent with the clear finding from the quantitative data that colours with lower levels of both brightness and saturation are preferred for surround colour.

The comments were collated as information on preferences on particular levels of saturation and chroma.

N.B. The word **shade** has been used here as the correct term for a hue that has some black or white added and is a particular strength of chroma.

Y20R

0505

This shade was described by a few people as too bright and intense.

0520

A few people commented that this shade was too strong and too bright.

0540

There were many comments made about this shade to the effect that it was too strong and too bright.

1010

This shade seemed to receive a mixed response. While some people commented that it was neutral others commented that it was "too much". This very unusual pattern of responses may be unique to this colour.

1030

The overwhelming response to this shade was that it was too intense.

1050

This shade was found to be too strong but a number of people commented that it felt warm.

2005

This shade was considered to be dull and drab by a number of people.

2020

This shade was said to be sludgy and too dark.

3010

This shade was described as too dark/intense and also as grey and depressing.
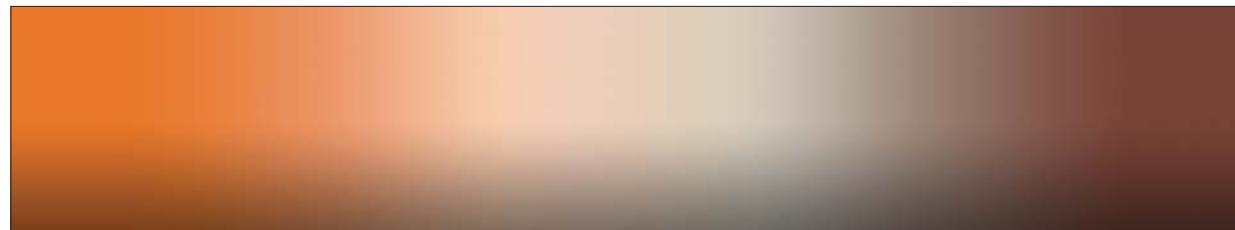
Y60R

0505

This was seen as "magnolia" and was regarded as being bland and boring although some people liked the fact that it was light.

0520

There was not a clear pattern to these comments although a couple of people commented that it was too intense.

0540

A lot of people commented that this shade is too intense.

1010

The only recurring comment about this shade was that it is too dark.

1030

Overall, people commented that this shade gave a sense of warmth.

1050

Many people commented on the fact that this shade was too strong and intense.

2005

This shade was felt to be grey, bland and boring.

2020

This shade is described as brown, dull and gloomy.

3010

A number of people found this shade to be too dark and intense.

R
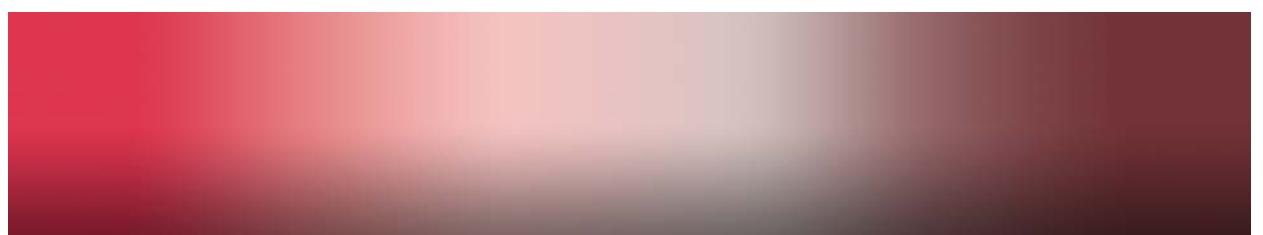
0505

This shade was felt by many people to be neutral, some describing it as magnolia. Some people liked the fact that it was neutral whilst others felt that it was bland and "nothingish".

0520

There was no clear pattern to the responses to this shade although two people did describe it as being institutional and like a hospital.

0540

This shade was described as too deep and dark. It was also described as "dull", "depressing" and "boring". Some people thought that the colour was "girly".

1010

The general feeling about this shade was that it was bland and boring.

1030

This shade generated some quite contradictory feelings. While some felt it to be too dull and gloomy others described it as being too bright.

1050

This shade was felt to be too bright and intense. Some people also commented that this colour made rooms feel smaller while it was also felt that this colour gave a sense of warmth.

2005

Most of the comments about this shade described it as dull, gloomy and drab.

2020

The comments about this shade described it as too dark and intense and also as too bland, dull and drab.

3010

This shade was seen as too dark and intense and also as dull and dreary.

R30B

0505

This shade was described by a number of people as "magnolia" some of whom liked it, some did not. Some felt that it was too boring/uninteresting.

0520

There were a lot of comments stating that this shade was too "girly". Some people also found the shade to be too intense.

0540

This shade was felt to be too intense and bright and also too gender-specific. Two people also felt that it looked institutional.

1010

This shade was described as "magnolia" and was felt to be too dull and boring.

1030

This colour was felt to be too intense and bright and also too gender-specific.

1050

There was clearly a feeling amongst many of the commentators that this shade was far too bright and overpowering. There was also a feeling that it was too gender-specific, "girly".

2005

This shade was described both as too grey and dull and as too dark and saturated.

2020

The overwhelming response to this shade was that it was too dark.

3010

Again, almost all of the comments made in response to this shade stated that it was too dark. It was also considered to be grey, dull and depressing.

R60B

0505

This colour was felt to be boring and bland. A number of people also commented that this shade seemed a bit cold and that it also felt clinical and hospital-like.

0520

A number of people felt that this shade gave a sense of space to the rooms. Some commented that the colour was too grey.

0540

Many people commented that this shade was too intense and overpowering. A number of people also commented that the colour was gender-specific ("girly"). (actually R50B 0530)

1010

By far the most common comment to be made in response to this shade was that it was

too grey.

1030

There was a real mix of positive and negative comments to this shade. Some people expressed the view that this shade is too strong and also that it was too "girly".

1050

This colour was described as being both too bright and too intense. It was also described as being gender-specific. (actually R50B 1040)

2005

There were a large number of comments describing this shade as dull, grey, drab and monotonous.

2020

Commentators seemed to find this shade too dark. Two people also found the shade rather cold.

3010

Many people commented that this shade is too grey and also that it was too dark. Some also commentated that there was a lack of contrast between this colour and the colour of the floor. It may have been the case that with a different floor colour this grey may have been more popular.

R90B

0505

This shade was described as being pale and neutral. Some people also found it to be

clinical and hospital-like as well as rather cold whilst others found it to be calming and restful.

0520

This shade was considered to be rather bright as well as cold and institutional.

0540

The general feeling about this shade was that it was too bright and too strong. Two people also commented that it was cold.

1010

This shade was thought to be rather cold by a number of commentators.

1030

The general feeling about this shade was that it was too intense and also too cold.

1050

A number of people commented that this shade was too strong and bright. Two people also commented that this shade was cold.

2005

This shade was described as being too grey as well as being dull and bland. It was also found to be rather institutional/hospital-like.

2020

A number of people described this shade as too dark, and also as too grey, although some thought that it would be good as an accent colour.

3010

The most common comment made in response to this shade was that it was too dark although a number of people mentioned that they found it rather grey and dull.

B10G

0505

There was no clear consensus on this shade. There were a mixture of positive and negative comments. One person commented that light colours will get dirty very easily.(actually B20G 0505)

0520

Most comments were negative. A number of people commented that this shade is too cold. Two people also commented that it is too bright.

0540

Participants overwhelmingly commented that this shade was too intense and bright. There were comments to the effect that although the colour is acceptable it is not suitable for the type of room in question.

1010

Comments were mixed. Although some liked the colour, others found it to be cold or hospital-like.

1030

Many people commented that this shade is too strong/intense. One person also commented that it is too hospital-like.

1050

Almost all comments were to the effect that this shade is too intense/bright. Two people also commented that it was a cold colour.

2005

Most commentators said that this shade was grey, dull or drab and one commented that they would find it depressing. Three people also commented that the colour is too dark. (actually B20G 2005)

2020

Almost all of the comments made with reference to this colour stated that it was too intense and dark. It was also described as too drab and depressing.

3010

The most common comment made about this shade was that it is too dark. It was also described as being terribly gloomy and depressing. Two people also lamented the lack of contrast between the floor and walls.

B50G

0505

There were a number of positive comments about this shade some people describing it as "nice and bright/light". However, it was also described as being cold and three people described it as being institutional or hospital-like.

0520

There was not a clear consensus of comments about this shade. The most common remarks were that it was hospital-like or institutional and that it was too intense.

0540

Almost all of the comments about this shade stated that it is too intense and bright.

1010

This shade was described as being peaceful, calming and sedative. It was described as being too intense by two commentators.

1030

This shade was described as being too strong, too dark and too bright. Two people said that they liked the colour but that it was not suitable for the room in question. One person said that it was too hospital-like and one person said that it looked cheap, like a primary school.

1050

Again, the most common comment was that this shade was too bright/intense. Three people said that it would be good as an accent colour. Others commented that it made the room feel small and that it gave a "male look". There were two comments that it was a nice colour but not suitable for a corridor.

2005

Almost all the comments made about this shade were that it was grey, bland and dull.

2020

This shade was commonly described as too dark. It was also described as too intense as well as dull and boring.

3010

With only a few exceptions, this shade was described as being too dark, with one person commenting that at twilight it would turn almost black.

G

0505

There was no obvious pattern of results with this colour although two people described it as "too acidy" and two people described it as "too cold".

0520

The only comment to be made by a number of people was that this shade is too intense.

0540

There were a large number of comments describing this shade as too dark and too intense.

1010

This shade was described as being institutional or hospital-like and also as too dark/dull.

1030

There were many comments describing this shade as too strong/intense.

1050

This shade was described by many people as too bright and too strong.

2005

This shade was described as being too strong and also too dull and drab.

2020

This shade was described by a number of people as being too dark and intense.

3010

This shade was described as too dark and intense and also as dull and depressing.

G60Y

0505

The general feeling about this shade was that it was rather boring. It was also variously described as "magnolia", "lemony" and "limey".

0520

This shade was felt by a number of people to be too bright. Two people did describe it as too dark but it may be that by this they meant that it was too bright. It was also thought that this colour made created a sense of spaciousness.

0540

This shade evoked strong negative feelings in a number of people. It was felt that the colour was too garish, bright and intense and was even described as "psychedelic" and even as "slightly bilious".

1010

There was no clear pattern of comments in response to this shade although there was perhaps a feeling that it was too grey and dull. Comments included "I like it because it is neutral" and "green with too much yellow."

1030

This shade was felt by many people to be too bright/intense. It was also described as "too sickly" and "limey".

1050

Again, this shade was felt by many people to be too strong and too bright. There were quite a lot of very negative comments made about this colour e.g. "horrible", "definitely no".

2005

The general feeling about this shade was that it was dull and dark. There were people who described it as: "khaki", "muddy" and "depressing".

2020

This shade was described as being too dark and intense.

3010

Many people found this shade to be too dark and intense. It was clearly not a popular colour.

Section 4

Real World Projects

Introduction　　The main aim of this phase was to be able to advise on critical issues related to colour design for interiors in long term healthcare environments. The team sourced three sites where they could make recommendations, work with staff and service users and develop refurbishment strategies. These projects ended with post occupation evaluation (POE).

Three sites were chosen for the 'Real World' projects:

1　Elizabeth Fitzroy Home, Silver Birches, Richmond, Surrey - Home for Young Adults with Cerebral Palsy

2　Age Concern, Raliegh House, New Malden, Surrey - Day Centre for Seniors

3　Tees and North East Yorkshire NHS Tust, St Luke's Hospital, Middlesbrough, Durham - Mental Health Day Centre, to Forensic Unit

At each of the sites the research team had significant levels of interaction with all staff and service users wherever possible. Family members and local facilities personnel were also involved in discussions. This involvement took many forms from formal interviews through to focus groups and evaluation of visualisations.

After the redecoration it was possible to carry out different levels of POE. The sites and service users varied considerably and therefore much of the POE was undertaken involving the carers or support staff who could communicate and convey many of the service users' opinions. The team visited the sites after a period of time had elapsed from the completion of the work.

The experimental study of colour preferences ran ahead of this phase so many of those early results from testing participants were used in the 'Real World' projects (see Section 3).

The value of this 'Real World' phase was the implementation and subsequent evaluation of learned strategies, discussion with a range of professionals on the site audits and interaction with the key practitioners in the field.

Elizabeth Fitzroy Home, Silver Birches, Richmond

Background

Elizabeth FitzRoy Homes and Support provides forty seven services (twenty four registered care homes, eight day services and fifteen supported living services) residential homes, throughout England, for adults with profound learning disabilities and multiple disabilities. These include homes in Great Malvern, Birmingham, Manchester, Nottingham, Sussex, Surrey, Hampshire and Norfolk. The homes specialise in adjacent day resource centres which help to train the residents in life skills and various employment skills. They aim to help the residents lead as independent a lifestyle as possible.

Profile of residents

Elizabeth FitzRoy Support cares for and supports around 500 people with a learning disability across England. The charity was founded by Elizabeth FitzRoy, whose fundamental belief was that all people are equal and that their differences should be respected. Features of the charity and its services include the following.

* Secure, stable homes and support services for people in locations throughout England.
* The majority of residents are regarded as having severe learning disabilities and many may also be physically disabled and use wheelchairs.
* Homes vary from a country mansion to single person flats.
* Some homes are registered as nursing homes, most are registered care homes.
* Staff undergo extensive training and induction.
* Flexible, local help in four locations (Hampshire, Norfolk, Richmond and Trafford) for young people with learning disabilities who still live with their families. Scheme to help young people with mild learning disability learn skills to establish their independence.

The home in Richmond, Silver Birches, cares for young adults with cerebral palsy; the managers look for enthusiastic and dedicated staff to join the team to support adults with learning disabilities to live the life of their choice and more importantly to enjoy life the way they want to. Patience and sensitivity are more important than experience as they will be supporting people with every aspect of day to day living including shopping, trips out, accessing the local community and there is personal care involved.

Description of the site

Silver Birches is situated in a very quiet leafy part of the town close to Richmond Park. The interior as you enter from the street has a communal stairwell with flats approached from the hall; the home is organised into smaller units. The living accomodation is supported by extensive provision for numerous activities in a separate building.

On entering the home you pass through a very busy office where staff obviously never have time to sit down as they work non stop caring for the services users. The building is clean, efficient and functional. With considerable input from staff the building presents a domestic environment for the service users.
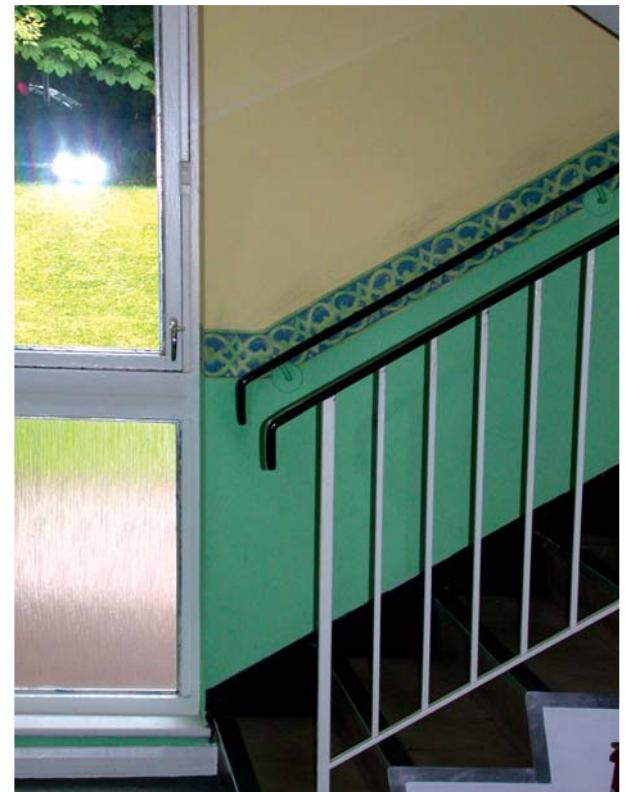
Lounge before refurbishment

Kitchen and corridor before refurbishment
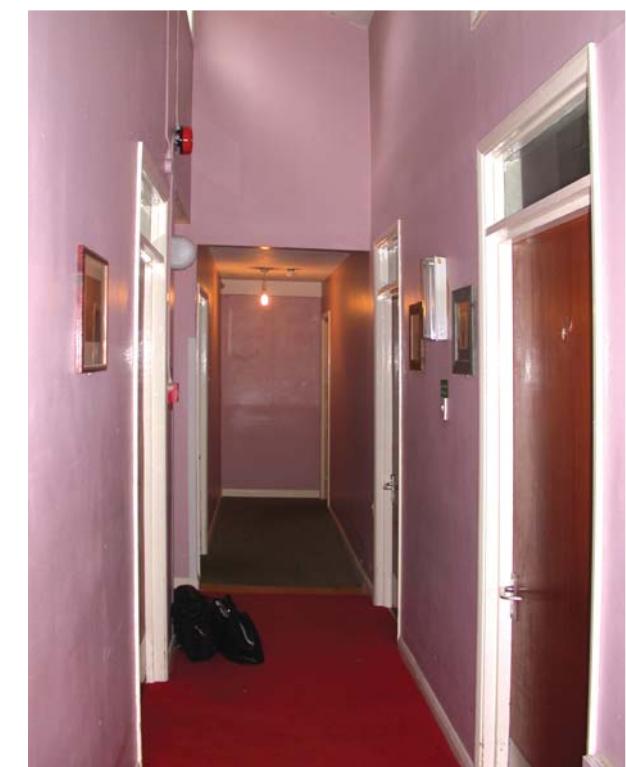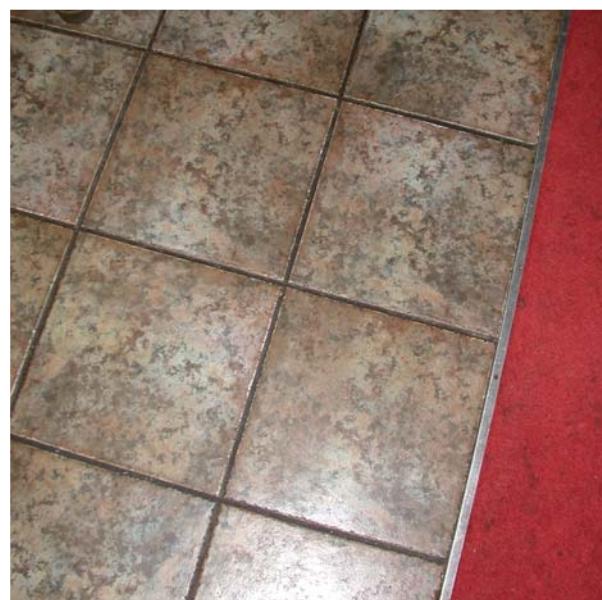
Bathroom , bedroom and lounge area before refurbishments
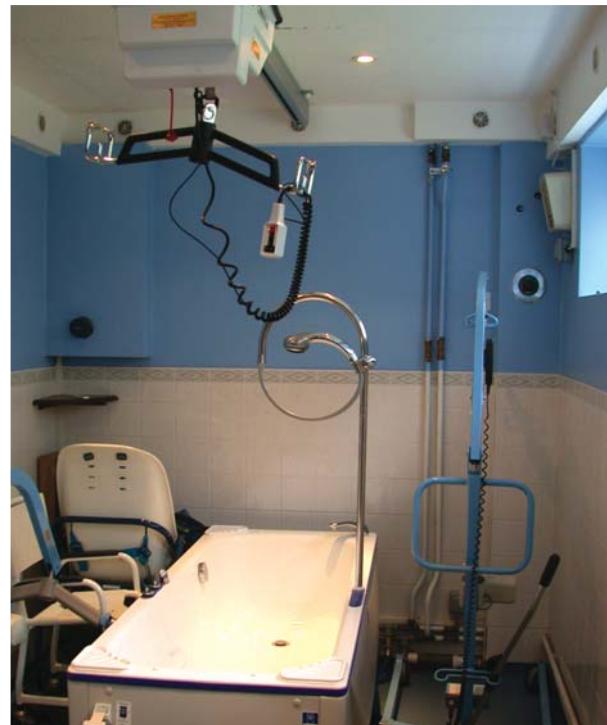
Research with users The research team worked closely with staff, carers and the service users to identify the preferences for the refurbishment of the home. Three areas were seen to be in need of immediate updating; the lounge, kitchen and corridors. The lighting throughout the building needed updating. Funding for paint was supplied by ICI/Dulux. Visualisations were presented to the staff and users to get feedback on preferences; carpets were carefully chosen, as the residents were all young adults with cerebral palsy, who are known to dislike extreme changes which they find disorientating.

The senior manager in the home was keen to maintain a familiar feel to the environment but she needed to show upgrading to improve staff morale and create an ambient environment for the service users and their families.
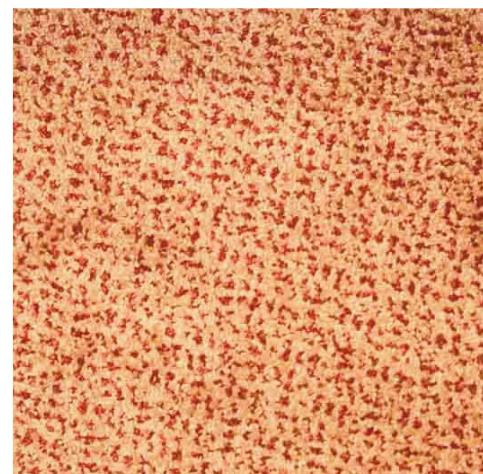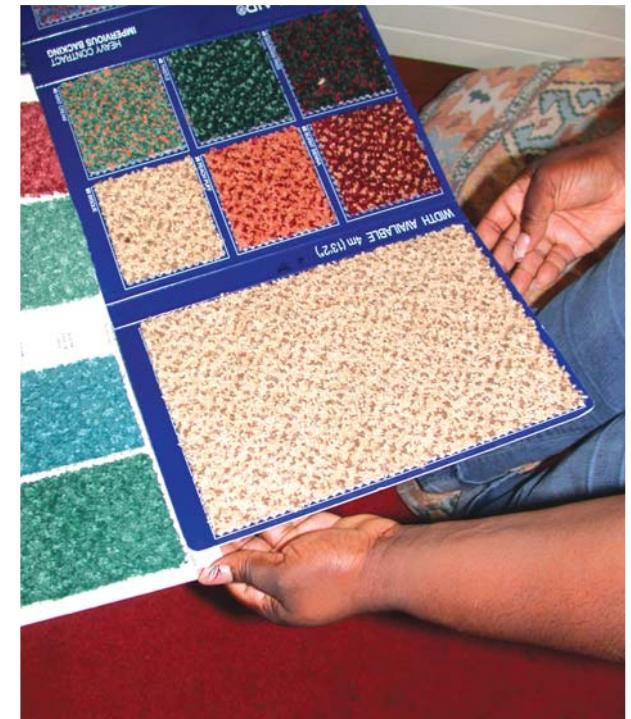
When final discussions were completed on the colour schemes the building was cleared and the staff and service users left for a week's break in the west country while the home was redecorated.

 A light, softer, warmer colour was used in the corridors as the best choice for this high ceilinged, narrow and poorly lit space. A terracotta carpet replaced the vibrant red throughout the home. It was anticipated that as the colour was fairly close to the original it would not cause too much disturbance when they returned from their break.

The staff organised a 'special opening' of the building by cutting a ribbon - only one person was troubled by the changes, but for only a short period of time. The environment was much calmer and the staff especially found it more relaxing to work in.

Kitchen

The scheme for the kitchen area was chosen to link together chairs, table and flooring around the space. This harmonious tonal scheme gave the kitchen a more tranquil, less frenetic ambience and enhanced the kitchen cabinets which previously contrasted too strongly with the blue/purple wall. The use of tonal schemes can be very useful for environments that appear to be too cluttered and filled with 'visual noise'. Using a colour which is related to any furniture or elements of a building that have to be retained can often provide a very successful and economical upgrade to older environments.
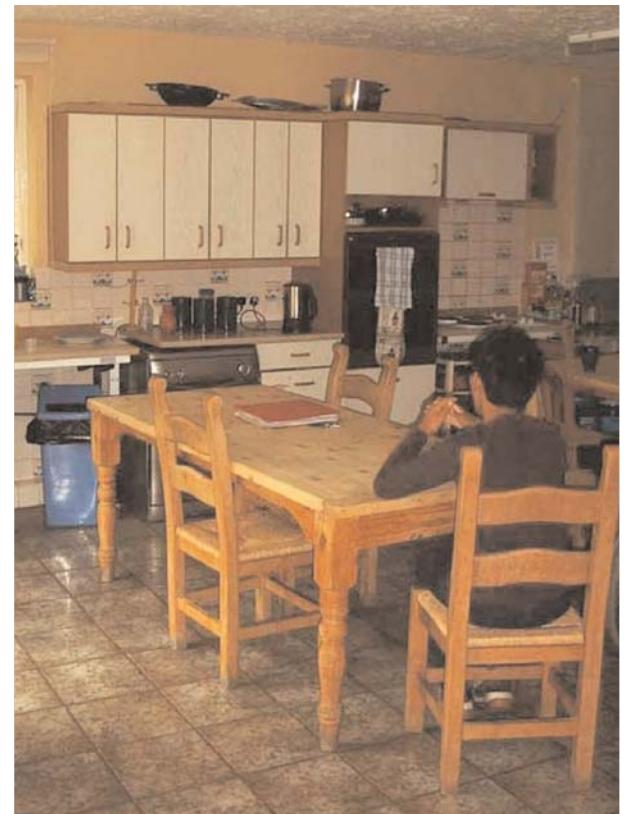
Both staff and the service users were happy with the redecorated kitchen. Although staff were worried about these changes there were no problems with the results. The upgraded interiors were appreciated by visitors and staff. Some of the service users were able to thank ICI, with help from their support staff. Staff morale was raised and there was a noticable change in some activities such as sitting and relaxing with the service users and carers

A more classic scheme with a softer coloured carpet created a relaxing lounge. It had been a very busy traffic area for staff and service users as well as visitors; this was a major improvement to the home. The scheme provided an opportunity for the fire surround to be seen adding a homely feel to the space. The lighting scheme unfortunately could not be upgraded at the same time. due to lack of funding.

Lounge after

Colour Scheme References	NCS Paint Ref
Lounge Area - Cream	0520 Y20R
Kitchen Area - Beige	1020 Y20R

S1: Female, 26 years

How long have you been working here?

Four years.

Do you think the Colour and Design of the environment is important to the health and sense of well-being of your service users?

Yes.

Have you noticed anything related to the colour of objects or aspects of the environment?

The décor and specifically the wall colours could be better. The curtains are too plain and don't match with anything. The flooring in the kitchen is hard and not suitable for service users with epilepsy who are more likely to have falls.

How often does the building get repainted?

Every 2-3 years.

How often do the patient's/resident's rooms get repainted?

Every 2-3 years. Bedrooms are re-painted if service users ask for this to be done. Four rooms have been painted since 2001.

How often does the flooring get replaced?

The living room carpet was replaced in 2002.

Who makes the decisions about colour schemes?

Everyone together, service users and staff.

Did you notice anything about how the patients/residents felt after the last refurbishment?

Some noticed the changes while others did not.

Do you think the colour of objects or the environment affects your service users in any way?

A change would affect them.

Do you have any suggestions for improvement of the existing environment?

Change the kitchen flooring.

Have you noticed anything related to lighting?

I hate it. It is too dark. One service user tries to pull the light fittings.

Are the service users encouraged to personalise their space?

Yes.

Do you think being able to personalise their space has any effect on your service users?

Yes, it has a positive effect.

What other things apart from colour do you think influences your service users' health and makes them feel good?

Social events: parties, movies, restaurant, holidays. Being together. Going to the day centre.

Do visitors comment on the establishment in general?

They have a negative view of the furniture and the layout of the furniture.

How do you feel about the decoration of the patients/residents rooms - from your point of view?

I like some better than others.

Do you get asked your opinion when it comes to choosing colour schemes for linen, rugs, flooring, pictures or wall colours?

We all discuss it together.

How do other places you have worked at compare to this one?

This place is cleaner but doesn't look as nice.

S2: Rosemary, Female, 32 years

How long have you been working here?

Over 12 years.

Do you think the Colour and Design of the environment is important to the health and sense of well-being of your service users?

Not sure.

Have you noticed anything related to the colour of objects or aspects of the environment:

I think that we should have table coverings. It would also be nice to have rugs etc. but these are problematic due to health and safety.

How often does the building get repainted?

The common areas are painted approximately every four years.

How often do the patient's/resident's rooms get repainted?

Less often than common areas.

How often does the flooring get replaced?

About every four years. The carpets and flooring is changed more often in the bedrooms. When a new client moves in

the carpet in their bedroom is changed. The carpets are cleaned as often as possible.

Date of last refurbishment:The common areas were refurbished about three or four years ago.

Who makes the decisions about colour schemes?

In the common areas the service users decide in consultation with the staff. We look at pictures in catalogues and everyone is allowed to participate.
For the bedrooms the service users decide in consultation with their families.

Did you notice anything about how the service users felt after the last refurbishment?

They only noticed the new carpet. One service user did not want to enter the room with the new carpet.

Have you noticed anything related to lighting?

The lighting is not good. It is very dark. The service users don't like the flickery fluorescent lights. One resident tries to hit the light fittings which constrains what can be done.

Do service users receive medical treatment in their room?

No.

Are the service users encouraged to personalise their space?

Yes, very much so. When new residents arrive their rooms are painted magnolia and a neutral carpet is laid. They are allowed to change these.

Do you think being able to personalise their space has any effect on your service users?

Yes, and they have very definite ideas about what they want.

What other things apart from colour do you think influences your service users' health and makes them feel good?

The temperature; the atmosphere socially. Music is very effective, with different types being good for different things.

Do visitors comment on the establishment in general?

They think that it is posh.

Interview with service users

Many of the service users have severe disabilities including severe communication difficulties. It was therefore very difficult to elicit intelligible responses from them. The following is the information which we managed to obtain together with information provided by the carers.

SU1: Cathy, Female; 42 years old
Information provided by the carer:

How long has the service user been receiving care/treatment in this establishment?

23 years.

How long has the service user been staying in this particular flat?

23 years.

Is the service user able to leave the flat and move around the building/gardens?

She is a wheelchair user and so has restricted mobility.

Apart from her room, where else does she go? Does she have a daily routine?

She goes to the day centre on Mondays, Wednesdays, Thursdays and Fridays between 10.00 and 3.30.

Information provided by the service user:

Do you notice anything about the colour of the rooms that you use?

I like black. Pink is my favourite colour.

Do you like the décor and fittings in your room?

Yes, it is decorated with green wallpaper.

Do you like the bathroom you use?

It is dark.

Do you have any suggestions for improvement of the existing environment?

Change curtains to pink.

Have you personalised your bedroom?

Yes, and it makes me feel good.

What kind of flooring do you like best?

Hard flooring because it is easier for my wheelchair.

SU2: Nina, Female; 29 years old.

Information provided by the carer:

How long has the service user been receiving care/treatment in this establishment?

6 years.

How long has the service user been staying in this particular flat?

6 years.

Is the service user able to leave the flat and move around the building/gardens?

Yes, under supervision.

Apart from her room, where else does she go? Does she have a daily routine?

She goes to the day centre on Mondays, Wednesdays, Thursdays and Fridays between 10.00 and 3.30.

Information provided by the service user:

Do you notice anything about the colour of the rooms that you use?

The carpet is red. This is good.

Do you like the décor and fittings in your room?

Yes, it is white.

SU3: Kate, Female; 29 years old.

Information provided by the carer:

How long has the service user been receiving care/treatment in this establishment?

5 years.

How long has the service user been staying in this particular flat?

5 years.

Is the service user able to leave the flat and move around the building/gardens?

No, she has severe mobility problems.

Apart from her room, where else does she go? Does she have a daily routine?

She goes to the day centre on Mondays, Wednesdays, Thursdays and Fridays between 10.00 and 3.30.

Information provided by the service user:

Do you notice anything about the colour of the rooms that you use?

Yes, I like them.

Do you like the décor and fittings in your room?

Yes, it was recently decorated in pink.

What don't you like about the décor or fittings in your room?

Nothing.

Do you think that the colour/design affects your sense of well-being?

Not sure.

Do you have any comments regarding the lighting of your room or other rooms you visit?

They are too dark.

Many of the service users have major disabilities including severe communication difficulties. It was therefore very difficult to elicit much in the way of feedback from them directly about the changes which had been made. The following is all the information which we managed to acquire.

SU1: Cathy

Have you noticed any changes to Silver Birches recently?

Yes, I've noticed changes and I like the changes which have been made.

SU2: Nina

Have you noticed any changes to Silver Birches recently?

Yes, it is nice. It is new. Noticed new carpet. She has pink in her bedroom.

Do you think that the changes look nice?

It is nicer now.

Interview with staff **S1:** Male

Have you any comments specifically about the way that the new décor looks?

It looks a lot lighter. It is newer and cleaner and gives the place a lift.

Have there been any functional

implications for the service users? e.g. have they become at all disorientated?

He hasn't noticed any immediate adverse effects but hasn't been working a great deal since the changes were made.

S2: Female (Rosemary)

How do you feel about the changes to the decoration of Silver Birches?

The changes have made it bigger, brighter and more calming. It feels more homely,much more like a normal home. The carpet is much better and contributes to this homely feel.

Have you any comments specifically about the way that the new décor looks?

It feels more homely. It is nice that the spaces merge together with some continuity.. The decoration enhances the space.

Have there been any functional implications of the new decoration?

She has only been back from holiday a short time so hasn't yet seen how it will work at night.

Do you think that the service users have noticed the changes to the

decoration?

Those who are able to communicate like it. The changes in the layout of the furniture disturbed some of the service users. It took time for them to get used to it. The decision-making about the new décor was made in consultation with some of the service users.

Do you think that they appreciate it from an aesthetic point of view?

They are making pictures for the walls in order to take ownership of the space. A mirror is needed. When we returned from holiday we put a ribbon across the front door which one of the service users cut. Service users now remove their shoes before coming into the room.

Have there been any functional implications for the service users? e.g. have they become at all disorientated?

They were initially disorientated when they came back from holiday to a changed environment but settled in really quickly. The service users were assisted in thanking ICI/Dulux.

Age Concern Raleigh House

Background

Profile of Clients

Raleigh House is an Age Concern Centre situated in New Malden, Surrey.

Age Concern run this Day Service which they believe offers help to older people to maintain their independence, social contact, well-being and confidence. They aim to offer a wide range of activities and learning opportunities to suit all tastes.

Age Concern offer equal access to people of different faiths, cultures, sexual orientation and to people with disabilities (subject to general eligibility criteria). They aim to enable and encourage people to participate in making decisions about the day to day running of the centre and are sensitive to people's individual needs and requirements. They try to respond as flexibly as possible to these and are open Monday to Friday. The centre offers support, friendship and recreation. Lunches are cooked on the premises, and they run a wide range of activities and opportunities, outings, exercise, access to specialist advice, information, and a range of health and well being services, such as counselling, podiatry and hairdressing.

The Raleigh Centre is suitable for all older people and facilities include snooker and table football. They run a stimulating activity programme include outings, discussion groups, art and craft, music appreciation, games and singing.

Although the service users are not in long-term healthcare some of the people visiting the centre are disabled, immobile or do not leave their living accommodation other than to visit the Day Centre.

www.ageconcernkingston.org/raleigh.htm

Description of the site
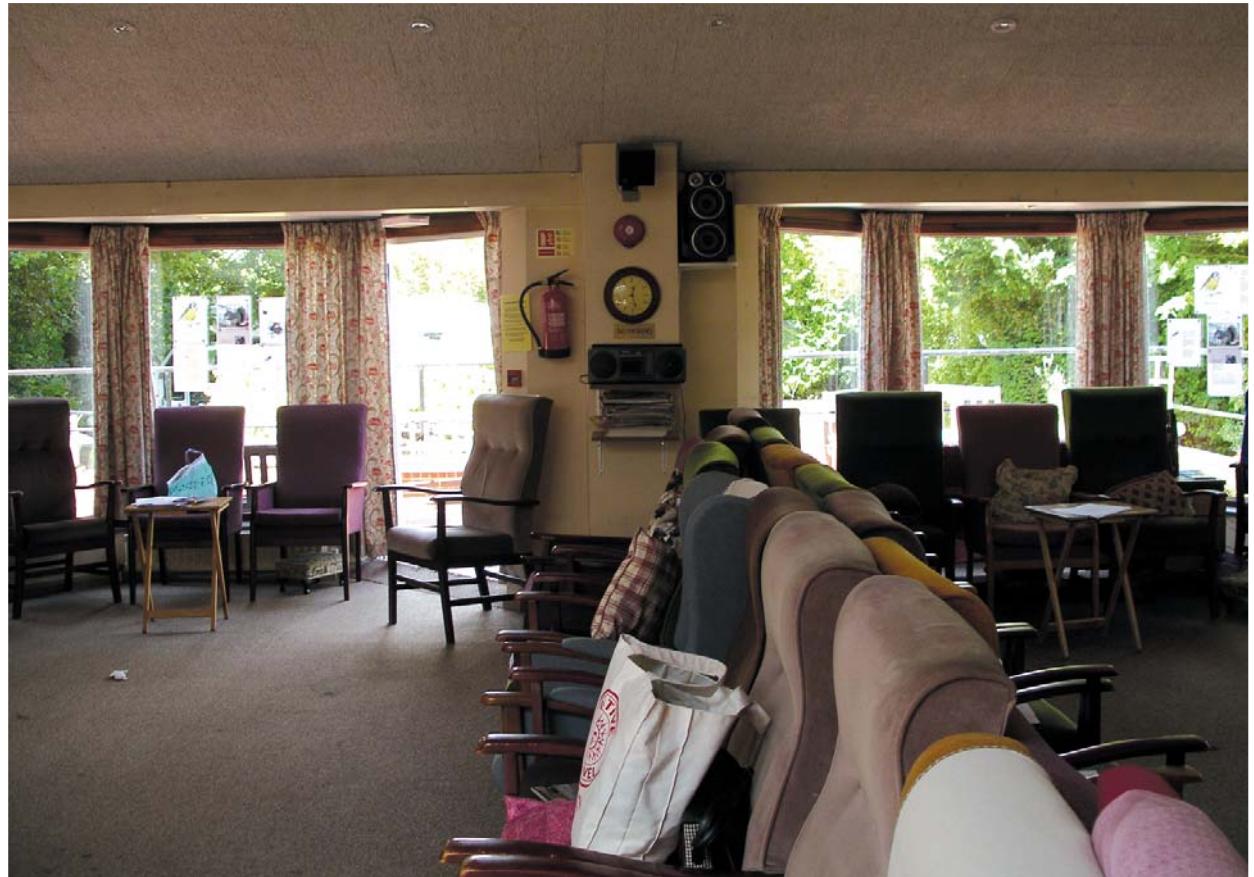
The Age Concern site in New Malden was a vibrant centre where the clients travelling in on a daily basis were active and participated in a variety of interest groups. Some had disabilities. The main concern for staff was the regime of seating in rows in the sitting room which they felt lead to a level of inactivity and boredom. The other issue they faced was that the large sitting room was boring and dull not only for clients but for the staff as well. The managers at the centre wanted to envigorate the space, improve staff morale, redecorate, define the Tea Shop area and deal with the low lighting levels and poor provision of luminaires.

The research team commenced interviews with staff and clients gathering opinions about their preferences. Test schemes were submitted for the clients and staff to approve.

Interview with staff

Mini Site Audit – Age Concern New Malden

Date: 21.6.05, 22.6.05

Address of site:
14 Nelson Road
New Malden
KT3 5EA

See website: http://www.ageconcernk-ingston.org/raleigh.htm

A member of staff was interviewed. He was a 54 year old male.

His overall feeling about the environment was that it was dark and dismal. He said that the furniture was comfortable. It was in lots of different colours of which the browns and greens weren't too bad but the other colours were not so good. Some of the ladies have made cushions for them which helps.

He felt that the flooring was too dark and commented that it was very stained. As far as the wall colour was concerned, he said that he hadn't really noticed it and was unable to say accurately what colour it was.

He commented that recently some service users artwork had been hung and that this was a highly successful initiative.

The main function room became too hot sometimes. He said that this was due to the lighting but this is questionable.

He said that the lighting could be improved by having more efficient lighting and he thought that picture lights would also work well. He thought that the site was "homely".

In terms of improvements to the environment he would like to see the temperature issue addressed and believes that the main room would benefit from being re-painted. He believes the walls would be better if painted a lighter colour with perhaps an accent wall.

The Centre manager, commented that she felt that the environment was very bad. She said that she found it boring and institutional.

Interview with clients Four female service users were interviewed.

They are four friends who have been coming together to the Centre for 2 years and 3 months.

When at the Centre they have coffee and tea, play skittles, exercise with the help of an external exercise lady. They play "name that tune", bingo, quizzes, sing songs. They also go out to pub lunches and places like Kew Gardens. They said that the food at the centre is very good.

They do believe that the environment is very important to their sense of wellbeing. They commented that if the Centre was a more pleasant environment more people might choose to use it.

They thought that the décor in the Centre was cheerless and dreadful. They said that all aspects of the environment could be improved upon.

The partition between the dining and sitting areas is seldom used. This is a problem due to noise interference between the spaces particularly when bingo is being played.

They said that they thought that the lighting was bright enough which appears to be in contradiction to their comment that the Centre was cheerless.

They commented that the main room is very cold in the winter there being only one radiator which works. A convector heater is brought in but it is insufficient.

They were concerned by the poor level of cleanliness at the Centre. One woman had been a cleaning supervisor in a hospital and so perhaps had high standards. They commented in particular on the carpet in the main room which they believed to be filthy. They also said that the dining room was dirty and also the toilets.

They thought that there were too many chairs in the main room with the consequence that service users with low vision would walk into them. Relatedly they expressed concern that the fire exits were blocked.

Dining Room

Large Sitting Room

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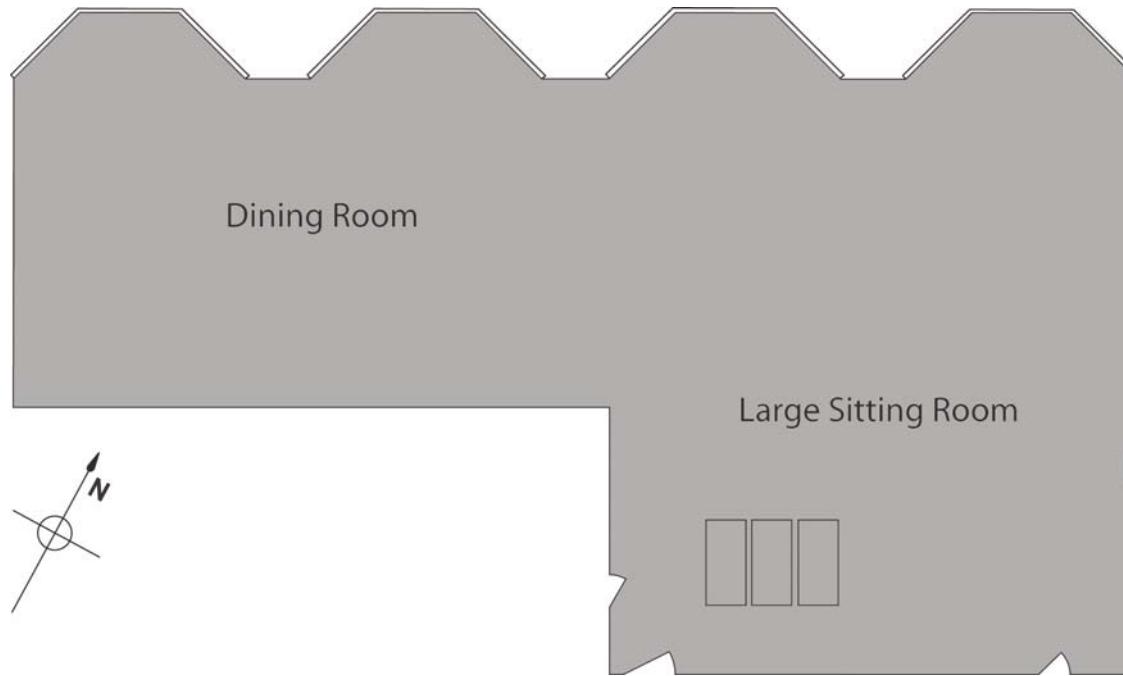
Colour Measurements

AHRB 06 – Raleigh House New Malden

Audit 21/06/05
Colour Measurements and Materials:

Large sitting room						
	L	c	h	Material/Texture	Comment	Personal/Instit.
Walls	88.80	15.34	76.87		Lab:88.80/+3.49/+14.94	
Dado	33.15	24.58	152.1		Grab rail; Lab: 33.15/-21.73/+11.49	
Skirting	60.18	16.75	84.56		Also around doors and office windows; Lab: 60.18/+1.59/+16.67	
Door	68.17	40.67	74.35	Grained/wood	Lab: 68.17/+10.97/+39.16	
Floor	33.74	12.79	60.12	Mottled/tufted carpet	Lab: 33.74/+6.37/+11.09	
Chair 1 fabric	24.54	19.62	98.49		Lab: 24.54/-2.90/+19.40	
Chair 1 frame	19.83	29.45	44.75		Lab: 19.83/+20.91/+20.73	
Chair 2 fabric	24.31	11.89	49.03		Lab: 24.31/+7.80/+8.98	
Chair 2 frame	24.29	37.89	38.88		Lab: 24.29/+29.50/+32.79	
Chair 3 fabric	36.11	31.18	64.83		Lab: 36.11/+13.26/+28.22	

	L	c	h	Material/Texture	Comment	
Chair fabric 4	35.16	13.32	63.02		Lab: 35.16/+6.04/+11.87	
Worktop	58.55	31.75	69.98	Grained/wood	Lab: 58.55/+10.87/+29.83	
Window frame	26.30	28.89	45.33		Lab: 26.30/+20.31/+20.55	
Curtains	61.84	8.17	87.70	Green 1	Lab: 61.84/+0.33/+8.16	
	66.38	9.63	77.12	Green 2	Lab: 66.38/+2.15/+9.39	
	72.68	3.90	93.90	Blue	Lab: 72.68/-0.27/+3.90	
	60.97	23.08	43.66	Main red	Lab: 60.97/+16.70/+15.93	
	82.22	6.60	74.48	Basic colour of fabric	Lab: 82.22/+1.77/+6.36	
Notice board 1	65.75	39.29	71.51		Lab: 65.75/+12.46/+37.26	
Notice board 2	34.89	18.17	55.45		Lab: 34.89/+10.31/+14.97	

Dining Room						
	L	c	h	Material/Texture	Comment	Personal/Instit.
Walls					Same as sitting room	
Floor	55.99	9.87	103.2		Lab: 55.99/-2.26/+9.61	
Table top	59.58	48.37	68.81	Grained/wood	Lab: 59.58/+17.48/+45.11	
Table legs	36.56	7.64	205.2		Lab: 36.56/-6.91/-3.25	
Chairs	57.29	42.20	69.69		Lab: 57.29/+14.64/+39.57	
Curtains					Same as sitting room	

Lighting Large sitting room, Lux 2200-165 Levels
Orientation:N-W/N-E
Time: 12.30pm
Weather: Sunshine, blue sky

Luminaire type	No.	Lamp Type	Comments	On/Off	Dimming	Control	Control Location
Surface Mount. Downlighter	12	fluorescent	In ceiling near windows				
Wall Mounted uplighter	5	2 bulbs each	Around the room				
Pendant Uplighter	2	2 bulbs each	Hanging in centre of room from cieling				

Lux level

light measurements

Lux Levels - Horizontal Illuminance
★ Surface Mounted Downlighter - off
● Pendant Uplighter - off
❘ Wall Mounted Uplighter - off
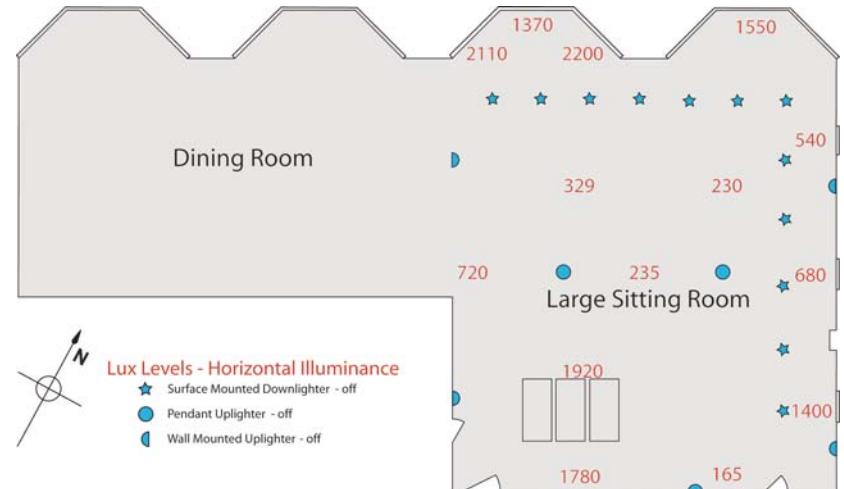
Windows: Main sitting room

No.	Orientation	Comments	Size m²	Treatment	Glazing	View	Control	Open/closed
3	N/E		-0.9		double	Garden and paved way for buses		
6	N/W	2 sets of bay windows			double	Garden and terrace		
3	S/E	In roof all three right next to each other			double	sky		

Sitting Room and Billiard Room
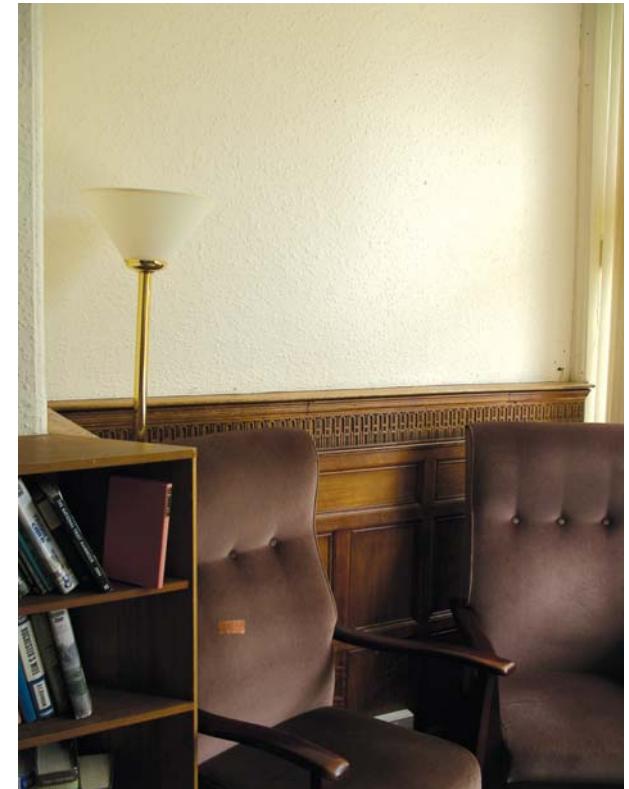
Tea shop and lounge

Before

After

Dining room and lounge

Colour Scheme References	NCS Paint Ref
Lounge & Dining Area - Green	**2010 G10Y**
Shop Area - Pink	**1040 R***

* The pink colour used in the shop area was judged to be too strong by some people - not all. A lighter version, such as 0520 R or 1030 R could be substituted.

The managers at the centre all reported that the community became much more lively following the refurbishment. Whether this was because the change in their environ-ment spurred on conversation and debate, or because they wanted to discuss their likes and dislikes of the new colour schemes the staff were unsure.

Post occupancy evaluation
Interview with staff

The POE was conducted on a day when a lot of clients were brought into the centre for social events and also interest group meetings. Staff were asked to comment on their feelings about the changes to the decoration at Raleigh House.

They were asked to talk specifically about the way that the new décor looks. Were there any functional implications of the new decoration?

Interview with clients

The study then asked about the clients' feelings about the changes to the decoration. Had the clients noticed the changes to the decoration and did they appreciate it from an aesthetic point of view? Had there been any functional implications for the clients and have they become at all disorientated? What did they think about the changes that have been made and were the changes nice? Did anyone feel at all disorientated by the changes to begin with? How did the décor here compare with your own home and would they like the décor to be like it was here if it was entirely up to you?

Responses

Male Client

Yes I like the scheme. Changes are appropriate, varied and 'contrast'; Colour near the windows is still there and you only realize changes once you step further into the room. His own place has got cream coloured walls, a blue ceiling with golden stars, which is in harmonic relation with furniture.

Male Client

Yes bright and pleasant

Male Client

I think green and pink go together, would choose them for own home

Female Client

Does not like it

Female Client

Prefers the pink to the Bamboo

Female Client

Restful and lovely. Likes it.

Male Client

Yes likes it, looks lighter, cleaner and brighter. He is not convinced the colours go together.

Female Client

Lovely

Female Client

The pink is headachey/ heavy especially when sun on it

Female Client

Likes the green but not the pink in a dining room. Room is lighter now redecorated.

Female Client

Nice and bright likes it (Client new to the Centre)

Male Client

Green is a bit light. Dining room should be blue.

Female Client

Likes the green but the pink is too strong. wall is a bit bare without pictures; scheme would be more tasteful if all green

Female Client

Likes the scheme. Really positive, need more lighting, Colours really nice, having two colours is good and more interesting, People generally like colours. Pink is warm.

Female Staff

The pink - nicer feel, new scheme is more domestic and welcoming; no functional implications; clients have genarlly noticed the change and they like it; chairs-wheelchairs used to have to go at the end

of the row, social dynamics (follow the crowd), Disorientated? No, do not have clients with dementia ; Re-organisation of chairs: Circle did not work, wave formations-people seemed to be chatting more now and are much less passive

Female Saff

Plainer would have been better, too much colour going on now. Pink is too bold for older people. There are a lot of other colours going on (e.g. brown around the windows); Green inspired by curtains: She tend to look at the darker colours in curtains and not green; Two ladies/clients do not like the chairs like this and refuse to eat - we can not have them on this basis.

Female Client

Likes it all.

Female Staff

Likes the new scheme. pink is a more obvious change than green.

Female Client

Likes it. pink is a more obvious change.

Female Client

Scheme is marvellous job- grateful. Pale green works nice. PInk - does not like it. it is nice coming here - colours are nice; walls with accent colours look modern (which suggests that she feels that as a

result the environment is less institutional)

Female Client

Scheme is nice - same sort of colours at home. Green nice - same sort of colours at home. PInk is cheered pink. I was first disorientated by arrangement of chairs

Female Client

Scheme is nice and cleaner then before. Main comment is carpet needs changing (bit lighter) , décor is not like hers at home at home

Male Client

Nice and cleaner then before - wants to come to the place. first impression: just thought that is nice

Female Client

Colour pink very heavy

Female Client

Pink is too bright.

Female Client

It's like being at home - just 4 walls

Female Client

Alterations from Monday made a big improvement

Female Client

Liked changes

Female Client

Changes looked good

Male Client

Likes the new lounge, much improved

Female Client

Like the new make over (nice colours)

Female Client

Scheme has very nice cheerful colours., more friendly atmosphere

Female Client

Scheme is very pleasing

Female Client

Attracts people to other parts of room

Female Client

Scheme is nice and clean. love the green

Background St Luke's hospital, part of the early audit phase, was also a 'real world' site for this project. The provision of mental healthcare on the site covers a wide range of needs for the North East Yorkshire NHS Trust. The aesthetic quality and ambience of the whole building was a major priority for all the staff caring for people experiencing mild to extreme mental health problems. From the entrance hall tapestry on display (see picture right) to art work around the buildings it can be seen that visual interest is implemented and maintained in the internal environment.

Profile of Residents

This hospital is unique as it is a remaining example of a well intact Victorian Asylum. The building now provides a range of extensive services for adults and older people with mental health problems and learning disabilies. It also contains the regional medium secure psychiatric unit in a modern building to the rear of the hospital called the Hutton Centre.

Service users varied from those requiring attendance on a daily basis to a drop-in centre, to those people with particular needs in the secure forensic unit.

Description of site The hospital staff had a project which involved the research team in the development of a colour design scheme for their hall. This building, attached to the main body of the hospital, was of architectural interest; had interesting historical characteristics and features which were hidden behind a false ceiling.

The hall is the centre of leisure activities on the site for the service users, staff and visitors. People would play games, listen to live music, meet relatives, and have social discussions with the specialist staff.

Funded by the King's Fund.

The hall before renovation with the ceiling panelled over.

Corridor outside the hall

The space was gloomy and institutional, devoid of any comfortable or personal spaces. There were areas which could be developed such as courtyards, adjoining the hall, where the service users could sit securely but in the open. The development of these spaces and the removal of the false ceiling was seen to be of primary importance for the team. The design of the refurbishment commenced with discussions with the staff and architects on site; planning included constant interaction with the service users on preferences.

The ceiling before and after structure was exposed

The external area which became a courtyard.

Examples of proposed colour design schemes.
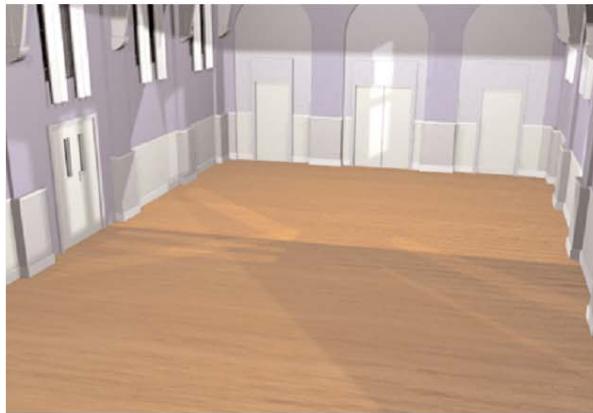
A set of 100 colour schemes was designed in 3D Studio Max with a lighting scheme. Schemes and palettes were created from the early results of the experimental study on preferences tested with the project's participants (see Section 3). The visuals were presented to the focus group as a Powerpoint presentation. The group was made up of service users, nurses, medical staff, archi-tects, and the research team. who all voted for the schemes. The focus group of 19 people had to score each of the schemes out of 10. The group were working over a large part of the day discussing and commenting on the schemes presented. Results were analysed and presented back to the group.

All decisions were recorded on a voting sheet and comments logged for future use.

The focus group meeting.

Nurses, staff, service users, the design team and architects met to go through the 100 schemes which had been designed for the hall.

Analysis was conducted on the individual Design Schemes for all the decorative features as well as the colour palettes proposed.

Painting Scheme and Colour Group Preferences.

Scheme 4: -
A, B, D, G, H - L D
                 M M
F   - M
             D M
C   - D L
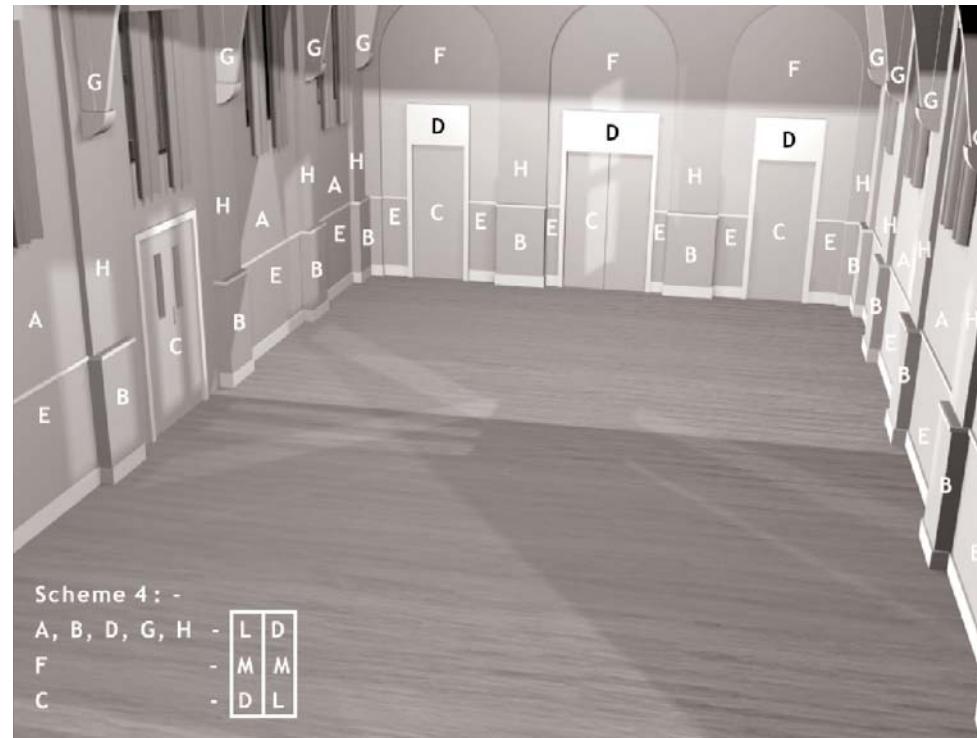
The most popular painting scheme was Scheme 4 (above). This diagram shows the layout of Light, Mid and Dark tones.

The schemes centred around one dominant colour, with the doors and inner arches picked out with tonal variations. The colour prefix results suggest that lighter colours were preferred to more saturated colours.

NCS S2 references of saturation and chroma 1010, 1030, 0505 were prefered and the most popular colour groups were: R90B, Y60R, R60B, B50G.

Results

* 11 out of 19 people gave this colour scheme B (on the right) more than 5/10

 * 9 Females liked it – scoring this scheme 6 and over

 * No one scored it as low as 1 so little negativity unlike many other colour schemes

 * 6 Males liked it – scored the scheme 2 and over

 * These two schemes provided the final strategy - the green colour scheme above A (top of page) was modified to a yellow/green and the painting scheme B

shown above was chosen.

The hall completed with sanded and polished floor, a new co-ordinated tonal scheme to the paintwork, book and display cases, and lighting.
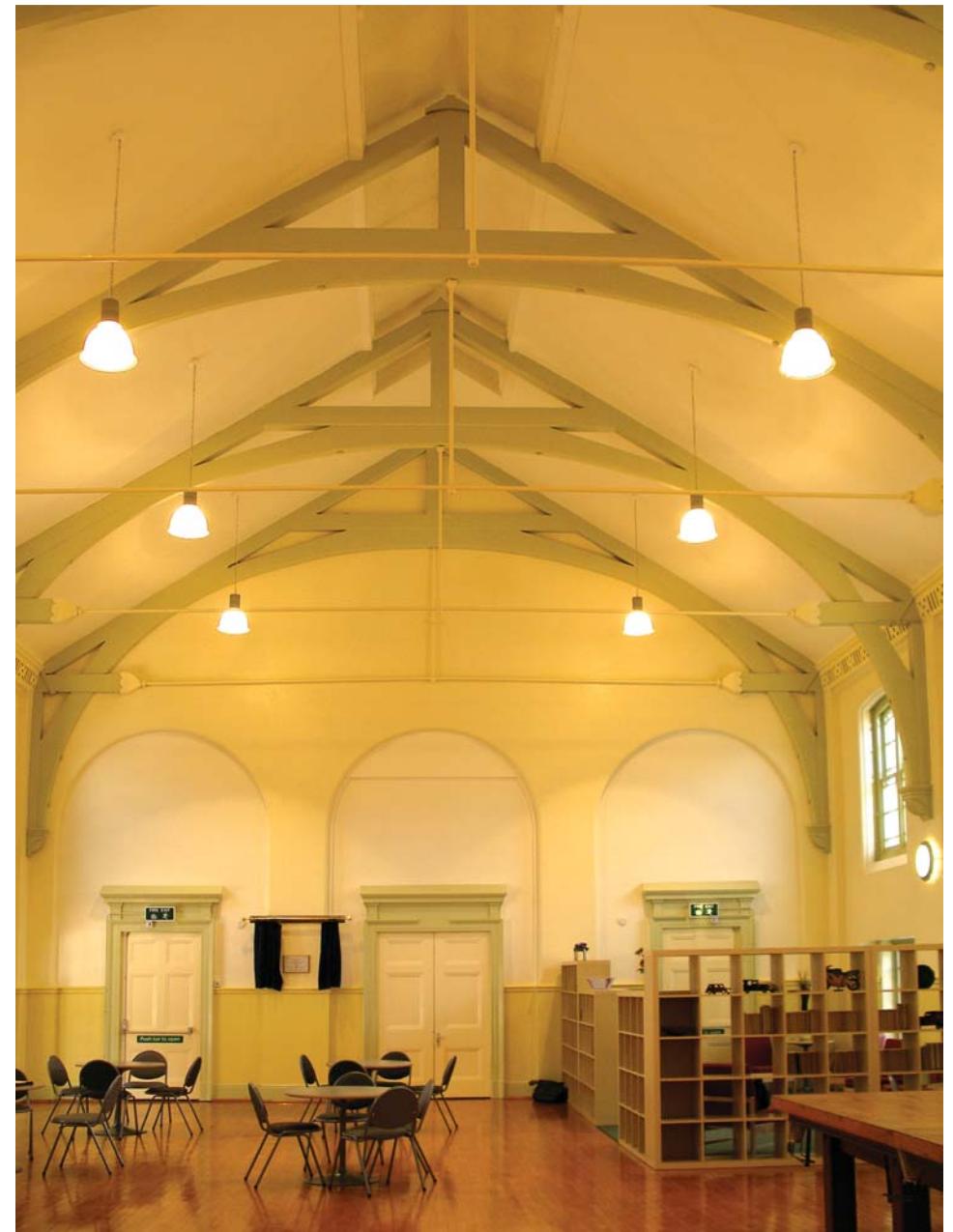
Details showing the use of a tonal colour scheme picking out the architectural detail.

The hall paint references

Colour Scheme References	BS Paint Ref
CEILING	10 B 15
TRUSSES	12 B 17
TIE BARS	10 C 31
FEATURE ON BEAMS	10 C 31
WOODWORK	12 B 17
MAIN WALLS	10 C 31
PIERS AND RECESS ARCHES	10 B 15
DADO PANELLS/RAILS	10 C 33
STAGE FRONT	10 C 33
PLASTER MOULD-INGS TO ARCHES	12 B 17 (mould-ing) 10 C 33 (arch)
DECORATIVE TIM-BER EAVES FRIEZE	10 C 33
DOOR PEDIMENTS	10 B 15 12 B 17

Areas for sitting and meeting. A small area for reading with some personal privacy behind the shelving.

The refurbished courtyard provided an opportunity for a mural of a trompe l'oeil wooden door, and a small garden water feature.
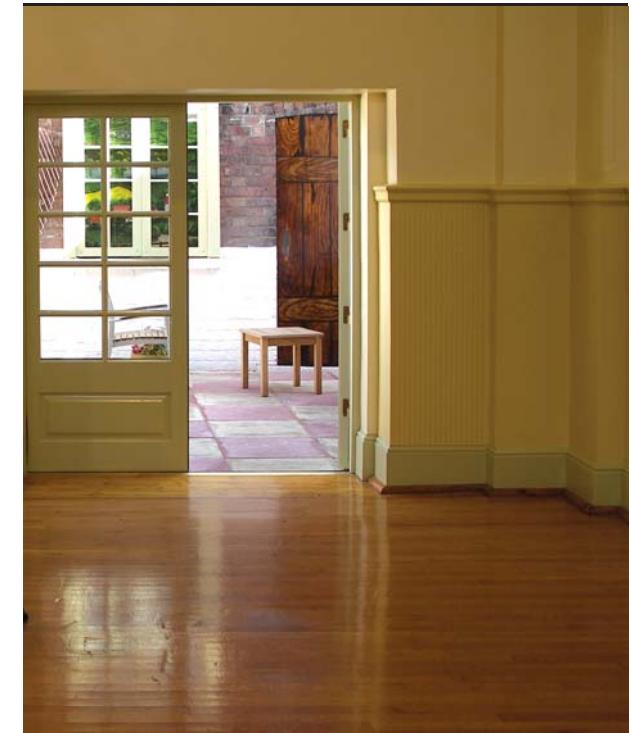
Post Occupancy Evaluation

Many of St Luke's service users were asked their opinions about the hall since it had been refurbished. The people using the hall varied immensely in their ability to communicate, but some were able to articulate their feelings via their carers. The comments were collected with staff assistance.

Most of the users appreciated being able to have access to secure, outside spaces such as the newly refurbished courtyards. A major result in terms of satisfaction was the improved areas of space with privacy, to sit and read within the hall. This one area was singled out as a favourite place by the service users. The seating area behind the book/display cases provided an impression of privacy although still in view of staff who needed to maintain visibility of all the people who used the hall.

The brightness of the hall with a calming feeling.
The colour scheme.
The reading area + courtyard areas.

The courtyard is great love the little painted window of the landscape all the art looks really good.

Delightfull

Much more welcoming & relaxing (like the little area which is cornered of where the water feature is nearby)

Much better colouring + Much better lights

WELL DONE.

GOOD what you DO for the People.

Nice

A LOT MORE CHEERFUL to WHAT IT used to BE. NICE OUTSIDE AREAS

GOOD

Everything

New doors and window which look likes have always been Here

Section 5

Exhibition and Conferences

Dissemination Exhibition

21 November 2005

Dissemination of the research findings consisting of two A1-sized boards included in an exhibition held at The Building Centre in central London. The exhibition was entitled 'Capital Health' and ran between 10 October and 26 November 2005. It focussed on the historical, contemporary and future healthcare estate in London, which will be transformed over the next 10 years as part of the largest capital building programme in the history of the NHS. The exhibition explored themes such as healing environments, new models of care and new technology in their architectural context.

Optimising Design Conference

Hilary Dalke and Mark Matheson presented the findings of the project in the seminar which accompanied the Capital Health exhibition at The Building Centre. It was attended by approximately 80 delegates made up of professionals from both health care and architecture. The seminar was promoted as follows:

Many of the most radical advances n health care design are taking place in response to the changing delivery of health care and the understanding of the body of evidence which is being brought back to the design professions through audits of existing buildings.

Leading researchers and practitioners present the challenges for the future.

Sue Francis, Future Healthcare Network.

Kate Trant, Cabe, Paul Hyett, Ryder HKS on how new technologies in healthcare are changing the buildings in which it is being delivered.

Joanna van Heyningen, van Heyningen & Haward on networks of care and the Lewisham Children's Centre.

Hilary Dalke, AHRC and Designplus funded research on refurbishment in long term health care facilities.

12th June 2007

Section 6

Recommendations

This two-year programme of research has uniquely investigated the use of colour in long-term healthcare environments from a number of different perspectives. The evidence from the different research paradigms has been drawn together to provide a robust evidence base concerning the use of colour in these environments.

Site audits have examined the way in which colour has been used, both effectively, and in ways which are less successful. Following this a carefully-controlled laboratory study allowed colour preferences in contiguous spaces to be rigorously examined and clear recommendations to be identified. This was supported by a sub-study of qualitative responses to colour. Finally, the recommendations from the laboratory study were tested through the implementation and evaluation of colour schemes in three 'real world' environments, providing support for our r e c o m m e n d a t i o n s . T h e s e recommendations are detailed here. Statistical analysis has provided key directions for colour application based on tested preferences

These findings will be of practical use to those concerned with the design of long-term healthcare environments and will further our understanding of this aspect of environmental psychology. The latter is true both in terms of the empirical evidence provided by the study and in terms of the methodology developed, which has considerable potential for use in studies of other environments such as prisons and schools. It should always be borne in mind that long-term healthcare environments provide a home for people of any age not just the older person; this is often forgotten when designing for long term healthcare environments.

This section has two parts of final advice based on generated data which has been analysed right the other anaecdotal information captured during the research phases:

1   Key Recommendations

2   General Conclusions

Firstly these key recommendations based on the last phase of statistical analysis of colour preference testing provides very clear evidence on what colours people wanted for their contiguous spaces in environments. The final part states some diverse major issues related to design, lighting and colour application in long-term healthcare environments.

Hue

1.   There is little evidence that there are clear preferences for particular hues. However what evidence there is seems to suggest that hues with **G** as a component tend to be less popular.

2.   If using either of two hues **B10G** or **B50G**, particular care should be taken to avoid darker versions of these hues which were particularly unpopular.

3.   If using either of hues **B50G** or **R30B**, particular care should be taken to avoid more intense (i.e. more saturated) versions of these hues which were particularly unpopular.

4.   If selecting a colour for a bedroom, **G** and **G60Y** should be avoided, while **R90B** would generally be a good choice.

5.   If selecting a colour for a corridor, **B10G** and **G** should be avoided, while **R90B** would generally be a good choice.

6.   If selecting a colour for a day room, **G** and **G60Y** should be avoided while **R** or **Y20R** would be generally a good choice.

7.   The evidence for preferences for hues amongst particular age groups is not strong. However, **R60B** seems to become less popular with age and hues with an element of **G** seem to be more popular with older people.

8.   If designing environments for a particular gender group it should be kept in mind that **G** and **G60Y** were more popular amongst men while **R30B** and **R60B** were more popular amongst women.

9.   If using either **B50G** or **R30B**, both the brightness and saturation levels should be kept low.

Brightness

1.   There is very strong evidence of a preference for pale colours. Dark colours should therefore be avoided. This preference was found to be true for each of the three room types investigated.

2.   Very pale colours are most likely to be preferred if they are associated with saturation levels which are either very low or intermediate. If a colour is slightly less pale then it is more likely to be preferred if it is associated with a slightly higher saturation level.

3.   While all age groups prefer pale colours, younger people show a greater liking for dark colours than do older people.

4.   The preference for pale colours is equally true of both men and women.

Saturation

1.	There is very strong evidence of a preference for colours of low saturation. Very intense colours should therefore be avoided. There is also some evidence for moderately intense colours. These should however be used sparingly.

2.	While colours of low saturation are preferred in each of the three room types, liking for moderately saturated colours is not found for corridors. Corridors should therefore always be painted with unsaturated colours on the majority of walls; accent walls may have more saturated colour applied.

3.	If using colours with higher saturation levels, these are more appropriate for environments for younger rather than older people.

4.	Likewise, colours with higher saturation levels are more appropriate for use in environments for males rather than females.

Journeys between rooms

1.	The colours in contiguous spaces should be of hues that are either the same or close together on the colour wheel. Schemes with colours which are radically different between contiguous spaces should be avoided.

2.	Brightness values should be kept consistently low across contiguous spaces.

3.	Saturation values should be kept low across contiguous spaces, although a moderately saturated colour may be used for a bedroom or a day room but not for a corridor.

See Appendix A Paper for more information on the results and analysis.

General Conclusions

- Future population projection states that by 2026, 41% of the population will be 50+ (DTI 2004) – the growth impact on the long term healthcare sector will be enormous

- It should be understood by everyone working in the healthcare sector that 75% of the 75+ age group will have serious vision problems

- Monotony and the poor conditions of a building are without doubt a contributory factor to low morale and sense of well-being for not only patients and staff but also visitors and relatives.

- Ability to change place, scene or go outside is vital for stimulation for the long term immobile.

- Views out that are interesting are critical and can be important for mental health and well-being; scenes of everyday life going on are really beneficial for elderly patients for example with dementia.

- To date, evidence supporting the influence of colour on mood suggest it is often minimal and limited.

- 200+ experiments worldwide were examined - no empirical evidence was found that any single colour can affect our bodies and emotions, long term (Wise 1988)

- Recognition time for Alzheimer's sufferers is significantly faster if colour is used as a cue, it improves day-to-day functioning, even for simple things

- Smaller communal rooms to avoid large institutional feel would offer a variety of spaces

- Screened areas where one can sit protected but in the open air are appreciated by service users.

- A room in a different colour from others in an establsihment can encourage service users to visit that space, e.g.a blue room in an otherwise all pink building.

- Corridors wide enough for two people to be walking and supporting a resident or patient with an accent wall colour, can make orientation, navigation and wayfinding easier.

- Variety of lighting with local controls was often mentioned as a major need by residents in long term healthcare.

- Furniture needs to be well designed for the elderly or disabled; winged armchairs are top-heavy, unstable and dangerous for patients who need to use furniture to raise themselves up.

- Extreme contrast which is not co-

ordinated can be unpleasant in a small room. E.g Black skirting in an all pink room; much better to have a very darker version of the same colour as the contrast.

• Age is an important factor in poor colour perception – yellowing of lenses affects colour vision making colours such as lilac looks look dull and grey but blues and greens more interesting.

• Older participants liked an increase in saturation from 10 to 20

• Overuse of green in mental healthcare environments has been observed on and reported

• Strong colours can give rise to after images so colour schemes chosen for contiguous spaces should work well together and not be extreme.

• The youngest or the oldest age groups are likely to prefer more saturated colours.

• Paler, less saturated colours are preferred across all the hues (S 0505 NCS)

• Male and female preferences differ most on yellow/green

• Men prefer greens and green/yellows more than women

• Women are likely to choose lilac/purples more than men.

• The youngest age groups are more likely to choose yellows and yellow/oranges

• 30-39 age group prefer lilac/purples overall

• 80+ age group prefer blue/greens, greens and green/yellows

• Lighting must be planned in unison with colour schemes for maximum effect.

• Light within a room is more likely to have an emotional source for women

• Aof ndequate provision atural daylight is essential for a sense of well-being

• Well-lit transition areas should be provided to accommodate adaptation from dark to light areas; this is a particularly difficult issue for the older person who has slower adaptation. As the visual system ages, adaptation lengthens.

• Low-cost refurbishments should focus on achieving colour co-ordination of features, fittings that have to be retained.

• Plan colour schemes as a 'journey' of visual stimulation for the less mobile.

• After image and contiguous spaces are major factors in design for long term healthcare.

• Factors such as saturation (strength

of colour) or brightness (black/white) are more important than hue (which actual colour)

• Colour can be used with dementia patients in order to promote desired behaviour, discourage undesired behaviour and enhance the ambience of the environment

• Patients were discouraged from leaving wards, entering restricted areas, or other patient' wardrobes by painting doors the same colour as the walls.

• Doors to activity areas were bright red and patients spent increasingly more time in these areas.

• Dementia patients were shown to be more interested in their food if served off different coloured plates.

• Residents may have access to only three contiguous spaces. Constraints of limited mobility require the careful planning of the colour environments

• Redecorating regularly affects everyone's morale positively. Variety and change helps all. Painting walls is the most effective way of upgrading environments.

Section 7

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Appendix A
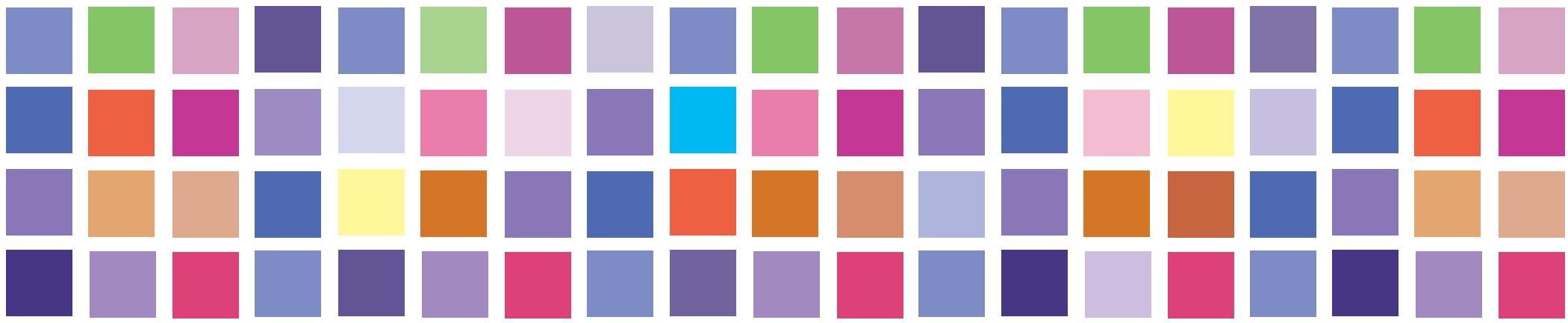
Preferences for wall colour application in long-term healthcare environments

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Abstract

Residents of long-term healthcare environments live in confined spaces. The design of these spaces can impact in important ways on users. Wall colour is an aspect of the design of healthcare environments which can be modified at modest cost. The present study aimed to provide empirical evidence of preferences for wall colour in rooms typical of those found in long-term healthcare environments. A sample of 112 subjects was tested, stratified for age and gender. Subjects selected their preferred colours for three contiguous room types (bedroom, corridor and day room) from a palette of 90 colours, structured by hue, brightness and chroma saturation values. Statistical analysis yielded a number of significant effects which are described in detail, the most striking being on brightness value and chroma saturation. Subjects expressed a very clear preference for pale colours with low levels of chroma saturation, regardless of hue.

Introduction

As discussed at some length in the literature review, many studies of colour preference have suffered from significant shortcomings. With these shortcomings in mind, the broad aim of the present study was to examine preference for surround (i.e. wall) colour for rooms typical of those found in long-term healthcare environments. The test was restricted to surround colour with the complicating factors of colour combinations and accent walls being omitted.

In earlier work by the Colour Design Research Centre the acceptability of surround colour was assessed by means of model "rooms" (ICI internal report). These were each constructed from three pieces of cardboard (two size A2 and one size A3) and when viewed in close proximity, filling the total field of vision, provided a convincing analogue of a full-size room[1]. For this earlier work two hues from the NCS colour wheel[2], Y20R and R90B, were examined. In each case 44 permutations of saturation and brightness were presented to subjects who were asked to judge whether each colour was "acceptable", "unacceptable", or that they were "not sure". The results of this study provided evidence, for these two hues, for the levels of saturation and brightness which subjects found to be "acceptable" for "surround colour", colour on all the walls of a room.

The present study extended this earlier work in two ways. Firstly, we examined whether the findings for surround colour acceptability based on these two hues would generalise

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[1] Subjects were asked to rate how convincing they found the paradigm out of a maximum score of 5. The mean score of subjects was 3.84.
[2] The Swedish Natural Colour System (NCS). See Appendix for description.

to other hues. To this end we selected a total of ten hues (including the two used in the earlier work) from around the NCS colour circle, selected in order to provide a good range of hues with no obvious visual gaps. For each of the ten hues nine combinations of saturation and brightness were selected, being representative of those found to be acceptable for Y20R and R90B. These were the same across all ten hues. This gave rise to a total of 90 colours (10 hues x 9 saturation/brightness combinations).

The present study also extended the earlier work by examining preference for colour in the types of rooms typical of long-term healthcare environments. Three types of rooms were selected as being most representative of those rooms occupied by residents of long-term care: bedrooms, corridors and day rooms. In view of the fact that many residents in long-term care inhabit only a very small number of spaces the colours chosen for the totality of the environment (i.e. bedroom, corridor and day room) was of interest as was the way in which these spaces related to each other as they would be experienced in a journey beginning in the bedroom, travelling through the corridor and into the day room. "Artist'.s impressions" of the rooms were created by hand-drawing images based on photographs of real environments. For each of the three types of rooms (1 (bedroom), 2 (corridor) and 3 (day room)) three example images showing different styles of room layouts were created (A, B and C), producing a total of nine room images (1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, 3C). Figure 1 illustrates the three bedroom images i.e. images 1A, 1B and 1C.


Figure 1. Uncoloured images of bedrooms A, B and C.

Using Photoshop the walls in each of the nine rooms were flood-filled with each of the 90 colours. This produced a total of 810 coloured image cards (CICs). In order to minimise the potential confounding effects of additional colours within the images all colours other than those used for walls were neutral and held constant across the CICs. For all images the floor was coloured grey, the ceiling white, and the furniture and furnishings cream, the latter selected as being close to the natural colour of wood. Figure 2 illustrates one of the CICs.

Figure 2. A coloured image card (CIC).

Method

Materials

Coloured image cards (CICs): The 810 images were printed onto cards which were approximately 124 mm x 93 mm. These were measured with a spectrophotometer to check final colour output and accuracy to ensure that the test colour was exactly the same as the NCS colour sample selected for the testing set. This is known as ICC profiling. The coloured image cards were kept in separate piles for each of the nine rooms (i.e. bedrooms A, B & C, corridors A, B & C and day rooms A, B & C). The ordering of the CICs within each pile was random.

Grey backgrounds: A piece of grey foam board was placed on a table to provide a neutral background against which participants could sort through the CICs without background colour affecting visual appraisal of the CICs.

Grey easel: Constructed from grey foam board this provided a place for subjects to put preferred cards which allowed them to easily see how the different colours worked together (Fig. 5).

Board with black and white images of all nine rooms.

Pens were provided for subjects to sign the consent form.

Printed materials: Verbal instructions; Subject Information Sheet and Consent Forms; subject record sheets to record responses.

Participants

A total of 112 subjects were tested. Of these 56 were male and 56 were female. The average age was 54.46 years. The sample was stratified by age with a total of 8 males and 8 females being tested from each of the following age bandings: 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80+ (See Fig.3).

	18-29	30-39	40-49	50-59	60-69	70-79	80+	TOTAL
Female	8	8	8	8	8	8	8	**56**
Male	8	8	8	8	8	8	8	**56**

TOTAL	16	16	16	16	16	16	16	112

Fig 3. Demographic characteristics of participants.

Procedure

Tables were arranged so that the subject could sit next to a table with the easel and a table with the grey board where they could sort through the images. The experiment took place in good natural light between 10.00 and 14.00 each day. The experimenter began by explaining what the experiment involved and then gave the subject the Subject Information Sheet and Consent Form. The subject then read the Information Sheet and signed the Consent Form. They were then asked to look at the three uncoloured images of bedroom styles and to select the bedroom style (A, B or C) which they found easiest to imagine themselves in. The rationale in offering the subjects this choice was that it would allow them to select a room which they could readily imagine themselves in, thereby increasing the ecological validity to the task. The subjects were next asked to select one of the corridor styles followed by one of the day room styles. These choices were recorded and the research assistant then gave the experimenter the piles of CICs corresponding to the subject's choice of rooms, A, B or C. The experimenter then flicked through the CICs for the bedroom in order to give the subject a preliminary idea of the range of colours available and then asked the subject to sort through the cards selecting the three images having the wall colours which they would most like to live with (Figure 4). The participant was further requested to articulate any thoughts that they had during the sorting and selection procedure.

Figure 4. The selection process.

The method which the subject used was recorded together with any other thoughts or comments they articulated during their sorting and selecting. Typically, subjects began by eliminating those colours which they definitely did not like. Subjects then selected their three "preferred" colours from those that remained. Those "preferred" colour choices which were shortlisted but ultimately not chosen were recorded by the research assistant. Having made their choice of three preferred bedroom wall colours their choice was placed onto the easel by the experimenter (See Figure 5). This allowed easy reference to these colours during the rest of the experiment.

Figure 5. The easel to view three preferred colour choices of the journey.

This sequence of events was repeated for the corridor and day room, in each case subjects being required to choose preferred CICs of rooms with colours which they liked as surround colour. The only difference was that when selecting colours for the corridor and day room subjects were asked to take into account the colours which they had selected for the bedroom, and corridor where appropriate. Subjects were asked to keep in mind a journey that they might take beginning in the bedroom, travelling along the corridor and into the day room considering the way in which the colours in the three spaces would work together. They were asked to select colours in order to make up their preferred journey between the three spaces.

Once the subjects had picked out their "preferred" colours for each of the three spaces and these had all been placed on the easel the experimenter asked the subject which of the three combinations of colours (i.e. a bedroom, corridor, day room combination) was their overall "most preferred" scheme. Subjects were permitted to re-order the cards and change the cards in order to create their most preferred combination. The three schemes (each of three cards) were recorded, and the "most preferred" of these.

Subjects were thanked for their participation and given a modest remuneration.

Analysis

The 112 subjects were able to make three choices for each of the room types – bedroom, corridor and dayroom, a maximum of 1008 choices. However, not all subjects specified all their choices for each of the room types and as a result only 982 data points were recorded.

The choices thus made were analysed using chi-squared tests of association (Agresti 2002). From contingency tables of frequency counts of subjects' responses, a chi-squared test of association between two factors was conducted. The factors considered were hue, brightness value, chroma saturation with each other and also with each of room type, age and gender. room number (i.e. style) was not included in the analysis as the different room layouts were not of particular interest and had been included merely to give subjects an opportunity to select a room which they could identify with as explained above.

In addition, logistic regression modelling (Agresti, 2002) was carried out to identify which factors could predict whether a colour (defined by hue, brightness value, chroma saturation) would be chosen or not. Here, the outcome variable was whether chosen (i.e. "preferred") or not, and the explanatory variables were the three colour constituents: hue, Brightness value, chroma saturation. Separate analyses were performed for each of bedrooms, corridors and dayrooms and also for the combination of all room types. This methodology also allowed investigation of two or three-way interactions between hue, brightness value and chroma saturation.

Results

The structure of this section is as follows:

   A. Colour choices by
- Hue
- Brightness
- Saturation

   B. Associations between two factors
1. Hue x Brightness
2. Hue x Saturation
3. Hue x Room Type
4. Hue x Age
5. Hue x Gender
6. Brightness x Saturation
7. Brightness x Room Type
8. Brightness x Age
9. Brightness x Gender
10. Saturation x Room Type
11. Saturation x Age
12. Saturation x Gender

Note that the interactions between Room Type and Age, Room Type and Gender, and Age and Gender are not examined as in each case both factors were fixed before the choice of colour (Hue, Brightness and Saturation) was made.

C. Three-way interactions between Hue, Brightness and Saturation overall and separately for each of the three room types

D. Analysis of the Journey between the three room types
- Journey in terms of Hue
- Journey in terms of Brightness
- Journey in terms of Saturation

A. Main effects for dependant variables

Hue

The frequency distribution of choice of Hue across all room types and all levels of Brightness and Saturation is shown in Figure 6. It can be seen that there were differences in the preferences across the hues. The most popular hue was R90B (15%), while the least popular was G (6%).
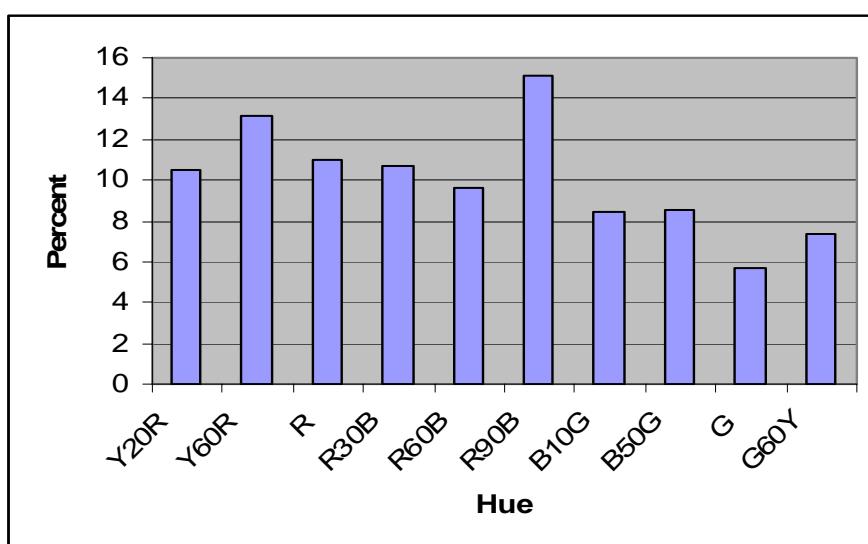

Figure 6. Distribution of choice of Hue.

A chi-squared test showed that there was a highly significant association between Hue and choice of colour. $\chi^2 = 66.3$, df = 9, p < 0.001.

The results from the logistic regression analysis supported this with Hue being a significant factor (p < 0.05). The Maximum Likelihood Estimate (MLE) from the logistic regression was highly significant in a negative direction (p < 0.001) for G, indicating that it was a very unpopular choice. The MLE for G60Y was significant (p < 0.05) in a negative direction indicating that this was an unpopular hue. The only positively significant hue (p < 0.05) was R90B, this being the most popular choice of hue.

Taken together, these results show that there are certain hues which are preferred over others, regardless of the levels of Brightness or Saturation. It is difficult to generalise about the hues that are preferred. It is not possible, for example, to say that "people prefer blues to reds" as R90B, a slightly purple-ish blue, was the most popular hue, while B10G, a slightly greenish blue, was amongst the least popular. Perhaps the only

generalisation which can be made is that any hue with green as a component was amongst the least popular.

Brightness

The frequency distribution of choice of Brightness level across all room types and all levels of Hue and Saturation is as shown in Figure 7. It can be seen that there were differences in the preferences across the Brightness levels. 66% of subjects chose the 05 level, 26% level 10, 7% level 20 and only 2% chose level 30. It would appear that the paler the Brightness level the more often it was selected.
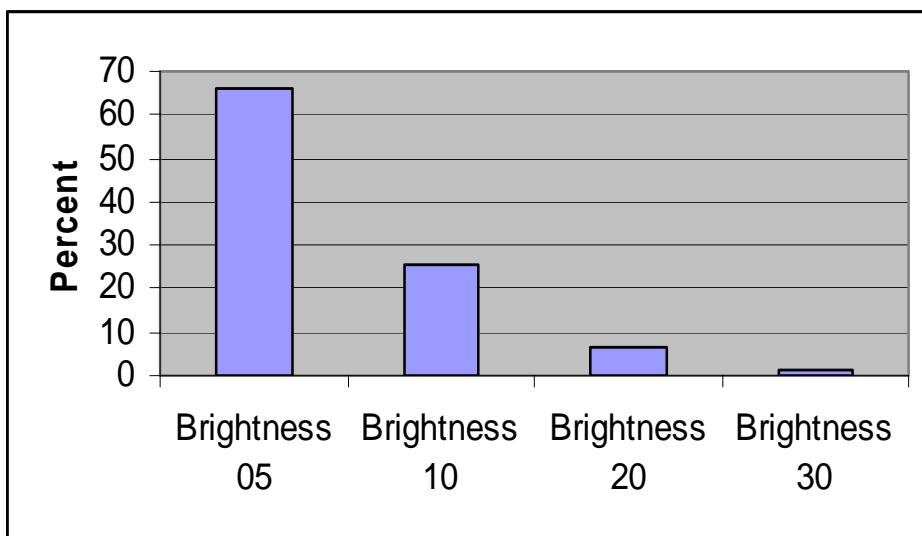

Figure 7. Distribution of choice of Brightness level.

A chi-squared test showed that there was a highly significant association between Brightness and choice of colour, $x^2 = 1005.9$, df = 3, p < 0.001.

The results from the logistic regression analysis supported this with Brightness being a highly significant factor (p < 0.0001). The Maximum Likelihood Estimate from the logistic regression was negative, indicating that favourite choices were the lower values of this variable. This means that these differences can be attributed to subjects' preferences for Brightness level, rather than to the influence of any extraneous factors.

Saturation

The frequency distribution of choice of Saturation level across all room types and all levels of Hue and Brightness is as shown in Figure 8. It can be seen that there were differences in the preferences across the Saturation levels. Broadly, the lower the saturation level of a colour the more likely subjects were to choose it. However, an exception to this pattern is the frequencies for saturation levels of 10 and 20, the former having the lower frequency count. This suggests that the participants liked colours to be either very neutral or fairly strongly coloured, those with saturation levels of 10 satisfying neither of these criteria.
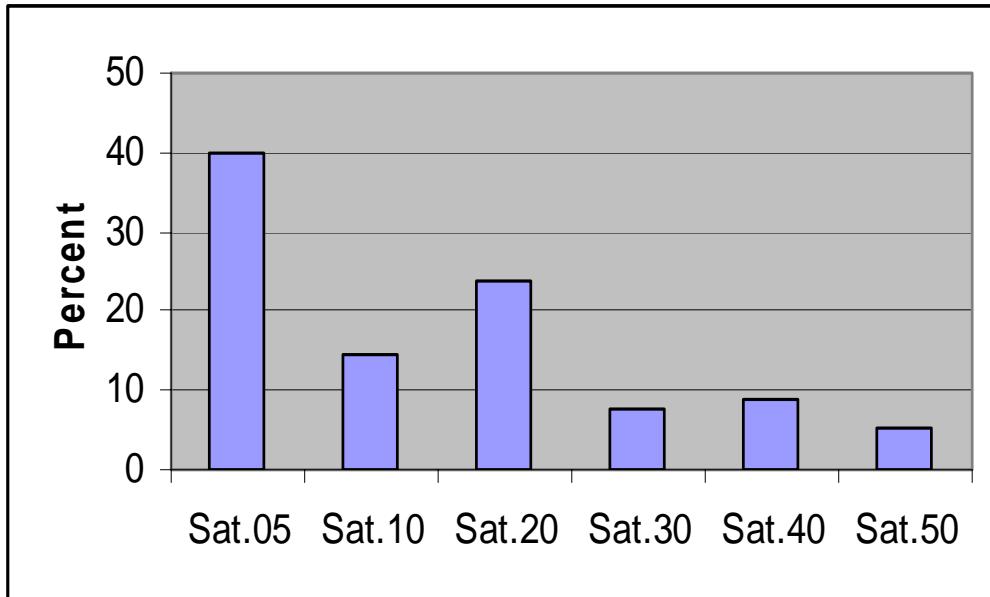
Figure 8. Distribution of choice of Saturation levels.

A chi-squared test showed that there was a highly significant association between Saturation and choice of colour, x^2 = 508.9, df = 5, p < 0.001.

The results from the logistic regression analysis supported this with Saturation being a highly significant factor (p < 0.0001). The Maximum Likelihood Estimate from the logistic regression was negative, indicating that favourite choices were the lower values of this variable. This means that these differences can be attributed to subjects' preferences for saturation level, rather than to the influence of any other factors.

B. Associations between two factors.

1. Hue and Brightness

Figure 9 shows the distribution of the level of Brightness within each hue. The pattern across the hues is very similar for the levels of brightness, with 05 being the choice in 60-70% of each hue. However, for Y60R and B50G brightness level 10 makes up 30-35% of the choice, whereas it is less than 20% for R30B and G60Y. Note that this pattern holds for R. It was anticipated that perhaps this hue might show a different pattern from the other hues with darker reds being more popular than paler reds i.e. pinks. This prediction is not supported by the data.
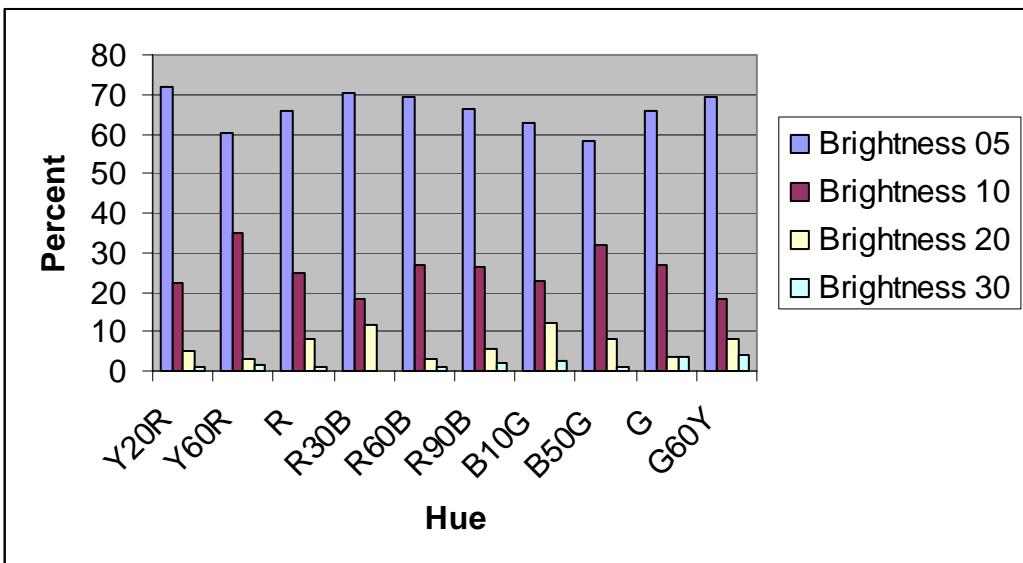
Figure 9. Distribution of Brightness within Hue.

A chi-squared test indicated that there was no statistically significant association between Hue and Brightness (p > 0.05). This confirms what is noted above that the pattern of Brightness level is very similar across all Hues.

However, the logistic regression found the interaction of Hue and Brightness to be significant (p < 0.05). The MLEs indicated that B10G and B50G were both significant (p < 0.05), while R30B was significant at the 10% level (i.e. p < 0.1). In all cases the sign of the MLE indicated that it was the paler brightness levels which were preferred.

2. Hue and Saturation

Figure 10 shows the frequency distribution of the level of Saturation within each hue. It can be seen that the frequencies differed between the conditions. Again, the pattern is very similar across the hues with saturation levels of 05 being the most popular in each case, saturation of 20 being generally next most popular followed by saturation levels of 10.
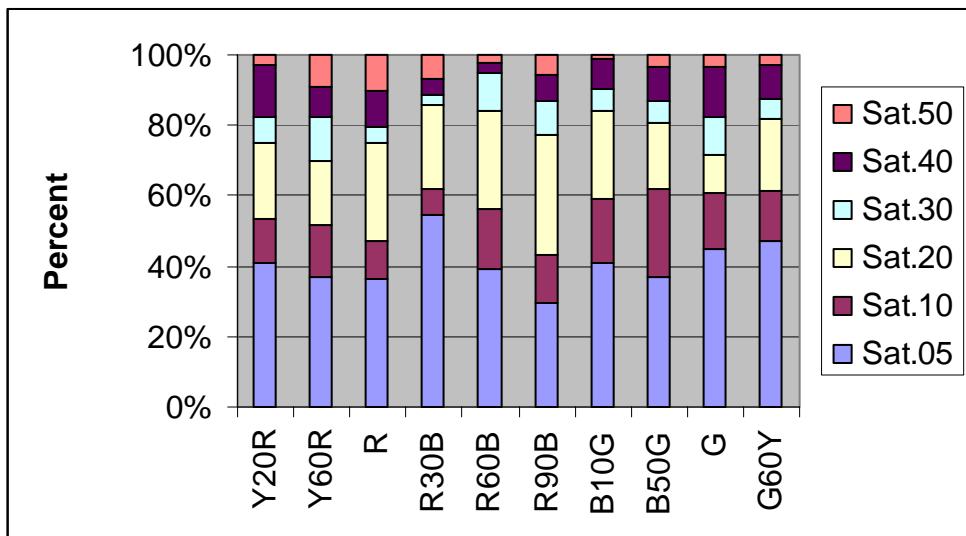
Figure 10. 100% stacked bar chart for distribution of Saturation within Hue.

A chi-squared test indicated that the association between Hue and Saturation was statistically significant, $\chi^2 = 78.9$, df = 45, p = 0.001.

The logistic regression was also significant (p < 0.05). The MLEs showed that B50G and R30B were both significant hues. This means that whether these hues were selected depended upon the saturation level. This was not true of the other hues. In both cases the sign of the MLE indicated that it was the lower Saturation levels which were preferred.

3. Hue and Room Type

Figure 11 shows the distribution of the level of Hue within each room type. Y20R, Y60R and R are more popular for Dayrooms than for either Bedrooms or Corridors, whereas R60B and R90B are more popular choices for Bedrooms and Corridors than for Dayrooms.
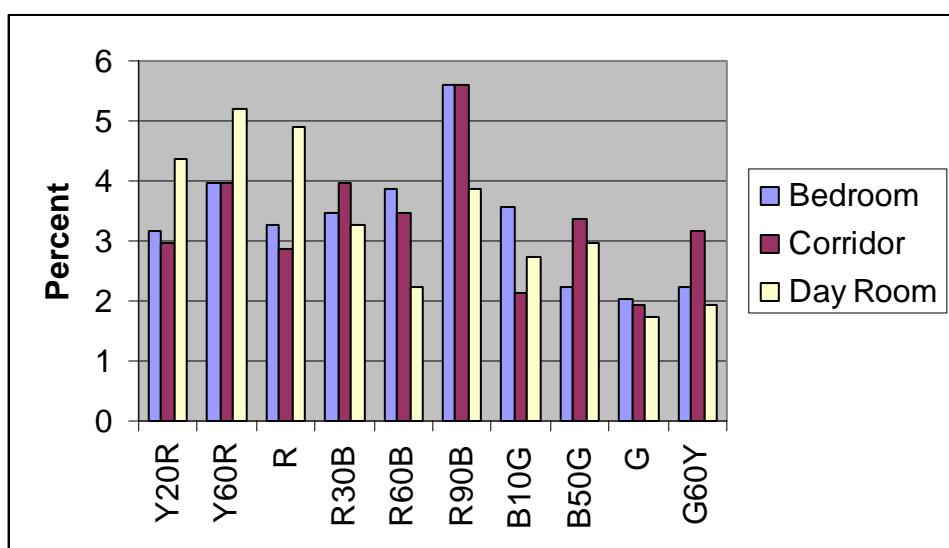

Figure 11. Distribution of Room Type within Hue.

A chi-squared test indicated that the association between Hue and Room Type was significant, ^{2} = 30.17, df = 18, p < 0.05. This shows that these differences are attributable to the influence of Room Type and Hue rather than to the influence of any other factors.

The logistic regression examined the interaction of hue and each of the room types considered separately (i.e. hue x bedroom; hue x corridor; hue x dayroom). In all three cases the interaction was found to be highly significant. The maximum likelihood estimates (MLEs) indicate that for bedrooms G, G60Y and R90B are significant hues (all p < 0.05). The MLEs for the first two are negative, indicating that they were rarely selected, while the MLE for R90B was positive indicating that it was a very popular choice. In the case of corridors, significant hues were B10G, G and R90B (all p < 0.05). The MLEs for the first two were negative, indicating that they were rarely chosen, while the MLE for R90B was positive, indicating that it was often chosen. Finally, as far as day rooms are concerned, significant hues were G, G60Y, R and Y20R. The MLEs for the first two were negative indicating that they were rarely chosen while the MLEs for R and Y20R were positive indicating that they were frequently chosen.

Taken together these results confirm the observations from the bar chart. Specifically, for all three room types G was unpopular. G60Y was also unpopular for bedrooms and dayrooms while B10G was unpopular for corridors. R90B was the most popular hue for bedrooms and corridors while Y60R was the most popular hue for dayrooms. R and Y20R were also popular for dayrooms.

4. Hue and Age

Figures 12a and 12b show the distribution of age within each hue. The 20-29 age group were most likely to choose R90B, Y20R and Y60R; the 30-39 age group were most likely to choose R60B and R90B. Although R90B is also popular for the 40-49, 50-59 and 60-69 groups, the popularity of R60B diminishes with age. The choices for the 70-79 and 80+ groups are different, except for R and G; otherwise the 70-79 age group prefer Y60R and the 80+ prefer B10G and B50G.
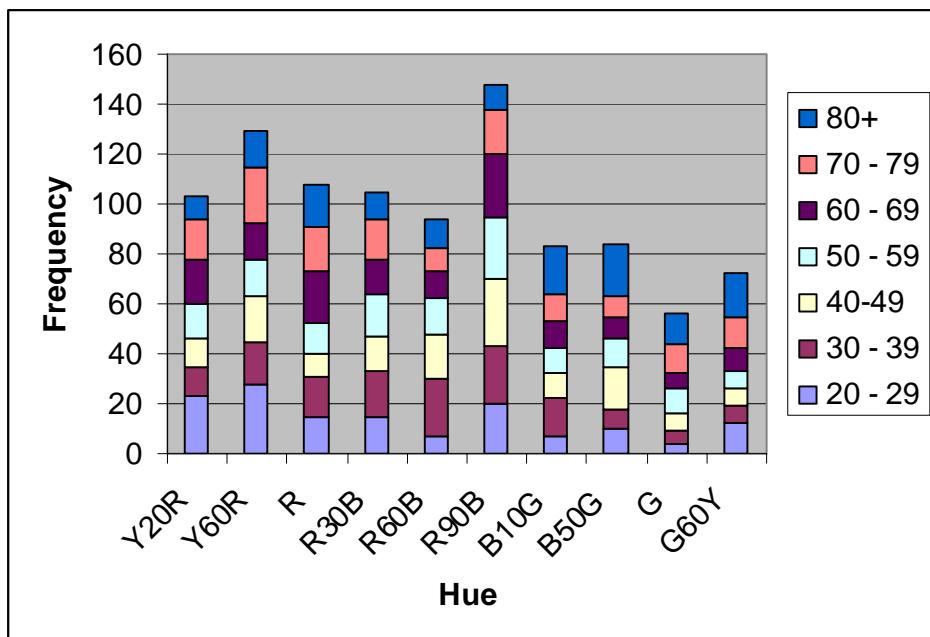

Figure 12a. Stacked bar chart for distribution of Age Group within Hue.
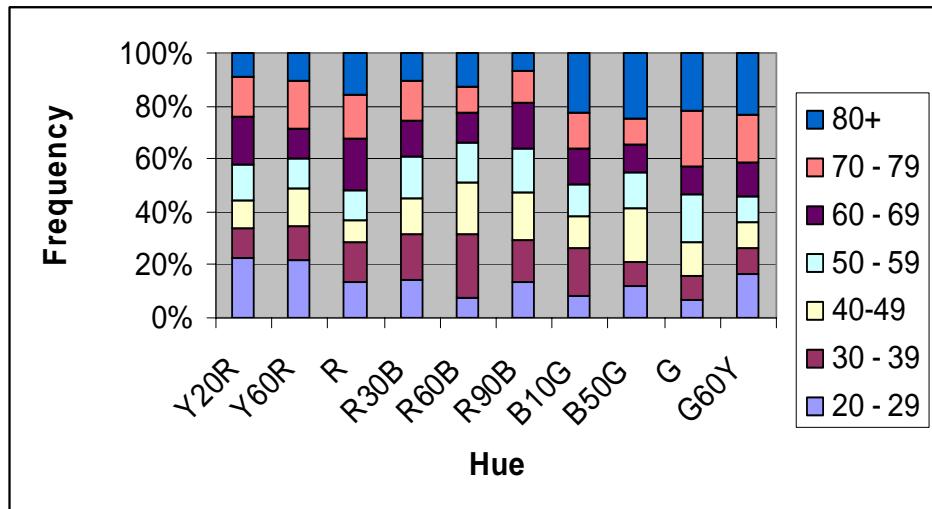
Figure 12b. 100% stacked bar chart for distribution of Age Group within Hue.

A chi-squared test indicated that the association between Age and Hue was statistically significant, $\chi^2 = 85.97$, df = 54, $p < 0.05$, showing that the observed differences can be attributed to the influence of Hue and Age Group.

5. Hue and Gender

Figure 13 shows the distribution of Gender within Hue.

This shows that there is a difference in the choices made by males and females for some hues. For example, within the hue choice, males are more likely to choose G and G60Y than females, whereas females are more likely to choose R30B and R60B than males; otherwise the choices made are almost equally divided between males and females.
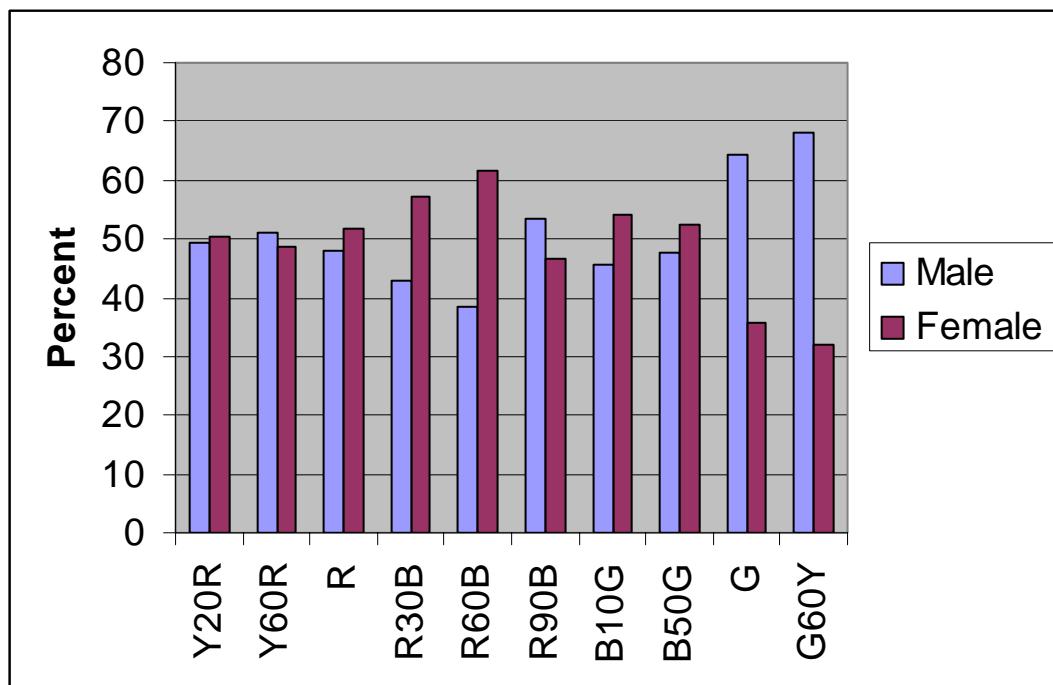

Figure 13. Distribution of Gender within Hue.

A chi-squared test indicated that the association between Hue and Gender was statistically significant, $x^2 = 22.9$, df = 9, p < 0.05. The observed differences can therefore be attributed to the influence of Hue and Gender rather than to the influence of any other factors.

6. Brightness and Saturation

Figure 14 shows the distribution of Brightness level within each Saturation level.

This association must be treated differently from the others as the levels of Saturation depend on the levels of Brightness, e.g. for Saturation 05 it is only possible to have Brightness 05 or 20. The results for this association are therefore shown in tabular form.

		Saturation					
		Sat.05	Sat.10	Sat.20	Sat.30	Sat.40	Sat.50
Brightness	Brightness 05	355	0	204	6	83	0
	Brightness 10	0	127	1	70	3	51
	Brightness 20	36	0	29	1	0	0
	Brightness 30	0	16	0	0	0	0

Figure 14. Distribution Brightness within Saturation.

A chi-squared test indicated that the association between Brightness and Saturation is statistically significant, $x^2 = 997.59$, df = 15, p < 0.001. The logistic regression found this interaction to be close to significant (p < 0.0535). There is only one MLE for this interaction as both variables are ordered and numeric. This indicates that the likelihood of colours with particular saturation levels being selected depended upon the brightness levels of those colours.

7. Brightness and Room Type

Figure 15 shows the distribution of Brightness level within each room type.

There don't appear to be any differences between the three room types in terms of the Brightness levels of the colours chosen. In other words, subjects' preferences for brightness level did *not* differ depending upon the type of room under consideration. For each of the three room types, the paler the colour the more likely it was to be selected.
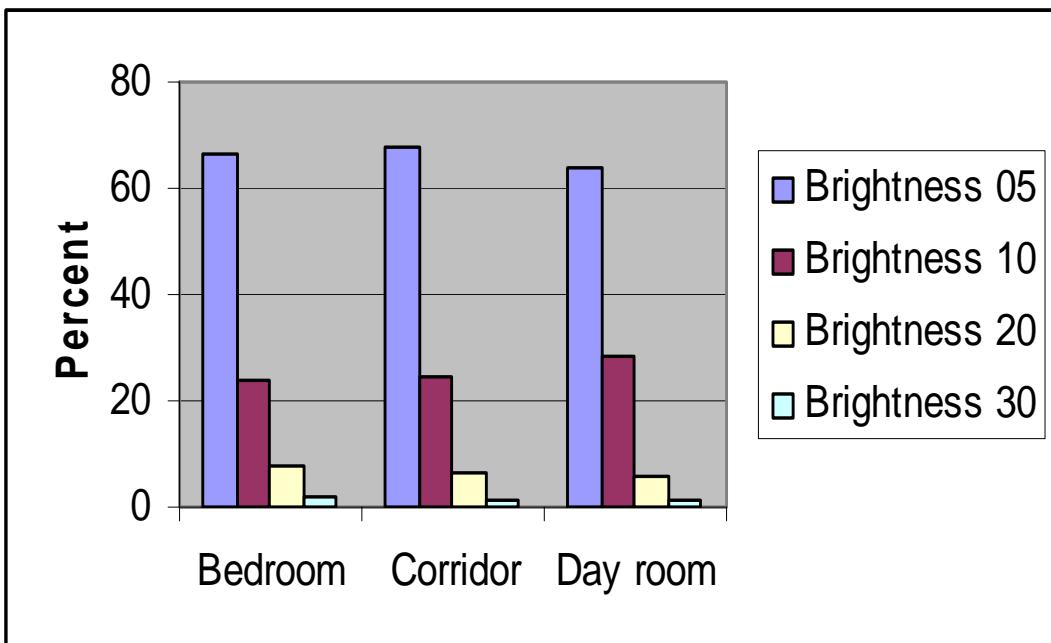
Figure 15. Distribution of Brightness within Room Type.

A chi-squared test indicated that there was no statistically significant association between Room Type and Brightness (p > 0.05).

The logistic regression examined the association between Brightness and each of the room types considered separately (i.e. Brightness x bedroom; Brightness x corridor; Brightness x dayroom). In all three cases the interaction was found to be highly significant. The maximum likelihood estimates (MLEs) indicate that for each of the three room types Brightness is negative, indicating that the lower values of this variable were most popular.

8. Brightness and Age

Figure 16 shows the distribution of the level of Brightness within each age group.

All age groups show a clear preference for bright colours. The younger age groups however show a greater preference for colours which are slightly less bright than do the older age groups as indicated by the higher levels of brightness level 10 amongst those in their twenties and thirties compared with the older age groups.
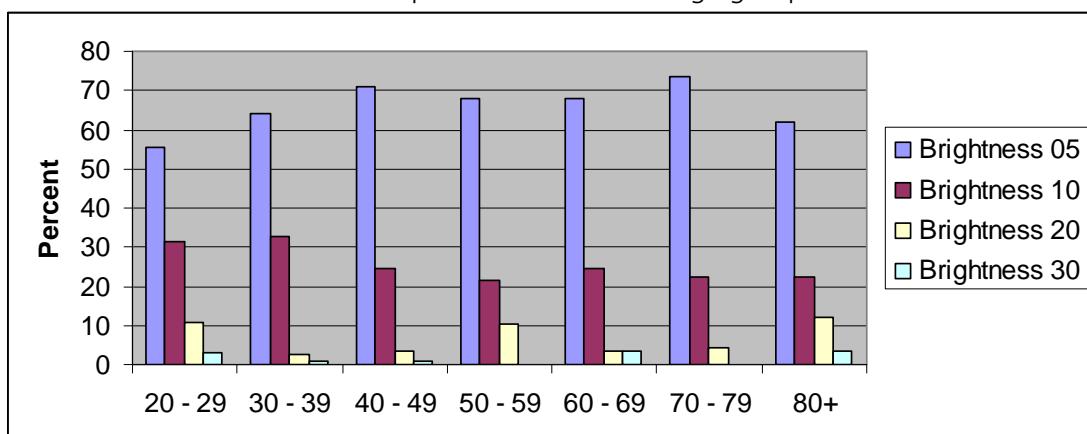
Figure 16. Distribution of Brightness within Age Group.

A chi-squared test indicated that the association between Brightness and Age Group is statistically significant, $\chi^2 = 45.69$, df = 18, p < 0.001.

9. Brightness and Gender

Figure 17 shows the distribution of Brightness within each Gender group.

There do not appear to be any differences between the two Gender categories in terms of the Brightness levels of the colours chosen. It therefore appears that both males and females were more likely to select a colour the lower the brightness value of that colour.
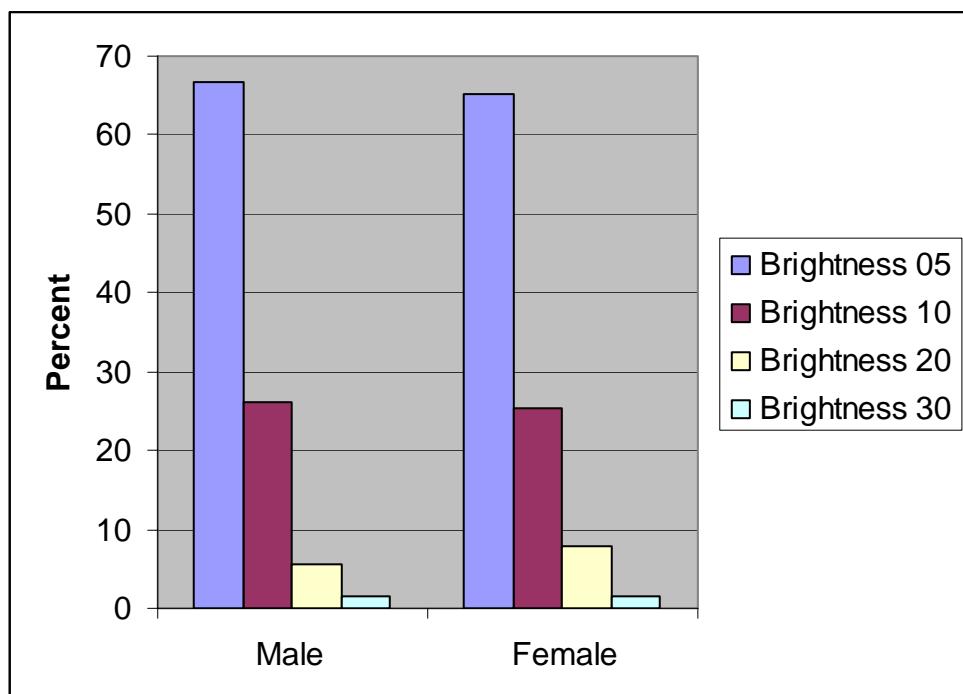
Figure 17. Distribution of Brightness within Gender.

A chi-squared test indicated that the association between Brightness and Gender is not statistically significant, p > 0.05.

10. Saturation and Room Type

Figure 18 shows the distribution of Saturation levels within each room type.

The comments above regarding the pattern of results for Saturation hold In the case of each of the three room types. Specifically, in general the lower the saturation level of a colour the more likely it was to be selected, and saturation levels of 10 tend to be less popular than saturation levels of 20. These results suggest in addition that in the case of corridors, more than for bedrooms or day rooms, colours having very low levels of saturation are selected. The liking for colours having moderately high levels of saturation does not seem to hold for this room type as it does for bedrooms and day rooms.
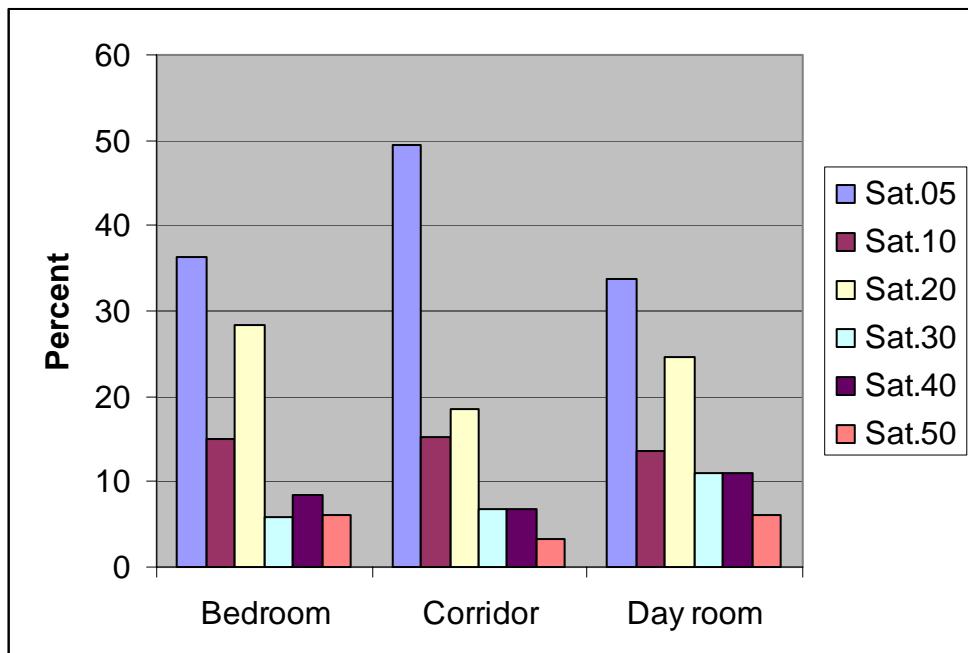
Figure 18. Distribution of Saturation within Room Type.

A chi-squared test indicated that the association between Room Type and Saturation is significant, $^2 = 31.95$, df = 10, p < 0.001.

The logistic regression examined the interaction of Saturation and each of the room types considered separately (i.e. Saturation x bedroom; Saturation x corridor; Saturation x dayroom). In all three cases the interaction was found to be highly significant. The maximum likelihood estimates (MLEs) indicate that for each of the three room types Saturation is negative, indicating that the lower values of this variable are most popular.

11. Saturation and Age Group

Figure 19 shows the distribution of Saturation levels within each age group.

It can be seen from Figure 14 that from aged 40 onwards at least 40% in each age group prefer the lowest saturation level. For those aged 30-39, saturation level 20 is the most popular choice. This suggests that colours with higher saturation levels are liked better by younger people.
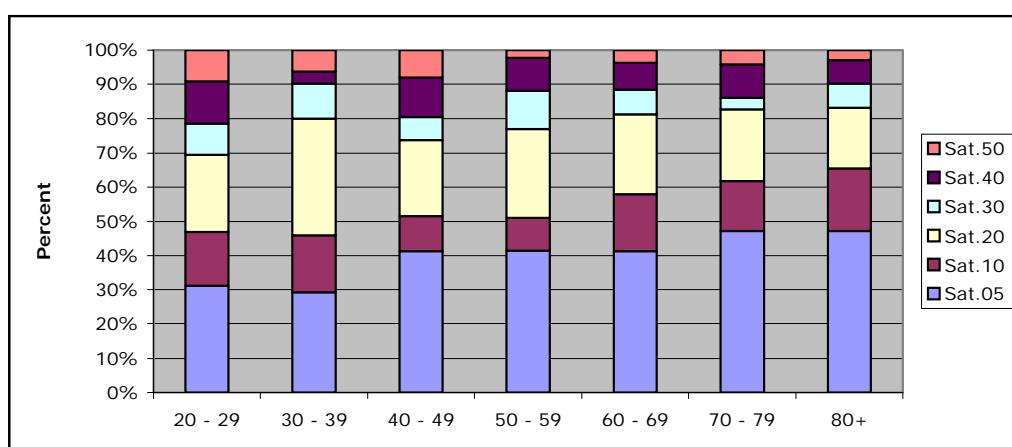
Figure 19. 100% stacked bar chart for distribution of Saturation within Age Group.

A chi-squared test indicated that the association between Saturation and Age Group is statistically significant, $x^2 = 54.32$, df = 30, p < 0.05. The differences are attributable to the influence of Saturation and Age Group.

12. Saturation and Gender

Figure 20 shows the distribution of Gender groups within each Saturation level.

This figure suggests that the preference for colours of low saturation is more pronounced in the case of females than it is of males. Males appear to have a greater tolerance of highly saturated colours than females.
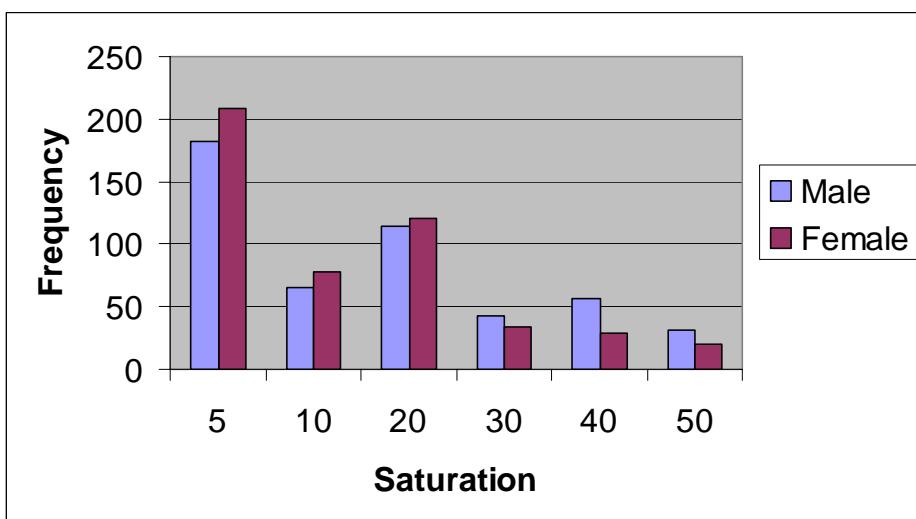
Figure 20. Distribution Gender within Saturation.

A chi-squared test indicated that the association between the frequencies for the interaction of Saturation and Gender is statistically significant, $x^2 = 15.74$, df = 5, p < 0.05. Once again, the differences can be attributed to the influence of the factors under consideration rather than to any other factors.

C. Three-way interactions overall and for each of the three room types separately

It was not possible to examine three-way interactions by means of chi-square analyses, hence only results for the logistic regression are reported.

Collapsing across the three room types produced a significant three-way interaction. Significant hues were B50G and R30B. In both cases the sign of the MLE indicated that it was the paler brightness levels and lower saturation levels which were preferred. This indicates that whether these two hues were selected depended upon both the brightness level *and* the saturation level.

The analyses for each of the three room types separately produced no significant three-way interactions.

D. Analysis of the Journey between the three room types

The data set was too small for statistical analysis but the patterns are shown graphically. See separate files for details.

Journey in terms of Hue

Appendix 1 contains a bar chart showing the frequencies for each of the possible "hue journeys".

The choice of hue across the three room types was analysed as follows.
The choice of hue for the bedroom was taken as the starting point. For each of the ten hues we then examined how far the choice of hue for the corridor deviated from that of the bedroom in terms of its distance around the Colour Wheel (Figure 21).
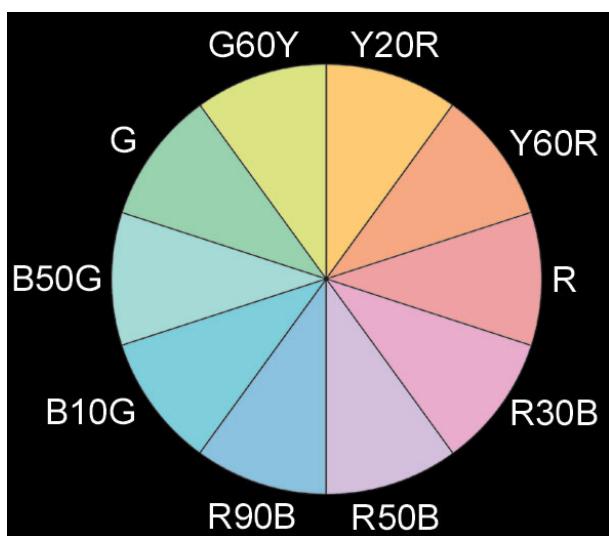
Figure 21: Colour Wheel with deviations from starting point numbered e.g.:
G60Y – 1 – 2 – 3 – 4 – 5 – 4 – 3 – 2 – 1 – G60Y

We then examined how far the choice of hue for the day room deviated from that of the bedroom.

Considering the journey from the bedroom through the corridor to the day room there were a total of 36 permutations in terms of the patterns of "hue deviations" across the three spaces. These are listed in Figure 22.

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Bedroom	Corridor	Dayroom	Y20R	Y60R	R	R30B	R60B	R90B	B10G	B50G	G	G60Y	TOTAL
0	0	0	3	5	2	1	4	8	2	2	0	1	29
0	0	1	1	2	2	5	0	4	2	0	0	4	20
0	0	2	0	1	0	4	3	6	0	1	0	0	15
0	0	3	0	0	0	0	0	0	0	0	1	0	1
0	0	4	2	0	1	1	2	2	1	0	1	1	11
0	0	5	0	0	1	0	1	1	0	1	0	0	4
0	1	0	0	5	1	0	0	3	4	0	0	1	14
0	1	1	2	3	3	3	1	1	1	1	0	1	16
0	1	2	2	3	1	1	2	3	2	3	2	1	20
0	1	3	3	1	1	0	1	0	2	0	0	1	9
0	1	4	0	1	1	1	4	2	1	2	3	1	16
0	1	5	0	1	0	1	0	1	0	0	0	0	3
0	2	0	0	0	3	0	0	1	0	2	0	0	6
0	2	1	2	5	0	2	0	2	4	1	1	0	17
0	2	2	0	1	1	2	1	2	2	0	1	1	11
0	2	3	0	0	1	2	1	2	1	1	0	0	8
0	2	4	0	0	0	0	0	1	1	1	0	0	3
0	2	5	0	0	2	0	0	0	0	2	0	0	4
0	3	0	2	0	1	0	1	1	0	0	0	0	5
0	3	1	3	0	0	0	3	2	1	0	1	0	10
0	3	2	2	0	1	0	2	0	0	1	0	1	7
0	3	3	1	1	0	0	0	0	0	1	3	0	6
0	3	4	1	1	0	1	1	1	1	0	1	0	7
0	3	5	1	0	0	0	0	0	1	0	1	0	3
0	4	0	0	1	0	0	0	1	0	0	0	2	4
0	4	1	0	2	0	1	1	0	1	1	0	0	6
0	4	2	1	0	1	1	0	2	0	0	1	0	6
0	4	3	0	1	0	1	2	0	0	1	1	0	6
0	4	4	1	0	0	2	0	2	1	0	0	2	8
0	4	5	0	1	0	0	1	2	2	0	0	0	6
0	5	0	0	0	2	1	0	0	0	0	0	0	3
0	5	1	1	1	2	0	1	0	2	0	0	0	7
0	5	2	1	0	2	0	0	0	1	0	1	2	7
0	5	3	0	0	0	0	0	0	0	0	0	0	0
0	5	4	0	2	0	0	1	2	1	0	0	0	6
0	5	5	1	0	0	0	0	1	0	0	0	0	2
TOTAL			30	39	29	30	33	53	34	21	18	19	306

Figure 22: Table showing the 36 permutations of journeys in terms of "hue deviations" and the frequencies under each hue.

It can be seen in Figure 22 that the bedrooms are always 0 as they are the starting point. Depending upon how far the choice of hue for the corridor deviates from that of the bedroom it is assigned a score of between 0 and 5. A score of 0 indicates that the same hue was chosen for the corridor as was chosen for the bedroom. The same is true *mutatis mutandis* for the day room. The remaining columns of the table indicate the number of cases which were observed for each of the 36 permutations, separately by hue.

The bar chart in Appendix 1 shows the frequencies for each of the possible "hue journeys".

This analysis revealed one key finding. In choosing colours for the corridor and for the day room, participants tended in general to choose colours with hues located at a close point on the colour wheel to those of the previous room. For example, in selecting a colour for the corridor participants were likely to choose a colour with a hue located close on the colour wheel to the hue chosen for the bedroom.

Journey in terms of Brightness

Appendix 2 contains a graphical representation of the journey between the three rooms in terms of Brightness.

The frequency counts for *Brightness of 30* are very low so these figures should be interpreted with caution.

The most important observation is that at every "decision point"[3] the smaller the brightness value of a colour, the greater the frequency with which it was selected. This is true firstly of subjects' choices of brightness for the bedroom, the most common choice being *Brightness of 05*, then *Brightness of 10*, and so on. Then, irrespective of the level of brightness they chose for the bedroom, the same pattern is observed in their choice of brightness for the corridor. Likewise, irrespective of the level of brightness they chose for the corridor, this pattern also holds true for their choice of brightness for the day room.

The really interesting point here is that even when subjects chose a colour with a bigger brightness value for the bedroom and/or the corridor, they still were more likely to choose a colour with a smaller brightness value in their subsequent choice/choices of corridor/day room. In other words, irrespective of whether they had chosen a lighter or darker room at any point in their journey, they were still more likely to want to enter a lighter, rather than a darker room next.

These observations hold for both the Preferred and Most Preferred choices. In fact the pattern of responses for each of the brightness levels were very similar between Preferred and Most Preferred.

Journey in terms of Saturation

Appendix 3 contains a graphical representation of the journey between the three rooms in terms of Saturation.

The frequencies for the following are very low and accordingly should be interpreted with caution:
Saturation of 30 – Most preferred
Saturation of 40 – Most preferred
Saturation of 50 – Most preferred

The most striking observation from the data is that, in general, at any given point in the journey the likelihood of subjects selecting a colour was inversely related to the level of

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[3] With the exception of *Brightness of 30 – Preferred – day room,* where the frequency counts are so low as to be of questionable validity.

saturation of that colour. That is to say, the higher the saturation level, the less likely was the colour was to be selected. This was true irrespective of the level(s) of saturation of the colours which had previously been selected. Thus moving from the bedroom into the corridor, subjects were more likely to select a colour of low saturation rather than a colour of high saturation irrespective of the level of saturation of the colour which they had chosen for the bedroom. This observation was true both of the Preferred and Most Preferred data. To this extent, this pattern of results reflects that of the brightness data.

There is however one important difference. There appears to be a preference across the saturation data for saturation levels of 20 over saturation levels of 10. Subjects were therefore in general most likely to select colours with saturation levels of 05 and next most likely to select those with saturation levels of 20, rather than those with saturation levels of 10 as would have been consistent with the generally-observed pattern. This suggests that people like either very neutral colours or something quite colourful without being overpowering. It seems that colours with saturation levels of 10 are neither neutral nor sufficiently colourful to be appealing.

Key recommendations and conclusions

Hue

1. There is little evidence that there are clear preferences for hues. What evidence there is seems to suggest that hues with G as a component tend to be less popular.

2. If using either of hues B10G or B50G, particular care should be taken to avoid darker versions of these hues which were particularly unpopular.

3. If using either of hues B50G or R30B, particular care should be taken to avoid more intense (i.e. more saturated) versions of these hues which were particularly unpopular.

4. If selecting a colour for a bedroom, G and G60Y should be avoided, while R90B would generally be a good choice.

5. If selecting a colour for a corridor, B10G and G should be avoided, while R90B would generally be a good choice.

6. If selecting a colour for a day room, G and G60Y should be avoided while R or Y20R would be generally a good choice.

7. The evidence for preferences for hues amongst particular age groups is not strong. However, R60B seems to become less popular with age and hues with an element of G seem to be more popular with older people.

8. If designing environments for a particular gender group it should be kept in mind that G and G60Y were more popular amongst men while R30B and R60B were more popular amongst women.

9. If using either B50G or R30B, both the brightness and saturation levels should be kept low.

Brightness

1. There is very strong evidence of a preference for pale colours. Dark colours should therefore be avoided. This preference was found to be true for each of the three room types investigated.

2. Very pale colours are most likely to be preferred if they are associated with saturation levels which are either very low or intermediate. If a colour is slightly less pale then it is more likely to be preferred if it is associated with a slightly higher saturation level (see Figure 14).

3. While all age groups prefer pale colours, younger people show a greater liking for dark colours than do older people.

4. The preference for pale colours is equally true of both men and women.

Saturation

1. There is very strong evidence of a preference for colours of low saturation. Very intense colours should therefore be avoided. There is also some evidence for moderately intense colours. These should however be used sparingly.

2. While colours of low saturation are preferred in each of the three room types, liking for moderately saturated colours is not found for corridors. Corridors should therefore always be painted with unsaturated colours.

3. If using colours with higher saturation levels, these are more appropriate for environments for younger rather than older people.

4. Likewise, colours with higher saturation levels are more appropriate for use in environments for males rather than females.

Journey between rooms

1. The colours in contiguous spaces should be of hues that are either the same or close together on the colour wheel. Schemes with colours which are radically different should be avoided.

2. Brightness values should be kept consistently low across contiguous spaces.

3. Saturation values should be kept low across contiguous spaces, although a moderately saturated colour may be used for a bedroom or a day room but not for a corridor.