

Analysis of Sustainable Therapy Room Surfaces in Acute Mental Health Inpatient Facilities—A Field Study in Essex Rochford Hospital in UK*

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Abstract: This article is based on the developments in recycling of materials and design principles of sustainable surface materials in acute mental hospital therapy rooms. The use of recycled, reusable and local materials in interiors is a contemporary issue for the sustainability of environment. The use of sustainable materials is important in designing healthy building interiors and for human health. Thus, the aim of this paper is to examine the most recent innovations in design principles of sustainable materials in acute mental hospital therapy rooms, placing an emphasis on patient comfort and providing them with a homelike environment in order to accelerate the healing process.

Key-Words: sustainability, environment, sustainable materials, surface materials, healthy buildings, mental hospital, therapy room.

1 Introduction

Every building in our environment should be evaluated according to its greenery, water and waste systems, construction systems, urban planning and finally interior design and materials used in its interiors. By this way we can understand the extent of sustainability of the buildings. The “Sustainable Development” concept has been widely recognized since 1987. The focus has primarily been on economics and environment. The health issues and the social values created by the micro and macro-environments that form cities are not usually considered by most business and urban design sectors, although the majority of policy oriented efforts, such as Agenda 21, Health for All and WHO Healthy City projects, have included and emphasized the desire to consider these factors in addition to creating economic sustainability. Hancock (1996) suggested a concept model of sustainable development in the WHO Healthy City project, which is based on the equilibrium, liveability, and sustainability of relationships between environmental, economic, and social factors as well as integrating healthy sustainable development [8].

Today, we can see many environmentally sensitive large-scale buildings. Designers express the new scale of sustainable technologies by imaging entirely new types of living and working interiors and interiors that feature multi-level gardens, healthy materials, amorphous shapes, and high-tech techniques. Over the past five to ten years

the field of hospital architecture has developed abundant expertise and understanding of the benefits that a good environment has a positive effect on the healing process of patients and the wellbeing of staff. This is inherently related to sustainability, especially in the case of interior environment. Lighting, thermal comfort, noise and air quality have main effects on both staff and patients that are already compromised by illness. It is acknowledged that the choice of internal materials can have a significant effect on the quality of environment.

The aim of this article is to examine and to understand the nature of sustainable interior surface materials in acute mental hospitals therapy rooms and to present sustainable design guidelines that hospital administrative staff can use and discuss when arguing patient needs with architects. Finally, the study is intended to call attention to the importance of using sustainable surface materials in therapy rooms and the need to establish sustainable architectural design as a tool in sustainable therapy environments in acute mental hospitals. Rochford Hospital in Essex which was opened in February 2008 will be examined and analyzed in this article as a chosen sample. The building itself is environmentally friendly considering its building process and the materials used in interiors. The maximum level of patient comfort has been aimed to be achieved in this mental hospital both in interiors, and in patient therapy rooms; making this the reason why Rochford Hospital will be examined in this article.

2 Sustainable Design Principles in Mental Hospitals:

Sustainability is a fundamental principle of ecological design. It involves preserving natural resources by not depleting the environment of materials which cannot be easily replaced during the design, construction and production processes. The concept of sustainability roughly refers to the need to develop rather a long term understanding of buildings that recognizes not only the current needs but also the future changes. This concept also covers the construction cost and performance in the use of the building. This has consequences for the design in terms of land use and environmental services. If it is going to be a sustainable building, the designers need to combine the connected issues: social factors, economic factors and environmental factors [2]. Using green materials in hospital interiors have many positive effects both on occupants and on the environment. Such materials are firstly supposed to be less allergic, as they breathe; they have also low emissions during manufacturing and during the lay down process. [9].

A product can be considered “green” for many reasons. Some products are considered green because they are manufactured in a way that they releases minimal pollutants or avoid toxic by-products. Other products are thought to be green as they minimize the negative effects of construction, and also help to minimize the energy or water consumption of a building. The raw materials used in making them may come from sources considered environmentally friendly such as wood from certificated well managed forests, recycled materials, and rapidly renewable agricultural fibers [3]. It is well recognised that the construction industry can play a vital role in protecting the environment through careful consideration of how buildings are designed, materials selected and constructed. During the construction of a hospital building, many materials and products are used. Even in greenest of projects it is likely that many products will be used that are not themselves green- but they are used in a manner that they help to reduce the overall negative environmental effects of a building.

Ulrich (1991) who demonstrated that therapeutic environments could directly influence patient’s recovery, has made facilitating changes in healthcare design. Furthermore, “healing architecture” -a new architectural understanding- is interested in both human spiritual ecology and environmental ecology.

The term mental health is defined as “psychologically well being or adequate adjustment, particularly as such adjustment conforms to the community accepted standards of what human relations should be” in the Psychiatric Dictionary [14]. Thus the violence character, self-harm and similar behaviours of the psychiatric patients could be considered while selecting the surface

materials in the mental hospitals. Designers should create environments that will help patients feel at ease, to be conducive to efficient working and to contribute to staff morale. As this is based on many scientific, psychological and design researches, the design of therapeutic environments should offer comfort, control and variety both to patients and the staff. This ambiance can be achieved by using proper fitting elements, light, colour, texture, aroma, sound, surface materials, and integration of interior and exterior spaces and also with the integration of art into the building. [9].

3 The Sustainable Understanding in Mental Hospital Therapy Room:

All humans live together with the nature and its’ their natural right to continue this behaviour also in the hospital environment. Especially in acute mental hospitals it is important to be in a direct relation with the nature and the patients. According to Rodemann, in a healthcare setting, simulating these characteristics and features of nature, may help the patient to recover. The right environment can create an uplifting, positive, calming, and healing effect [11].

In mental hospital therapy rooms there should be enough space for group activities such as listening or making music, dancing, social interaction areas, certain ball games, relaxation areas and gardening space. For these activities some fixed equipments may be needed on walls as well as movable ones [5]. The therapy rooms are very important in acute mental hospitals as the patients stay in these hospitals for a long time. These rooms are the only places where they can have social interaction with other people and the world. Patients use these spaces as places for listening music, playing certain games with other patients and relaxing areas. These rooms sometimes have outside exit or a nice external view. These rooms could be attractively decorated that might be used during the rehabilitation programme and also furnished in a homely style [7]. The fitting and furnishing elements which can be used in therapy rooms may include storages for board games, art works or books and magazines; coffee tables and comfortable chairs and finally a TV or music area. There might be also a dining room adjacent to the activity area. In larger hospitals the tables and chairs could be stored in another part of the room so that the therapy room itself might be used for other purposes. Sometimes in these rooms patients prepare their own dry goods, so a preparation place could be essential in such cases. It would be good if a parking place for trolleys could be arranged in these therapy rooms [3]. Consequently, the therapy rooms of mental hospitals could be designed contributing to develop the physical

and social skills of the patients. Sensitive and environment friendly designs can provide properly functioning spaces that help patients in their healing process and also assist the environment friendly design [12].

Commonly the colours of walls, floors and ceilings are not considered in isolation, but the pattern on these surfaces and the forms of structural elements are important for the reflection or absorption of sound and light. In the therapy room the patients want to sit, talk, eat, read, write, watch television, listen to radio, play games, and perform hobbies. Additionally, the room could be sited as such that it could be supervised by nurses. Such a room should be at least 25 m² for the activities that have been mentioned above [5]. It is crucially important for the hospital planners and designers who are deciding surface materials and wall coverings to understand the accessibility of natural lighting, the selection of direct source and the lighting controls that will be available. These factors will affect the saturation, hue, colour and texture of the wall, floor and ceiling coverings in mental hospitals. However the most important factor that will affect the selection of the material is the activity that will take place in the space. It is essential that the designer could check the product qualifications for each product and evaluate whether a particular product will satisfy the demands of the space [7]. Also it is vitally important that the designers should consider the environmental considerations while deciding this product. The product should be easily cleaned, maintained, refurbished in terms of the sustainability point of view.

The therapy rooms are generally large and open spaces with high ceilings. In fact these are the rooms where patients need to relax and feel comfortable. According to the type of activity that would take place in the room the character of the room and the divisions within the room should not be decided before discussing with the hospital's administrative and clinical staff and designers. The designers might also consider the patients belonging to different age groups and suffering from several different illnesses use these rooms. Also the arrangement of fitting elements has an effect on the social behaviour of the patients [7]. For instance, if the furniture is lined up in a row against the wall, this arrangement discourages the patients' socialization. Unfortunately this type of arrangement helps the therapists and nurses to watch the patients more easily and the maintenance is easier with this arrangement.

In summary the therapy rooms in acute mental hospitals should rather be designed according to the needs of the patients not to the needs of the clinical and administrative staff. The design of the unit would compromise the following conflicting requirements such as [3];

- encouraging and supporting the normal behaviours,
- preserving the privacy and dignity of patients,

- providing staff with an easy visual angle and observation areas. Observation of patients is one of the crucial things that have to be taken into consideration in acute mental hospitals. So in designing therapy rooms this observation issue should also be taken into account if needed.

In the psychological treatments it is important for the patients to be aware of the therapy properly, to cognate it and reflect this to his/her attitudes and feelings. One of the important points during the therapy is the place where the patients spend their time. In this case, it is important to decide the components of these spaces and their arrangement in the room. The selection process of surface materials in acute mental hospitals should include a consideration of below criteria from the sustainability perspective [3]:

- Social and cultural values that are related with the planning and design,
- Climatic factors and local materials and techniques,
- Life cycle assessment of all materials including the surface materials in the interiors,
- More efficient use of raw materials, recycling and less contribution to environmental pollution,
- Efficient and effective procurement systems that assures the achievement of a safe construction with minimum cost.

A number of specification issues for components and finishes are critical in terms of safety, security and sustainability. Sustainability issue is directly linked to safety and security but will determine how the fabric and finishes will perform in use. A hospital building which rapidly deteriorates internally and externally will degenerate into a depressing environment which is likely to have a negative effect on residents of acute mental hospitals.

Components and finishes need to be robust as they are likely to be subject to heavier wear than a normal domestic situation. This is due to the logistics of care delivery such as the use of hoists, wheelchairs, and heated roof trolleys as well as behavioural patterns and traits of the residents.

As a consequence, from the sustainability viewpoint, the finishes should be robust enough to endure accidental impact and additional protection should be provided according to the activities which will take place in the therapy room. The mobile items like trolleys or others can harm the corner of walls and the floor coverings. Thus the floor finishes should be capable of being patch repaired in the event of damage. This will also ease the maintenance work and will be a cheaper solution for floor finishes.

3.1. The Use of Sustainable Surface Materials in Therapy Rooms of Mental Hospitals:

It is important that if the places for therapy could be designed in a way that they are supporting the patient's healing process, this will shorten their stay in hospitals. The patients and hospital staff use therapy rooms quite frequently, thus the surface materials and fittings will deteriorate quickly and easily. Therefore, offering patients sustainable surface materials and fittings in therapy rooms that can be reused, maintained or refurbished easily, would affect the patients' psychology positively and would help their healing process as well. Currently, the design challenge for therapy rooms in acute mental hospitals is to use materials that are sustainable, easily cleaned and disinfected, that can withstand hard use, yet are pleasing to the eye and touch. When choosing a material it would be good to decide the materials according to the climate, culture, altitude, exposure, orientation, budget and function of the building at the same time. Instead of using new materials it would be better to use the materials that have been tried and tested before for specifications including durability, robustness and production of relatively risk free buildings [14].

The best guide to an appropriate type of sustainable hospital construction is to study other buildings in the area, for instance, their shape, roof type and the materials which are used in the construction. It is significant that often over 80 percent of the cost of setting up a new hospital is spent on the building. There is a cardinal principle to be applied in the selection of building materials, namely that local materials should always be preferred rather than imported ones [9].

3.2. Sustainable Wall Materials in Therapy Rooms:

The walls occupy the major portion of the visual field in every interior. As the wall covers the largest proportion of the eye level, it attracts the attention and psychologically has the greatest significance. Modulation, texture, pattern, colour and their ability to display messages play utmost importance in determining the character and atmosphere of the significant space. In recent years, the use of different colours, textures and patterns has helped to get rid of the gloomy look of the hospitals. Technological improvements make it possible to employ different colours, textures and patterns and pave the way to change the hospitals' inner atmosphere too. Now, designers can use surface materials that are both functional and easy to maintain and also aesthetically pleasing in hospitals. This helps the designer to create supportive environments for the patients' well being [9]. Generally the walls are made of exposed concrete blocks and painted with high-gloss paint in pastel colours such as green, yellow or blue. The use of these colours increases glare, reflects light and sound and reduces the definition of space. Highly polished

floor surfaces too reflect light and cause additional glare. This combination of hard materials on both walls and floors sometimes makes it difficult to distinguish between floor and walls [3]. Considering the patients' illnesses and the medicines that they have been using during their therapy, the differences between the floor, wall and ceiling should be perceived properly and clearly in the activity rooms of mental hospitals.

The activity that will take space should be the main concern while deciding on the material that will be used in the room surfaces. For instance, in highly used spaces the materials should be subject to wear, abuse, tear and would require additional cleaning and replacement. These kind of wall coverings perform well especially in below-chair-rail applications. The reflectance level of material is also important; if the material is too rough then the reflectance might be more. Hence, this also affects the colour, texture and pattern of the surface material [11].

Walls are built of low maintenance bricks chosen on the basis of whole life maintenance costing. They are also thicker than usual, and act as thermal skins to moderate day light and night temperatures. Blockwork walls are more durable than stud, plaster wall, and will perform better acoustically. The use of emulsion/eggshell paint in the therapy rooms might be easier to wash down and or replace than wall paper, however may be less attractive [5]. Unfortunately, it may happen that the patients could easily tear up the wall paper, considering their possible violent behaviours. As in all healthcare spaces the use of corner guards might be necessary on routes frequently used by trolleys in therapy rooms. In the paint work of walls, water based satin paint that is produced from renewable materials and which has low percentage of solvents could be used. Water based acrylic paints contain less organic solvent than alkyd paints and they adhere better to the surface. As a result, water-based alkyd paints contain less adhesive than water-based acrylic paints. The composition of the high solid paints is comparable to that of common alkyd-resin paints. It is better to use water-based acrylic paint or natural paint for interior woodwork and high solid paint for outside [11]. Whether there is an outside access, an art corner or a kitchenette in the therapy room then terrazzo tiles can be used in those areas as they can be considered more sustainable than PVC coverings.

3.3. Sustainable Ceiling Materials in Therapy Rooms:

Generally therapy rooms have a theme related with the activities in the room. The ceiling would be better if it could be able to pick the theme of the space [3]. It could also integrate well with the activities that are going to take part in the room and also with the wall covering, floor covering, fittings, and so on. Today the designers can

achieve a number of different possibilities in designing a ceiling. The openings in the ceiling panels allow designers to continue a chosen edge detail around high-hat light fixtures, and sprinkler heads, speaker grills, air diffusers and other HVAC openings.

The use of acoustical ceilings in the therapy room is generally more preferred because of their ability to perform sound absorption and decrease noise levels within the room. Also, if it is more important to achieve a silent atmosphere in the therapy room, then using acoustical ceilings is the best option. If an acoustical ceiling is going to be used in the therapy room, then designers should better take into account the key considerations such as the installation of lighting fixtures and curtain tracks within the ceiling. The choice of acoustical ceilings depends on the type of therapy that takes place in the room and on whether water is present. The choice of lighting fixtures also can be the determining factor in determining the type of suspended ceiling. The amount of natural light coming from window and the need of artificial lighting elements could also be considered in deciding the type of ceiling for sustainable solutions [11].

Today there are also new technologies used for the entire ceiling design that are cheaper, better looking, having smoother transmissions between different ceiling and wall, easy to apply, maintain and which are more sustainable. The ceiling design should complement and enhance the interior.

The ceilings consist of three major types; metal ceilings, gypsum board or plaster ceilings and mineral fibre and fibreglass acoustical ceilings. Acoustical ceilings are the most commonly used ceiling systems in healthcare facilities because of their combination of aesthetics, acoustics, and accessibility to the problem. Plasterboard ceilings with access voids to maintain service in the ceiling will provide a more domestic environment than lat-in ceiling tiles. Panel acoustical ceilings could be preferred more in hospital interiors for the benefit of sound absorbance especially an important issue for acute mental hospitals. Therapy rooms are generally used by both patients and hospital staff thus the use of such ceilings can be considered as a necessity in these rooms. The use of 60x60cm acoustical panel ceilings are generally preferred in healthcare environments owing to the need of easy changeability, ease of handling and being less costly [11]. Therefore acoustical panel ceilings can be measured as a sustainable choice as they are easy to maintain and change.

In therapy rooms, the sound absorption quality of the ceilings are also important since the patients and hospital staff use every area all day in the hospital, but the materials used in the suspended ceilings have different sound absorption levels. Generally the mineral fibre ceilings have the best sound absorption level. The form

and type, material, finish, accessories and accessibility of ceiling systems could be considered in respect of the sustainability concept that includes the maintenance, cleaning, repair and replacement of the whole part of the system [5]. Recently, within the sustainability concept, in many mental hospitals therapy rooms, either newly refurbished or built, the designers prefer to use water based paint on the ceilings. By this way it will be easier to refurbish and maintain the ceiling area. The use of suspended ceilings is mainly seen on the common areas and corridors of the hospitals.

3.4. Sustainable Floor Coverings in Therapy Rooms:

BRE in the UK recognise that the chemicals can have an adverse effect on health and comfort, including eye and airway irritation, headaches and tiredness. There is increasing demand on reduced VOC emissions from indoor surfaces. The function of the room could be the determining factor in choosing the floor covering. Carpet, PVC, terrazzo or rubber floor coverings are generally used in the healthcare architecture. Although floors are not occupying the majority of the building, the texture, pattern, colour and the message they give are still important. The designers would take into account not only aesthetic considerations but also functional, financial and environmental friendly considerations as well while deciding the floor covering. Among all other considerations, the aesthetical considerations are the ones that achieve greater impact (the most important one) as they affect the hospital staff, visitors, patient relatives and patients healing process. In the aesthetical considerations the designers consider the colour, texture, pattern of the material, as these affect the psychological and behavioural responses of the patients. Especially patients that have mental instabilities are affected more with the choices of the designers [11]. For instance, strong contrasts of change in floor finish types, in colours or patterns could cause confusion, or interpreted as a change in level.

The junctions between the floor coverings should be detailed carefully in order to prevent obstruction and tripping hazard of the patients, fittings and hospital staff and patients that are using that room. And the junctions between the finishes should be easily cleanable and support the propagation of bacteria. Although the choice between carpets or not is still an issue for some hospitals (for reasons relating to cleanliness and infection control) there are many opportunities to use flooring that creating attractive solutions to problems of sustainability, maintenance and cost [13].

The floor coverings and skirting in therapy rooms of acute mental hospitals contribute to the provision of a non-clinical environment, yet at the same time they should

be hardwearing. Floors should be of non-slip character and their patterns should not induce disorientation for the patients. Additionally, the materials used on the floor surfaces should not be reflective and again should not disturb the patients and hospital staff as well. Besides these, the pattern of the floors should not induce disorientation. Flammability, infection hazards, static electricity and impermeability to fluids also have to be considered in therapy rooms. The finishes should be available in order to ensure that appropriate activities can be carried out, and cleaning can be made progressively [13].

If there is an art corner in the therapy room, then PVC floor finishes could be preferred in this area due to their characteristics such as: being flexible, good impact of sound reduction, good slip resistance especially when dry, good resistance to chemicals, suitable for food and light wheel traffic. If there is also a dining section in the therapy room, games area or even hobbies area, then again PVC tiles can be used as a floor covering. If a library, music activity, sitting or quiet area is present in this therapy room then the use of textile floor coverings such as carpets can be used. If there is an access to the outside garden from the therapy room then insitu-concrete, granolithic, mastic asphalt or ceramic or terrazzo tiles can be used as a floor covering [5].

The changes in the floor level are generally not wanted neither in therapy rooms in acute mental hospitals nor in hospitals in general. Floor finishes would also be appropriate for the activities that take place in the therapy room. The internal walls should not be built with plasterboard or similar materials regarding noise penetration issues, instead solid internal walls could be preferred. From the sustainability point of view, the use of plaster walls would be preferred, but with these types of walls it would be difficult to control the noise penetration in therapy rooms. It is important to select the materials that can be changed easily from the maintenance point of view. Not only in therapy rooms but also in hospitals in general, the design of corners, partition walls, counters and other elements should be chosen with easy cleaning and changeability issues in mind [5].

4. Conclusions:

Today, sustainability is progressively seen as the only rational design issue in architecture of the 21st century. No architecture has any validity unless it is environmentally sustainable. In terms of sustainability, technology is a bridge between social and aesthetical dimensions. This brings about the new types of buildings, technologies, and new agenda for design where the habitants and nature find a median. The healthcare division is a remarkable consumer of materials both during the construction and refurbishment and this

continue throughout the life of the building. In the healthcare agenda the green material is defined as a material that preserves natural resources and reduces environmental deterioration. Also the materials' toxicity and its impact on the air quality are important concepts in the sustainability agenda.

In the healing architecture it is important that the design of the hospital should enable the patients and the staff to be in touch with the outside environment as well as the inner environment. This harmony and balance is also related with the ecological design of the buildings. This new architecture focuses on physical and psychological health of the human being. The effects of this could be seen more in the design of mental hospitals. In the healing architecture it is observed that people respond more positively to traditional buildings which are more ecological and sustainable [1]. Especially in psychiatric hospitals the patients need not only indoor therapy rooms also they need outdoor therapies such as using the garden in the hospital. This is also a design principle in the concept of sustainability and they are called community gardens. In these gardens the patients will be safe as they are familiar with the environment and are also be able to deal with the garden which can be used as an outdoor therapy for patients. If the materials used in therapy rooms are chosen from sustainable materials this will support the sustainability concept together with the use of horticulture as a therapy as well in the hospital building. Hence, this will strengthen the sustainable relation in hospital buildings. In this manner, the sustainable therapy rooms in the hospitals support the healing process of the patient, the effective use of these rooms will also have an enduring effect on the hospital's administrative and clinical staff.

The use of these sustainable design guidelines in acute mental hospitals will provide several benefits for the hospital management, patients and for the environment. Firstly, the quality of space for patients will increase, they would be using environmental friendly therapy rooms; secondly, the sustainable architecture concept would be part of the therapy room and the hospital itself becoming more environmental friendly; and finally the therapy room and the hospital will promote for further sustainable developments and design.

Furthermore, these guidelines will help to understand the concept of environment friendly hospitals and interiors and the hospital designers could take these guidelines as a basis for sustainable environment improvements. Using local materials with low carbon emissions, materials that can be maintained (i.e., cleaned, refurbished) easily and the use of robust materials is very important not only in hospital interiors but also in other buildings. By this way the design solutions will be found more easily and quickly. This will also educate the clinical and

administrative staff in the name of sustainable design and materials and benefits of using them in therapy rooms and hospital interiors.

The understanding in acute mental hospitals will continue to change. Also the innovations will continue in treatment process of patients as well as in construction process of hospitals. Recently the environment friendly structures are becoming more popular and increasing rapidly around us. The designers have understood that a hospital building can be sustainable as well as providing patients and the hospital staff with a major support in patient's treatment process. Consequently, we can say that sustainability has become an important component of hospital buildings.

To achieve a sustainable therapy room in mental hospitals the surface materials in these rooms should be selected in order to minimise the maintenance. These materials should be compatible with their intended function as well and also the sustainability concept would be taken into consideration. This means that the materials should be robust and easily cleanable [5]. It is important to avoid using surface finishes that need frequent redecoration, or are difficult to service. Designers should also give special attention to corners and partitions in therapy rooms in the design stage of mental hospitals. In addition, in the connection of walls and floor there should not be any cracks or voids that will make it hard to clean these surfaces. Only with these aspects taken fully into account can a therapy room be named as a sustainable therapy room in a mental hospital.

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