

Evidence Based Design Guidelines for a Healthcare Environment: A Conceptual Framework

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Abstract Healthcare facilities should provide a therapeutic environment in which the overall design of the building contributes to the process of healing and reduces the risk of healthcare-associated infections rather than simply being a place where treatment takes place. Healthcare buildings exist primarily for the patients and other people who use them. There is a growing body of evidence that if the design is right, satisfaction levels improve as do patients' health outcomes and staff productivity. Health Building framework gives best practice guidance on the design and planning of new healthcare buildings and on the adaptation/ extension of existing facilities. They provide information to support the briefing and design processes for individual projects in the National Health Service building program. In this paper a comprehensive, Health Building guidelines are summarized, which provides general design guidance for healthcare buildings. These overarching Health Building guidelines give an overview of the policy and legislative framework around capital projects in healthcare, strategic planning, master planning and building design.

Keywords: Evidence Based, Design Guidelines, Healthcare Facilities, Hospital Planning

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1. Introduction

The World Health Organization defined "health" as "a state of physical, mental and social wellbeing and not merely the absence of disease or infirmity" [1]. Healthcare delivery is constantly changing, and so too are the boundaries between primary, secondary and tertiary care. The focus now is on delivering healthcare closer to people's homes. Healthcare facilities should provide a therapeutic environment in which the overall design of the building contributes to the process of healing and reduces the risk of healthcare-associated infections rather than simply being a place where treatment takes place [2]. In turn, the healthcare planning and design process therefore needs to be correspondingly broad enough to include not only the issues surrounding the treatment of disease, but also the promotion of health and prevention of disease – essentially the creation of a safe and therapeutic care environment [3].

An opportunity to build a new department/ facility or refurbish an existing one may only happen occasionally but when it does, it provides the opportunity to design a modern department that inspires and intuitively supports safe, effective and efficient patient care, with the flexibility to meet future developments in healthcare, technology and patient needs [4,5]. The Health Building

design framework is based on the patient's experience across the spectrum of care from home to healthcare setting and back. Because of its general nature, its content will be familiar to experienced architects and healthcare planners. It is intended particularly for those who are new to this work and also to patients or their advocates who may be requested to become involved. It may also be helpful for commissioning organizations and regulators, giving an overall picture of the design issues and future-proofing requirements that need to be addressed in a healthcare capital project [6].

The main aims of providing Health Building guidelines are to:

- promote the design of healthcare facilities with regard to the safety, privacy and dignity of patients, staff and visitors;
- provide best practice guidance to architects, designers and healthcare planners seeking information on the special needs of typical healthcare facilities;
- help to achieve value-for-money solutions for the planning and design of healthcare facilities

2. Research Methodology

In this paper, the qualitative research method has been used. The systematic literature review explores the basic

concepts of healthcare environment through books, internet and secondary data from relevant published academic literature from journal's research papers. The data collected in the qualitative research is the data that comes from several case studies and examples that are described descriptively and are supported by illustrations and photographs to reinforce the arguments put forward. This study offers comprehensive, general design guidelines for planning and design process of healthcare buildings. These overarching Health Building guidelines give an overview of the policy and legislative framework around capital projects in healthcare, strategic planning, master planning and building design.

3. Arriving (Outside Environment)

3.1. Evidence

Evidence from many post-occupancy evaluations confirm that people like unambiguous entrances that are logically positioned in relation to the points of arrival onto a site and that are usefully indicated by the whole shape and form of the building (Figure 1).

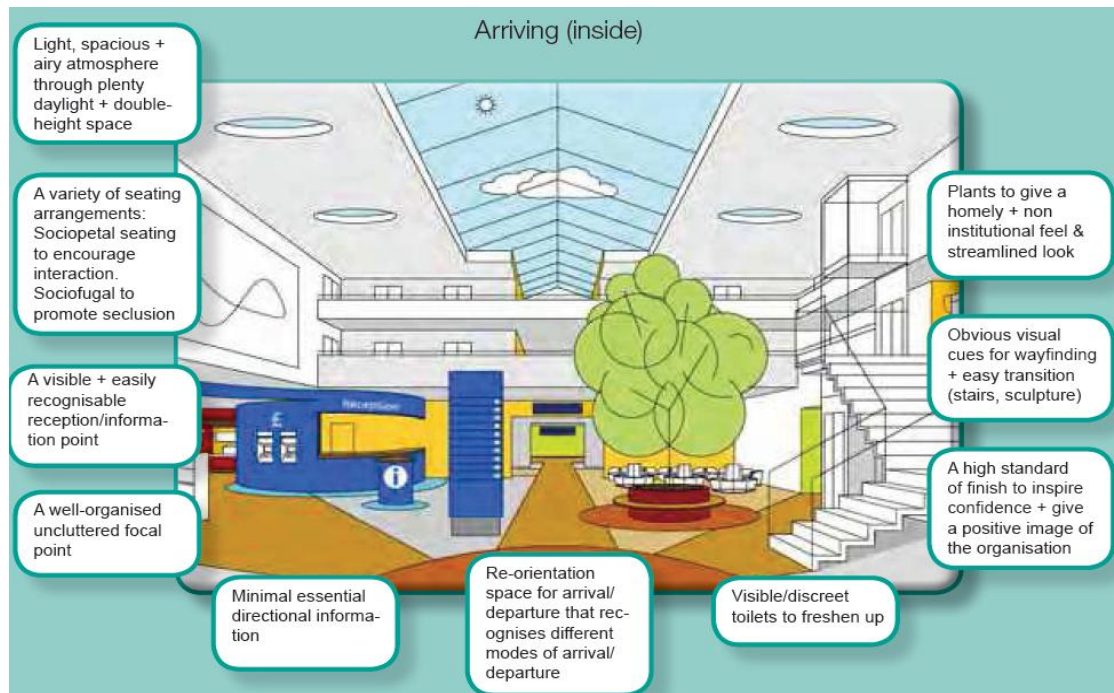


Figure 1. Conceptual design of external environment of a healthcare building

Design Considerations

- Introduction of character to the main entrance helps people identify it more readily and can create a sense of uniqueness, friendliness and individuality for buildings.
- Innovation at the main entrance could be in many forms: art, sculpture, landscaping, planting, fountains, architectural features etc – all of which add to a sense of modernity and progress, and provide interest.

3.2. Evidence

The site as a whole should not introduce further stress by being ambiguous about where the entrance is. The Surveys of users in healthcare buildings confirm that multiple entrances are confusing, are a source of security concerns, increase stress levels in patients and staff, and should be avoided. Where this is either necessary or deemed desirable, clearly locating them, making them architecturally apparent and signposts are helpful.

Design Considerations

- High and generous entrance ways feel welcoming and uplifting.
- Low or narrow entrances are claustrophobic, not easily identified and can cause uncertainty.
- The perceived height of the entrance way will be relative to the building rather than people, so this should be accounted for when the main building is several storeys.
- Generous space leading up to the entrance further confirms its presence, projects confidence and creates an easily identifiable meeting point.
- Entrance areas should provide many meeting points and places for people to rest or wait.

3.3. Evidence

Research indicates that the extent to which both staff and patients can see out of and around the building has many benefits such as reducing stress, alleviating anxiety and adding recovery.

Design Considerations

- There should be uninterrupted and clear views of the entrance from the approach to the site.
- Low level signs and planting help maintain a clear view to the entrance way.
- Interesting views can be created for people waiting or resting near the entrance.

3.4. Evidence

Research findings note that patients experience positive outcomes in an environment that incorporates natural light, elements of nature, soothing colors, meaningful and varying stimuli, peaceful sounds, pleasant views and a sense of beauty.

Design Considerations

- Protection from the elements should be provided around the entrance.
- Structures such as canopies and landscaping (trees and bushes) shelter an entrance from sun, rain, wind and, increasingly in city centres, noise.
- Nature and greenery around the entrance is reassuring and calming.

4. Arriving (Inside Environment)

4.1. Evidence

Research notes that patients experience positive outcomes in an environment that incorporates natural light, elements of nature, soothing colors, meaningful and varying stimuli, peaceful sounds, pleasant views and a sense of beauty (Figure 2).

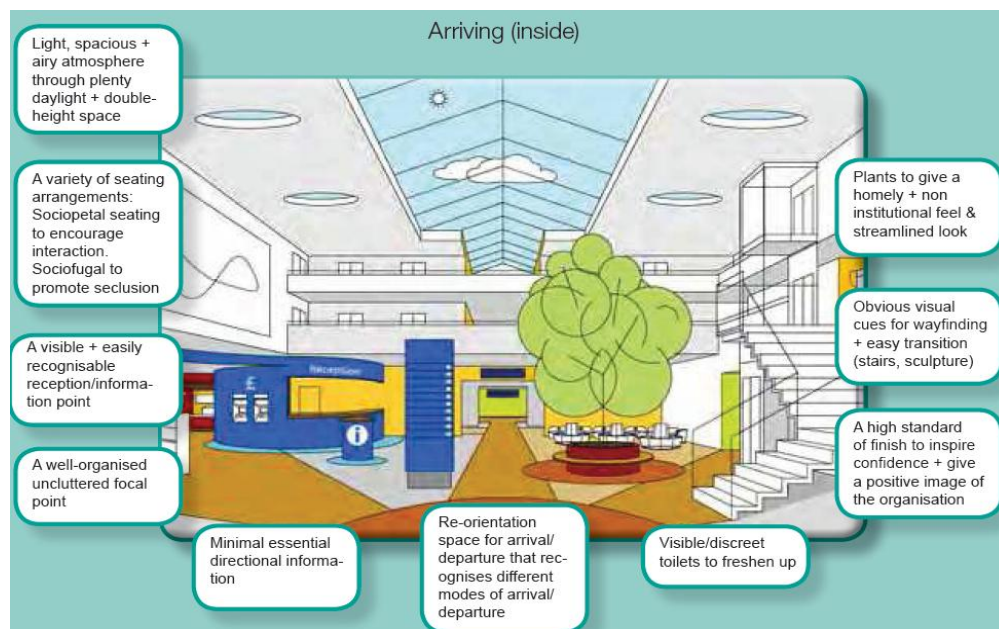


Figure 2. Conceptual sketch design of the entrance hall

Design Considerations

- Color can be used to further brighten the entrance and make it a refreshing place.
- Color in the entrance should be bright, light, fresh and natural.
- Dark, dull and cold colors should be avoided as they will make an entrance seem inhospitable and austere.
- Too much color here will detract from important signs.
- Color can be also used on floors to help identify routes.
- Destinations such as the reception, waiting area or a café could be further identified through the use of an associated color.

4.2. Evidence

Patients and staff like to be able to control their privacy and their interaction with others. In buildings and places where they are able to do so, people report increased satisfaction with their environments.

Design Considerations

- Quick and discrete routes into clinical areas should be created for patients who may have arrived in ambulances or be injured.
- There should be no views from the entrance to patient areas.

4.3. Evidence

Research indicates that the extent to which both staff and patients can see out of and around the building has many benefits such as reducing stress and anxiety and

adding recovery. People want to be able to see and to know what is going on.

Design Considerations

- The entrance is a transitory place that people pass through on their way to other areas, so views around and beyond the entrance should be clear and uninterrupted.
- The reception, information or help desk should be immediately apparent but not prevent people seeing the rest of the space or become an obstacle in itself.
- People should be able to see and read signs even when the entrance is very busy.
- Being able to see shops, cafés, toilets, cash machines and other facilities from the entrance makes people aware of them and reduces the need for signs.
- Being able to see staircases and lifts from the entrance helps people find their way more quickly.

4.4. Evidence

Post-occupancy evaluations confirm that the extent to which users of a building can come and go affects utilization and is helpful to the morale of both patients and staff.

Design Considerations

There should be a clear, uninterrupted route to the reception or help desk.

Generous pathways prevent bottlenecks.

Variation in materials on the floor can create pathways and help people move around a busy space in a more organized manner.

5. Circulation and Movement

5.1. Evidence

Evidence from scientific studies show that not only comfortable conditions but the ability to control levels of comfort for oneself in the different types of places are very important in reducing stress and alleviating anxiety.

Design Considerations

- Recessed seating areas along corridors provide places for patients and staff to meet and rest.
- Seating that coincides with views from corridors to the outside offers beneficial respite for patients, staff and visitors.

5.2. Evidence

Design reviews indicate that a successful building has clarity of design intention, and that this is appropriate to its purpose. This intention is reflected in the way it lifts the spirits of those who work in it and are being treated in it as well as those who visit. It communicates a strong positive image of the NHS throughout all the various places such as arriving, circulation, waiting etc.

Design Considerations

- Creating character within these spaces demonstrates a commitment to human values beyond the simply functional needs of moving around.
- Corridors and circulating spaces are an opportunity to introduce design features that may not be practical or suitable in other areas of a hospital.
- Innovative use of design in these areas can help healthcare organizations communicate non-functional or non-clinical information and enhance people's experience of the facility.

5.3. Evidence

Post-occupancy evaluations indicate that where there are significant numbers of similar places (such as corridors, wards), less significant changes of character perhaps through color, texture or material enable people to feel located meaningfully (Figure 3).

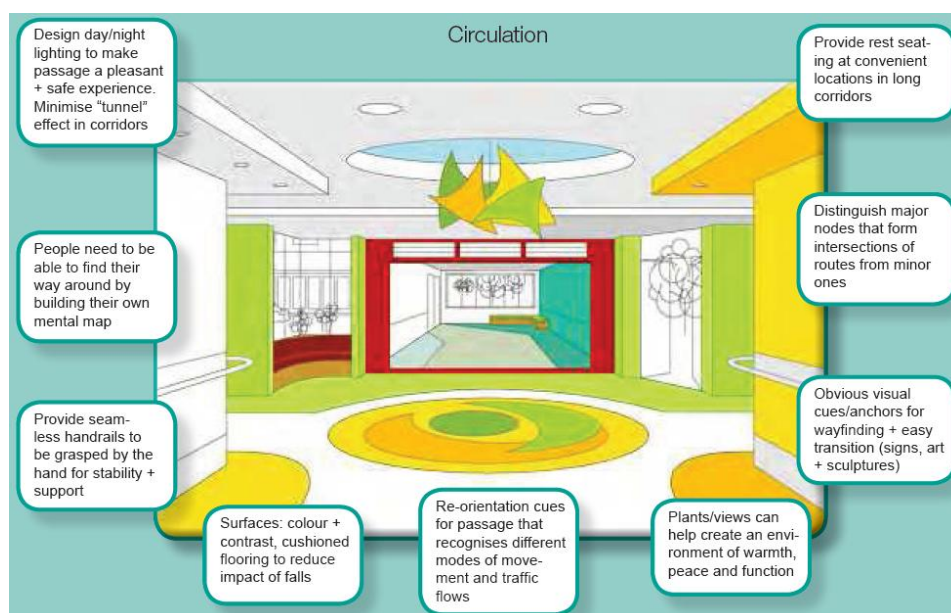


Figure 3. Conceptual sketch design of the circulation movement

Design Considerations

- Typical routes along corridors can be suggested by materials and colors on walls and floors.
- Flooring colors and/or materials in large open circulation spaces can create pathways.
- Projecting signs are easier to see when walking down a corridor than signs fixed flat against the wall.
- Signs can be hung from the ceiling or fixed above transverse bulkheads in a corridor.
- Introducing fake bulkheads and thresholds at junctions helps signal decision points.
- Placing signs ahead of key decision points helps people to be prepared.
- Repeating directions down long corridors gives reassurance.
- Changes in flooring can help suggest preferred routes and also “no entry” areas.
- Creating landmarks with art, sculptures and design features helps navigation.

5.4. Evidence

Patients and staff like to be able to control their

privacy and their interaction with others. In buildings and places where they are able to do so, people report increased satisfaction with their environments.

- Views from circulating spaces into bed and patient spaces should be limited.

6. Waiting Areas (Lobby)

6.1. Evidence

This includes all locations where waiting takes place. However, such places should be combined with other activities. People do not normally choose to wait. Making people comfortable and giving them other distractions is a prime objective. In healthcare buildings many people may be anxious, so gentle rather than frantic distraction is recommended. Consider where possible linking these places with retail, refreshment and performance places. Consider using patient call systems that allow people to move around and choose where to wait. Patients and staff like to be able to control their privacy and their interaction with others (Figure 4).

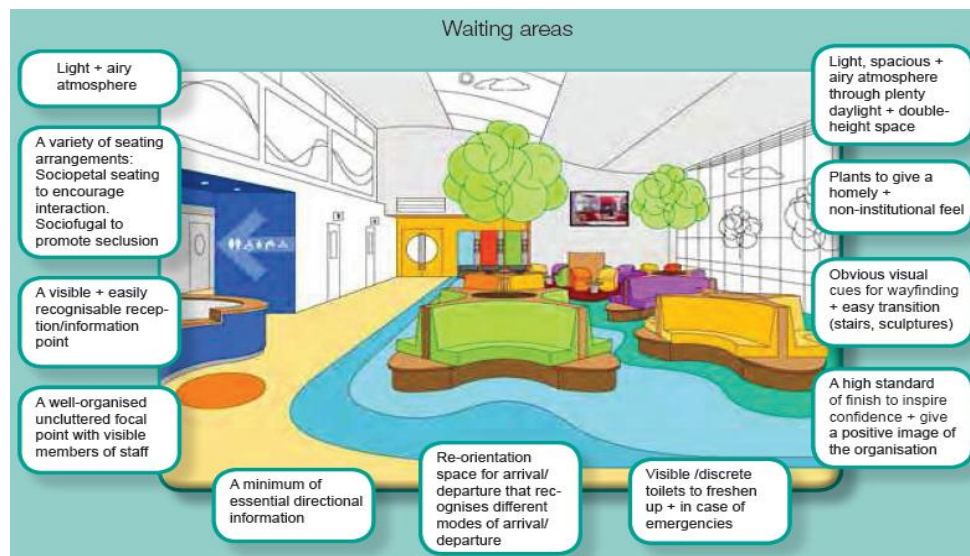


Figure 4. Conceptual sketch design of the waiting area

Design Considerations

- Waiting areas must provide as much privacy as possible, especially as people may be injured.
- Defined and separate personal space is of crucial importance in a waiting area.
- Seating arrangements should allow for relatives and friends to sit together.
- Seating arrangements that cause people to sit next to strangers can exacerbate stress and irritation. It should allow for people on their own as well as small groups.

6.2. Evidence

Research indicates that the extent to which both staff and patients can see out of and around the building has many benefits such as reducing stress and adding recovery.

What people can see is important and relates to their current activity and condition.

Design Considerations

- It is crucial that people can see the reception area.
- Outside views are calming, provide distraction and reduce claustrophobia.
- Views of nature are beneficial to reducing anxiety while waiting.

6.3. Evidence

Research studies show that not only comfortable conditions but the ability to control levels of comfort for oneself may be very important in reducing stress. Allowing patients control over their environment is desirable and may also reduce demands on reception. Stress and heart rates rise in noisy hospitals.

Design Considerations

- Comfortable seating is a prerequisite for waiting.
- View of reception is crucial to feeling in control.
- View of a clock and being able to keep track of time helps people feel in control.
- Access to communications (telephone, internet etc) helps people feel in control and connected.
- Refreshment should be readily available and close to the waiting area.

6.4. Evidence

Patients prefer toilets to be near and to be clear about their location with the actual door not in full view of many other people. They also would like toilets and bathrooms to have a degree of sound privacy and not to cause smells.

Design Considerations

- The location of toilets should be immediately apparent and within convenient reach.
- Entrances to toilets should be discrete and not in view of the waiting area.

6.5. Evidence

Post-occupancy evaluations indicate that users have fewer complaints when they are able to perform their duties and to operate the healthcare systems and facilities housed in the building.

Design considerations

- Reading matter should be available. There should be plenty of tables provided on which to place drinks, books and belongings.

7. In-Patient Rooms

7.1. Evidence

Activity studies have been conducted and have established minimum sizes of the space around the bed.

Design Considerations

- Carers must have access to one side of the bed.
- Doorways and circulation space must allow for trolleys and wheelchairs.

7.2. Evidence

Evidence suggests that where adequate provision is made for relatives to stay with the patient there are many benefits including reductions in nurse-call button activity, in patient falls etc.

Design Considerations

- Creating zones for patients, visitors and carers within the bed place helps each feel a greater sense of ownership and belonging.
- Providing a sofa or sofa bed for visitors to sleep on encourages them to stay with the patient for longer periods.
- Providing facilities (such as a desk) for visitors while the patient may be resting encourages them to stay.
- Every bed should have hand washing facilities.

7.3. Evidence

Patients and staff like to be able to control their privacy and their interaction with others (Figure 5).

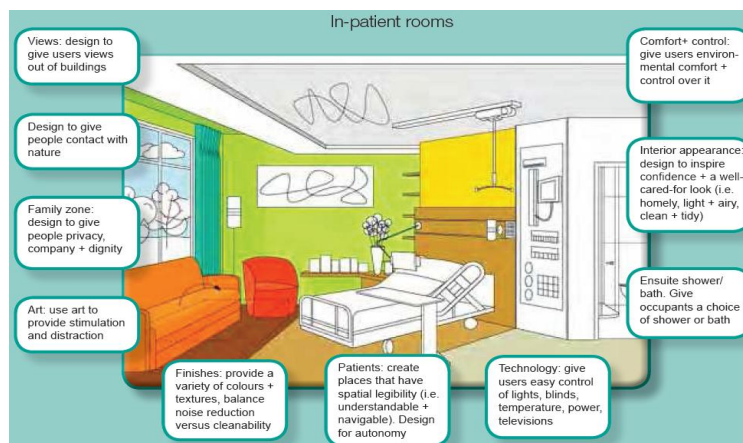


Figure 5. Conceptual sketch design of a typical in-patient room

Design Considerations

Design Considerations

- Personal space and a feeling of privacy is crucial to avoiding distress, discomfort and upset to patients in bed.
- Visual and audible privacy for patients undergoing treatment are crucial to maintaining patient dignity.
- Single patient bedrooms provide the highest levels of privacy and dignity.

- Furniture, screens and the positioning of beds can create a personal space in multi-bed rooms.
- Providing opportunities for displaying pictures and other personal possessions is important.

7.4. Evidence

Studies show that when daylight is available, many building occupants like to reduce artificial lighting to allow the daylight to take effect. During the day, the seasons' natural light levels vary enormously and people generally like to be aware of this.

Patients and staff express the need to be able to arrange for a range of lighting effects to avoid glare, to offer bright light for reading, to dim lights for night-time rest etc. They dislike direct and institutional lighting provided by high even levels of fluorescent lighting.

Design Considerations

Daylight

- All bed places should be exposed to daylight.
- Daylight is important for confined patients to maintain a sense of time and natural body rhythms. A lack of daylight will depress confined patients and could add to despondency.
- Direct sunlight should be avoided or shaded as it can be uncomfortable and irritating for patients in bed who cannot avoid it. Bedside controls of blinds and curtains helps reduce frustration and restores a sense of independence.

Artificial Lighting

- Patients should be able to control their own lighting.
- Artificial lighting should be of a variety of types and levels to provide for different activities.
- Low level task lighting should be provided for reading and watching TV.
- Soft indirect lighting is comforting.

8. Consultation (Out-Patients)

8.1. Evidence

While being the most medically technical of all our places, these rooms should nevertheless be designed as much to make the patients feel at ease as for the efficiency of operation by clinicians (Figure 6).

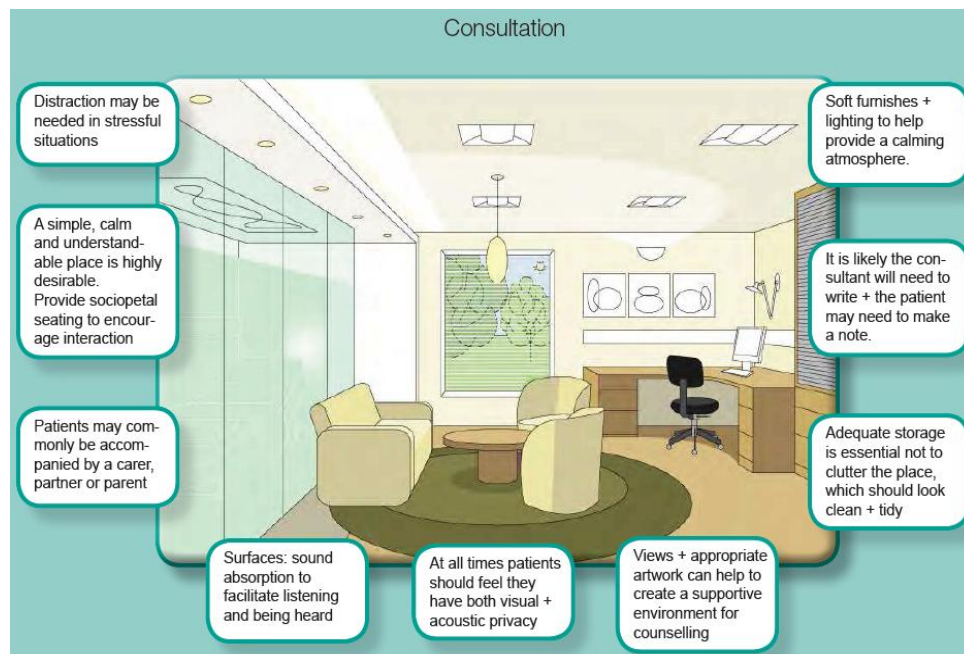


Figure 6. Conceptual sketch design of a consultant room

Research shows that scenes of nature whether actual or reproductions help to reduce stress.

Design Considerations

- In places where patients may be undergoing stressful or lengthy treatment, art and views can offer calm distraction.

8.2. Evidence

Patients are increasingly in dialogue with the consultant rather than just receiving information. The consultant is very likely to interact with a computer and may want to show the screen to the patient at times. It may feel discourteous to patients if the consultant has to turn away to work at a computer.

Design Considerations

- Being able to see computer screens and look at images will make the patient feel more comfortable.

8.3. Evidence

Patients show general consensus, as do staff, about wanting light and airy hospitals. This can be achieved by the use of materials, color, natural light and artificial light.

Design Considerations

- Domestic-style materials, finishes and décor help patients relax and feel more at ease.
- Soft materials help absorb sound and reduce noise.
- Natural materials such as wood feel more reassuring and human.
- Hiding, disguising or designing-in the necessary medical equipment makes it less obtrusive and unfriendly and prevents a feeling of clutter and disorganization.

8.4. Evidence

Research shows the benefits of views when people spend long periods of time in a space.

Design Considerations

- Being able to see the sky and nature gives people a feeling of wellbeing. It can even counteract the feeling of being temporarily cut off from the normal world. This will also be important to consultants who may spend long periods in these spaces.

8.5. Evidence

Research shows that people not only like to feel comfortable but also like to control their environment.

Design Considerations

- Patients may sometimes feel vulnerable or faint. Being able to open windows, change lighting and shut out background noise are important.

9. Socializing and Meeting

9.1. Evidence

This covers a wide range of places from those that are for specific meetings or events to those that are places simply to go to find company. The former need to be designed quite functionally whereas the latter are often more successful if they provide other reasons for being there (such as views, refreshment, reading materials etc). By contrast televisions often tend to kill the social qualities of places (Figure 7).

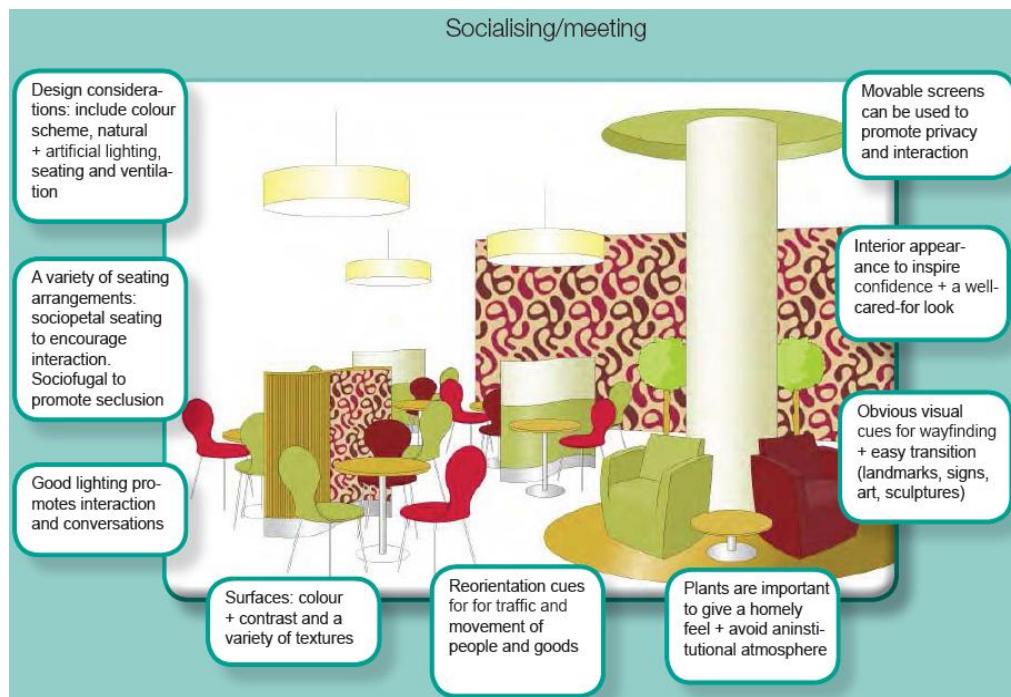


Figure 7. Conceptual sketch design of common areas for socializing and meeting

Research has shown that a richer quality of life can be led by less mobile patients when tables are immediately next to seats enabling them to keep magazines, books, knitting and other materials close to hand without having them tidied away. This saves them having to call for help or leave their seat.

Research shows that rooms with all movable seating tend to be controlled by cleaners who habitually arrange seats in rows or around the edge creating an unsympathetic environment. People prefer a protected back with a view of what is going on.

Design Considerations

- Create seating arrangements that bring people together (sociopetal) in appropriate sized groups. People further than 3 metres apart are likely to feel communication is unnatural or forced.
- Formal meeting places will almost certainly require free-standing furniture to allow for many arrangements. Informal places can often be created more easily by using a combination of fixed and movable seating.

9.2. Evidence

Research shows that chairs in informal social meeting places will inevitably be more popular if they are near windows with views out.

Design Considerations

- In-patients and longer term residents may spend considerable amounts of time here and they generally express a wish for such places to feel "light and airy".
- For formal meeting places, avoid glare from natural light at either the front or back of the space.
- Consider seating that feels located in the place and remains in the same location to create a sense of belonging.
- Unless these places are for very large formal meetings, they should be at a domestic scale.

10. Vending Zone

10.1. Evidence

This category includes all places where people conduct the essential transactions of normal life.

There is no reason to see these places in healthcare facilities as being different from those that may be found in the normal public domain in towns and cities. The feeling of being in a normal place is likely to be helpful, especially to patients who may have long waits. However, a highly exploitative commercial atmosphere or one of hustle and bustle is to be avoided (Figure 8).

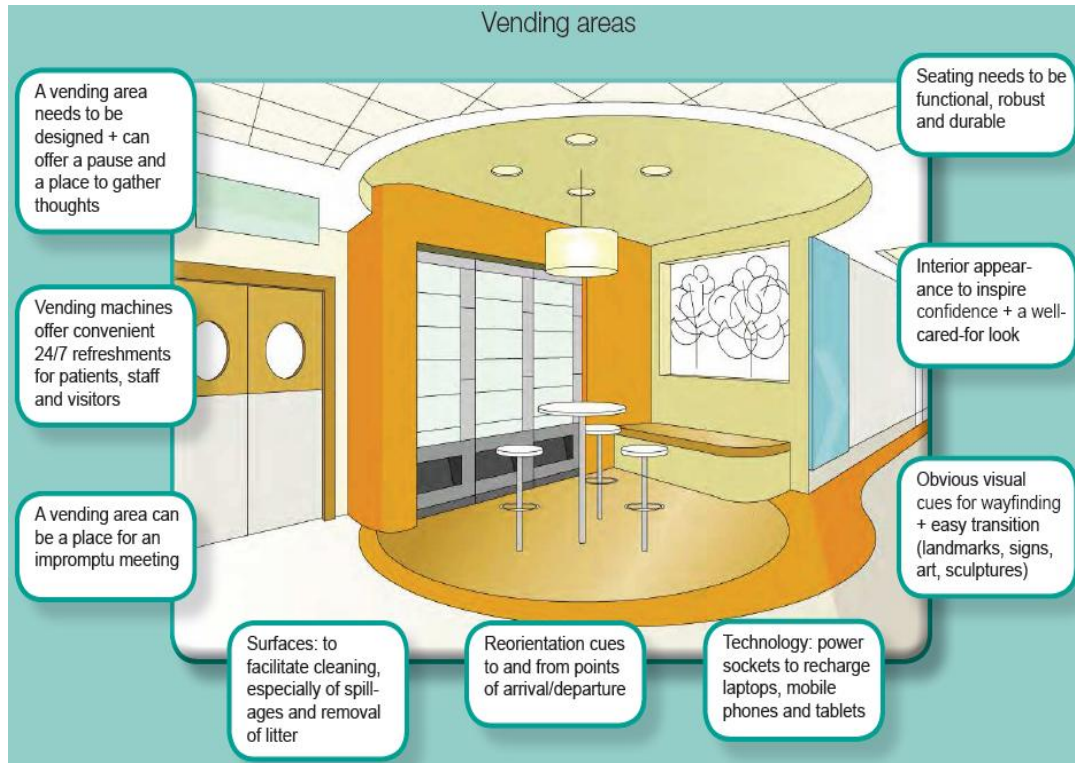


Figure 8. Conceptual sketch design of the vending areas

People generally like places that are not uniform and homogenous but have variety and variation of scale. Having places to sit that are well protected and feel personal is particularly helpful in healthcare versions of these places. Being able to sit quietly and yet watch life going on is found to be calming and distracting.

Design Considerations

- Arrangements of seating that are sociopetal but sociofugally separated are likely to be popular (that is, groups of seats that bring small numbers of people close together but separated by screens and orientation from other groups). This may not be possible with the density of seating used by some branded commercial operators.
- To give a feeling of security, a proportion of seats should feel as if they are located in a particular place rather than floating free in space. Also planters, screens and other fixed features can help.
- In high spaces, consider using line, form and color to creating a smaller scale feeling in the seating areas.

10.2. Evidence

Post-occupancy evaluations indicate that people use places such as these as landmarks to navigate around complex buildings.

Giving them names and clear identities can help in this process.

Design Considerations

- These places can also serve as landmarks for wayfinding in a complex building.
- Consider linking them to other major circulation decision points such as entrances and information points. Also consider grouping retail, banking and refreshment places to create more interesting places overall. The route back to clinical areas must be clear.

11. Sanctuary (Outside)

11.1. Evidence

Nature and gently moving objects are shown to induce a sense of calmness (Figure 9).

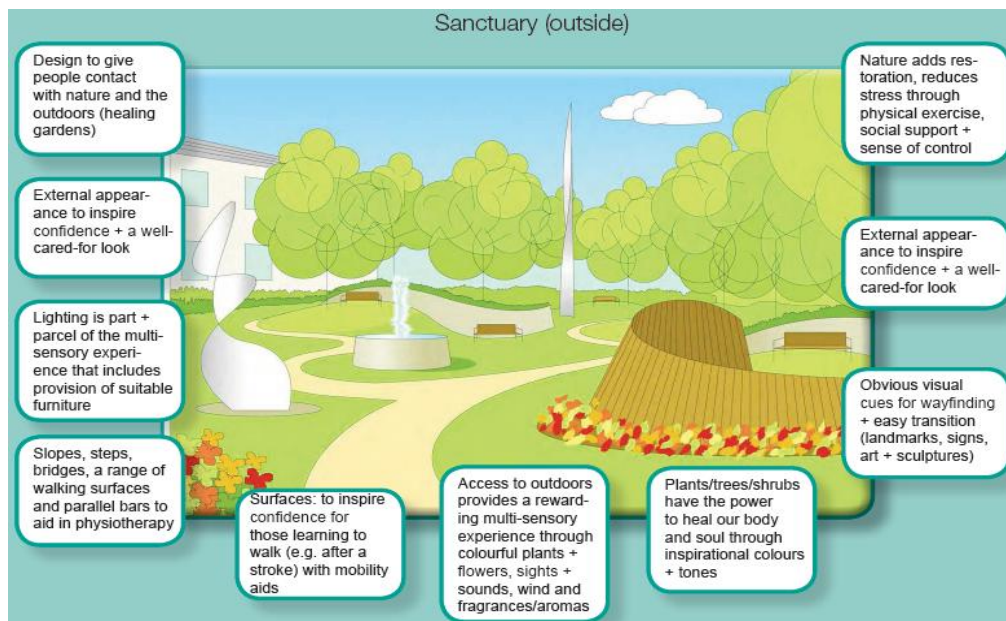


Figure 9. Conceptual sketch design of the outdoor environment

Design Considerations

- Simple calm forms and spaces can be very effective when complemented by a focus through color and texture, either man-made or natural.
- Avoid overt symbolism of a kind that speaks strongly of one religion or a set of beliefs unless this is offered in various alternatives in parallel.
- Forms that are calm and orderly and invite subtle interpretations help to create a sense of quiet wellbeing. Carefully chosen art can be helpful.

11.2. Evidence

Just as people want to sit quietly, so wandering slowly down an unfolding route is an aid to contemplation.

Design Consideration

- A route that reveals itself may be rewarding.

11.3. Evidence

- Scenes of nature are found to induce calm if it is not possible to see the real thing.
- People like to sit with a protected back and watch gently changing scenes of nature and life going on.

Design Considerations

- Gardens have shown to be highly therapeutic.
- An interesting but calm view helps therapeutic contemplation.

12. Toilets and Washrooms

12.1. Evidence

Data shows a very large number of falls occur between the bed and the bathroom/toilet especially at night. This is true in domestic, resident and hospital environments.

Design Considerations

- Ensure there is something to hold on to throughout the journey into and round the room.
- Space must be left for patients to be assisted; in some cases, hoists may be needed.
- Consider Automatic movement-detected lighting.

12.2. Evidence

Use materials that can look clean. People feel better that show evidence of being cared for by being clean.

Design Consideration

- Use materials that can easily be cleaned and consider using flush rather than recessed joints.

12.3. Evidence

Patients and visitors express a wish for places such as this to look clean as well as be clean (Figure 10).

Design Considerations

- Places that make patients feel intimate and special in their own way as places of hygiene.
- Color and texture should be used to give this sense of intimacy while ensuring this does not conflict with hygiene.

13. Sanctuary (Inside)

13.1. Evidence

These places can serve several needs ranging from quiet personal contemplation through counseling to a formal religious ceremony. Patients or staff may wish to follow some personal religious rituals or obligations in private. Some religions may want to offer some small congregational ceremonial service (Figure 11).

Nature and gently moving objects have been shown to induce a sense of calmness.

Design Considerations

- Simple calm forms and spaces can be very effective when complemented by a focus through color and texture, either man-made or natural.
- Avoid overt symbolism of a kind that speaks strongly of one religion or a set of beliefs unless this is offered in various alternatives in parallel.
- Forms that are calm and orderly and yet invite subtle interpretations help to create a sense of quiet wellbeing. Carefully chosen art can be helpful.

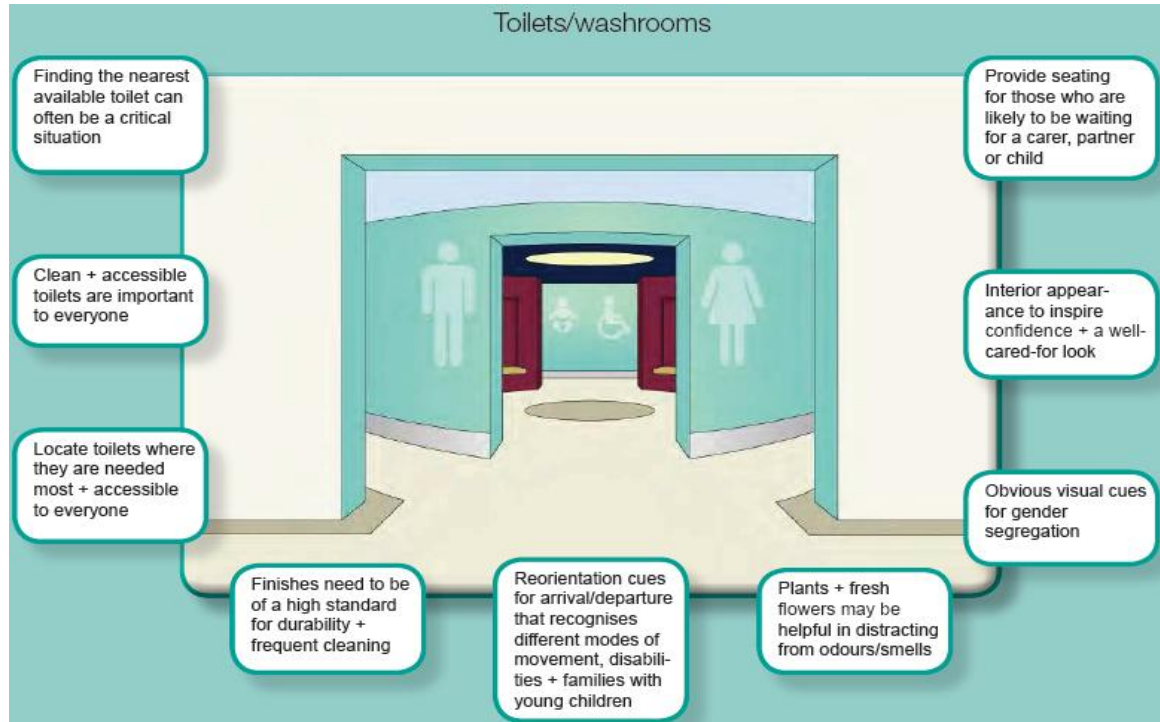


Figure 10. Conceptual sketch design of the toilets



Figure 11. Conceptual sketch design of indoor peaceful contemplative spaces

13.2. Evidence

People like to sit with a protected back and watch gently changing scenes of nature and life going on.

Design Considerations

- An interesting but calm view helps therapeutic contemplation.

14. Conclusions

A good design is often integrative. A single idea, device, form, arrangement or choice of material can solve a multiplicity of problems. The evidence-based design approach has the potential to improve the quality of patient experience and health outcomes while also saving time and costs. The purpose of this study was to propose factors that guide the design and suggest priorities for design decision making in planning hospitals and health care facilities. This paper provides an overview of general design principles and is not a comprehensive guide. Healthcare buildings exist primarily for the patients and other people who use them. As mentioned, there is a growing body of evidence that if the design is right, satisfaction levels improve as do patients' health outcomes and staff productivity. When starting to design appropriate healthcare spaces, rather than begin with the functions of rooms, research has found that it was more beneficial to concentrate on the needs and activities of all users – patients, staff and others [7]. The project team should refer to the growing body of research material indicating that the design of the healing environment impacts on patient

recovery and on staff, and that good quality environments impact positively on patient care and vice versa.

Acknowledgements

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