



Design Standards

October 2020

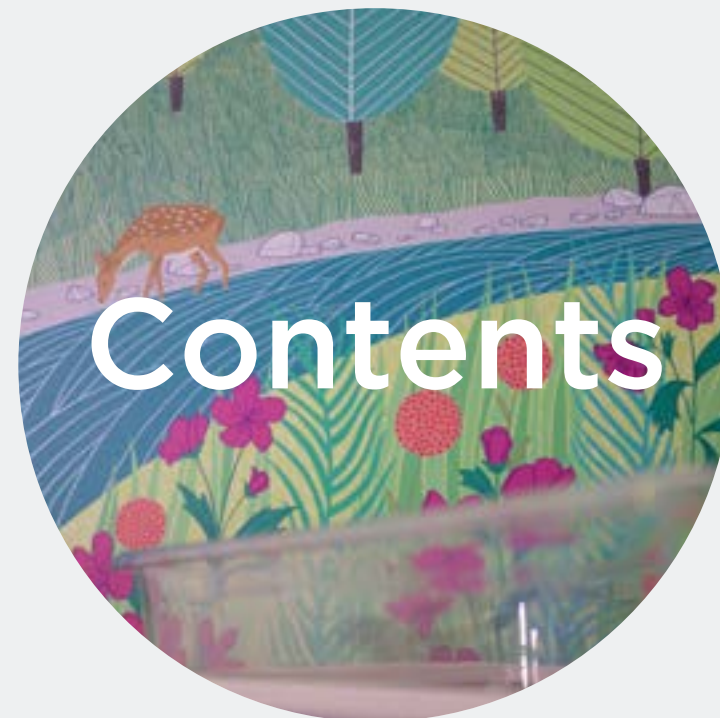


The official charity of Chelsea and Westminster
Hospital NHS Foundation Trust



NHS
Chelsea and Westminster Hospital
NHS Foundation Trust

1.0 Introduction	1
2.0 Designing Healing Environments	3
3.0 CW+ Design Standards	6
4.0 Wayfinding and Patient Information	9
4.1 Wayfinding	10
4.2 Patient Information	12
5.0 Patient Control	14
5.1 Future Hospital	15
6.0 Designing the Patient Environment	16
6.1 Acoustics	16
6.2 Air Quality	19
6.3 Lighting	21
6.4 Food and Nutrition	23
6.5 Biophilia: Closeness to Nature	24
6.6 Colour	25
6.7 Materials	28
6.8 Furniture	29
7.0 Patient Engagement and Wellbeing – the Arts and Music Programme	30
7.1 Visual and Participatory Arts	30
7.2 Music and Soundscapes	34
8.0 Design Quick Guides	38
8.1 Dementia-Friendly Design	38
8.2 Design for Paediatrics	44
8.3 Design for Mental Health	46
9.0 References	48



1.0

Introduction

CW+ is the official charity of Chelsea and Westminster Hospital NHS Foundation Trust including its hospitals and clinics.

What we do

The work of CW+ is ground-breaking. The charity fosters innovation in healthcare and seeks to establish and share best practice. CW+ curates and manages a nationally significant collection of artworks and collaborates with field leaders in arts and design. Our supporters enable us to:

- Build and enhance clinical facilities to create an outstanding healing environment for patients and staff;
- Deliver a unique arts in health programme to transform the experience and wellbeing of our patients;
- Invest in health innovation to deliver exceptional patient care.

“

The way that we run our hospitals is increasingly enhanced by the arts and design programme run by our charity, CW+. For example, what patients hear and what they see speaks to how quickly and indeed how sustainably they recover. I don't think I can over emphasise how important this is. The evidence that has been gathered here by CW+ and the pioneering work they are doing is of such interest nationally and internationally, that we are committed to sharing our practice.

”

Lesley Watts, Chief Executive,
Chelsea and Westminster Hospital
NHS Foundation Trust



Why create design standards?

This document combines the latest insights from the medical and public health sector researched by Arup, alongside the experience and expertise of the patient environment team at CW+.

These standards are to act as a best practice guide for future development at Chelsea and Westminster Hospital NHS Foundation Trust and should serve to promote enhanced wellbeing through design, operations and procurement of the healthcare services and estates.

These design standards were informed by a body of research and NHS estates related guidance. The Department of Health; hospital technical guidance; insight from a team of specialists giving advice on acoustics, lighting, materials; and research findings from the health and wellbeing/sustainability sector including the WELL Building Standard.

“

CW+ is committed to innovation in healthcare design. The design standards encapsulate our holistic approach to design. They are informed by the expertise of our in-house specialist team whose work is greatly enhanced with expert advice and input from world leading designers, innovators, clinicians and artists. The guide and the practice it cites responds to the needs and experiences of our patients who are the heart of everything we do.

”

Chris Chaney, Chief Executive, CW+



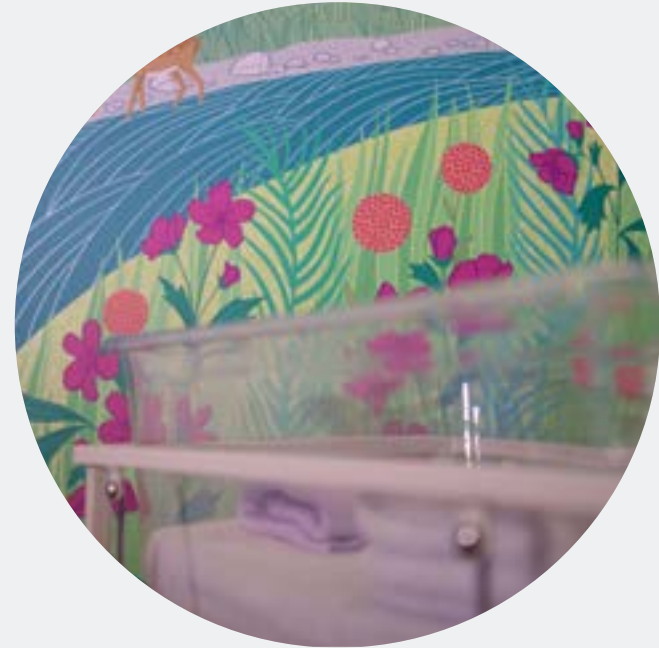
2.0

Designing Healing Environments

Humans are complex, multidimensional beings, and cohesion of body, mind and spirit is a hallmark of healing. While it is possible to treat medical symptoms without necessarily ensuring a holistic healing of root causes or broader impacts, the delivery of treatment in a supportive, healing context has the potential to accelerate recovery times and improve comfort, satisfaction and wellbeing.

What can often be found in hospitals is an emphasis on diagnosis and treatment. This can make hospitals noisy, cluttered, institutionalised environments, with potentially detrimental effects on the physical or psychological wellbeing of staff, visitors and patients. With a driving focus on functionality, healthcare design has often produced spaces that are functionally effective, but psychologically “hard”.

With years of scientific and medical research behind it, findings show that unsupportive design works against the process of healing. On the other side of the spectrum, supportive surroundings facilitate patients' coping with the major stress accompanying illness. But it is not only patients that benefit from a health and wellness-oriented environment, it is also staff, visitors and other stakeholders that profit from it.



The term ‘healing environment’ in this context describes the factors that positively affect the community served by the healthcare facility. Health impacts can be both physical and psychological, and the opportunities for intervention span both physical setting as well as organisational culture. A healing environment is designed to stimulate, support and enhance the inherent healing capacity of patients, visitors and care providers, and facilitate interaction between all three, whilst not compromising the effective and successful delivery of healthcare services.

The idea that physical healthcare settings influence health outcomes is not new; more than 150 years ago, Florence Nightingale was advocating that patients recover more quickly if they stay in an environment that has natural light, ventilation, cleanliness and basic sanitation. Having advanced ever since, and with recent empirical evidence to support these beliefs, the notion has gained real momentum within the built environment.

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Our art and design programme started back in 1993 when the new hospital opened, it really kick-started a movement of arts in health across the globe. Our arts programme is about improving the environment for the patients we are working with but also the psychological, physical and clinical outcomes across our hospitals. The design of a stimulating and responsive environment is pivotal to patient recovery. We are committed to bringing together design, art and technology to create optimum healing environments that are patient focused and support staff in delivering the best possible patient care.

”

Trystan Hawkins, Director of Patient Environment, CW+

Why is it important?

- It can play a pivotal role in supporting the healing process.

How do we achieve it?

- Through developing functional, fit for purpose designs.
- Identifying and engaging the relevant stakeholders throughout the design development process to ensure that the brief and design reflects all the end users.
- Drawing together the right expertise to establish the process, develop the concept and brief and undertake the design and delivery.
- Rigorous 360° evaluation of design with stakeholders supported with a multi-disciplinary team with relevant expertise.

Potential benefits

- The creation of a human centred environment which supports healing, reduces stress, supports patient recovery and promotes wellbeing.
- The architecture and design of a building forms the basis for many other aspects related to a healing environment. There is growing recognition that both are a tool in the healing process. A hospital involves a wide community as well as being a collection of very different spaces with highly specific and complex environmental needs. When designing a new building or space, as well as changing an old one it is crucial to consider flows, systems and areas, and how they relate to each other.
- In order to achieve optimal design, it is essential to integrate stakeholders into the design process, as needs may vary; for example, while certain design features benefit patients, staff needs may be compromised, and vice versa.

Benefits of standardisation



Staff efficiency



Cost savings



Repetition savings



Time savings



Quality



Consultation savings



Risk reduction



Patient/staff safety

3.0

CW+ Design Standards

These principles unite and connect features that relate to: operations, procurement and design.

All three elements are important when embarking on a design scheme as they are linked and can work to mutually reinforce, or counteract, each other. When designing a project, for example, understanding the complex series of tasks and stakeholders that it serves provides invaluable insight on how to shape the space.

Without doing so, operations and design will become standalone components that might even hinder each other.

The key principles detailed in this guide are:



Acoustics



Biophilia -
closeness to
nature



Comfort



Control



Privacy



Communication



Social spaces



Wayfinding



Materials



Lighting



Technology



Colour



Music and
soundscapes



Air quality



Art

These standards work from the basis that environments should be designed to minimise stress in order to support patients' recovery and medical outcomes.

Design which centres around stress reduction as its primary goal has both medical and economic benefits in healthcare environments.

Stressors which are the results of poorly designed physical environments include:

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The development of a design standard signifies our commitment to capturing and disseminating the good practice we have developed in the innovative design of our patient environments. We advocate a holistic approach to design that draws from all fields of relevant expertise and places the patient at the centre of this process. The design standard is combined with a toolkit of practical and technical examples of the best practice devised by our charity in collaboration with our Estates and Facilities teams which will continue to build.

”

David Butcher, Director of Estates and Facilities, Chelsea and Westminster Hospital NHS Foundation Trust



Stress in patients and their carers has a direct impact on patient recovery and experience. Stress in healthcare can be reduced through good design and clear patient centred information.

Key negative effects of stress include:

- Psychological; worrisome thoughts, sense of helplessness, feelings of fear or sadness.
- Physiological; changes in bodily system activity levels: higher blood pressure, heart rate, muscle tension.
- Behavioural; passivity, social, withdrawal, verbal outbursts, sleeplessness, noncompliance with medical regimes.

Stress affects medical outcomes:

- Can increase fatigue.
- Consume energy.
- Heighten neuroendocrine activity: Neuroendocrinology is the branch of physiology that studies the interaction between the nervous system and the endocrine system. The neuroendocrine system regulates reproduction, metabolism, eating and drinking behaviour, energy utilisation, osmolarity and blood pressure.
- Suppress immune system functioning; decreased resistance to infection and slowed down or worsened recovery outcomes e.g. wounds heal more slowly.



4.0

Wayfinding and Patient Information

Hospitals are large, complicated buildings with often piecemeal wayfinding strategies. Given that many people navigating their way are stressed and disorientated, it is essential to create effective integrated wayfinding strategies. Apart from stress relieving for patients, it also ensures that staff can focus on delivery of healthcare services, as they will not be constantly called upon to assist with wayfinding difficulties.

“

We are adopting a coherent, holistic and informed approach to wayfinding that considers the needs of different patient groups. The patient journey to their appointment can be fraught with anxiety, this can suppress the patient's ability to take on information and navigate their way through the Hospital Estate. CW+ is working with the Trust to implement a range of practical wayfinding measures including user friendly graphic design, colour, passive wayfinding and technology to create solutions that ensure patients arrive at their appointments in good time and have the optimum experience.

”

Lee Watson, Director of Nursing,
Chelsea and Westminster Hospital
NHS Foundation Trust



4.1 Wayfinding

Effective wayfinding systems include:

- Well thought-out administrative procedures that consider the visitor experience. These might include mailed site maps, electronic information, which is clear, accurate, accessible and regularly updated.
- Clear external and directional signs and cues in the local area to make visitors aware of the hospital.
- Local information upon arrival: this might include handouts, staffed information desks or information kiosks, you-are-here maps, clear site directional signage.
- Site-planning to ensure that high traffic areas are accessibly located and clearly visible.

“

Many of the large-scale artworks displayed throughout Chelsea and Westminster Hospital function as landmarks, helping to orientate patients and visitors as they navigate walkways and entrances. Our collection, which tends towards bold, abstract work, often rendered in bright colours, offers memorable images, shapes, and patterns that act as placemakers, creating strong visual identities in different areas of the hospital.

”

Carmel Woolmington, Art and Design Manager, CW+

Remove confusing wayfinding signage and update signage

Have an integrated wayfinding strategy

Expand wayfinding to include standardisation of patient rooms



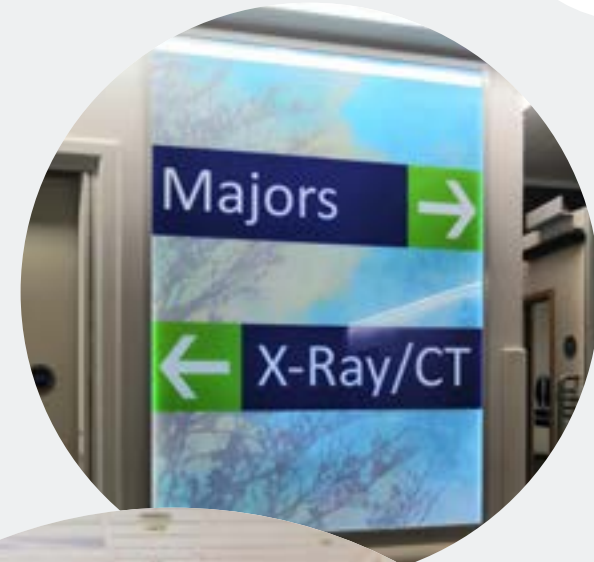
Case Study

CW+ Wayfinding Strategy

CW+ and the Trust have developed a wayfinding strategy for Chelsea and Westminster Hospital which is informing the implementation and delivery of a wayfinding renewal programme. The work being undertaken includes:

- Renewal of all key internal site signage: naming/directional and directories, with unified corporate branding, Ubuntu font, and floor colour coding;
- Updating all patient letters to reflect simpler naming conventions for each hospital location to ensure patients are correctly directed;
- Trial of a Wayfinding App to guide the patient journey into the hospital.

The wayfinding strategy set out to take an in-depth look at wayfinding at Chelsea and Westminster Hospital. It analyses the issues with the existing system, and identifies the activities necessary to improve wayfinding at the hospital for the benefit of patients, staff and visitors. It is divided into sections dealing with all the different aspects of wayfinding including names, circulation, pre-visit information, signs and implementing the wayfinding strategy.



4.2 Patient Information

In advocating for good design, we need to be conscious of the role information plays throughout the patients physical and psychological journey treatment. Wayfinding can often be a cause of stress in hospital buildings. Equally, lack of clear patient information has a significant impact on patient wellbeing and behaviour, particularly in Emergency Departments. CW+ has applied the findings from the A&E Design Challenge Report published by the Design Council in 2011.

Information and wayfinding is often inconsistent:

- Buildings are complex and hospital sites often have multiple buildings.
- Design of signage, passive wayfinding and considered wayfinding is often inconsistent.

- Services can be difficult to find and to access via public or private transport.
- Services are not always co-located therefore the patient visit can involve travelling and waiting for a range of diagnostic services e.g. blood, X-ray.
- Patients visiting specialist centres may have complex journeys and needs.
- Hospital estates are having to redevelop whilst remaining open to the public.
- The internal processes to get improvements through can be complicated and time consuming.



Case Study

CW+ Patient Journey Boards

CW+ designed patient journey boards informed by research commissioned by the Design Council, which looked at the role of design in reducing aggression in Emergency Departments. A key component of this research was the role information can play in explaining to patients the pathway of their treatment, provide a basic level of information about the department, explain likely wait times and offer translation services and patient support.



5.0

Patient Control

Being in a hospital is often a stressful time for patients and visitors. Many procedures indicate the dependency of patients on staff and lack of control over the unknown treatment. Furthermore, considering that all comfort, familiarity and personal preferences that come with being at home are absent, it comes with no surprise that the lack of control patients, visitors and staff have over their environment is associated with increased stress, depression, high blood pressure and weaker immune system (Devlin, 2003). Providing an individual with a sense of control with respect to a potential stressor,

the negative effects of the stressor are markedly reduced or even eliminated, creating a sense of security and creating a sense of normality in an otherwise abnormal situation.

Factors that should be considered are temperature, lights, acoustics, access to fresh air, hospital routines, interaction with staff, and position of the beds.



**Ensure
patients have access
to basic control
mechanisms**

**Seek to
strive a balance
between staff and
patient need**

**Provide
individual control
mechanism**



5.1 Future Hospital

For over four years, we have been using digital imagery and installations as part of our RELAX Digital portfolio to provide creative ways to distract and relax patients both in waiting and treatment environments. We have worked with artists such as Isaac Julien, Brian Eno, and Royal College of Art students to create audio and visual installations to reduce stress and anxiety for patients.

Looking to the future, we want to develop this area of work to become more interactive for our patients. Working with our partners we will look to create virtual gardens, digital companions (avatars) and generative artwork. This will be developed to support a vast array of health conditions including mental health, HIV, chronic illnesses and a range of neurological conditions including delirium, anxiety and dementia.

The new area of work will look at creating new interventions that are accessible for patients at bedside but can also be translated into public areas of the hospital, encouraging creative engagement for the hospital community.



6.0

Designing the Patient Environment

6.1 Acoustics

Existing studies claim that noise in hospitals is one of the biggest issues affecting patients, mainly linked to poor quality of sleep. This is a common concern among patients, significantly affecting their wellbeing.

Noise levels at night are often too high for patients to enter proper sleep. A reduction in noise levels can support patients having a good night's sleep and therefore make the recovery process more effective, and the hospital experience less stressful. The high level of noise in hospitals not only affects the patients experience, but also disturbs staff. Not all noises in hospital are avoidable, however, evidence suggests that many could be reduced with good design and by modelling behaviour.

Present guidance sets out sensible high level parameters, but currently does not address occupied noise levels or deal in detail with the importance of room acoustics. The World Health Organisation guidance regarding hospitals recommends maximum noise levels (35dB night/40dB day).

Room acoustic treatment has very important benefits beyond the theoretical reduction in reflected sound. Treatment acts as a behaviour modifier, meaning that conversation levels are reduced, and other noise such as phones and alarms can be reduced in volume. Critically, speech intelligibility is improved, and staff stress levels are reduced. The reconciliation of acoustic treatment (normally achieved with porous materials) with infection control requirements is therefore a key issue.



- There is a body of evidence pointing to the benefits of effective acoustic mitigation (materials that serve to dampen or reduce noise through controlling vibration levels).
- Patient response to noise is highly variable case-by-case, but more sensitive patients are adversely affected by high sound levels and this is expedited by certain health conditions.
- The way in which patients respond to the soundscape within hospitals is not yet well-understood, however an ongoing management culture of keeping noise levels down, and including visitors in this, can provide a clear benefit.
- Privacy is aided by some masking sound, but this needs to be carefully judged in the hospital context. Sound monitoring can be an effective means of reducing and mitigating sound in hospitals. Sonitos software uses a noise meter that helps to create an awareness of noise levels in hospitals the noise meter brings understanding where and when the noise levels are critical Sonitos has been applied in High Dependency Units in Chelsea and Westminster Hospital to monitor sound levels. Measured and reported information on noise levels can work as a tool for change. It has been noticed that not all noises are avoidable, but evidence suggests many could be reduced.

Differentiate between positive sounds and negative noise and seek to minimise 'noise'

Understand the impact of occupied noise levels and room acoustics
- waiting rooms/wards/treatment rooms

Install the appropriate sound reduction measures for each area and also introduce codes of behaviour to help reduce 'noise'

Hospital noise levels

100dB+

In some hospital areas like the Intensive Care Unit (ICU) care units sound levels always exceed 45dB and peak at just over 100dB, which is the equivalent of a lawnmower.

72dB

Compared to 1960, hospital noise levels during the day have increased by 15dB, from 57dB to 72 dB; similarly, noise levels at night increased from 42dB to 60dB.

sleep

Lack of sleep hinders rest, treatment and recovery of patients; and it has been implicated in the development of delirium, increased pain sensitivity, high blood pressure and poor mental health.

noise

Since the 1950s, King's Fund observed that "hospitals are noisier than ever before" and noted how there are "numberless sources of noise and it seems that there can be no cure for all."

Acoustics Practical Examples



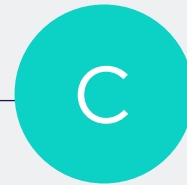
Lobby



Sound
absorption class



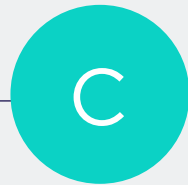
Emergency



Sound
absorption class



Patient
rooms



Sound
absorption class



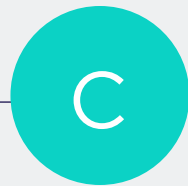
Nurses
station



Sound
absorption class



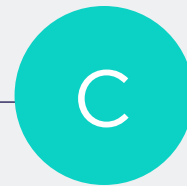
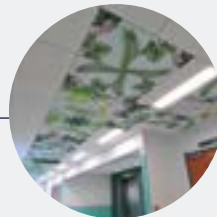
MRI



Sound
absorption class



Laboratory



Sound
absorption class

Sound absorption key

Highest



Lowest

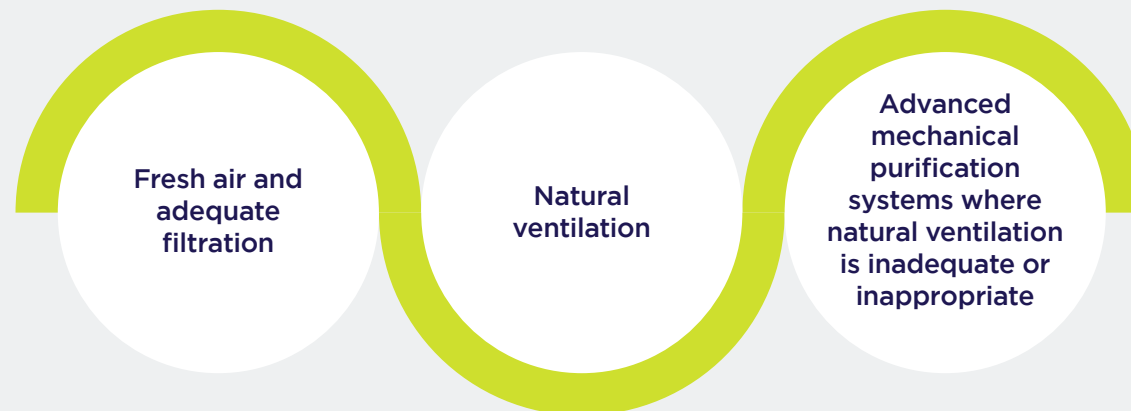
6.2 Air Quality

The quality of the air we breathe can be impacted by many factors. It can be degraded by outdoor air pollution sources, off-gassing from building materials, and surfaces which can accumulate airborne germs. All the contaminants contribute to a range of negative health outcomes, making good air quality so essential to a healing environment. It has also been linked to substantially reducing infection incidence and reduction of mortality rate.

In order to ensure and maintain good air quality, aspects such as ventilation systems, types of filters, direction of airflow, air pressure, air changes per hour in room, humidity and cleaning and maintenance need to be considered. Intake location should be away from sources of pollution (roads, flues, exhausts etc.) to minimise pollutants entering the ventilation system. Furthermore, a natural ventilation strategy creates a sense of the outdoors inside.

Ventilation is critical, especially during construction and renovation activities. Several studies have identified these as a source of airborne infection outbreaks due to dust or particulate generation (Oren, 2001). HEPA filters are suggested for healthcare facilities by the Centre for Disease Control and Prevention (CDC) and Healthcare Infection Control Practices Advisory Committee (HICPAC) and are strongly recommended in all construction and renovation areas but should be used in conjunction with other measures, such as enhanced cleaning, sealing of windows and barriers (Sehulster, 2030).

The benefits of good air quality include protecting patients and healthcare workers against hospital-acquired infections, preventing sick-hospital syndrome, which causes headaches, fatigue, eye and skin irritations.



Case Study

ICU Dashboard

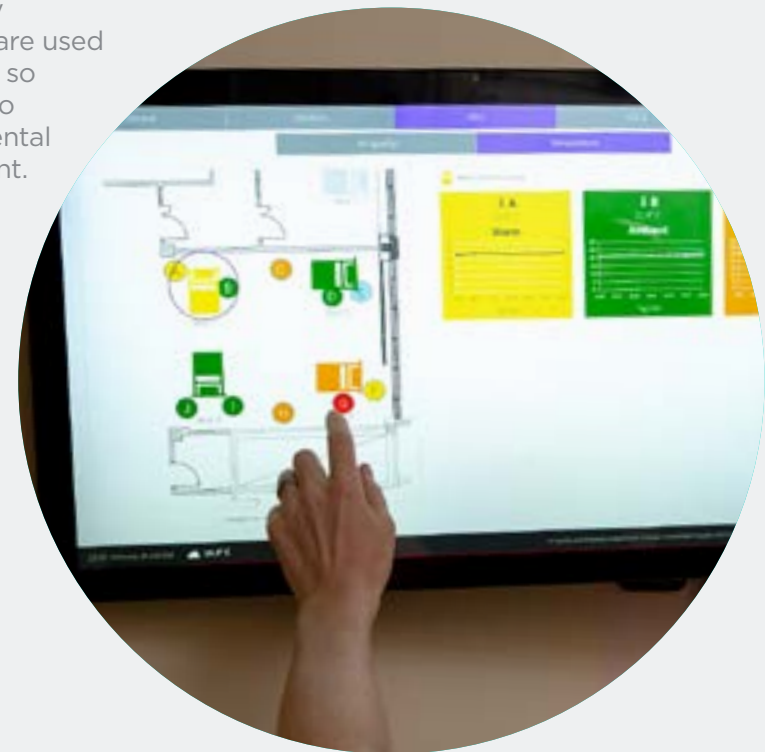
CW+ has installed air quality and temperature monitoring software in the Intensive Care Unit (ICU) at Chelsea and Westminster.

The dashboard shows the air quality of all the bed bays in ICU. The snapshot of the dashboard shows each of the ICU bays in a green condition which is good, anything higher would suggest a possible a gas leak, or harmful fumes from something in the area, which would alert staff to check the area.

This screen below provides an area summary that shows the temperature for each bed bay area. Blue being cold and orange/red hot. Green again is good. This is an indicator for staff on how cold or warm the patient may be and so will either need air-con/fan or a blanket. However, it could also show that an area is being purposefully heated or cooled to adhere to the patient's needs. Environmental factors could be that there's a window or a door, or an enclosed space.

The final screen is bed bay specific regarding temperature rather than the area, which is therefore more patient specific.

A patient in a cool bed bay area can be easily identified using the monitoring software and subsequently moved to a warmer area to stabilise their body temperature. The colours are used as user-friendly indicators, so staff only need to glance to understand the environmental factors affecting the patient.



6.3 Lighting

Lighting can be a major contributor to the promotion of health and recovery in patients it can also create stress by inhibiting a patient's normal cycle of rest and activity. Hospitals are harsh environments where lighting is mainly focused on flooding spaces and supporting clinical examination and care. This can have a very detrimental on patient wellbeing by upsetting the body's circadian rhythms.

When creating a positive holistic environment for patients, the aspects to consider are:

- Different health conditions and the body positions of patients;
- How light might be used for navigation, to create contrast;
- The spatial distribution of lighting, which impacts on its intensity;
- How the light reflects off of surfaces, and the impact of the time of the day;
- Weather conditions and the personal phase of the patient.

All light, not just natural light, can contribute to circadian photoentrainment. Circadian refers to the natural cycles of any biological organism within a 24 hours period. Entrainment is the study of the environmental factors influencing the natural cycles of behaviour and can include patterns of sleep, concentration, energy or activity levels, function of glands etc. Daylight has spectral properties the intensity of daylight makes it especially important and powerful in the impact it has on the body's cycle (13). However, different considerations must be given to each light source. Maximising daylight is important as it enables the body to respond and stimulates the natural circadian rhythms more effectively than electric light sources.



Lighting should help to eliminate not contribute to stress and not glare or flicker

Lighting should create an ambient calm environment unless the light is for the purpose of clinical examination or care

Light can be a positive distraction through sensory stimulation and engagement - twinkling, light and shadow, colour

Studies have shown that people prefer daylight over artificial light sources.

In the context of Hospital Design, it is important to maximise daylight, consider the position of the beds and choose lighter surfaces when there is not enough daylight.

When looking at artificial light sources make sure that they are glare and flicker-free, have an optimal spectrum and make sure that you consider all sources (emergency lighting, screens, equipment etc.).

Good illumination levels have also been found to reduce medical errors (15). This can relate to better visual acuity but also with the reduced stress staff experience when exposed to daylight.

Light in hospitals is often based on functional need and how much light is needed to perform a

certain task to ensure visual acuity. However, light has been found to be a powerful feature that is responsible for several important mechanisms in our body. Light regulates our internal clock, which synchronises a host of physiological functions on a roughly 24-hour cycle; known as our circadian rhythm.

Keeping the body's internal clock synchronised is a process known as circadian photoentrainment. When light enters the eye, it gets absorbed by cells which then send signals to different parts of the brain and trigger reactions in the body. Given the criticality of sleep in restoration and recovery, it is therefore clear why lighting must be applied in the right way to create an optimal healing environment.

Recommendations



Task illumination

Circulation areas (night-day) 50-150 lux

Reading
(casual-critical)
200-500 lux

Treatment
(minor-critical)
500-750 lux



Bed areas

Critical health effect: sleep disturbance
consider lighting controls dimmer
Night 50-150 lux
Day 200-500 lux
higher levels for elderly care



Ward circulation areas

Day 150 lux
Night reduction



Bathroom

Energy saving
Dimmer switch



Staff rooms/offices

Reading 300 lux



Waiting areas

200 lux minimum



Nurses workstations

Day 300 lux
Night reduction



Day room

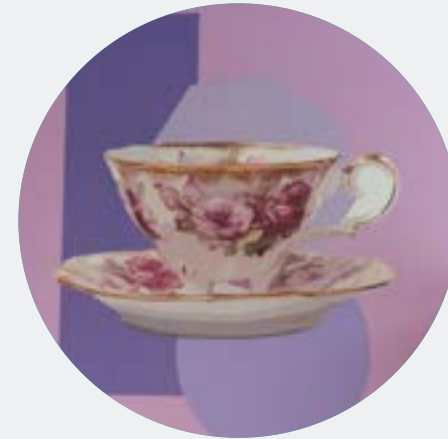
300 lux reading areas
100 lux areas in-between

6.4 Food and Nutrition

Food that is adequate in the nutrition it provides may not comfort and meet the needs of patients. A poor food offer that is unappealing and can mean that the patient falls into decline through lack of suitable nutrition in addition to the challenges they are facing through their disease or condition.

Although enough calories are in the meals offered to patients to maintain weight, food wastage in hospitals is in excess of 40%, implying that the average patient may only be consuming 60% of their caloric needs. The effects can be weight loss and malnutrition, leading to declining health outcomes and an increase in morbidity. While certain morbidities are predicated solely on poor health status prior to admission, hospitals should do everything they can to minimise the decline in nutritional status. Having nutritional care as an integral part of all care pathways, could reduce admissions and readmissions and shorten hospital stays.

Design can play a key role in supporting the social function of eating. Providing patients, visitors and staff with access to communal eating spaces in which meals can be taken in company supports eating as an inherently social activity. The hospital should help facilitate, rather than discourage, socialising among patients by making certain rooms available for communal meals. Even if patients are unable to make use of this space due to being intubated, immunocompromised or otherwise immobile it can offer an opportunity for families to connect, reflect and support each other.



6.5 Biophilia: Closeness to Nature

Until relatively late in the 20th century, outdoor spaces around most hospitals were very much a part of the healing environment. However as time has passed, the benefits of patients being able to spend time outdoors in the fresh air has been increasingly overlooked, as the emphasis on creating a sterile environment indoors. This is changing once again, and the benefits of the natural world is becoming rediscovered.

While direct access to nature can speed up healing, exposure to views and images of nature can also aid this. Even patients in intensive care units are conscious of their surroundings. A study showed that patients in rooms without windows had less accurate memory of their stay. Hallucinations and delusion were more than twice as high.

CW+ worked with leading garden designer Jinny Blom to create 'Green Haven', an indoor garden at Chelsea and Westminster Hospital.

Jinny also led on designing the 'Sky Garden' on Level 5 of the hospital outside the new Intensive Care Unit (ICU). The garden is a bespoke space for ICU patients and their families to connect with nature.

It is not only the patients that can benefit from a closeness to nature and the provision of green spaces. For staff, it can provide a positive escape from workplace pressure and to recuperate from stress. There is further evidence showing that hospital gardens increase staff satisfaction and may help in hiring and retaining talented staff.

Designing outdoor spaces to have a therapeutic function represents a cost-effective approach. It can also bring sustainability and carbon reduction gains, especially in relation to tree and woodland planting. It also appears to have a positive effect on staff performance and retention, as many surveys have shown that staff are the primary users of outdoor spaces.



Use current spaces to their full potential (e.g. beds facing windows, indoor gardens, nature themed art-work and photographic imagery)

Create outdoor and indoor spaces

Incorporate nature into positive distraction techniques and treatment plans

6.6 Colour

Colour plays a vital role in creating a calming, positive atmosphere, it can also be a cost-effective way of transforming a space.

According to existing studies, colour influences people both psychologically and physiologically. Hence, it is a powerful tool in affecting human perception and wellbeing.

Used wisely it can be beneficial in enhancing mood, recovery and differentiating spaces for specific purposes. It can also play a crucial role in navigation and wayfinding within a hospital setting.



White

- White-dominant patient room design for children should be discouraged
- White is cited as the least preferred colour by children
- Rooms painted in white can contribute to patient stress
- Typically, white is viewed as hygienic and clinical, which is desirable in surgical areas

Neutral tones

- Very functional and useful for interiors

Primary and saturated colours

- Highly saturated bold colours may be too controversial, triggering unpleasant associations and reactions in some patients

Appetite can be improved with the use of warmer colours for dining areas – coral, peach and soft yellow tones

Violet, yellow-green, grey, olive and mustard are cited as poor choices, however these can be used as accent colours of with pattern in areas where a more domestic design is favourable e.g. dementia care

Orange is a good energetic and warm colour for use in maternity units, yellow should be avoided as it hinders the diagnoses of jaundice

Primary colours: (red, yellow and blue) are pleasing initially but such bold colours can be visually tiring

Blue is the colour preferred by children

Bold contrasting colours are favourable in dementia care environments where they can be used to differentiate surfaces and locations

<p>Warm colours (reds and oranges)</p> <ul style="list-style-type: none"> – Warm colours like reds and oranges promote physical and social activity 	<p>Green and grey</p> <ul style="list-style-type: none"> – Green and grey can improve health condition – Green colour creates calm feelings and a sense of relief – This is dependent on tone and saturation. Green and grey can have negative impacts if overused in certain environments and the wrong shades are selected. 		
<ul style="list-style-type: none"> – Reds and strong oranges are not popular choices for dermatology departments and mental health wards – Saturation of red colours tend to worsen patients' conditions. Patients can feel physically unwell and experience headaches and perspiration 	<ul style="list-style-type: none"> – Grey is very functional and a useful colour for interiors 	<ul style="list-style-type: none"> – The overuse of green in mental healthcare environments can exacerbate depression 	
	<ul style="list-style-type: none"> – Green promotes relaxation and sleep and is a good colour to use in areas where a calm state is preferable (counselling/ emergency care) 	<ul style="list-style-type: none"> – Intensive care units and surgery corridors can be in cool colours, such as blue-green or green to reflect a functional and more serious atmosphere. A cool patient room might have sandstone on three walls and a feature colour of pale green on one wall. 	
			<p>Cool hues</p> <ul style="list-style-type: none"> – A quiet relaxing or contemplative atmosphere can be created with cool hues – Patient rooms in cool hues or violet tones are used to break down inflammation – In cardiology, blues and violets should not be used as it makes diagnoses difficult – Blue colours are believed to be calming and receding which promotes relaxation as well as aid sleeping

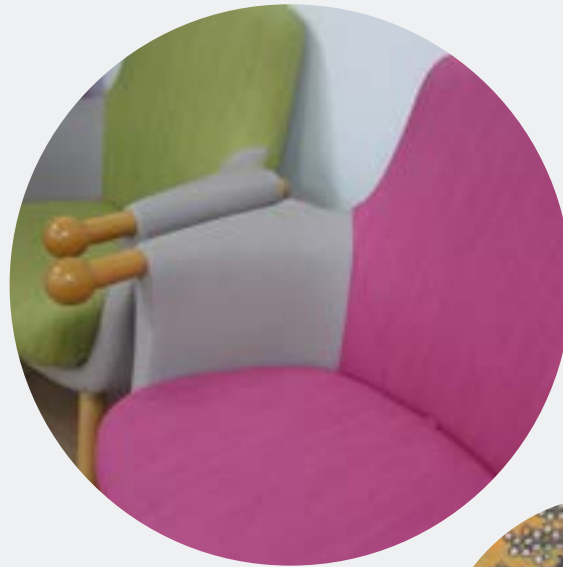
6.7 Materials

Materials and aesthetic treatments can change the look and feel for a space, turning a sterile and stark environment into an inviting, calming space that effectively incorporates the natural world.

When choosing materials, considerations need to be balanced across a range of performance requirements, including reduced hazardous content, value for money, longevity, robustness, ease of sourcing, ease of repair or replacement, acoustic performance and aesthetics.

Considerations include the use of hazardous materials: examples of materials of concern include;

- Paints and coatings that emit VOCs (Volatile Organic Compounds)
- PVC flooring and equipment that contain phthalates
- Timber products that emit formaldehyde
- Flame retardants or anti-stain treatments for fabrics. Cleaning products can also contain solvents and unhealthy chemicals that should be avoided in hospitals. When creating a healing environment consider purchasing policies that state a preference for green materials, design goals that express a preference for environmentally friendly building materials, requesting suppliers to disclose chemical and material content of products can help in making sure that hazardous materials are kept at a minimum.
- Avoid products that emit VOCs, contain hazardous substances or are difficult to clean and maintain
- Use materials that meet hospital technical requirements including infection control standards and are fit for purpose
- Use aesthetically pleasing materials to connect with the wider ethos of a design scheme



6.8 Furniture

Furniture is a key component of healthcare design. Furniture selected should be carefully considered in respect of the design scheme. The specification of furniture should be:

- Fit for purpose.
- Adjustable in terms of height.
- Flexible and support the revised use of space.
- Portable, when required and transferrable to other uses.
- In multi-functional spaces the furniture might need to be storable.
- Accessible for all patients.
- Health and safety compliant.
- Innovative in terms of design.
- Durable and cleanable.
- Low VOC.

Seating features



Neutral colour



Ergonomics



Appealing and coherent design

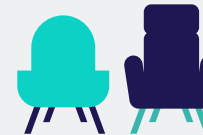
Exam room



Dayroom



Patient rooms



Reception desk



Waiting room



High-back chair



Regular sitting



armchair/sofa

7.0

Patient Environment and Wellbeing

7.1 Visual and Participatory Arts

CW+ has significantly evolved its arts in health programme to combine digital, visual and performing arts with innovative design to create a healing environment which can improve patient experience and clinical outcomes. This is achieved through a wide range of activities which integrate arts into an acute healthcare setting.

These activities include live music, dance, theatre performances and workshops for patients of all ages. CW+ commissions site-specific art and design throughout our hospitals to create a better, healing environment. We bring music, art, craft and movement activities to the wards every day to improve social inclusion, auditory and verbal memory, mood, and visual awareness.

The use of positive distraction and art can assist and support the creation of a healing environment.

Some of the most striking scientific evidence regarding negative human consequences of poor design has emerged from studies of patients exposed to low stimulation or sensory deprivation in healthcare facilities. This supports the idea that our minds and bodies are inextricably connected.

A positive distraction is an environmental feature or element that elicits positive feelings, holds attention and interest without taxing or stressing the individual, and therefore may block or reduce worrisome thoughts.



Careful attention, however, needs to be paid to choosing the right artwork. Artwork that has proven to be “psychologically appropriate” shows representational images with themes relating to nature; waterscapes, natural landscapes, flowers and gardens and figurative art showing emotionally positive gestures and facial expressions.

A recent study by Texas Tech’s Neuroimaging Institute found out that nature based positive distraction features cause a neural activation in response to the visual stimulus. Therefore, diverting one’s attention and consciousness away from the immediate ailment and stressful environment.



**Eliminate
negative
distraction
features**

**Create a
stimulating
environment**

**Use positive
distraction as a
support tool for
patient care**



Case Study

Emergency Department

CW+ commissioned artists and designers to install bespoke art and design throughout the new Emergency Department at Chelsea and Westminster Hospital. We also worked closely with the project architect and design team to ensure the design of the new department was conducive to healing for example dimmer controlled lighting. Using sound-proofing materials, the department is now quieter, and the privacy of patients is protected through a redesigned use of space.

Digital moving image artwork, ceiling lightboxes, window transfers, digital wallpaper and music systems have all been installed, bringing the most innovative art and design ideas into a healthcare environment.



Case Study

Digital Art 'The Zoo'

As part of the re-development of the Emergency Department (ED) at Chelsea and Westminster Hospital, CW+ commissioned the creation of a digital zoo. 'The Zoo' is a collection of animal video portraits featuring 60 different animals ranging from goldfish to elephants composed of over 150 clips and totalling over an hour of footage.

We partnered with Colchester Zoo, Battersea Dogs and Cats Home, Hounslow Urban Farm, London Aquarium and Battersea Park Children's Zoo to film the animals. The project is designed to help distract children from any pain or distress they may experience during their visit to ED.

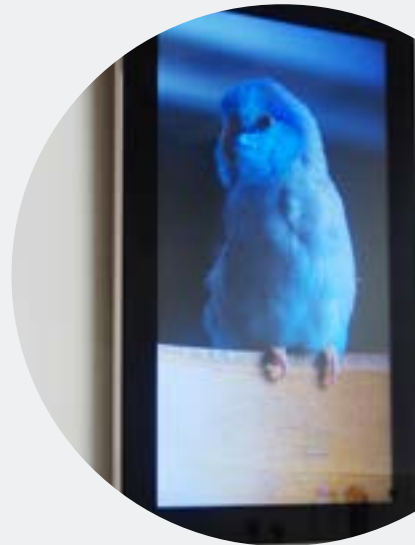
An initial small pilot study had the following results:

- 84% reported improvement in their patient's anxiety.
- 79% reported improvement in their patient's perceived pain.
- 89% agree that The Zoo is an efficient tool.
- 83% agree The Zoo benefits patients, and themselves as clinicians.
- 67% reported improvement on the time taken to complete a basic procedure.
- 84% reported improvement in the wellbeing of parents/guardians
- 83% would recommend The Zoo to a colleague

“

My name is Rudy! I cut my knee very badly today and whilst I was being treated my Dad and I enjoyed laughing and giggling at your amazing digital animals. They are brilliant – thank you.

”



7.2 Music and Soundscapes

Noise levels in hospital can be prohibitive to patient recovery, but equally important is the qualitative experience of the hospital soundscape. In some cases, the addition of pleasant sounds can positively affect a patient's experience, providing a useful mask for unwanted clinical noise whilst also providing an enjoyable distraction. When considering the design of soundscapes, both musical and non-musical sound should be considered.

Music

Music is often used in the creation of pleasant soundscapes, and its positive effects on listeners have been shown to include reductions in anxiety and pain, slower breathing and heart rates, and reductions in stress hormones such as Cortisol. Such wide-ranging benefits have led to a plethora of research studies into the effect of music listening in various acute settings; these are perhaps best represented by a series of Cochrane literature reviews, the subjects of which include music's effect on coronary heart disease patients, people with dementia, and mechanically ventilated patients to name just a few. Acting on this research

base, music has been successfully implemented in many areas at Chelsea and Westminster Hospital, including wards, waiting areas and operating theatres.

Whilst the benefits of music listening for patients have been well documented, the effect of specific musical content, and the process by which such content is chosen, is open to debate. The innate subjectivity of music means that there is not necessarily one musical style that is 'the most relaxing', and whilst in smaller treatment spaces patients might select their preferred music, larger communal or public spaces demand a curatorial sense for what might constitute the best music for that environment.

It is useful to establish a consultatory process when designing playlists that can include all users of the space, capturing opinions both at the start and the conclusion of the process. A good example of this is the iterative process developed by Short et al. (2009) for designing playlists for use in an Emergency Department, which includes consideration of both

demographic and clinical context, consultation with music experts, careful analysis of musical and lyrical content, and a specially-designed questionnaire to assess listeners' perception of the music.

“

The engagement and social interaction offered by our participatory arts and music programme cognitively stimulates patients. It can improve the patient's ability to maintain independence. It's about the lasting effect it has on the patients' entire experience within the Hospital.

”

Sarah Bryan, Lead Nurse
Older Adults and Frailty



A similar survey-based process was used in the design of playlists for the Chelsea and Westminster Hospital Emergency Department, in which 74 patients answered questions about their perceptions of relaxing music and sound, leading to the creation of seven bespoke playlists for the new department.

Ultimately, however, the musical judgement of the playlist curator remains at the centre of the process. Krout (2007) suggests the following musical characteristics as guidelines on what might be considered 'relaxing':

Slow and stable tempo (pace or speed), low volume level and soft dynamics, consistent texture (combination of sounds and instruments), absence of percussive and accented rhythms, gentle timbre (sound or tone colour), legato (connected) melodies, and simple harmonic or chord progressions. New playlists are being devised and tested by CW+ in response to research and feedback to include upbeat popular music.

In addition to these, and based on the experience of curating music at Chelsea and Westminster Hospital, we would also suggest the following considerations:

- Overly emotional music should be avoided, whether it is manifested vocally through lyrics, or instrumentally through complex harmonies and quickly changing dynamics. Preferable to this are pieces of music which exhibit a sense of balance and order: western classical music of the 'classical' era (around 1750-1810, including Mozart and Haydn) is particularly appropriate.
- Small environments are best suited to small-scale intimate music settings, such as solo piano, acoustic guitar and chamber music (duos/trios/quartets/quintets). Orchestral music can sound incongruous in small quiet spaces.
- Common cultural associations can be a powerful influence on a listener's perception of music. For example, choral music may have strong religious associations, and may not be well suited to communal spaces with a diverse patient group.

Non-musical sound

Natural sounds have also been shown to be pleasant for listeners as well as having positive physiological effects, and improving quality of sleep and so can also be considered in the sound design of hospital spaces. Synthesised sound masks, such as white or pink noise, have also been used experimentally in acute settings, particularly in relation to improving sleep.



However, participants in the 'HPNoSS' workshop, a collaborative research project between CW+, the Kings College London and the University of Arts London, described particularly favourable responses to natural soundscapes of water or rain rather than synthetic sound.

Patient Choice

Patient preference is an important consideration, and wherever possible both patients and staff should have control over what sound is played in an area. True personalisation of the soundscape in a communal or public setting is a technical challenge, necessitating the use of headphones which must meet infection control standards (although the advent of super-directional speakers may offer new opportunities in this regard). In individual treatment areas or waiting rooms there is more scope for patient choice, with Bluetooth connectivity in sound systems allowing patients to stream their preferred music from their own devices. It should also be noted that some studies, such as Goertz et al (2011), suggest patients are equally benefited by a randomised selection as they are by music that is self-selected.

Technology and implementation
Different areas of a hospital will have varying requirements for implementation, mainly dictated by infection control protocols and demands of portability. For example, operating theatres that require regular deep cleaning will be best suited to smaller portable speakers that can be easily removed. In this environment music may be particularly effective for patients who stay awake during procedures, and therefore patient-chosen music should be accommodated by choosing a sound system with Bluetooth connectivity.

Within Chelsea and Westminster Hospital there are several different sound system models used to meet various needs, and these are outlined below:

- Flat wall-mounted hi-fi systems (e.g. Panasonic SC-HC397) – for permanent installations in smaller spaces. Some models can accommodate both Bluetooth connectivity and playlists on a USB stick.
- Bluetooth ceiling speakers (e.g. Lithe Audio) – for permanent installation in larger spaces and corridors. Music can be streamed via Bluetooth from a device operated by staff, or, in smaller spaces, by patients.



- Wi-Fi Networked speakers (e.g. Sonos) – for permanent installation of multiple speakers across a very large multi-room space. Requires an internet connection.
- Portable DAB radio with Bluetooth capability (e.g. Roberts Blutune 5) – a portable solution incorporating both DAB radio and Bluetooth connectivity.
- Small Bluetooth speaker (e.g. Anker Soundcore mini) – for maximum portability between spaces but lacking the volume and sound quality of other solutions.

Any sound system installation should always be checked for adherence with infection control protocols.

Finally, the quality of digital audio is also of importance: MP3 tracks should have volumes normalised and should ideally undergo a process of 'dynamic range compression' to minimise sudden variations in volume. The online service Auphonic is very useful for this, providing batch processing of audio to broadcast standard quality.



8.0

Design Quick Guides

This section of the design guide offers a set of at-a-glance guides which are visual and summarise current best practice in differentiated areas of care.

The guides look at best practice in Dementia, Paediatrics and Mental Health.

8.1 Dementia-Friendly Design

“

There are currently around 750,000 people living with dementia in the UK. These numbers are predicted to rise dramatically – more than doubling by 2051. The simple explanation is that people are living longer; as more people live beyond 65, growing numbers will be living with dementia. One in three of us who live to 65 will have some form of dementia before we die.

The economic and social costs of dementia are enormous. The UK currently spends around £20 billion per year on dementia – by 2026 this will have risen to £35 billion. Meanwhile, there are no calculations that can put the countless human stories into perspective. Dementia eventually affects every aspect of a person's life, and the lives of those caring for them.

”

Design Challenge: Living well with dementia, Design Council and CAGE





Floors

These should be a single colour without any changes or joins that could be mistaken for steps or voids.

Shiny floors can be perceived as slippery.

Sound absorption is important, and floors should be considered as part of sound mitigation.



Skirting and walls

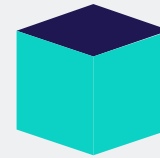
Need clear definition to show clearly where the floor and wall join.

If the floor covering is curved onto the wall surface this should be as low as possible and in a contrasting colour.



Handrails

These should contrast with the wall and have clear indicators where they end. This could be a knob or turn into the wall.



Ceilings

The ceiling is a key to manage noise and provide sound absorption this can be achieved cost effectively through the installation of sound absorbent tiles.

Ceilings should also be light in colour to reflect light.



Clocks

Large, clear, accurate analogue clocks should be visible from every bed.

There is evidence that clocks can help with delirium (National Institute for Health and Clinical Excellence, 2010).



Doors

These are crucial for wayfinding.

Staff-only doors should be the same colour as the walls.

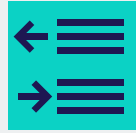
Patient doors should be clearly signed and in contrasting colour.

Sliding doors should be avoided as these can be confusing to patients.

Doors with glass panes can be useful to enable patient monitoring and enable patients to orientate and see where they are. These can be utilised to bring in light and create a sense of openness. The exception is areas where privacy is of paramount importance e.g. bedrooms and bathrooms.

If doors are identical, add striking dementia specification signage, kick plates, panels or artworks.

Toilet doors should be a consistent and a bold, contrasting colour.



Signs

Signage should be dementia friendly and consistent throughout.

Positioned at no higher than 1.2metres add from the floor level.

Contrast with the wall or door.

Use capital and lower-case letters in a clear font and include a graphic image.



Lighting

Light levels should be high to account for the decline in vision experienced by most older people. In healthcare environments light should be twice the strength of a standard lighting scheme.

Ideally patients should experience as much daylight as possible during waking hours.

Patients with dementia are sensitive to glare therefore over-bed and chair task lighting is vital.

Good clear lighting over food and drink helps patients to recognise and consume meals and refreshments.

Staff need lighting to observe and monitor patients. However, darkness at night is desirable to encourage sleep.

Lighting that is activated by movement needs to stay on for long enough so people who move slowly can do so safely.

Light switches should be easy to understand and made visible through contrasting colours.



Sound

Sound should be minimised to avoid distress, and this includes the noise from phones, bells and buzzers, noisy conversations.

Washable acoustic panels should be fitted on walls and ceilings.



Furniture

Should contrast in colour from the floor.

Beds should go right down to the floor and bedrails be avoided.

Table coverings and place mats should contrast in colour with plates to help people see their food.



Mirrors

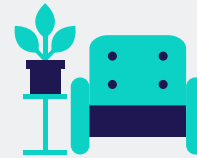
“These can cause problems for patients who no longer recognise their own image. They may wonder, “Who is the strange person looking puzzled at me through this window?” Provide covers or doors for mirrors.” Nursing Times, 2013.



Bathrooms/shower rooms

These should have contrasting colours, and familiar fittings.

Showers can frighten dementia patients and be overwhelming to the senses; therefore, showers should be height-adjustable with detachable showerheads to allow gradual exposure to water.



Day Rooms

These are an asset in dementia care providing social space for sitting, eating and speaking to relatives.

Activities can relieve boredom and stress for patients and have therapeutic benefit.

Day rooms are a good resource to use for one-to-one work with patients with communication difficulties.

Case Study

Crane Day Room

The Frailty Unit on Crane Ward at West Middlesex University Hospital is a key component of the Trust's overarching Frailty pathway. The Unit provides a Consultant-led, multidisciplinary Acute Frailty Service for patients who have been identified as needing further care on a ward based on their Clinical Frailty Scores. Through the development and agreement of a CGA clinical management plan, combined with provision of intensive rehabilitation, the aim is to reduce the length of stay for these patients by an average of two days. Critical to this is encouraging mobility and activity on the ward so that patients are sat out, dressed and mobile wherever possible.

The Day Room on Crane Ward was designed by CW+ to provide an opportunity for activity and a social space with a domestic feel that would simulate a home environment. The space is utilised to host activities, meetings with relatives and carers,

The key design elements considered in the realisation of the project were:

- A domestic scale and style kitchen area to facilitate the making of drinks and snacks.
- Vinyl wallpaper designed to simulate home environment featuring bespoke botanical design.
- Soft calming colours for walls.
- Provision of ample social space including a range of seating for both comfort and function.
- Dementia friendly clocks.
- Flexible secure storage systems for craft, reminiscence materials and resources.
- Dementia friendly pictorial signage.
- Window vinyl treatments designed to simulate lace curtain designs.
- Use of nature-inspired imagery and simulations of natural materials.
- All surfaces wipe-clean, easy care, durable and meet infection control standards.
- Ample natural light.



Key Components of Dementia Friendly Design

- Use of high contrast bold colours.
- Specialist sensory or pictorial signage.
- Clear colour and image coding of bed bays to enable patients to orientate.
- Integration of design elements and technology which assists with therapy.
- Replacement of gloss flooring with matt and no interruptions in the flooring that could be mistaken for voids or steps and cause distress or falls.
- Use of natural materials and non-reflective surfaces.
- Introduction of dementia friendly clocks.
- Positioning of visuals and signage at a suitable height, 1.2 metres from floor level is recommended.
- Simple, clear signage. One type to minimise confusion, Always use capitals and lowercase letters and a clear graphic.
- Domestic design features to simulate home environments and provide a sense of comfort and familiarity.
- Ensuring patients can move freely and explore the ward areas without harming themselves or impacting on patients, visitors and staff.
- Integrating storage for activities.
- Integrating reminiscence artwork.

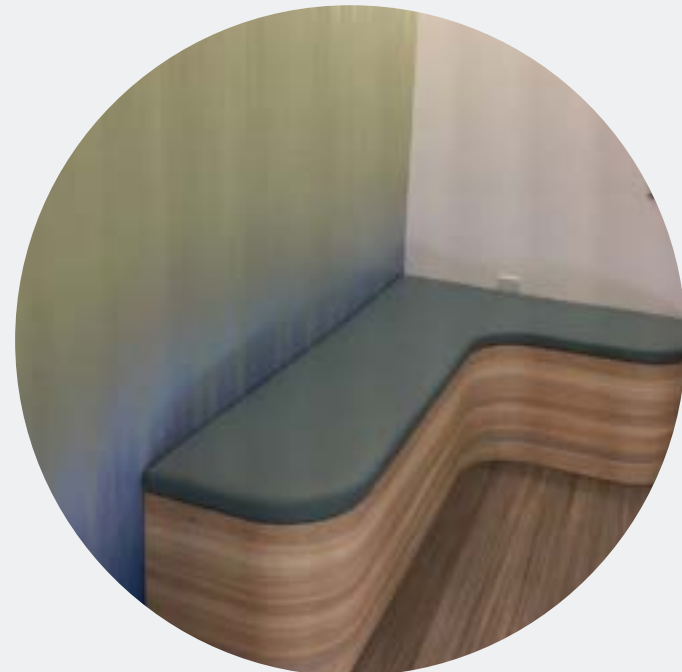


8.2 Design for Paediatrics

- Paediatric wards and clinics accommodate patients with ages ranging from 0-18.
- Historically, paediatric ward and clinic aesthetics have focused on primary colours and familiar cartoon characters as a mechanism for humanising the space and distracting patients.
- Children and their families are now more visually literate and have come to expect a more sophisticated environment that embraces technology. The growth in specialist children's hospitals has given rise to innovation in design which has set a benchmark for good practice.
- The best examples of paediatric ward contemporary design practice have been developed

using multi-disciplinary teams incorporating artists to create schemes which feature colour, consider spatial design, materiality, graphic design, wayfinding and technology.

- A holistic approach to design considers function, aesthetics and context.
- Patients often are accompanied by extensive family groups - waiting areas and treatment rooms should factor this in.
- Parents and carers benefit from rest rooms, an area to make meals and have some quiet time and space and facilities to remain with the child at their bedside.



Case Study

WMUH Playroom

CW+ commissioned specialist play company Tigerplay to transform the West Middlesex University Hospital playroom into a bright, bold and engaging space for patients, their families, carers. The scheme was devised to be functional and practical and create a base from which the play team could actively engage patients. Tigerplay created a bespoke scheme that incorporated the following key design elements:

- Use of bespoke graphics and designs to appeal to a broad demographic and age range.
- Sophisticated design using surface patterns, a spectrum of colour, bespoke graphics and multi-sensory surfaces.
- Design of extensive safe and secure storage for equipment.
- A range of furniture to meet sensory needs.
- Infant and adult height sinks and cleaning facilities for wet play.
- The design reflects the request of staff for a 'no technology' rule to encourage physical and sensory play.
- A range of work surfaces and sinks at different heights.
- Display areas for patients to showcase their art and craft work.
- Use of natural-looking materials including simulated wooden flooring, wooden furniture and play features and grass effect flooring to bring in warmth and create a more domestic, non-clinical environment.



8.3 Design for Mental Health

“

Mental health is a state of well-being in which an individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and is able to contribute to his or her community. In this positive sense, mental health is the foundation for individual well-being and the effective functioning of a community.

”

World Health Organisation

- Soft surfaces and easy clean fabrics.
- Imagery and colours that link to the natural world and fabrics and surfaces that appear natural.
- Natural light where possible.
- Calming colours including scope to incorporate soft colour lighting.
- No sharp edges or harsh materials.
- Every element of the design should meet anti-ligature requirements.
- The environment should be secure and comforting.
- Dimmable lighting is a key component.
- Minimal sound.
- Ability for staff to observe patients without being intrusive.
- No loose items or design elements that can be removed and used as missiles.



Case Study

Boex Mental Health Room Chelsea

CW+ commissioned textile designer Ptolemy Mann to create a feature wall for the room. Ptolemy used calming greens and blues in a modern gradated design.

Wood effect finishes were specified for flooring and furniture to help reduce the clinical feel of the space. All of the walls were covered in full length wall protection, and an ultra adhesive wipe-able and graffiti resistant vinyl was applied on top. The vinyl was printed with Ptolemy's design to create a feature wall, and a soft blue colour was selected for the other three walls.

“

This specially designed room will have a huge impact on the safety and experience of our patients with mental health needs - it is designed to provide a calm and non-clinical environment that also demonstrates to patients that we take their mental health needs seriously and compassionately. The feedback from patients about the newly finished room has been overwhelmingly positive.

”

Paul Morris, Lead Nurse –
Mental Health, Chelsea and
Westminster Hospital NHS
Foundation Trust



9.0

References

Healing environment

1. Ulrich, R.S. (1991) Effects of interior design on wellness: theory and recent scientific research. *Journal of healthcare interior design*, pp. 97- 109.
2. Ulrich, R.S. (1999) Effects of gardens on health outcomes: theory and research. In: Cooper, M.C., Barnes, M. editors. *Healing Gardens therapeutic benefits and design recommendations*. John Wiley and Sons; New York.
3. See, for example: Nightingale, F (1858) *Notes on Matters Affecting the Health, Efficiency and Hospital Administration of the British Army*. Nightingale, F (1859) *Notes on Hospitals and (1859) Notes on Nursing*.

Design

4. Ulrich, R.S. (1992) *How Design Impacts Wellness*. *Healthcare Forum Journal*.
5. Mazuch, R. and Stephen, R. (2005) *Creating healing environments: humanistic architecture and therapeutic design*. *Journal of Public Mental Health*, 4(4), pp. 48-52.

6. Hughes, R.G. and Murphy, M.R. (2008). The impact of facility design on patient safety. In: R. Hughes, ed. *Patient Safety and Quality: An Evidence-Based Handbook for Nurses*. Rockville: Agency for Healthcare Research and Quality, pp. 167-192.

7. Ulrich, S.R. (2006) *Essay Evidence-based health-care architecture*. *Lancet*, 368, pp. 38-39.

Colour

8. Dalke H., Littlefair P.J., Loe D.L., Camgöz N. (2004) *Lighting and colour for hospital design. A Report on an NHS Estates Funded Research Project*, London South Bank University, Published by The Stationery Office. [Online] Available at: tso.co.uk/bookshop
9. Dalke H., Little J., Niemann E., Camgoz N., Steadman G., Hill S., Stott L. (2006) *Colour and lighting in hospital design*. *Optics and Laser Technology* 38: 343-365. [Online] Available at: sciencedirect.com

10. Gyu P.J. (2013) *Color Perception in Pediatric Patient Room Design: American vs. Korean Pediatric Patients*, *Herd Journal*, published by SAGE Publications. [Online] Available at: journals.sagepub.com/doi/abs/10.1177/193758671300600402

11. Dalke H., Littlefair P.J., Loe D.L., Camgöz N. (2004) *Lighting and colour for hospital design. Report on an NHS Estates Funded Research Project*, London South Bank University, Published by The Stationery Office. [Online] Available at: tso.co.uk/bookshop
12. All-Party Parliamentary Group on Arts, Health and Wellbeing”, *Inquiry Report, “Creative Health: The Arts for Health and Wellbeing”* (2017), [Online] Available at: artshealthandwellbeing.org.uk/appg-inquiry/Publications

Acoustics and sound

13. Morrison, W.E. et al. (2003) Noise, stress, and annoyance in a pediatric intensive care unit. *Critical Care Medicine*, 31(1), pp. 113-119.
14. Blomkvist, V. et al. (2005) Acoustics and psychosocial environment in coronary intensive care. *Occupational and Environmental Medicine*, 62, pp. 1-8.
15. Hagerman, I. et al. (2005) Influence of coronary intensive care acoustics on the quality of care and physiological states of patients. *International Journal of Cardiology*, 98, pp. 267-270.

Music and soundscapes

16. Tedja and Tsaih, 2015.
17. Saadatmand, 2013/2015; Aghaie, 2014.
18. Williamson, 1992.
19. Farokhnezhad Afshar et al, 2016; Stanchina et al, 2005.

Way-finding

20. Burton, E., Torrington, J. (2007). Design environments suitable for older people. *CME Geriatric Med*, 9(2), pp. 39-45.
21. Passini, R. Arthur, P. (1992) *Wayfinding: People, signs and architecture*. New York: McGraw-Hill Inc.

Positive distraction and artwork

22. Ulrich, R.S. Lunden, O. and Eltinge (1993).
23. Dr. McCuskey Shepley, M. (2006) The role of positive distraction in neonatal intensive care unit settings. *Journal of Perinatology*, 26, pp. 34- 37.
24. Ulrich, R., (1991). Effects of interior design on wellness: theory and recent scientific research. *Journal of healthcare interior design*, Volume 3, pp. 97-109.
25. Ulrich, R., (1981). Natural versus urban scenes: Some psychophysiological effects. *Environment and Behaviour*, Volume 13, pp. 523-556.
26. Ulrich, R.S. and Giplin, L. (2003). *Healing arts: nutrition for the soul*. In: S. G. L. a. C. P. Frampton, ed. *Putting Patients first: designing and practicing patient centred care*. San Francisco: Jossey-Bass, pp. 117-146.

Biolophilia: Closeness to nature

27. Shackell, A. and Walter, R. (2012) *Practice Guide: Greenspace design for health and well-being*. Forestry Commission.
28. Ulrich, R.S. Lunden, O. and Eltinge (1993) Effects of exposure to nature and abstract pictures on patients recovering from heart surgery. Paper presented at the 33rd meeting of the Society for Psychophysiological Research, Rottach-Egern, Germany. *Psychophysiology*, 30(7).
29. Buzzell, L. And Chalquist, C. (2009) *Ecotherapy: Healing with Nature in Mind*.
30. Keep P., James J. and Innman M. (1980). Windows in the intensive therapy unit. *Anaesthesia*, 35(3), pp. 257-262.
31. Whitehouse, S., Varni, J.W., Seid, M., Cooper-Marcus, C., Ensberg, M.J., Jacobs, J.J. and Mehlenbeck, R.S. (2001). Evaluating a children's hospital garden environment: Utilization and consumer satisfaction. *Journal of Environmental Psychology*, pp. 21: 301-314.
32. Shackell, A. and Walter, R. (2012). *Greenspace design for health and well-being*, Edinburgh: Forestry Commission.

Furniture examples

33. TEAL Healthcare | 2019 Catalogue, The Senator Group.

Our Arts in Health Programme

Our Design and Environment programme creates works that are tailored to meet the needs of our hospital audience. We work with renowned partners who specialise in health, technology and environmental design, to address the factors which create the optimum healing environment. These include temperature, lighting, acoustics, air quality, closeness to nature, way-finding, privacy and the arts and technology.

We are initiating new projects and partnerships and welcome the opportunity to share and discuss our work.

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