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## Environmentally Friendly Operative Room (Green Operative Theater) Initiative

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## Environmentally Friendly Operative Room (Green Operative Theater) Initiative

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### Abstract:

This initiative is one of the outputs and practical solutions in the face of climate change and was launched at the third international conference of Al-Azhar University for sustainable development under the title “Climate Change Challenges and Confrontation”. In the session that discussed climate change and its impact on health, this initiative was innovated and presented by Senior Author and was adopted as one of the solutions’ outcomes.

Furthermore, Al-Azhar University adopted this initiative to implement it in university hospitals and spread its idea throughout the Egyptian country and across the world in order for humanity to unite together in facing climate change and limiting its effects and impacts on humanity. Surgeons of various specialties, including plastic surgeons, are motivated by the effects of climate change, to think of initiatives and solutions that lead to the optimal use of resources and sustainable development while preserving the environment for future generations.

This initiative focused on how to pay attention to small steps in the health system and in daily practice in operative rooms in order to promote green health, preserve the environment and reduce the impact of climate change as well as sustainable development.

Al-Azhar University’s interest in such initiatives comes in light of the global trend to preserve the environment and sustainable development and the convening of the World Climate Summit COP27 for the year 2022 in Sharm El-Sheikh in Egypt.

**Keywords:** *Operative Room; Climate Change; Initiative; Green Theater.*

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### INTRODUCTION

Global warming directly affects all economic, social, health and environmental sectors, and the phenomenon is mainly human and secondarily natural. So, the whole world is turning to provide environmental solutions to reduce the impact of environmental pollution and confront climate changes. Egyptian state is preparing to host the COP 27 World Climate Summit for 2022.<sup>1,2</sup>

In this regard Author launched the “environmentally friendly operative room initiative” (Green Operative Theater), which was one of the outcomes of the Third International Conference on Sustainable Development under the title “Climate Change,

Challenges and Confrontation”. Conference was held under the patronage of President Abdel Fattah El-Sisi and in the presence of His Eminence the Grand Imam Ahmed El-Tayeb, Sheikh of Al-Azhar.<sup>1</sup>

Surprisingly, operative theater is resource consuming room and results in pollution emissions from anesthesia gases and burning plastics and other waste used in the operative room. Hence the idea of the initiative “environmentally friendly operative room” (Green Operative Theater) Helmy’s initiative.

### MAGNITUDE of the Effect of Operative Theater On Climate Change And Resources Sustainability

The operative room is one of the biggest causes of environmental problems and therefore a cause of global warming and climate changes as well as it is considered a large resource-consuming room (energy of all kinds).

Basically, the operative room consumes a very large amount of water and electricity, whether in air conditioning or anesthesia machines, lighting.

Furthermore, it consumes a quantity of surgical disposable materials, plastic devices, and many consumables for each surgical operation, that produce huge medical waste.

Consequently, the burning of these wastes results in a quantity of gases emissions, the most important of which is carbon dioxide, the biggest component of global warming, along with methane and other harmful gases.

Statistically, Operative room and delivery room waste alone accounts for nearly 70% of hospital waste. Healthcare facilities are the second largest contributor of waste in the United States, generating more than 6,600 tons of waste per day and more than 4 billion pounds of waste annually.<sup>3</sup>

Each ton of municipal solid waste incinerated typically releases between 0.7 and 1.7 tons of CO<sub>2</sub>. This includes fossil carbon dioxide emissions (e.g., from burning plastics) and bio-carbon dioxide (e.g., from burning wood, paper, food).<sup>4</sup>

If the output of medical waste, according to one of the scientific reports published in 2011, in the United States of America only, is 6,600 tons of medical waste per day, and more than 2,409,000 tons of waste per year.<sup>3</sup>

Mathematically, then the number of polluting emissions with a simple equation in average 1.2 tons of CO<sub>2</sub>/one ton of waste, is a product of 6600 tons of waste x 1.2 = 7920 tons of CO<sub>2</sub> daily and x 365 day = 2,890,000 tons of CO<sub>2</sub> yearly in USA alone !

Clearly, this means adding at least tens of millions of tons of carbon pollution annually in the world from medical waste that comes mainly from operative rooms, in addition to the pollution resulting from daily human and industrial activities.

The key-facts published on the WHO website states that; the total amount of waste generated by health care activities, about 85% is non-hazardous public waste, and the remaining 15% is a hazardous substance that may be infectious, toxic, or radioactive. The World Health Organization also, reports an estimated 16 billion injections are made worldwide each year, but not all needles and syringes are disposed of properly after that. Open Disposal of medical waste by incineration, in some circumstances, can lead to the emission of dioxins, furans and particulates.<sup>5,6</sup>

The negative economic and health impacts of operative room are not limited to the gas emission that results from waste products incineration, but extend to waste of resources, especially in poor countries that depend on water and betadine in surgical scrubbing for surgeons, nurses, and trainee.

Interestingly, An African study was conducted to estimate the average water consumption during surgical hand scrub found that; The total volume of water used for washing was 200,283 liters to proceed on 3305 surgeries in the operative room. When it was necessary only 58,498.5 liters (29.2%).<sup>7</sup>

Furthermore, the electricity that is used to light the operative room and the corridors leading to it, to operate equipment, air conditioning and other energy requirements that there is no space to list in great details.

Actually, it is a colossal waste of resources if we know that another study<sup>8</sup> in 2008, estimated the number of surgeries performed annually around the world at 234.2 million of major surgeries!

Evidently, the pollution production that comes from incineration of 6,600 tons of waste per day in USA, is considered the second pollution production (next to the food industry). It also produces about 10% of all emissions of greenhouse gases and various pollutants known to adversely affect human health.<sup>9</sup>

Clearly, the activity of the operative room affects the consumption of resources (energy and water), their unsustainability, and the need to rely on unclean energy sources to meet the demand. The output of combustion of operative room waste - Like other causes of pollution - it affects humans with asthma, allergies, respiratory and digestive problems, as well as skin and eyes diseases.

### DETAILS OF THE INITIATIVE AND STEPS TO IMPLEMENT IT IN PRACTICE.

This initiative of an environmentally friendly operative room or a green theater is based on five main axes. When each of them is implemented, Health personnel will obtain noticeable environmental benefits and resource sustainability. That results in light of the current conditions facing the world in terms of the climate change crisis and the lack of resources available for development.

The first axis in the initiative is to replace the water used for scrubbing for the surgical teams with modern sterilization methods such as the use of rub-in hand disinfectants as Sterillium.

Simply, it is possible to completely disinfect hands with a small portion of Sterillium and wait for a minute and a half, this results in an efficiency in disinfection.

Expectedly, this practice results in rationalization of water sustainability as it is an important resource for all human activities.

Possibly, such practice might be safer in future because of the expected changes in water components as a result of climatic changes. The mutation of microbes and viruses, their migration in rivers, transfer from one environment to another are theoretically expected as a result of floods, temperature changes, humidity, and wind activity.

The second axis is the surgeon's practice of local anesthesia instead of general anesthesia whenever possible.

The use of local anesthesia may be common practice among plastic surgeons,<sup>9,10</sup> but it is not so with many other surgeons. The use of local anesthesia results in the absence of anesthetic gas emissions and a significant saving in the energy consumed in anesthesia machines. This practice also leads to a reduction in consumables resulting from anesthesia waste.

The third axis is to reduce the use of plastic medical consumables in the operative room as much as possible. In the operative room, many plastic consumables derived from the petroleum industries are used, and they represent unclean energy.

Actually, a lot of scrub dressings and towels, syringes, catheters, drains, cannulas, and the remains of surgical threads are wasted, all of which are plastic

consumables that end up incineration in medical waste.

The return to use re-sterilized cotton tissues for the clothes of the medical team and patients, operation brushes and sterilization towels may represent a return to the old! But it is definitely better for the environment and resistant to global warming. If a comment raised; this cotton materials that could be used in toweling's, etc., require re-washing with quantities of water before re-sterilization! The answer is it is certainly the least of the two harms.

Certainly, washing clothes with some water is less dangerous to the environment than burning huge medical waste. Modern technologies can reduce the quantities of water used in washing methods before re-sterilization.

The fourth axis is rationalizing electricity consumption, conserving the energy used in the operative room. That means not using any equipment except when needed.

Truly, simple measures like turning off the side lights on the theater's corridors leading to the operative rooms, as well as turning off the lights of unused operative rooms and corridors in hospitals are very wise practice.

Importantly, this practice reduces the need for electricity obtained from unclean energy resources such as petroleum derivatives. Unclean energy resource are major causes of global warming as they already heavily used in daily human activities and multiple industries.

Finally, the fifth axis is the dissemination of green theater culture and general guidelines. That should not only target to the surgical team, but to all health personnel and to the management leaderships of health institutions. The set of strict rules for best dealing with and management of health and pharmaceutical waste is not an option now.

Globally, it is necessary to adopt such initiative and the best technological methods for the incinerators used to burn surgical waste, and to devise safer ways to dispose of these wastes.

#### **STEPS to activate and implement this initiative**

1 -Dissemination of this initiative by awareness that targets surgery and health sector workers locally and globally.

2 -Issuing a written guide, videos, film materials, and digital production that explains the importance of the initiative and how to implement its developed axes and strategies.

3 -Setting guiding rules that could be a legal and part of ethical practice.

#### **CONCLUSION**

Environmentally friendly operative room initiative" (Green Operative Theater) focuses on how to pay attention to small steps in the health system and in daily practice in operative rooms. Definitely that promotes green health, preserve the environment, and reduce the impact of climate change as well as sustainable development.

Really, these measures will reduce carbon emissions from operative room activity to the minimum degree

and will reduce the negative effects on the environment and public health.

Conflict of interest : none

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