



A study of green hospital initiatives at tertiary care hospital at Katra, Jammu and Kashmir

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Abstract: Climate change is likely to affect all forms of life. The study was undertaken to study the progress made by the hospital towards becoming a climate friendly green hospital.

Aim: To study the progress made by the hospital towards becoming a climate friendly green hospital.

Material and Methods: A observational study was conducted from 24th July 2021 to 8th September 2021 to analyse hospital's journey towards becoming a green hospital. The observation was made in line with the 7 WHO directives related to climate change.

Results: It was observed that the several initiatives taken by the hospital with intent to improve energy efficiency like replacement of halogens and Compact Fluorescent Lamps (CFL) with Light Emitting Diodes (LED), diesel with Compressed Natural Gas (CNG) as fuel for boiler in laundry. For conservation and effective utilisation of resources, solar water heating system and seven rain water harvesting systems have been installed. Efforts have been made towards waste minimisation and efficient management with a sewage treatment plant for management of liquid waste and BMW management and recycling as per the guidelines.

Conclusion: Over the years the hospital has taken several steps towards becoming a climate friendly green hospital. This study emphasises the commitment of the hospital towards a healthy environment for the wellbeing of our patients.

I. Introduction:

WHO has defined green hospital as a hospital, which is responsive to local climate conditions with optimized energy use. Climate change can have various adverse impacts on health. Healthcare sector is an energy intensive organization. In the United States of America, health sector consumes an average energy worth 8.5 billion US\$ annually which is about twice of the energy consumption at equivalent office space. The

healthcare in England is responsible for 3.2% of total CO₂ emissions in the country which is around 18 million tonnes; equivalent to 30% of total public sector greenhouse. Based on USAID ECO- III project report, energy consumption has been estimated to be between 246 to 492 Million kWh in urban Government hospitals in India while rural was assumed to be around 20% of this figure. World Health Organization (WHO) has published a discussion draft based on its mandate from member states to develop programs for health care organizations to reduce their greenhouse gas emissions. Healthcare facilities should provide a therapeutic environment in which the overall design of the building and its site contribute to the process of healing, rather than simply being a place where treatment takes place. This change of paradigm implies that both healthcare planning and design processes must be broad enough to include not only the issues surrounding the treatments, but also the promotion of health and prevention of disease by creating a safe and therapeutic care environment. According to the World Health Organization, 'environments are considered therapeutic (with healing qualities) when there is direct evidence that a design intervention contributes to improved patient's outcome'. gas emissions.

Aim: To study the green hospital initiatives at SMVDNSH at Katra, Jammu

Objectives: 1. To explore the journey of SMVDNH toward becoming a green hospital.

2. To assess the initiatives taken by the SMVDNH toward becoming a climate friendly hospital.

II. Methodology:

A observational study was conducted from 24th July 2021 to 8th September 2021 to analyse hospital's journey towards becoming a green hospital. The observation was made in line with the 7 WHO directives related to climate change. Data was gathered from primary and secondary sources of



information. The primary data was collected through a checklist. Check list was the major instrument for collecting data for this study. The checklist was carefully structured and designed in order to ensure easy answering. The parameters in checklist were personally collected for analysis and analysed to aid reasonable findings and conclusions for the study. The secondary data was collected from the documents of the facility department, journals, articles, website, various publications relating to healthcare system, publications of executing agencies viz WHO, publication of MoHFW, were also reviewed. MS excel was used for statistical analysis.

III. RESULTS:

SMVNSH is 240-bedded tertiary care teaching hospital in Katra. The institution has taken several steps over the years towards becoming a climate friendly hospital.

Building Design

The hospital is extended over **125 acres** including residential area. It was built in 2016, having a sustainable architectural design. It includes

- Spacious corridors in the hospital
- Wards provides ample source of natural light and cross ventilation.
- Roof Ventilators is used in the cafeteria area.
- Roof top of the cafeteria is designed as top rise, which provides ample source of light which helps in electricity conservation.
- Use of indoor plants in the hospital.
- There is herbal garden spread over an area of 60-70% and consist of trees which provide soothing environment to the patient.
- Environment friendly approach like preference to STAR rated equipment, Ozone-depleting Substances (ODS) free equipment, mercury free instruments at the procurement stage.
- More than 70% area of the campus is maintained with greeneries and natural open spaces for comfort of outpatients and patients.
- Garden and landscape are an aesthetic delight and promote wellness of patients. Person exposed to plants have higher level of positive feelings.

Lighting

- SMVDN hospital is designed in such a way that it maximizes day light and optimizes the artificial lighting requirements in all patients' areas.
- Day lighting is the controlled admission of natural light from the sky (direct and diffused) into a

building so as to reduce the use of electrical energy for lighting in corridors /main lobby/reception and other patients' area.

- Hospital has a glazing facade so as to have both view and daylight. Day lighting has been proven to have positive effects on patients in hospitals.
- Since 2021, all halogen and CFL have been replaced with LED. 36watts LED light has been installed in the hospital area with good quality light. Majority of street lights are LED based.

Alternative Energy Generation

- The hospital has installed Solar Hot water system, which provides water for washing, bathroom, emergency and operation theater.
- It consists of a collector to collect solar energy and an insulated storage tank to store hot water.
- Fuel for boiler, of laundry, was changed from diesel to CNG, since diesel fuel is expensive and polluting.
- Solar panel and sustainable source of energy are new Government initiatives and hospital is working towards it.

Biomedical waste

- Hospital has multispecialty wards, seven OT, twenty OPD, emergency and laboratory services.
- A total of 200Kg of BMW per month is generated which include 30% incinerable waste, 58% autoclavable waste, 10% glass waste, and 2% sharp waste.
- All health care workers adopt standard precaution and safety measures while handling and disposing the health care waste.
- It is transported in separate color-coded trolleys as per the BMW 2016 rules.
- The waste storage site of this hospital is approximately 500 meters away from patient care areas.
- Hospital is using wheeled non- motorized trolleys, which do not require any fuel.
- All infected plastic waste is autoclaved, shredded and handed over to an authorized facility. Glass waste is also recycled. Only sharp waste and incinerable waste is handed over to the Jammu Pollution Control Department authorized Common Biomedical Waste Treatment Facility (CBMWTF) for their respective treatment while the uninfected general waste is handed over to the municipal corporation.
- The health care workers are trained regularly on issues related to BMW management and encouraged for adopting safe practices during



segregation, transportation, treatment and disposal of health care waste.

- Biomedical waste audits have been performed to improve waste segregation and reduction.
- All infected plastic waste is autoclaved, shredded and handed over to J&K PCB authorized facility. Utilization of recycled water of STP and ETP is done for gardening purpose.
- Regulated waste disposal only through the J&K PCB approved vendors.

Food

- Freshly prepared vegetarian food is served in the hospital.
- Hospital has organic waste convertor. A waste converter is a machine used for the treatment and recycling of solid and liquid refuse material. The process of converting solid waste into compost is very simple, and it saves the environment
- This machine performs its mechanism in the presence of air. The input it takes is biodegradable waste and the output it produces is compost. The use of Organic Waste Converter to automate and ease of the process of composting is a step in the right direction.
- All biodegradable waste – left over food, vegetable and fruit peel are converted into valuable compost that can be used for the organic farming.

Water

- Hospital has **rainwater harvesting pits**, which help replenish ground water. Underground water is used for flushing systems in the hospital and firefighting hydrants. Rain water harvesting pits are used for the collection and storage of rain, rather than allowing it to run off.
- For drinking, Reverse Osmosis (RO) based water purifier units are installed in all areas of the hospital for use by staff and public, thus negating the need of bottled water. Daily monitoring of water purifier through a defined checklist.
- Hospital has its own STP and ETP plant. Water is treated and used for the gardening purpose,
- Water conservation initiatives- low flow aerators, dual flush

Indoor Air quality- Active and Passive measures

- Engineering department is doing air quality and noise level monitoring testing in hospitals and also facility is doing regular waste testing of STP and ETP.
- Regular pollution monitoring / Air testing of stack emission for DG sets and boilers.

- Air culture testing in indoor patient's area including ICUs.
- OT monitoring and medical air quality testing.
- Monthly facility audit/ round to ensure safety & quality in place.

IV. Conclusion:

The hospital has initiated various steps towards becoming a green hospital. Hospital provides its commitment towards conserving natural resources and contributing to the environment. Further training programs, possibility of telemedicine and should be considered. Healthcare professionals should take a pledge to contribute towards building a carbon neutral or carbon negative healthcare facility and work towards becoming carbon literate. There is ample amount of sunlight, which can be captured. Solar energy can be utilized more. Facility has a plan for installation of 200 KW solar energy systems in the year 2022-23. Facility has a plan for installation of Hot water generator (Electric) and Steam generator.