Realizing our vision for sustainable development in Nepal through safe health care waste management and solar power generation

Tilganga Institute of Ophthalmology, Nepal

GGHH Agenda Goals

- Waste
- Energy

Progress Achieved

Waste

- Institutionalization of a safe health care waste management system and establishment of a waste management unit to manage hospital waste.
- Implementation of a safe health care waste management system in half of the units at the hospital.
- Fully functional waste treatment and storage center with a validated autoclave.
- Introduction of safe injection practice in the hospital using needle destroyers and cutters.
- Only 34% of the total waste is sent to landfill.
- Risk waste has been reduced from 47% to 25%.
- 63% of the total waste is recyclable and is sold to scrap dealers, generating a revenue of USD $40 (NPR 4,000) per month on average.
- As this is a specialist hospital, its waste stream is unlike regular hospitals, with an exceptionally high percentage of recyclable waste and very little food waste. 2% of the total waste is food waste, and 3% of the total waste includes sharp glasses, sharp metals and leftover liquids in water bottles and saline bottles.

Energy

- The hospital installed 156 solar panels from Sunpower Inc., USA. Each panel is 245 Wp.
- The total capacity of the installed solar panels is 38.22 kWp.
- The hospital also installed six X-TH 8000 solar inverters from Studer Innotec, Switzerland.
- The solar power is used to generate electricity for the operation theater and the outpatient department.
- With the installation of the solar panels, diesel consumption has been reduced by about 432 liters per week. There has also been a 7.5% to 10% reduction in electricity consumption.

Figure 1. Two-bucket sytem for general waste collection

Figure 2. Health care waste treatment and storage center

Figure 3. Non-risk waste transportation

Figure 4. Solar panels at the roof top of the hospital

The Issues

Tilganga Institution of Ophthalmology (TIO) is located on Bagmati Bridge, near the Bagmati River. Hindus and Buddhists consider it a holy river, and a number of Hindu temples are located on its banks. The river, however, is polluted and choked with untreated waste. A June 24, 2016 article on Kathmandu Post stated that the river is 10% water and 90% sewage. Previously, TIO contributed to polluting the river and dumped its waste in the municipal waste container near the river.

But TIO was eager to change its waste management practice and approached Health Care Foundation Nepal (HECAF) to design and develop a safe and environmentally-friendly health care waste management system for them in 2013.

TIO was also keen to use clean renewable energy sources to address the problem of frequent power cuts and protect public health. Previously, electricity power cuts and shortage of petroleum affected the regular operation of the hospital, and TIO had to use generators that run on diesel to fulfill energy demands. Subsequently, a decision was made by hospital management to use clean renewable energy sources by installing solar panels to support its critical facilities, like the operation theaters.

Figure 5. Meeting with hospital staff to discuss the placement of waste buckets and waste segregation stands in the hospital units (participatory approach)

Sustainability Strategy

TIO's sustainability strategy for waste management includes:

- Establishing a waste management unit to handle issues and decisions related to waste management at TIO.
- Adopting a participatory approach to system design and implementation, and ensuring that staff members' comments and feedback are taken into consideration. This promotes staff ownership of the system.
- Training for all staff members on the safe management of waste, including segregating waste at source, injection safety and safe handling of sharps.
- Generating revenue from the recycling of waste.

TIO's sustainability strategy for energy management includes:

- Engaging with renowned companies to set up the system for solar power generation at TIO.
- Ensuring that the agreement with the companies does not just include installation and set up, but also regular monitoring and update, and training for staff members on maintaining the solar panels and battery bank.
- Undertaking regular monitoring of the solar panels and battery bank.

Figure 6. Battery bank for solar energy

- Providing evidence to hospital management that the cost of diesel for the generator, and the cost of electricity and petroleum have been reduced, with the use of solar power

Implementation Process

The implementation process for safe health care waste management started with an assessment of the waste situation at TIO. This diagnostic assessment was conducted by HECAF to understand the amount and type of waste generated at the hospital, as well as observe and document TIO's existing waste management practices.

This was followed by a series of trainings and meetings with medical and support staff of TIO to raise awareness, build capacity on waste management issues, and design a safe health care waste management system for TIO in a participatory manner, which takes the comments and feedback from all staff members into consideration.

Figure 7. Waste segregation stand used in the operation theater

To ensure waste segregation at source, it was collectively decided that each unit at TIO will have a two-bucket system to segregate general waste, and there will also be a waste segregation stand in the required units, like in the operation theater.

Figure 8. Autoclave used for treatment of infectious waste

A waste treatment and storage center was established inside the hospital premise. All the waste generated by the hospital (both general waste and risk waste) is transported to the waste treatment and storage center by a designated staff member that has been trained to handle the waste safely. An autoclave was procured to disinfect risk waste in an environmentally-friendly way.

To ensure that the autoclave is functioning effectively, the integrator and biological indicator or spores test is conducted on a regular basis.

General waste like paper, plastic, glass and disinfected waste is sold to the local scrap dealers to generate some income to help cover the system maintenance costs.

Tracking Progress

For waste management, the hospital tracks progress through:

- Records of the amount total waste (risk and non-risk waste);
- Results of the regular efficacy testing of the autoclave;
- Records of maintenance of the autoclave; and
- Records of waste sold for recycling, and income from the sale (after transportation costs are deducted).

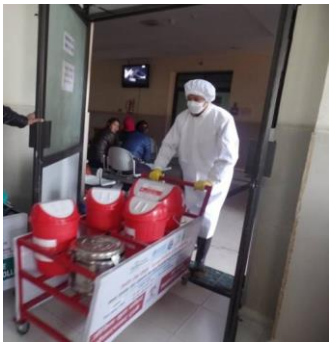

Figure 9. Waste transportation trolley

These record sheets for data collection were developed with support from Health Care Without Harm.
TIO also tracks energy consumption by fuel type – electricity, petroleum and diesel, since the installation of the solar panels.

Challenges and Lessons Learned

During implementation, TIO faced some difficulties in procuring the required equipment, as well as some technical issues in operating the equipment, causing considerable delays in establishing the health care waste management system.
Regular meetings to update staff members on progress was important to sustain their interest and commitment to the new system.

Next Steps

Currently, not all units in TIO have adopted the safe health care waste management system. One of the next steps is to expand this system throughout the hospital to all units, including training for staff in all units on health care waste management.
TIO plans to install additional solar panels to increase its capacity.
TIO also plans to address the other goals of the Global Green and Healthy Hospitals (GGHH) network.

"We faced some challenges implementing the waste management system. Changing the attitude and behavior of staff members was the most challenging, but the most important. We also had some problems with getting the autoclave to work. But things are working smoothly now and we are planning to replicate the health care waste management system in our 18 community screening centers."
~ Hari Vinwar, Assistant Manager of Maintenance, Tilganga Institute of Ophthalmology

About Tilganga Institute of Ophthalmology and HECAF

TIO is the implementing body of the Nepal Eye Program, a non-profit, community-based, non-governmental organization. TIO was established in 1994. Previously, it had about 1,200 patients and performed about 75 operations per week. But when the institute expanded in April 2009, its services also expanded from an outpatient eye care facility to a full American-standard eye hospital serving 1,500 patients per day, with more expertise and greater research capabilities. For more information see http://www.tilganga.org.

With the expansion of the institute, more waste is generated, and the institute faced many difficulties in its management of the health care waste. At the request of the hospital, HECAF started implementing a health care waste management system at the hospital in 2013.

HECAF, established in 1994, is a national non-governmental and not-for-profit organization with a mandate to work in three core areas: (1) health care, (2) environmental health and (3) emergency health. HECAF established the National Kidney Center in 1997, offers technical support in developing a safe and sustainable health care waste management system, and provides capacity development and training in emergency management and disaster risk reduction. For more information see http://www.hecaf.org.

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