Green Design Approach to Achieve Energy Efficient Health Care Building

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***Abstract*- The word "hospital" have always a centre of attention .thus they perform a major role as the mission of the community and should be responsible for it. Hospital have been observed as a significant source to make impure by exposure all around the world .Therefore they helping to threatened public health on an unintentional process. Although, the main mission of the hospital is to encourage human health, it cannot from its Environment "sustainable hospital" as an apart of approach to address Environment technologies and try to improve the health this is important mission. In this approach all the environmental aspects of sustainable built form in hospital are important and to be addressed. while designing a hospital we focuses on the energy efficiency through natural daylight, indoor air quality, clean and green interior building materials, garden and landscape. this subject matter in nature , using man library and online sources it discuss about the need to move "Environmental techniques " . healing environment and healthy environment (greenery, garden, landscape)play an important role in patient to reduce their stress and its more beneficial to improve their recovery. This paper aims to explore to various environmental technologies in health care facilities to achieve sustainable built form.**

***Index Terms*- Energy efficiency, Indoor air Quality, Clean & green interior building material, Gardens and landscape, Health care facilities.**

1. INTRODUCTION

The objectives are to make a healthy environment for the patient and they feel good. This limits to natural daylight, artificial light, natural ventilation, clean & green interior building material, gardens and landscape.

Focus area for green hospital design:

1. *Energy efficiency* –

I. Lighting: natural day lighting

II. Lighting: artificial

2. *Indoor air Quality* –

I. Passive and active measures a) Natural ventilation

3. *Clean & green interior building material*

4. *Gardens and landscape*.

1. *Energy efficiency*-

I. Lighting: natural day lighting

To save energy cost for lighting up we can use day light as an option to minimize or reduce cost of energy and to create a healing environment and minimize the amount of natural daylight.

In hospital natural daylight is helps to reduce the stress that's why we design a room in such a way which's become lighter and brighter. To design a hospital, it's a challenge for hospital designers are to integrate the natural lighting along with the thermal control system of the hospital. For example, in hospital for complete natural light, we use entirely glass in exterior built, it may be uncomfortable. If the facility is located in an extreme hot or cold climate area. Some of these reason to design "smart "thermal design strategies such as adjustable shading to reduce heat, double pane glazed with low- emittance film to retain heat. According to the Indian green building council what is a benefit of day

Lighting and view in hospital are as given below-

1. Day –lighting has been proven to have positive effects on patients in hospitals.
2. Enhance health & well –being of the patients and reduce stress levels of hospital employees, thus improving quality of care.
3. Combats seasonal affective disorder, or winter depression, through view connectivity to natural vistas
4. Improves facilities over all operation efficiency.

Important fact:

Humans synthesize 90% of their body's requirement of vitamin –D, naturally – from the skin's

Exposure to sunlight

Building can save up to 20 % of cooling energy load by optimally substituting artificial lighting with day light.

2. LIGHTING: ARTIFICIAL

In hospital the use of natural light is required in some cases artificial light is also required. For save the energy and maintenance cost they installing energy efficient light fixture Indian green building council artificial lighting is required in sensitive area of the hospital –including operation theatres, medical dispensaries, interior corridor and passage. However, with rising energy cost of lighting in hospital –by combining natural lighting and efficient artificial lighting.

Recommended lighting levels for hospital: (ASHRAE 90.1-2007)

TYPE OF ROOM	LPD (Lighting power Density)
Emergency	2.7
Recovery	0.8
Nurse station	1.0
Examination / Treatment	1.5
pharmacy	1.2
Patient room	0.7
Operating room	2.2
Nursery	0.6
Medical supply	1.4
Physical therapy	0.9
Radiology	0.4
Laundry -washing	0.6

Few of the passive design aspects to enhance natural lighting in hospital:

Design glazing facades soaps to have both view & daylight.

Install translucent skylights having soothing colors.

Have transparent & operable openings to green courtyards.

Consider ledge seating at windows – engaging nature in the curative process. Few of the design aspects to enhance efficiency of artificial lighting in hospital:

Use occupancy sensors in passage ways, storage rooms, labs, etc.

Install low-energy LED lighting to save on indoor lighting energy cost (up to 40%).

Use task lights to provide illumination in task areas like consulting rooms, labs wards.

3. INDOOR AIR QUALITY BY PASSIVE & ACTIVE DESIGN

The use of ventilation system in green building have to attempt to improve their energy efficiency while maintaining the building's precise temperature control, as well as the highest possible indoor air quality. According to the Indian green building council As restoring and safeguarding health is the main purpose of healthcare facilities ,indoor environmental quality is considered critical to green hospitals.

Must Do's for good indoor environment:

Install permanent entry-way systems to capture dust particle like slotted systems ,grates or grilles at all primary entrances

Use certain species of indoor plants which not only produce oxygen but also reduce indoor pollutants like VOC (Volatile Organic compound) from air.

Improve fresh air by providing courtyard spaces with native & adaptive plant species, which are free from any allergic effects.

Use zero-VOC interior materials.

Outdoor Fresh Air Requirement for ventilation of health –care Facilities:

(In cubic feet per minute –CFM)

Applications	Estimated Occupancy / 100 Sq.m	Outdoor air requirements		comments
		CFM/Person	CFM/Sq.ft	
Patient rooms	10	25		Procedures generating contaminants may require higher rates
Medical procedure	20	15		
Operating rooms	20	30		
Recovery and icu	20	15		
Autopsy rooms	20		0.5	Air shall not be re-circulated into other spaces
Physical therapy	20	15		

a.) Natural ventilation –

Natural ventilation another words is passive ventilation, which utilized the outdoor air movement through built purpose and building openings. In purpose build openings include windows, doors, solar chimneys and tower. Natural

ventilated depends on the climate building design and human behaviour. Natural ventilation means a large amount of window and open area which are fully ventilated by the outdoor air., yet in hospital some area the natural ventilation is very important like, entrance foyer, waiting rooms, stair case, toilets etc. The important of natural ventilation creates a healing environment for the patient and non-patient.

There is some benefit to use natural ventilation:

- Maintaining the cost.
- Capable of achieving higher ventilation rate.
- Suitable for warm and temperate climates- moderately useful with natural ventilation possible 50% of the time.
- Natural ventilation can be more energy efficient.
- Natural ventilation can generally provide a high ventilation rate more economical due to natural forces and large opening.
- Well- designed natural ventilation could be used to access higher levels of daylight.

4. CLEAN &GREEN INTERIOR BUILDING MATERIALS

To choose a right materials selection is very important because of the nature of hospitals mission to heal the sick it seems ethically responsible for hospital for hospital to choose the environment friendly materials to reduce exposure to potential dangerous chemical.

As per Indian green building council: hospitals may inadvertently contribute to illness by exposing patient and staff to a host of pathogenic germs &toxins that enter the hospital premises through the medium of a large number of infected patients.

Ensure that the hospital surface have the property of repelling or resisting the growth of pathogenic germs and bacterial. patented interior surfaces are now available which resists bacterial and fungal growth.

Consider using copper based interior materials. Recent research also that copper is a good material for common 'touch' surfaces in hospitals (door handles, lights witches, faucets, countertops, etc.) due to its microbial resistant properties.

Use indoors & flooring which do not emit/absorb/re-release indoor pollutants such as VOC's and Dust

5. GARDEN & LANDSCAPE

Plants and garden are more beneficial for the patient in health care it helps to reduce the stress while viewing the plants and garden. For a patient, non-patient spending long hours in a hospital can be a feel stressful experience. Nearby access to natural landscape or a garden can have people's ability to deal with stress and thus potentially improve health outcome. According to the patients and non-patient groups point of view shown that simple looking for environment (flowers, greenery, or water) as

Compared to the build form is more helpful for reducing stress and its more beneficial to improve their recovery.

A research suggests if patient viewing plant and other nature for a few minutes it helps to reduce the

Stress. The restorative effect of nature scenes is manifested with in only five minutes on a combined of psychological/emotional and physiological changes. In psychological /emotional, viewing of vegetation and garden they raise the levels of positive feeling (pleasantness, calm) and reduce negatively tones emotions such as fear, anger and sadness. Some nature scenes effectively sustain interest and attraction and accordingly can perform as pleasant distractions that mu diminish stressful thoughts. Regarding physiological manifestations stress recovery, laboratory and clinical investigation have found that viewing nature setting can produce significant restoration with in less than five minutes as indicated by positive changes, for instance, in blood pressure, heart activity, muscle tension and brain.

As per the Indian green council –

Garden & landscape are an aesthetic delight and promotes wellness of patient in hospitals.

Persons exposed to plants have higher levels of positive feelings as opposed to negative feelings.

Various research studies show that recuperation from stress is faster and complete when patients are exposed to natural setting than any other form of built environment.

6. CONCLUSION

Although the main of the hospital is to encourage human health, it cannot be supposed as an earth a part from its Environment. This philosophy shows the significant impact on the future hospital idea and

priorities. we promoting the health with the nature .in the new philosophy, both structural aspects and structure of hospital be revised. one steps towards nature and transforming it into a climate friendly that has a sustainable future for health care for patient. we should encourage our society to build a greenery environment in hospital which crate a health environment around the patient it helps to reduce their stress and they live comfortably.

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