Effective UV-C (Ultraviolet) Air Flow Disinfection System for Burn Patients outside Intensive Care Unit

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***Abstract*— In the face of an epidemic, it has become apparent how crucial premises disinfection is to our lives. Microorganisms in the air are as hazardous as coming into contact with an affected person. Patients with serious burns or infectious diseases require medical treatment. Infection of healthy tissues surrounding the wound needs surveillance and infection control, and it is followed by increased concentrated warmth, pain, or discomfort. That's why it necessitates the deployment of a disinfection system capable of purifying the air containing germs and viruses and delivering high air quality to the patient's room. The work presents a system, specifically designed for patients who require special healthcare services along with pure and healthy disinfected air, in order to survive their disease and be protected from microbes and viruses. A comparative study was done to evaluate the effectiveness of the system using nutrient agar medium and 2 hours of sterilized air to eliminate all microbes. There was no bacterial growth on the dish.**

Keywords*— Ultraviolet, UVC, air disinfection system, intensive care unit, burn patients, effective disinfection system.

I. INTRODUCTION

Multi-resistant airborne infectious agent strains have developed around the world over the past decade. Moreover, sterilization and purification to reduce microbial hazards to persons gathering within premises have been valued in light of the confirmed increase in bioterrorism threats. The best economic strategy is to sanitize the places in which most germs thrive, like windows, their locks, the flooring, objects, furniture, and so on, on a regular basis. UV-C radiation, which is routinely utilized within air ducts to disinfect the air, can assist in avoiding such diseases and viruses. This is the safest way to use UV-C radiation because direct UV-C exposure to human skin or eyes may cause injuries, long term exposure can lead to damage to skin or eyes, and installation of UV-C within an air duct is less likely to cause exposure to skin or eyes. The other control module was created to allow UV light control by the high-level management system. Ultraviolet radiation inactivates viral, bacterial, and various pathogens, preventing them from replicating and potentially causing illness [1-4].

For more than 40 years, Ultraviolet light has been used frequently to disinfect surfaces in general, including liquids, air, labs, medicinal products, and housing equipment. Ultraviolet germ reduction mostly utilizes ultraviolet (UV-C) light, even though the term "ultraviolet" refers to any light rays with a wavelength around 100 to 400 nanometers. The UV-C wavelength range is 100–280 nm, and the ultraviolet germ reduction wavelength range must be 250–270 nm, with the highest efficiency occurring at 265 nm [5]. The ozone layer absorbs the UV-C rays that the sun emits, while the UV-A and UV-B spectral bands that reach the Earth's surface are less energetic. Ultraviolet germ reduction, which is known to inactivate airborne and surface-based bacteria, has been utilized in healthcare facilities for years to inhibit their development and multiplication when inhaled or aspirated. Because nucleic acids such as DNA and RNA absorb UV-C radiation extensively, it is an efficient method of killing infections because it induces large changes in their nucleic acids, preventing them from carrying out critical metabolic activities [6,7].

Airborne microbes and allergens pose a far greater risk to people's health than other kinds of microbes in terms of total incidence and total healthcare costs, but there are significantly fewer air disinfection mechanisms in use than liquid and other sterilization mechanisms, and Airborne UV disinfection has significantly less relevant information than water applications.

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