

# The Use of Ultraviolet-C Light Technology as a Form of Controlling the Spread of Infection in the ICU Setting

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## Background

Infections among hospitalized patients in intensive care units (ICU) is an issue that is preventable yet still occurs. Fifty-three percent of pathogens from device-associated infections come from adult ICUs (Bauer & Sampathkumar, 2017). Often times nurses carry these devices such as their scanners and dopplers from room to room without disinfecting them. This leads to the spread of pathogens between patients with the nurse as the carrier. Ultraviolet-C (UVC) light is considered an option for reducing pathogens due to its use of specific wavelengths that breaks down the DNA of microorganisms (Buonanno et al., 2020). The purpose of this study is to test the effectiveness of UVC lighting in reducing the rate of infection among ICU patients.

## PICOT Question

In adult ICU patients (population), does the use of ultraviolet light C (intervention) reduce the rate of infections (outcome) compared to units that do not use ultraviolet light C (comparison) within a 6-month period (time frame)?

## Literature Search Criteria

**Key words:** Ultraviolet light, Infection control, MRSA, COVID-19, ICU, Adult ICU

**Database:** CINAHL complete, PubMed, Google Scholar

**Article selection criteria:** Published in the last 5 years (2017-2022), published in English, published in academic journals, peer-reviewed



## Synthesis of Findings

- UVC light can be used to reduce microorganisms from high touch surfaces and to inactivate airborne viruses without causing biological damage to human cells (Buonanno et al., 2020, Casini et al., 2019).
- Using UVC light in the ICU setting to reduce cross contamination from high touch surfaces has been shown to enhance patient safety and improve outcomes (Casini et al., 2019, Gostine et al., 2020)
- UVC light can be used to reduce surface pathogens and thus infection in the ICU setting. UVC lighting has the ability to reduce infection risk by 27.8% for MRSA and has a charge reduction of 99.9% for SARS- CoV-2 after three minutes of operation. Utilization of the UVC light has shown to be an effective measure for disinfecting ICU spaces and decreasing potential infections (Lugo et al., 2020; Messina et al., 2021; Gostine, 2020)
- UVC light has exhibited as a helpful tool for irradiation-based sterilization. It has shown to significantly reduce the viral titer of COVID-19 on surfaces of the ICU at 99.99%. It's been encourage for use in the ICU due to rapid reduction of pathogens: 99.99% reduction in 10 minutes of exposure (Gidari et al., 2021, Messina et al., 2021)



## Decision to Change Practice

- A considerable amount of research demonstrates that UVC lighting has the capabilities of reducing the infection rate in ICU settings. This will therefore reduce the number of complications in ICU patient care.
- Implementation will begin with an education course for hospital staff on the utilization on UVC lights for infection control. It will include benefits of UVC lighting and when to use it for therapeutic patient outcomes.
- Research has shown that UVC lighting aids in decreasing the length of patients' stays at the hospital due to its abilities to eliminate pathogens, including drug-resistant organisms, from high-touched surfaces. This reduces cross-contamination and improves patient outcomes.

## Evaluation

- The outcome we are looking for is a reduction in acquired infections among ICU patients by implementing UVC lighting into the ICU hospital setting.
- We will measure the effectiveness of UVC lighting in improving patient outcomes by monitoring the difference in hospital-acquired infection prior to UVC light implementation to after the implementation of UVC light in the ICU as a tool for reducing surface pathogens.
- UVC lighting will be implemented and tested over the course of 6 months. During the 6-month time frame, infection rates and the number of infection cases will be documented. Therapeutic responses to the implementation of UVC lighting will demonstrate a reduction in the number of acquired infections among ICU patients by at least 8%.
- Staff members a part of the UVC light education course will have an increased knowledge of the utilization of UVC light.

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