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Ecosteria - A Step Towards Innovative and Sustainable Medical Technology - A Revolution in the Healthcare Sector

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ABSTRACT

In rural and underprivileged areas where people lack the facility of stable electrification, sterilization is an immense problem faced by all during medical procedures. Due to this lack of sterilization, proper hygiene cannot be maintained even for patients in critical conditions. Proper hygienic conditions are a human right for individuals especially during birthing and other OT procedures.

In an everchanging world, we have progressed vastly in areas of communication, transport, economics, policy formulations etc. where betterments and modifications constantly strive to better define and navigate through modern day life. Ever since the mid-twentieth century we have been concerned about the environmental impacts that industrialization can bring about and this is a dire issue that we are still trying to find concrete answers and solutions to.

Particularly in healthcare, the premise of making devices and methods that are better for the environment remain relatively unexplored, with vast potential of making healthcare devices eco-friendly and more innovative that maximizes utility. Ecosteria is a Portable Solar Powered UV lamp which is a medical device to bring pioneering change in this direction.

India and many other countries in the world possess a vast rural population with 65% of the people comprising the Indian rural population.[1] In such a scenario, we must strive towards the betterment of healthcare facilities so as to fulfil the larger aim of achieving the third SDG of Good Health and Well-being.

Keywords: Medicine, Sustainable Medical Innovation, Environment, SDG's, Mother and Child Health.

INTRODUCTION

This research paper aims to elaborate on the need for sustainable and innovative medical technology in the rapidly progressing modern society where crucial social and environmental objectives are yet to be fulfilled in entirety. The paper elaborates on Ecosteria, which is a Portable Solar Powered UV Lamp, a medical device that aims to provide sterilization of operation theatres and other medical environments in rural areas, highlighting on the following reasons for such innovation in the Indian social dynamic in particular, and world society in general:

1. Reasons of Mother-Child Health
2. Reasons of Healthcare Infrastructure and Delivery
3. Reasons of Energy Supply

MATERIALS & METHODS

The prototypes of Ecosteria were distributed in several local hospitals in Delhi, Jaipur and Jodhpur and feedback from medical professionals was taken into account, between years 2023-2025. With positive remarks of helping provide proper sterilization of medical equipment in

particular, mentioning that it proved particularly useful in on-site camps and emergency operations without fail.

RESULT

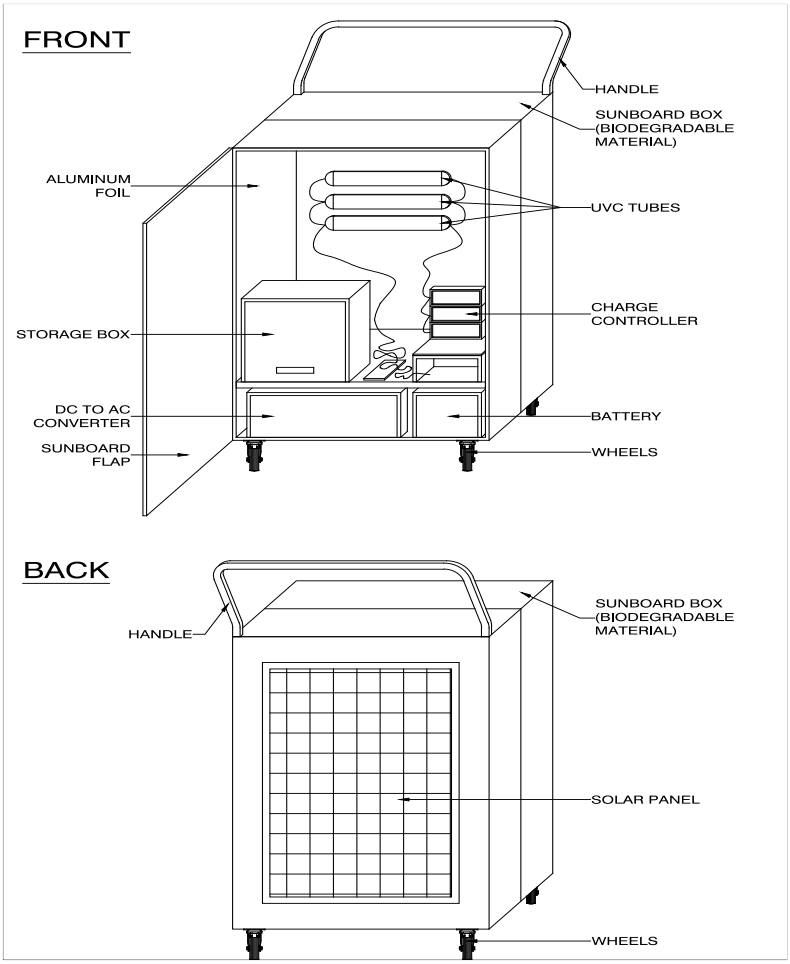
With positive remarks of helping provide proper sterilization of medical equipment in particular, mentioning that it proved particularly useful in on-site camps.

DISCUSSION

About Ecosteria

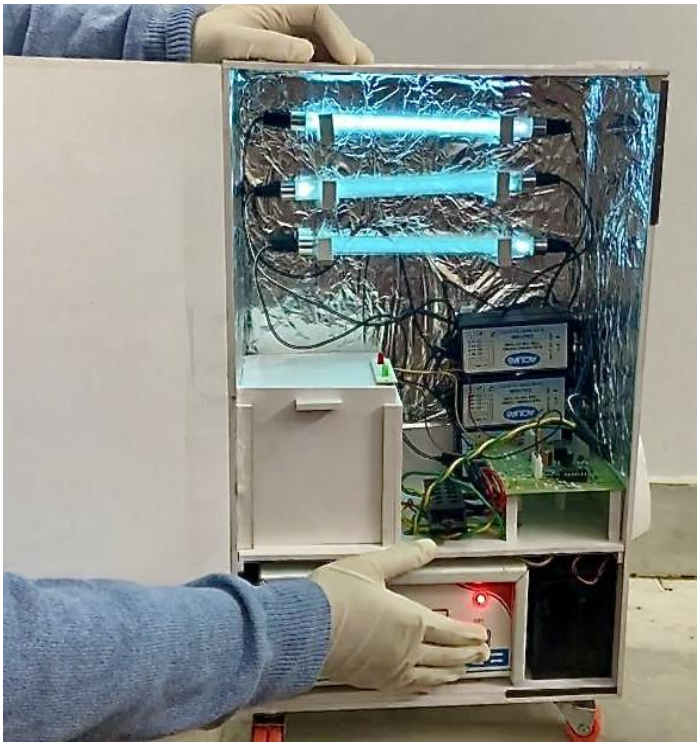
Hence, I created the Ecosteria, which is a Solar Powered UV Lamp with an aim of providing sterilization and subsequently, hygiene to all those who undergo medical procedures in unsanitary conditions. The UV lamp is portable as the need for power sockets is eliminated and can be used reliably for days after charging. It can thus be used in healthcare camps and emergency operations without fail.

The invention, a solar powered UV lamp consists of the following components- A solar panel, three 11 Watt UV-C tubes, three charge controllers, a solar panel controller, an externally chargeable Lithium ion solar battery, a DC to AC current converter, a red and green bulb along with connecting wires for the circuit. For the outer covering, it is made of 5mm Sunboard (a biodegradable material) for the walls and a 1cm(10mm) Sunboard for the base, with wheels at the bottom and a handle on the top for mobility. In addition, the inner side of box is coated with aluminum to allow reflecting of UV-C light. All the components are arranged within a compact box, ensuring portability. The battery can also be promptly charged and thus the device can operate efficiently for medical use, incorporating affordable materials to make the device.



Need for Ecosteria

Ecosteria aimed to target surgical interventions, taking closely into account the prenatal, parturition and post-natal interventions for both the mother and child. With the data at hand, significant truths come into light.



1.Reasons of Mother-Child Health

Maternal and perinatal conditions are a leading cause of death in India, with about 21.5 persons per 100 deaths being due to communicable, maternal, perinatal and nutritional conditions, with 83.6% of deaths under the age of 4 and 34.1% in the reproductive ages of women, typically from 15-44 years of age.[2] Perinatal conditions in particular, is a top 10 cause of death in India with 3.7% of all deaths occurring due to the cause.[3]

With a population of over 1.4 billion people,[4] the mere facility of proper sanitary conditions in medical procedures can save millions of lives and Ecosteria is an effort that can act as a stepping stone to make this a reality.

A similar demographic is seen in the world data as well. Overall, reports show that progress in improving survival rates has stagnated since 2015, with around 290 000 maternal deaths each year and a staggering 2.3 million newborn deaths, which are deaths in the first month of life.[5]

2.Reasons of Healthcare Infrastructure and Delivery

Taking a look at the healthcare infrastructure in India, data reflecting revenues of healthcare financing schemes-entities that provide resources to spend for health goods and services in the health system, show that 59.24% of healthcare facilities come from household incomes,[6]only a smaller fraction of which can be contributed by rural families due to low incomes. Under such circumstances, it becomes essential to provide quality healthcare at affordable costs. The global data also shows similar patterns. Over 1 billion people worldwide are at risk of falling into poverty due to out-of-pocket health spending of 10% or more of their household budget.[7] Additionally, the betterment of healthcare facilities only by improving of practices and conduct in healthcare and with the advent of innovative

and affordable medical devices, an estimated 75% of the projected health gains from the Sustainable Development Goals could be achieved through primary health care.[7]

3.Reasons of Energy Supply

Reliable energy supply too plays an important role in the steady operation of medical equipment. Globally,733 million people don't have access to electricity which is about one in ten people worldwide.[8] In India, although all villages have been electrified under governmental schemes, but this supply is usually erratic in nature. Till October 2021, State-wise Average hours of power outage in a year varied considerably in different states, from less than a hundred hours in a state and more than a thousand hours in another. On an average, rural areas face about 397 hours of power outage every year, resulting in unreliable power supply.[9]

Decoding the Myths of Childbirth

It is widely observed that the social dynamic in rural regions is such that many families and mothers are still unaware of legitimate medical practices during childbirth. This stems from a lack of interference of bonafide medical professionals, with traditional birth attendants or "daai" as they are referred to India, still assisting rural women during childbirth. Even when a woman goes into labour, her wellbeing and safety are hindered by non-scientific myths that command her actions. For instance, it is commonly believed that a woman should not give birth during an eclipse as it is highly inauspicious and can cause deformities in the newborn. Similarly, during the birth of the fifth or sixth child of the mother, she often feels that she may complete her daily chores and then seek medical support for delivery which is even after the rupture of the amniotic sac. Another such myth dictates that a baby should strictly be born after nine months and not a day prior due to the belief that the child will be unwell throughout their lives. Such delay causes the death of the child and also severe infections to the mother.

In many cases, ailments and deaths of the mother and child are easily preventable if adequate medical equipment and facilities can readily be made available to patients in a time of need. With an increase in awareness and that of innovation in healthcare facilities the gap between the patient and their treatment can be reduced drastically.

CONCLUSION

The well-being of the mother and child is vital for creating a healthy and capable society that is able to live up to its full potential. In a fast-paced world with the enhancement of amenities and various types of technology, even in the healthcare sector, it is now important that we lay emphasis on innovative and sustainable medical technology that bridges the gap between the patients' needs and financial capacities. This need is quantified through multiple reasons such as that of Mother-Child Health, healthcare infrastructure and in some cases the lack of reliable energy supply. Annually, there are millions of deaths due to poor hygiene conditions in surgical interventions, a contributing factor to which is the lack of proper sterilization of operation theatres and tools. Ecosteria is one such effort which must be considered as a preliminary effort to a movement that brings about the advent of innovative and sustainable medical technology that revolutionizes the healthcare sector and advocate for the good health and well-being of people worldwide.

Declaration by Author

Ethical Approval: Not Applicable

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Conflict of Interest: No conflicts of interest declared.

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