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High efficiency particulate arrestor filter Golden half hour for prevention of surgical site infections

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ABSTRACT - The prevention of nosocomial infections and surgical site infections is a major focus of the discipline of infection control. Any method can be used to propagate an infection, including blood, oral fluid, other fluids, surfaces, tools, air, etc. Air is the most abstract way of disease transfer. 99.97% of all particles larger than 0.3 microns in diameter may be removed by the HEPA (High-efficiency particulate air filter). However, it takes time for the HEPA filter to start lowering the microbial load in the air in the room. In this study, we examined the amount of time the HEPA filter needs to operate in order to prevent any development on a culture plate. We were able to stop any development on the culture plate after 30 minutes, highlighting the need of turning on the HEPA filter 30 minutes before surgery for the greatest benefits in preventing surgical site infections.

INTRODUCTION - An important field of study called infection control focuses on stopping nosocomial infections as well as surgical site infections. Any method can be used to propagate an infection, including blood, oral fluid, other fluids, surfaces, tools, air, etc. Air is the most abstract way of disease transfer.

Four technologies that target the decontamination of air are:

1. Filtration or decontamination - Through high-efficiency particulate arrestor (HEPA) filters.

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2. Ozonisation — It charges the air with tremendous voltage. This causes nearby oxygen atoms to separate, resulting in the production of the ozone isotope. The highly reactive ozone molecules react with germs when they come into touch with them, rendering them harmless. However, the quantity of ozone needed to eliminate airborne germs would be hazardous to both medical professionals and patients' health.

3. Ionization - It projects negatively charged ions into the atmosphere using charged electrodes. These negatively charged ions draw to the airborne bacteria, making them heavier and causing them to precipitate onto surfaces. The germs aren't wiped off throughout this procedure, though. They are still alive and need to be treated further using a more traditional disinfection method.

4. Air sterilization — through the use of UV rays. All bacteria and viruses have their DNA ruptured, rendering them sterile and unable to procreate.

The physical removal of airborne particles through filtration is a crucial step in establishing acceptable indoor air quality. Additionally, it is said that the operating room's air exchange rate needs to be greater than 20 times per hour in order to maintain air cleanliness over the long term (NABH protocols 2018). Different filtering methods, including carbon, HEPA, or combinations like a carbon/HEPA filtration unit, are used by air purifiers. HEPA is the best air filter for airborne particles, whereas carbon filters work best for chemicals and odours in the air.

High-efficiency particulate air (HEPA) filters send air over the operating table in a single direction, typically horizontally over the table from foot to head or upwards from above downward. After passing through HEPA filters, the used air is recirculated. These enclosures provide air that is impressively devoid of microorganisms and particulates. 1,2,3 Large volumes of air may now be cleaned thanks to this innovative filtration technology, making the filtered air essentially sterile. 99.97 percent of all particles larger than 0.3 microns in diameter may be eliminated by the HEPA filter.

MATERIALS AND METHOD - The hospital, research centre, and medical college of DR DY Patil hosted the study. In the operating room, twelve Nutrient agar plates were stored beneath the laminar airflow being filtered by the HEPA filter. The experiment employed the settle plate methodology to assess if HEPA filters were effective in producing nil growth on nutrient agar plates. The agar plates were given sequential names. The nutrient plates were opened sometimes, and the HEPA filter was turned on. Before turning on the HEPA filter, the first plate was opened. This provided information on the colony density in the OT room air. After turning on the HEPA filter, the second plate was uncovered after 10 minutes, but the remaining 10 plates remained covered. After using the HEPA filter for 20 minutes, the third plate was opened to reveal the difference in bacterial quantity in the air load. After 30 minutes, the fourth plate opened, the fifth after 40, and so on. This continued for 110 minutes after the HEPA filter was turned on, when the 12th agar plate was finally unsealed. These plates were kept in the OT for 24 hours before the colonies on them were transferred for pathological investigation. Results from this experiment, which was conducted 15 times on

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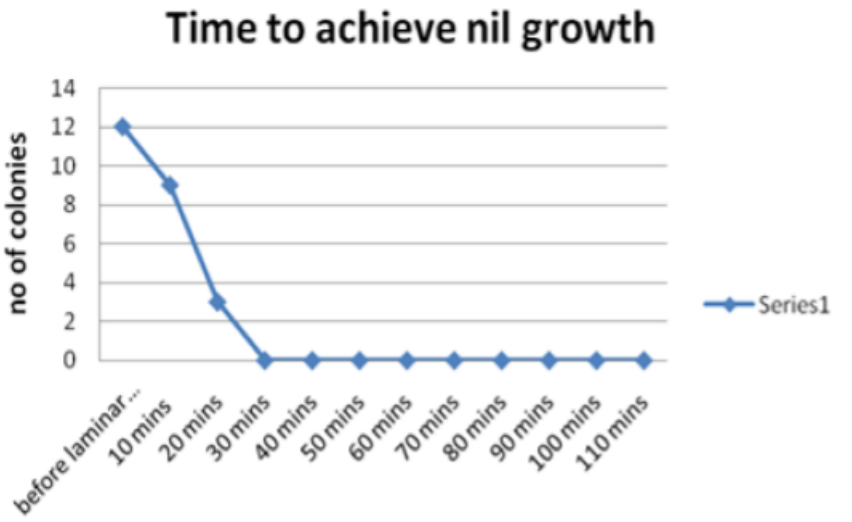
various occasions in the same OT, were analysed. A general surgical OT was used for the trial**.**

RESULTS - Staphylococcus aureus colonies were those that were found. As the air in the OT continued to be filtered by HEPA, the number of colonies found in the succeeding growth cultures remained dropping. A "No growth" report was generated 30 minutes after the OT's HEPA filter commenced. At 20 minutes, the desired outcome of no growth was attained on 4 distinct instances, whereas at 30 minutes, it was accomplished 11 times**.**



CONCLUSION - This study highlights the functioning of HEPA filter in reducing the microbial content in the operation theatre and focuses on the importance of switching it on at least half hour before a case is posted to achieve the best desired results

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