

GREEN HOSPITAL MANAGEMENT

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Abstract

Hospital management has recently turned hospitals towards green hospital management with the increasing green perspective on management. Thus, a new type of hospital management has emerged: Green Hospital Management. Green hospital management protects natural resources, is sensitive to the environment, takes precautions against environmental pollution, has a sustainability perspective, attaches importance to recycling, disposes of waste appropriately, uses water consciously, allows energy to be obtained through natural means, and ensures that hospital buildings have green building characteristics. It is a management style in which the gardens are built according to the required equipment and hygienic air conditioning to ensure clean air, plants that require little water are grown in the gardens, the use of hazardous substances is minimized, and safer ones are preferred instead. In this study, in order to understand green hospital management in detail, the concept of green building is defined, not only the concept of green building is defined, but also the certificates related to health institutions that must be obtained regarding green building are mentioned and the advantages of green buildings are mentioned. Then, the concept of green hospital was explained, the characteristics that green hospitals should have were mentioned, and the goals of global and healthy green hospitals were explained in detail. Finally, it is stated which issues green hospital management should give importance to. Green hospital management is the management in which the hospital's policies and procedures in line with green management are applied on important issues such as hazardous substances management, waste management, sustainable water management, air emission regulation system and innovative environmental designs.

Key Words: Green Hospital Management, Green Hospital, Green Hospital Goals, Green Buildings.

1. Introduction

The importance given to the environment in the world has begun to increase. Conditions such as being sensitive to the environment, being sustainable, recycling, human health, leaving a clean world to future generations, and the desire to protect the green have become people's expectations.

Apart from these, people now expect environmental sensitivity from businesses. They demand that the businesses they receive service from have a green perspective, regardless of the area they serve. Of course, the health sector is one of these areas. Green hospitals have emerged in line with these expectations.

Green hospitals attach importance to issues such as green building construction, energy, water, waste, hazardous substances, air emissions, and innovative environmental design. For this reason, they carry out their management in line with these issues.

2. Green Building Concept and Advantages of Green Buildings

Before explaining the concept of green hospital and green hospital management, it is useful to define green building. In order to better understand these concepts, the concept of green building and the characteristics of green buildings will be discussed in this section.

2.1. Green Building Concept

Green building is briefly defined as a building that means environmentally friendly and ecological. It is expressed as sustainable buildings that are designed taking into account the environmental and social conditions, ensure efficient consumption within the climatic conditions of the region and the possibilities of that region, ensure the consumption of renewable energy resources, produce minimum waste, and

respect the environment (Karademir and Dağ, 2021). According to another definition, green building means zero carbon and zero energy (Çelik, 2009).

Green buildings are buildings that are evaluated from a life cycle perspective starting from the selection of the land on which the building will be built, designed with holistic thought and environmental and social responsibility awareness, built according to climate data and the conditions of the location, consume as much as needed, have renewable energy, use materials that reduce waste production to zero, and use materials that reduce waste production to zero. They are defined as structures suitable for the system and ecosystem (İşildar and Gökbayrak, 2017).

Green buildings are buildings that, in their construction and design, have high air quality in the space, natural lighting, humidity and temperature control, care about the issues that will protect human health by taking into account the elements that give importance to waste management, and in addition, when looking at the methods used in building construction, they leave a clean environment for the people who will use them. (Şentürk, 2014).

After defining green building, there is an important issue that needs to be addressed in order to better understand green building. There are two important certificates that green buildings in the world must obtain: These are; They are LEED and BREEAM certificates. The aim of green buildings is to have these certificates. In addition, LEED and BREEAM certificates are given in hospitals, clinics and healthcare areas. Particularly in countries where green buildings are common, obtaining these certificates is encouraged by government policies.

LEED Health Buildings (LEED-HC): Hospitals, medical offices, education and research departments, polyclinics, etc. It was established with the aim of supporting the implementation of projects aimed at improving the environmental performance of buildings serving in the field of healthcare. It includes large-scale innovations applied to existing and new buildings, together with the scheme that evaluates the design and application processes of the environmental performance of health-related buildings (Çelik, 2016).

BREEAM certification is also given to healthcare structures. This certificate examines buildings in the following categories:

- Management
- Health and comfort
- Energy
- Transport
- This
- Material
- Wastes
- Land use and ecology
- Nine main categories, including pollution, and their subcategories (Çelik, 2009).

2.2. Advantages of Green Buildings

Green buildings have multiple advantages. It is possible to categorize these as environmental advantages, economic advantages and social advantages.

Environmental Advantages:

- It protects ecosystems, systems and biodiversity and contributes to their development.
- Improves water and air quality.
- It eliminates waste.
- It preserves and renews raw materials.

Economic Advantages:

- It reduces the costs of organizations.
- By creating new markets for green production and green service provision, it ensures the growth of these markets.
- Supports increased economic performance for the product life cycle.

Social Advantages:

- It positively affects the health and comfort of those living in the building.
- It reduces the pressure on the local system.
- It increases the quality of life (Alagöz, 2015).

Health & Community Benefits:

- It improves air, heat and acoustic areas (Özaydın and Baz, 2021).

Apart from these, it also has the following benefits:

- Easy maintenance: Green buildings require less maintenance than other buildings.
- Efficient technologies: Unlike traditional buildings, green buildings use technologies that increase energy and water efficiency.
- Improved indoor air quality: With green buildings, the air becomes better quality and healthier. Clean energy sources such as solar energy and wind power are used.
- Return on investment: The value of the building increases with the solar energy used in green buildings.
- Energy efficiency: Resources, energy and materials in green buildings are used effectively.
- Tax incentives: There are tax incentives for green building construction in developed countries (Terekli et al., 2013).

3. The Concept of Green Hospital, Features of Green Hospitals, And Goals of Global and Healthy Green Hospitals

Before explaining green hospital management, it is useful to define the concept of green hospital, talk about the characteristics of green hospitals, touch upon the importance of green hospitals and talk about the advantages of green hospitals. Thus, a better understanding of green hospital management will be achieved.

3.1. Green Hospital Concept

There are many definitions about green hospital. Looking at these definitions; The concept of green hospital is not only about the destruction of harmful and toxic wastes, but also recycling of what is possible, taking measures to save energy, regularly managing practices and wastes that endanger human health, integrating in terms of environment and building design, building sustainable and low-cost ones. or ensuring its restoration (Kurtaran and Yeşildağ, 2021).

According to another definition, the concept of green in hospitals is expressed as ensuring the most efficient use of energy and water, eliminating waste, and making positive contributions to public health by designing environmentally friendly buildings (Kılıç and Güdük, 2018).

Green hospital is the name given to hospitals that are more sustainable, prefer to use less energy and water resources, produce less waste and offer high quality environments to users (Çilhoroz and Işık, 2018).

Finally, the concept of green hospital is defined in different ways by various boards. According to this; Healthcare Without Harm defines a green and healthy hospital as one that cares about public health by continuously reducing its environmental impact and eliminating its contribution to disease. A green and healthy hospital establishes the connection between human health and the environment, and the hospital proves this through its strategies and operations. Indian Green Building Council defines a green hospital as a building that improves the patient's well-being, facilitates their treatment, and also uses natural resources efficiently and in an environmentally friendly manner (Dhillon and Kaur, 2015).

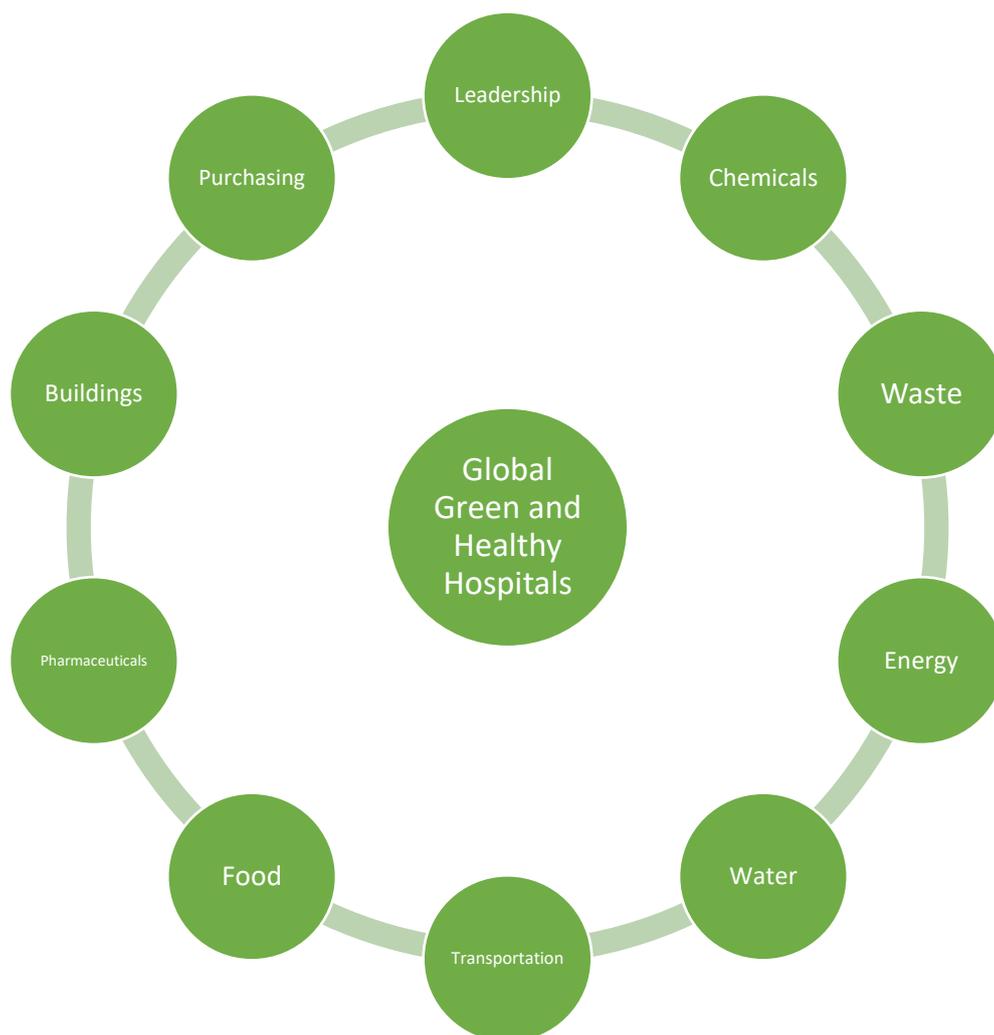
3.2. Features of Green Hospitals

- Having a ventilation system
- Preferring materials that do not contain chemicals
- Having plumbing that ensures efficient water use
- Preferring long-lasting materials
- The energy used is renewable
- Keeping the garden tidy
- Finding materials that protect the environment
- Ensuring the necessary safety practices are in place in case of emergency for staff, patients and patient relatives
- Finding a pedestrian path
- Reuse of rainwater by collecting it in the pool
- High indoor environmental quality (clean and healthy air, heat preservation, etc.)
- Abundant use of natural light (Kılıç and Güdük, 2018).

3.3. Goals of Global and Healthy Green Hospitals

With globalization, hospitals have also become global. Today, hospitals have gained not only a national but also an international dimension. However, green hospitals, which emerged as the environment gained importance, are now both global and healthy. In the international context, healthy green hospitals have certain basic goals. These goals are given below.

Figure 1. Global Green and Healthy Hospitals Goals



Source: <https://greenhospitals.org/goals> D.A: 13.11.2023

3.3.1. Leadership

Leadership is a method that is needed in green hospitals, as it is always and in every field. Thanks to leadership, green hospitals and those who work in green hospitals become sustainable institutions and individuals who care about and protect environmental health and understand that safety is essential. We can summarize what leaders need to do for green hospitals as follows:

- Creating a hospital policy for green hospital,
- Establishing a group of green hospital employees and ensuring the implementation of policies,
- Using people and resources to overcome problems related to environmental protection,
- To make and implement strategic and operational planning suitable for a green hospital,
- Educating employees about environmental health and sustainability,
- To cooperate on environmental health to prevent possible diseases,
- To encourage the construction of a sustainable healthcare facility that protects environmental health in hospital construction (<https://greenhospitals.org/leadership> D.A: 13.11.2023).

3.3.2. Chemicals

- Developing policy protocols for chemicals and materials in the hospital to protect employee, patient, public and environmental health,
- Creating and implementing a chemicals action plan by creating criteria and timelines for the hospital,
- Replace all mercury-containing thermometers and blood pressure devices with WHO-HCWH Global Mercury-Free devices, provided that they are reliable, accurate and affordable,
- Choosing safer alternatives over the use of chemicals of concern such as glutaraldehyde, halogenated fire retardants, PVC, DEHP and BPA,
- Explain the chemical contents of the products and materials used,
- Replace products containing substances of high concern (substances identified as carcinogenic, mutagenic or toxic to reproduction, or substances that are persistent and bioaccumulative or of similar concern) with safer alternatives (<https://greenhospitals.org/chemicals> D.A: 13.11.2023).

3.3.3. Waste

- To ensure the reduction and safe disposal of waste related to healthcare services,
- To reduce the volume and toxicity of healthcare-related waste and to protect human health by applying the most appropriate waste management (<https://greenhospitals.org/waste> D.A: 13.11.2023).

3.3.4. Energy

- Implementing an energy saving and efficiency program that will reduce energy consumption for buildings by at least 10% in one year and continue to provide continuous energy savings of 2% per year, resulting in a 10% reduction every five years, in addition to this, for new hospitals, buildings with a capacity of 320 kWh/m² or less to design in accordance with energy performance objectives,
- Conducting energy audits regularly and using the results obtained in awareness and improvement programs,
- Focus on purchasing renewable energy and purchasing at least 5% whenever possible, as well as switching to clean boilers,
- Researching renewable and clean energy sources and applying them in the building,
- Reducing greenhouse gas emissions and local threats and implementing money-saving climate changes,
- To reduce energy consumption, lower the thermostats a few degrees in winter or in cool climates and raise them a few degrees in summer or in hot climates (<https://greenhospitals.org/energy> D.A: 13.11.2023).

3.3.5. Water

- Ensuring zero water usage,
- Finding and implementing strategies to save water: making taps and toilets efficient, frequently checking plumbing and pipes to prevent leaks, destroying gaskets and cooling water in medical air compression and vacuum pumps, and replacing cooling systems with new ones,

- Switching from radiological imaging equipment with film feature, which uses a lot of water, to digital imaging systems that do not use water and radiological chemicals that pollute the environment,
- Using drought-resistant plants in the hospital garden,
- Collecting rainwater and recycling and using the water,
- Avoid using bottled water if quality water is available,
- Constantly analyzing the quality of water,
- If there is drinking water in the hospital, share it with the public and ensure that they drink clean water,
- Using wastewater treatment technologies when there is no municipal service,
- To carry out projects with the society in order to improve and protect water resources (<https://greenhospitals.org/water> D.A: 13.11.2023).

3.3.6. Transportation

- To improve transportation strategies for employees and patients,
- Providing transportation and service strategies that will reduce the hospital's climate footprint and local pollution (<https://greenhospitals.org/transportation> D.A:13.11.2023).

3.3.7. Food

- Purchasing and serving healthy food grown in accordance with sustainable conditions,
- Promoting healthy eating habits in employees and patients and reducing the environmental footprint of the hospital (<https://greenhospitals.org/food> D.A: 13.11.2023).

3.3.8. Pharmaceuticals

- Prescribing medications appropriately and administering them safely and disposing of them appropriately.
- Reduce pharmaceutical pollution by reducing overprescribing practices, reducing inappropriate pharmaceutical waste disposal, and preventing the disposal of medicines as part of disaster relief by ensuring that manufacturers take them back (<https://greenhospitals.org/pharmaceuticals> D.A: 13.11.2023).

3.3.9. Buildings

- Aiming for a carbon neutral building,
- Protecting the natural habitat and restoring it according to nature; Reducing the footprint of buildings, parking lots, roads and walks,
- Using high-reflective roofing or green roof systems,
- Creating local natural designs to harmonize the building with the community and the natural environment. Establishing facilities facing the sun and suitable for wind,
- Installing passive systems wherever appropriate to ensure high flexibility, as well as using narrow floor plates to benefit from daylight and natural ventilation,

- Using materials that will not threaten human and ecosystem health when building hospitals,
- Using local and locally sourced materials (reducing transportation energy), using salvaged and recycled materials,
- Avoiding materials such as paint, coating and asbestos containing lead and cadmium,
- Replacing PVC, CPVC, and materials containing persistent bioaccumulative toxic chemicals (PBTs), including halogenated and brominated flame retardants, with safe materials.
- To maintain indoor air quality, reduce stress, and make lighting and acoustic settings that ensure health and productivity,
- Taking as an example the guidelines set by national or regional green building organizations,
- Supporting policies and public financing that support green and healthy buildings (<https://greenhospitals.org/buildings> D.A: 13.11.2023).

3.3.10. Purchasing

- Purchasing highly reliable and sustainable products and materials,
- Purchasing sustainable supply chain materials from socially and environmentally responsible vendors (<https://greenhospitals.org/purchasing> D.A: 13.11.2023).

4. Green Hospital Management

After explaining the definition of green hospital, its features and goals, it is necessary to look at how green hospitals are managed and the issues that need to be taken into consideration. It is essential for green hospitals to be managed with green management in order to sustain their existence. The concept of green hospital management includes concepts such as green, sustainability, health, hospital and service. Another important issue is that in green hospital management, it is important to focus on low-cost and low-complexity departments.

Green hospital management covers areas such as management of hazardous substances, waste management, energy management, water management, air emission regulation system, innovative environmental designs, material selection, sustainable facilities, environmentally friendly purchasing, food services management, and social responsibility activities.

4.1. Management of Hazardous Substances

Although hazardous substances are important in many sectors, the management of hazardous substances in hospitals is an issue that requires more attention and management.

The concept and grouping of hazardous materials may differ from country to country. Regardless of concept or grouping, the management of hazardous substances is of great importance for hospitals. The reason for this is that the stages from the emergence of hazardous substances to their destruction are included in the routine work of hospitals. A safe working environment is created by providing various trainings to reveal registration and usage procedures and to use hazardous substances. Thus, precautions are taken against dangers for employees, patients and the environment (Terekli et al., 2013).

We can summarize the hazardous substances in hospitals as follows: halogenated, non-halogenated and inorganic compounds, acid/base containing substances, prescription drugs, carcinogens, disinfectants, compounds including reproductive or mutogenic toxins. In hospitals, these substances can occur in radiology departments, pathology procedures, dangerous microbiological culture procedures, anesthesia and sterilization (Çolhan et al., 2020).

Things to do to manage hazardous substances in green hospital management:

- Substances identified as hazardous substances in the green hospital should be grouped and made into a list.
- Hazardous substances must be present in amounts that will not be risky for use in the green hospital.
- In the green hospital, hazardous substances must be labeled and recorded from the very first moment.
- In the green hospital, hazardous materials that will affect each other should be stored separately.
- Necessary information and training should be given to the personnel who will use hazardous substances in the green hospital.
- In a green hospital, the precautions to be taken by personnel interacting with hazardous substances should be taught (Metz et al., 2020).

4.2. Waste Management

Waste management is one of the important processes that are necessary and must be managed for green hospital management. Various institutions have some statements regarding waste management.

The World Health Center stated that healthcare waste should be managed reliably and published a procedure to take the necessary financial measures. In addition, the World Health Assembly made an announcement to governments to take measures regarding waste management. The Special Rapporteur of the UN Commission on Human Rights called on people and governments to "develop a comprehensive international legal framework to protect human health and the environment from the negative effects of mismanagement in the disposal of hazardous medical waste" (Azmal et al., 2014). Within the framework of all these warnings, what needs to be done regarding waste management is listed below:

- Necessary measures should be implemented to properly separate waste and reduce its volume.
- Strategies and systems required for the necessary practices to separate, destroy and dispose of waste should be developed in order to reach both national and international standards.
- Autoclaving, chemical treatment and microwave ovening methods should be used in waste management.
- While managing waste in a green hospital, systems should be created and resources should be distributed, managed and disposed of appropriately.
- Awareness should be raised in terms of safe practices and risks related to waste in the green hospital.
- In waste management in a green hospital, reliable and environmentally friendly options should be preferred to avoid risks while collecting, storing, transporting, processing and destroying waste (Lattanzio et al., 2022).

4.3. Energy Management

Energy management, along with green hospitals, has led to greater emphasis on energy efficiency. Energy management focusing on environmental sustainability has become an inevitable strategy to be implemented in green hospitals. If energy management is provided well, it also includes energy efficiency, cost reduction and related procedures and strategies.

Various elements are required for the rational and efficient use of energy in hospitals:

- Energy consumption management
- Managing the use of green Technologies
- Management of building installations

The ISO 50001 standard is used to improve energy management. In addition, the use of green technologies is well managed and environmentally sustainable technologies are obtained and applied. Materials that consume more energy efficiently are preferred. Thus, costs are reduced. In green hospital management, issues such as energy efficiency designs, maintenance and renewal in building facility management are important. Sustainable, low or zero carbon technologies are used. In green hospitals, passive heating is used in energy management and existing natural resources are used instead of electrical energy to warm the hospital. Again, energy efficiency is achieved by using natural light in green buildings, and environmental sustainability and environmental sensitivity are ensured in accordance with green hospital management (De Oliveria et al., 2021).

4.4. Sustainable Water Management

Water usage in hospitals is quite high. For this reason, they need to act in an environmentally friendly manner. Water should be used efficiently, sustainably and without harming the environment. While managing this process, it is essential to routinely monitor water consumption, warn and supervise employees to use less water, and develop strategies that include less water use. Sustainable water management is an important management step, especially in green hospitals.

In green hospitals, unnecessary water use should be reduced, water savings should be ensured, water waste should be eliminated, wastewater should be destroyed and the necessary conditions for its reuse should be provided, and the water cycle for the ecosystem and system should be monitored. Thus, it can contribute to both sustainability, the environment and the economy (Altan, 2023).

4.5. Air Emission Regulation System

Health buildings have a high CO₂ and greenhouse gas emission impact on nature, but; Green hospitals can produce clean and sustainable energy suitable for public health with rainwater, wind, solar and other natural energy conversion methods. By using architectural solutions that will create clean air flow in interior spaces and buildings in a way that does not affect the amount of energy and heat consumption at a high level, and by constantly checking medical devices, gas transmission amounts resulting from technical applications and their equivalents can be controlled and waste gases can be eliminated. Hygienic air conditioning and installations must be provided for clean air (Altın, 2023).

4.6. Innovative Environmental Designs

In green hospital management, environmental designs prevent hospital infections, increase patient satisfaction, increase employee performance, and reduce injuries. This makes innovative environmental designs essential for public health (Özkan et al., 2014).

In addition, innovative environmental designs applied in green hospital management reduce environmental pollution, waste disposal costs, energy, water and operating costs, increase the quality of care of patients and increase the image of the hospital. In addition to all this;

- Environmental impacts are evaluated, results can be measured and audited,
- Standards and procedures are created and implemented,
- Changing the behavior of employees by raising awareness,

- Continuous improvement is adopted with new environmental policies,
- It is understood that by preventing environmental pollution, costs are reduced and, accordingly, performance is increased and the personnel actively participates. This case once again proves the importance of green hospitals today (Ekergil and Savaş, 2019).

5. Conclusion

Increasingly in recent years, green hospitals have become a target to be achieved in the healthcare industry. Many hospitals in the world and in Turkey are trying to meet the necessary conditions to become a green hospital. If hospitals want to be green, they are established according to the features that green hospitals should have.

In order to be a green hospital, being environmentally friendly and sustainable are among the important conditions expected from hospitals. Green hospitals also need a leader and his teammates to exist. Thus, under the leadership of the leader, green hospital management aims to provide services to the public as a hospital that is green, environmentally friendly, cares about environmental pollution, and attaches importance to public health and sustainability. In short, green hospitals will continue their development when managed with a successful green hospital management.

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