Colour and lighting in hospital design

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Abstract

Little information or guidance has been available to assist the development of a hospital’s visual environment. A report on lighting and colour design schemes, accessible to non professionals with responsibility for refurbishment strategies, was required by NHS Estates. Firstly, 20 hospitals were audited to establish a picture of current practice and to identify key issues where colour design could broadly enhance the environment for patients, staff and visitors. Critical areas were outlined in this report, where colour design can be utilised and applied, for the benefit of all users, from ambience to essential legal requirements such as colour contrast for the visually impaired.

Provision of staff relaxation rooms that are different in terms of colour and lux levels from immediate work spaces, or thoughtfully designed areas for patients awaiting intensive treatment, have been shown to have some beneficial effects on a sense of well being. Colour and design have not been established as a definite cure for sickness and ill health, but certainly monotony and poor conditions in premises that have not been refurbished with any care, have had a detrimental effect on recovery rates and staff morale. The realisation that a well balanced and attractive environment is of major importance to patients’ health is, in no way new; Florence Nightingale observed that ‘a variety of form and brilliance of colour in the objects presented to patients are an actual means of recovery’.

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1. Introduction

Much has been written on the different effects of colour on people’s sense of well-being and lighting and colour design is of vital importance in the creation of a pleasant, ambient environment. The NHS Estates Research and Development department funded the research into the use of colour design and lighting in hospitals. It was a 12-month study of current practice in general hospitals throughout England with two centres: the Colour Design Research Centre at London South Bank University and the Building Research Establishment.

The study to establish current colour application in the design of hospitals, revealed a wide range of literature presenting mixed evidence on this aspect of colour as well as a diversity of strategies for colour usage in interior design. The project stance on colour design was that colour is an inherent property of all materials and surfaces including everything from light and paint to art, from aesthetics to functionality and is an inseparable element of design.

Colour and lighting can have an impact on peoples’ perceptions and responses to the environment ([1], p. 23) and also affect patient recovery rates, improving the quality and overall experience of patients, staff and visitors [2]. Colour and appropriate lighting are also powerful tools for coding, navigation and wayfinding;
colour can also promote a sense of well-being and independence (Fig. 1). The visual environment, including quality of daylight and electric light, is a vital element influencing hospital staff morale and productivity (Fig. 2); studies have even reported that an enhanced visual environment have produced improved faster recovery rates by as much as 10%. In fact, these improvements have been attributed to particular elements of the visual environment; they include the use of appropriate colour in interior design, display of certain types of art work and the provision of sunlight and attractive views out (Fig. 3) [3].

There is also experimental evidence that people prefer certain types of light patterns for particular applications, which is likely to enhance the performance [4]. This level of benefit may not be sustainable for all areas, but realising a proportion of the improvements would contribute significantly to hospital environments and staff and patient morale. As the Disability Discrimination Act 1995 (DDA) becomes applicable to all service providers, healthcare environments will have to improve accessibility for all as well as the levels of functionality and aesthetics of those buildings. However, little information on the visual environment, lighting and colour was available in a user friendly and accessible format for use by specifiers responsible for the construction of hospitals. The refurbishment of healthcare building projects, often involve non-professional decision-makers on the ground, who require guidance on colour design and lighting strategies.

Research was carried out in 20 hospitals aimed at establishing NHS principles for the design of attractive visual environments for appropriate colour specification and to deal with issues such as accessibility and navigation [5]. Studies were undertaken in only those generic (non-specialist) areas of a hospital used by patients, staff and visitors; the routes from the main entrance, circulation space, to outpatient areas, wards and day rooms. Previous work on colour in public transport environments with visually impaired people (VIPs) had shown how VIPs search and navigate spaces,
experiencing problems with accessibility, safety and wayfinding [6]. These aspects of colour and lighting application are particularly important for old or visually impaired people as they require clear cues and may take longer to understand visual information. This group may also have less confidence in using environments, without effective signposting for navigation.

2. Aims

The main aims of the project were:

- to provide evidence-based design research results on colour and lighting,
- to create a guidance document on the use of colour design and lighting,
- to deliver a document for use by NHS staff as well as built environment professionals.

The users of the guidance document would be involved in developing not only new environments but also refurbishing old [5]. Some of the guidance would also be applicable to many other public spaces. The recommendations would include, ways of implementing colour schemes and lighting, both electric lighting and daylighting effectively within an inclusive environment; it would cover techniques for using colour and lighting in hospitals for the well-being of their users. For hospitals the main concerns are clear; they need to try and provide environments that promote a sense of well-being for all users of the building.

Ensuring optimal and appropriate colour and lighting for healthcare environments is vital. Pleasant hospital environments contribute to meeting the objectives of the NHS plan and in particular the target ‘to improve standards of accommodation’. It was observed that choices of colour in the design of hospital environments are often misguided; also strategies for contrast or colour coding and zoning appear to be inconsistent. In a recent study of hospital lighting [7], it is shown that it is often poorly maintained, concentrating only on basic requirements for task illumination resulting in a poor visual environment.

Specifiers, design teams, facilities’ managers and staff were often unaware of the benefits that lighting and colour design could bring, and did not know where to source advice. Work was urgently needed to establish some basic design guidance on uses of colour and lighting that would provide a comfortable, ambient and optimal environment for all.

Use of careful lighting and colour in the design of healthcare environments can promote corporate ‘sign-posting’ of important areas such as reception desks and nursing stations. Easing navigation and wayfinding can promote faster access, so reducing labour, frustration and wasted time. Further improvements in productivity and energy efficiency in lighting with reduced running costs would be another contribution, provided by clear, authoritative guidance on colour design and lighting specification.

3. Objectives

If the rationale for the work was to improve the visual environment of hospitals, then the main strategy for achieving this was to provide the tools for those NHS specifiers and staff who, most importantly, may be empowered with managing change within the hospitals. Some of the main benefits would be improvements in:

- ambience
- confidence and safety
- accessibility & inclusion
- attractive environments and visual stimulation
- stress reduction
- sense of place and spatial orientation
- enhanced patient recovery, staff productivity
- ease of navigation and wayfinding
- energy efficiency
- compliance with disability discrimination act
- empower specifiers and design teams
- corporate badging of key areas.

The research remit was to focus on the users’ experience and engage with patients, staff and visitors to determine their needs, experiences and opinions. In terms of the environment, the research was restricted to main routes and general areas. These were:

- entrance
- front of house/Reception
- waiting areas
- corridors
- day/consulting rooms
- wards.

Key lighting issues covered the need to complement existing guidance. Quality and lighting controls as well as maintenance and lighting of waiting areas were other major areas of focus.

4. Method

The hospitals to be audited had to be general, and medium to large, with approximately 400–1200 beds and found throughout the regions of England. Main methods of investigation comprised of:

- information gathering on sites
• audits of the journey from entrance to ward
• reviewing previous research
• conducting literature reviews
• interviews with management and estates and premises personnel
• discussions with staff and patients
• obtaining a visual record of good and bad practice.

The research focused on all types of users from young to old and the various kinds of healthcare environments that are found today. Meetings with an advisory panel and consultations with key stakeholders and site audit visits provided the material for the design guidance document structure.

5. Results

5.1. Physiological and psychological colour design issues

To date, the evidence supporting the influence of colour on mood has been both minimal and limited [8,9]. Over 200 colour experiments worldwide have been examined by Wise in the USA who concluded that there is still no established empirical evidence on the power of colour. In fact it was found that the research failed to establish that any single colour can affect our bodies and emotions, long term [10]. However, colour has been found to have a physical effect, certainly for short periods [11].

In a study by Hamind and Newport (1989), six preschool children (50–55 months) were measured on the effect of pink, blue and grey (control) coloured rooms on gross motor activity (physical strength) and mood. The children displayed greater physical strength and a high positive mood when under the pink condition [12]. Similar physiological effects have also been evaluated in adults [13]. Pink rooms were found to reduce muscle strength and rate of arousal in adults, measured using heart rate as well as affecting behavioural changes. The use of ‘Baker-Miller Pink’ in prison cells reduced aggressive and antisocial behaviour when compared with prisoners in cream painted cells. However, this was only for the first month after the colour change; the Hawthorne intervention effect was observed, after which the incident rate of aggressive behaviour rose steadily, increased and reached peak levels by the first half of the pink year. Overall, little or no difference was found in the incident rate for the pre- and post-pink months.

Numerous studies have been undertaken on the under or over stimulation effects of colour. One important factor for colour application in today’s environments is that a reduction of visual stimulation may lead to visual hallucinations especially in confined spaces or where inhabitants have limited mobility [14]. A study conducted at the University of Vienna showed that room colour influenced the concentration span of office employees; coloured rooms with balanced tension created the greatest concentration. It was found that grayish rooms produced less concentration from office staff [15]. White environments can produce some extreme results; in similar studies, typists in white interiors made more mistakes than those in different coloured interiors [16]; it was also found that white cells caused violent reactions from some prisoners in certain prisons [17].

In terms of the effects of colour on behaviour and cognition it was noted that colour can cue certain behaviours and enable differentiation between architectural elements of a room [18]; it can also affect activities that take place in that room. One study looked at the frequency of ‘undesired’ behaviours displayed by elderly patients such as hovering around door ways and walking into restricted areas, which were reduced by changing the colour of the walls and woodwork [19]. It has been said that the use of ‘cool colours’ such as blue and green promote relaxation as well as sleeping and activities which are calmer (i.e. counselling) (Fig. 4).

‘Warm colours’ such as red, orange and yellow promote physical and social activity, whilst ‘neutral colours’ such as grey or beige were seen to minimise attention [20].

5.2. Colour in hospital design

The application of colour and design to patients’ accommodation should take account of the emotional and psychological factors which can affect their well-being. The primary objective is to achieve a friendly and welcoming atmosphere with variety and interest for patients, staff and visitors. Colour does have a practical and functional use in patients’ accommodation. Used with subtlety in all environments, it can control bright reflected light and make the most of available daylight and help to reduce glare (Fig. 5). Colour in public spaces can address many other practical issues such as...
wayfinding orientation and provide key landmarks for local identity or ease of navigation (Fig. 6).

6. The users

6.1. Patients

Patients require a quality environment; they wanted to be visible and be able to see staff and key facilities (Fig. 7). In terms of accessibility, clear signs, visual clues and easy wayfinding were vital to assist visitors and patients who, on entering the hospital for the first time may be distressed or distracted by the reason for their visit.

Above all patients interviewed stated that connections to the outside world were paramount; being able to watch the TV, email and calling friends and family were very important to helping them feel more positive about their stay. The older patients found, just everyday life going on outside the hospital very entertaining; this appeared to be regardless of the types view or activities.

6.2. Staff

From the staff’s perspective the environment needed to be conducive to hard work as well as providing places for relaxing ‘time-out’ or rest periods. Numerous staff stated that a well-designed working environment can aid recruitment and the retention of staff as well as improving morale (Fig. 8). The staff require privacy and security in their rest areas, even if for only a few minutes. Another role that colour can play is to make
the environment of the hospital easy for orientation for new staff.

The nurses’ workstation is the hub of the ward unit (Fig. 9). It needs to be visually prominent and provide colour and lighting for maximum efficiency for all users. The immediate environment should be harmonious with variety of luminaires to give the eyes a chance to rest [5].

6.3. Children

Children in hospital present different problems for designers; whether as patients or visitors they may suffer from extremes of anything from boredom, to fear. A child’s perspective on the environment will be different from an adult’s. They need the environment to be interesting and to their scale (Fig. 10), especially in a reception area; in waiting areas in reception the floors will be their playground and colour can distract and alleviate tension providing visual interest or emotional outlets. More care has to be taken with types of materials used, as children use touch more than adults and are keen to explore everything at ground level (Fig. 11): very young children make associations with colour and shapes, and are less conscious of form. An external entrance to a children’s unit is scaled down for a child’s perspective. External illumination has been reduced in height.

For children the quality of the hospital environment is so important as they are away from familiar setting; they really do need the reassurance of their toys and familiar details from home (Fig. 12). Some studies carried out at The Chelsea and Westminster Hospital concluded that colours and designs were helpful as they acted as a focal point when treating patients, particularly children [21].

7. Architecture

7.1. The building

Hospital environments varied in character according to age and type (Fig. 13) so prescriptive guidance on achieving pleasant ambience was dangerous to formu-
late. However, the facilities and issues of accessibility are of supreme importance everywhere and can be covered by generic advice on contrast for example. The architecture of modern hospitals provides examples of best practice in presenting landmark buildings that achieved immediate recognition and accessibility (Fig. 14); older buildings that have expanded erratically, have more difficulty in presenting an impressive entrance for new visitors. The transition, for the user of a hospital building, from the exterior to the interior and the spaces of the reception area all require key ‘signposting’ to let people know where the main thoroughfares are.

7.2. Colour and wayfinding

Colour strategies most widely used in hospitals today are for wayfinding and signage; it can improve the definition of the architectural environment. Colour can reinforce the hierarchy of spaces, landmarks and prominent features, identifying destinations and differentiating between facilities. If thoughtfully implemented, colour in buildings can aid intuitive wayfinding, sensory acuity, cognitive mapping and the understanding of form. It was found in this study that patients use cues other than signage to find their way around. Lighting can enhance and affect the colour of materials; many hospitals had installed coloured glass designs in panels or windows in entrances, waiting areas or corridors which provided visual interest during daylight (Fig. 15).

7.3. Colour coding

Colour coding can be a useful and important strategy for any complex building, yet it was found in this study that many colour coding schemes were not recognised by hospital visitors. Colour and coding should be obvious, and easy for visitors to recognise and use under all circumstances (Fig. 16). As many as two thirds of coding systems are apparently misunderstood [22], colours need to be strictly limited and checked with the colour vision impaired to establish their effective use. Colour requires knowledgeable implementation and should be used for simple zoning of no more than four spaces of a building (e.g. quadrants) (Fig. 17). Simple colour zones, such as north green, south red, east blue
and west yellow have been used successfully, sometimes on floors. An example from one hospital visited showed that there was an added benefit to having coloured coding as wayfinding boundaries on the floor; this eliminated damage to corridor walls by alerting hospital porters to the trolley going off course (Fig. 18).

Coding colours should be limited to the colours that are, without confusion, known by their descriptive words e.g. blue, yellow, red and purple (Fig. 19).
Turquoise (a blue–green hue) for example, would be unwise to use as it is widely disputed whether it is a blue or a green; in fact there is some evidence that gender can make a significant difference to colour perception [23]. Grey may be similarly confusing as it can take on other hues and other shades and light purple may appear grey especially if people have yellowing lenses due to old age [5].

8. Colour specification

8.1. Colour and visual impairment

Colour design can be effective for people with visual impairment and contrast can provide accessible cues. VIPs require contrast on all potential obstacles for safety reasons (Fig. 20). Surface textures can also provide useful tonal detail and all materials should be checked for reflections and glare as both are further disabling for VIPs (Fig. 21). Colour and contrast are required in situations where tonal detail can give people clues to the shape of spaces such as corridors or rooms (Fig. 22). Poorly lit interiors can remove this detail. Victorian architecture and interiors were found in one study to be useful to VIPs for orientation, due to shadow detail on mouldings as it helped define the interior shape of spaces [24]. In modern buildings, architects and designers need to provide an opportunity to increase the incidence of shadow detail to ensure cognitive and intuitive understanding of spaces.

8.2. Colour and lighting

The balance between extremes of lighting, such as dark corridors that run into bright patches of sunlight can cause problems of light adaptation for older people.
or VIPs (Fig. 23). In some buildings the transition from daylight to night time illumination, dramatically changed the appearance of the interior. This control of illumination levels can be critical to maintain a pleasing atmosphere in hospitals and is often neglected (Fig. 24). Windows without curtains or blinds for example produce ‘black holes’ in the walls of the wards if uncovered and the view out is not appropriate.

8.3. Colour design and skin-tone

In the process of investigation throughout the healthcare sites visited, there were some established rules on colour application in specialist treatment or care areas. Careful selection of colour for interiors was closely linked to clinical requirements; yellow for example is not recommended for premature baby units as the nurses need to detect early signs of jaundice; green has long been held as a useful colour for operation...
theatres to counteract colour after-image from red wounds; blue linen is often used in dermatology wards to minimise, for the patient, the impact and appearance of orange treatment ointments on sheets (Fig. 25); orange has been used successfully for maternity units to give people a sense of energy during a short stay (Fig. 26).

One aspect of clinical assessment where lighting and colour would be critical is in the judgement of skin-tone. If a totally objective judgement of skin-tone were to be required consistently, then the ideal background would be a neutral grey to standardise screening for all skin-tones with the use of the same luminance; changing background colour can confuse judgement (Fig. 27).

8.4. Colour trends

Colour design is a subject to fashion trends as well as influences from the history of past practice in colour selection for hospital environments. Much conventional application of colour has been built on the earlier advice of colour design consultants such as Faber Birren who prescribed certain colour schemes ([1], pp. 100–109]; these have become dated, yet they have established conventions which are still in use today. The overuse of blue or green, for example, in medical interiors has been widely observed especially in older institutional
buildings and has even been reported as having an affect of exacerbating depression in mental healthcare environments [25] (Figs. 28 and 29). In some hospitals today, one can see the use of extreme, full chroma colours; these can be visually disturbing when fully saturated hues are used without any contrast and can be desensitising (Fig. 30). One consultant registered his dislike of the recent overpowering and painful repainting of his room with a vivid lime green; this was disturbing for him and his patients and went beyond subjective preferences. Aesthetic and quality issues are increasing in importance in healthcare today; patients require areas of the hospital to be much more modern and up to date and perhaps in keeping with commercial environments.

8.5. Textiles and furniture

These elements within any environment contribute considerably to the design quality of a colour scheme. The use of fabrics in hospitals is decreasing in popularity due to current opinion regarding bacteria transfer. Items such as curtains are seen to be a growing risk to infection transmission if hospitals are unable to wash them as regularly as bed-linen. Many patients reported having spent time in their beds looking at the reverse of unlined curtains, producing an interesting view for the staff and visitors but a boring view for the patient. Translucent, double faced or woven fabrics provide the best solution for curtains in hospitals as they maintain interest from all sides (Fig. 30).

Windows with either extreme light sources or messy urban views can be treated with sheer fabric blinds or Venetian blinds (Fig. 31). One example examined was of an old endoscopy unit, successfully refurbished using coloured blinds and co-ordinating wall colours; even the artwork fitted the colour scheme which produced an atmosphere that was surprisingly fresh and uplifting (Fig. 32).

Certainly bed-linen and garments proved to be a subject that both staff and patients were passionate
about. Hospital sheets with laundry names and utilitarian bed wear were all seen to be both depressing and important issues affecting a sense of patients’ well-being (Fig. 33). Coloured textiles could considerably improve the immediate appearance of the patient environment; patients, staff and visitors all said that they would benefit from upgrading items such as duvet covers or top blankets. More colourful textiles can throw reflected coloured light around the bed areas and provide a more domestic feel to the ward (Fig. 34).

Furniture makes up a large part of the hospital environment and can be a neglected part of a building’s colour scheme. Nurse’s work stations require appropriate surfaces for a complex range of activities from close work tasks to general activities. An open reception desk at wheelchair users’ level as well as privacy for discussions with visiting consultants is essential. The impact of the colour on these types of furniture in a scheme is enormous so care needs to be taken in the types of materials used. Current trends show a national preference for paler woods although other options can be blended into successful schemes (Fig. 35). Replacing old or tired furniture can have a dramatic effect on the overall ambience of the environment (Fig. 36).

8.6. Decor

The general areas of hospitals visited, usually showed a variety of art work for passing visitors, patients or members of staff to enjoy. However, sensitive and intelligent curating is required to provide the right visual
displays for those more prone, in bed, long stay or convalescing. Where funding does not extend to the purchase of art work, much can be done with lighting and colour to improve the appearance of the corridors and wards as seen here at Guy’s and St Thomas’s (Fig. 37). Certainly research carried out to date for the NHS report has shown that pleasing everyone with such a subjective task is virtually impossible, so new strategies for curating in hospitals are required.

Fig. 34. The power of reflected colour from, for example surfaces such as coloured textiles is often underestimated. These pictures were taken 1 min apart (not in a hospital environment), showing the effect of the coloured duvet on the colour of the surrounding wall.

Fig. 35. Current colour and material trends show a national preference for paler woods. There is enough contrast here to satisfy DDA and Building Regulations Part M contrast requirements.

Fig. 36. Replacing old or tired furniture with a new colour scheme can have a dramatic effect on the ambient quality of the environment. Lighter furniture can be uplifting.
9. The patient journey

Design quality, use of natural light and good artificial lighting design inspires confidence in the environment. Some approaches to hospital entrances were very unnerving (Fig. 38). The entrance and lobby of the hospital need to be highly visible from a distance and the ‘Way In’ needs to be obvious; It was found that many people are visiting the hospital under extremely emotional circumstances and concentration can be clouded by anxiety; the way into the hospital has to be obvious and accessible for all potential users.

Patients and staff interviewed did expect hospitals to be of a high quality, more like a hotel, comfortable and friendly. Many patients and staff have stated that they preferred a more domestic feel to the environment, although a few patients said that a hospital should feel like a hospital; a place that is a healthy, professional medical centre that they were going to leave very soon [5] (Figs. 39 and 40). The job of getting that balance of
ambience right, can justifiably fall upon the shoulders of colour design and lighting.

9.1. Reception areas

Reception areas need to be welcoming, friendly and informative (Fig. 41). Accessible staff desks should be open, well luminated and prominent to deal with all kinds of incoming visitors, patients and staff (Fig. 42). A strong colour behind the receptionist helps identify that key point in the entrance to the building. Lighting is especially important for creating an interesting atmosphere and is critical for ensuring that people are confident in entering and using the hospital (Fig. 43). In many newer buildings, an Atrium provides a wonderful opportunity to landmark the site and gives some vibrant visual interest and distraction (Fig. 44). Planting or art works displayed in these spaces have the benefit of good natural daylight but should also be well illuminated with artificial lighting at night (Fig. 45).

9.2. Corridors

Corridors form a large percentage of space in most public buildings, hospitals being no exception. Long corridors can be anything from interesting if well-designed to terrifying if poorly lit, unadorned and badly signposted. Many users of a hospital building may be new to the site so clarity of direction from the main entrance is vital. The use of colour coding on some floors has been very successful in helping new staff, visitors and patients find their way around this large site at Poole hospital (Fig. 46).
It is not easy to provide lengthy spaces with some continuity of visual interest and variety but certainly lighting and colour design can play a big part in making the environment more pleasant (Fig. 47). One major challenge for designers is to make the job of wayfinding throughout a hospital’s corridor space easy. Provision of well-designed and logical signage or landmarks at key turning points in corridors is essential to good navigation and orientation (Fig. 48).

Fig. 45. A successful combination of art, planting and good illumination in an atrium space can make a big impression on visitors. Photo courtesy of BRE.

Fig. 46. Corridors could utilise colour for clarity of direction for all users. This corridor scheme at Edinburgh Royal Infirmary shows where corridors intersect with the main thoroughfare.

Fig. 47. Colour design plays a big part in making the environment more pleasant. A well-lit accent colour on walls and art work along one side of the corridor at Chelsea and Westminster Hospital helps navigation and orientation.

Fig. 48. The use of colour coding on floors can be successful; however, this example shows that this blue and red could be confusing. There is too little contrast difference between them for visually impaired users of the hospital to use.
9.3. Waiting areas

Waiting areas were usually found near reception desks but are also situated along corridors and main thoroughfares leading to wards and special units (Fig. 49). The seating arrangements and colour schemes used in these parts of a hospital building can create restful and intimate spaces for people who are waiting for a wide variety of reasons. The best examples of waiting areas were in places that required a particularly sensitive approach to design, such as a chemotherapy or cancer treatment unit. The designs vary from being well supplied with planting and restful seating to a very ‘homely’, domestic style.

9.4. Wards

The route to the ward should be well signposted; colour-design schemes can produce some intuitive cues to ward entrances. At one hospital site, a strong colour started from the main thoroughfare corridor to attract attention to the ward entrance, down to the nurses’ workstation and then on to the ward, used a gradually diffusing pastel version of the stronger hue. (Fig. 50). However, like the problems with colour coding, there is a limit to how many colours can be used in this way; some colours do not lend themselves to being suitable at both full strength and then in a diluted pastel shade (Fig. 51). There could be many wards that may need to be treated in this way and generally these strategies run out of the number of colours required (Fig. 52).

Fig. 49. At Winchester Hospital seating arrangements and less institutional colour schemes create a restful and more intimate space for people waiting in the main hospital entrance.

Fig. 50. At the Edinburgh Royal Infirmary, colour coding in a strong blue is used to signal a ward entrance which breaks from the main thoroughfare corridor.

Fig. 51. The Colour coding of the ward entrance continues down to the Nurse’s workstation and on to the ward with a paler, diffused colour.

One refurbishment at Guys and St. Thomas’s showed what can be done with imagination and some simple, inexpensive colour solutions to revitalise a ‘tired’ older
part of the hospital environment (Fig. 53). The wards should also be reassuring places that convey a sense that the patient does have some control of his or her immediate environment (Fig. 54).

Privacy and monitoring, require a careful balance of screening, bed alignment and viewing angle to maximise the potential for care yet provide for personal, private space. People feel more positive about environments when they are able to customise their immediate or personal space with belongings or light controls [26].

A view out helps the patient feel connected to the outside world yet many windows are too high for the

Fig. 52. Strong colours for coding or zoning may look successful on paper but are not so easy to implement without confusing users. This red and orange had to be reduced in strength either side of a pillar to be suitable for large wall areas, making the paler colours difficult to establish.

Fig. 53. Before and after—In a refurbishment of an old endoscopy unit at St. Thomas's hospital, the coloured, reflected and filtered daylight adds considerably to this unit's improved visual appearance.

Fig. 54. Patients should have some potential control of their immediate environment; local lighting control and a customised ambience will be appreciated by the patient.
bed-ridden patients to be able to see out (Fig. 55). Research has shown that a natural scene can have a dramatic effect on the rate of clinical improvement compared to those patients who were in rooms looking out at a static urban scene [27].

### 9.5. Day rooms

While convalescing and in hospital for a long stay, the patients’ day room or quiet room was seen to be a haven from the general bustle of the ward (Fig. 56). These spaces need to be restful, not like a doctors’ surgery and should encourage patients who are ambulant to be active if required (Fig. 57). Clutter free areas with comfortable chairs, tables, blinds or curtains and a television are fundamental elements of a day room (Fig. 58). It may be a useful meeting place for other patients and visitors to get together and where lighting and more ‘homely’ domestic colour schemes would be more appropriate. Visual distractions, art works of some kind make a sensible strategy for these spaces. Subject matter relevant to the local community is often appreciated and of special significance for patients and visitors; this photograph of a local beauty spot is one example (Fig. 59).

### 9.6. Staff rooms

Patients, with comfort comes first for the staff, but the staff themselves has to be able to relax, even if only for a few minutes between dealing with patients, visitors and staff yet many staff rooms are very non-stimulating places in which to wind down (Fig. 60). To achieve optimum relaxation in a short time the environments they use should be as different as possible from the ward itself, to provide a visually stimulating change. Lighting and colour can play a large part here in creating the...
right changes; lowering or dispersing light sources may help, as would accent colour walls that are more energising and uplifting. The quality of furniture and fittings would be critical to achieving this overall benefit. Staff did report on this aspect of their working life affecting staff morale generally.

9.7. Visual noise

The hospital environment, like many public spaces is never free from a large amount of clutter or visual noise. Patients may need distraction but also require relaxation. Levels of visual noise within the environments observed was seen to be a major problem; it is a natural part of the hospital’s life to find a wide range of equipment lying around in use with all the usual paraphernalia found in public spaces (Fig. 61). Well-designed hospitals should provide adequate storage space to reduce this level of visual complexity as it can be confusing and distressing for patients, staff and visitors. Staff on several sites pleaded for more storage space, as some equipment is rarely used and has to lie idle in corridors or around the wards. Trying to ensure a light and spacious atmosphere within a busy hospital is not easy and most public spaces are filled with locally customised signage and arrays of leaflets or posters (Fig. 62). One hospital controlled areas so that sections
of the ward approaches were protected from visual chaos (Fig. 63). Controlling and maintaining restricted areas where notices, messages and leaflets are available, would improve the chances of successful communications.

10. Conclusion

Literature and research on colour application to date, is full of contrasting theories, myths and contradictions. Articles and papers on the use of colour in environmental design have shown that: there are some demonstrable, replicable, behavioural and perceptual effects from colour that justified their use in certain ways for design [28]. A study undertaken at the Chelsea and Westminster hospital has established that arts programmes showed an overwhelming response from visitors, patients and staff in that their stress levels were eased, changing their mood for the better [29]. Simple economical solutions such as regular re-painting can have an unbelievable effect on appearance, boost morale and raise interest. However, colour must be observed, planned or investigated in context to avoid generalisations about colour perception and mood affects. Negligent, careless or no use of colour design can have an impact on users’ perception and sense of space and well-being [30].

The important observations made by Florence Nightingale are still amazingly appropriate today:

I am inclined to think that the majority of cheerful cases is to be found among those who are not confined to one room, whatever they are suffering, and that the majority of depressed cases will be seen among those subjected to a long monotony of objects around them. A nervous frame really suffers as much from this as the digestive organs suffer from long monotony of diet. The effect on sickness of beautiful objects, on variety of objects and especially brilliancy of colours, is hardly to be appreciated. Such cravings are usually called the ‘fancies’ of patients but these ‘fancies’ are the most valuable indication of that which is necessary for their recovery. People say that the effect is only on the mind. It is no such thing. The effect is on the body too. Little as we know about the way in which we are affected by form and colour and light, we do know this: that they have an actual and physical effect. Variety of form and brilliance of colour in the objects presented to patients are an actual means of recovery Florence Nightingale

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References
