

Klaran UVC LEDs for Disinfection in Healthcare



Concern about the incidence of drug resistant pathogens, hospital-acquired infections (HAIs), cost of hospitalization and an aging population are converging to change the healthcare landscape from one of centralized care to a more distributed model.

Device manufacturers and innovators attuned to these trends are looking to provide higher automation and patient safeguards for both installed systems at the hospital and a new class of portable devices to provide quality care within this new healthcare paradigm.

As the network grows beyond a controlled hospital setting, it becomes critical that devices become lightweight, robust, easy-to-use and cost effective without impacting effective care and patient safety. In developing areas, this is amplified as the lack of sanitation and public utility infrastructure highlights the need for affordable, mobile disinfection solutions. As the medical device industry and entrepreneurs innovate for the future, ultraviolet (UV) disinfection offers a proven, scalable and effective means to safeguard patients and clinicians against infection.

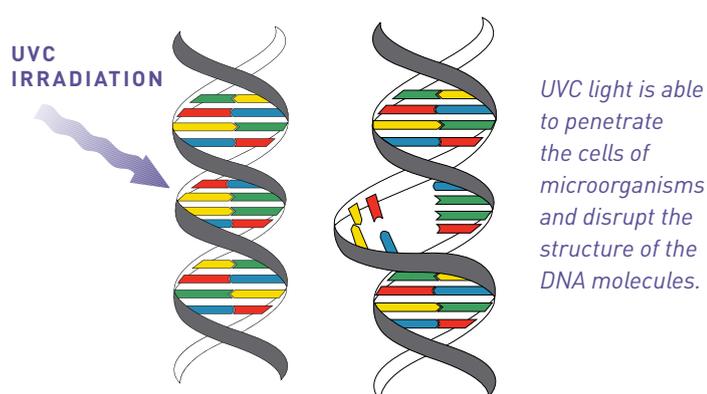


UV DISINFECTION

A proven technology

Using UV light to inactivate pathogens is not a novel technique. In 1903, Niels Ryberg Finsen received the Nobel Prize for using UV rays to treat disease and solve hospital indoor air quality issues by reducing airborne pathogens and preventing communicable infections.

Finsen accessed the deep UV, also known as UVC, wavelengths for disinfection using mercury lamps. Germicidal UVC light, which represents a portion of the UVC spectrum from 250 nm – 280 nm, is proven to destroy nucleic acids within microorganism DNA, thereby rendering them unable to reproduce.



After World War II, UV disinfection using mercury lamps was broadly used in hospitals for air disinfection along with disinfection of water and surfaces in other consumer industries like food processing and water treatment plants. However, during the 1960s as hospitals adopted chemical wipe protocols and advanced antibiotics surged, the practice of using mercury lamps for UV disinfection fell by the wayside.

UVC LEDS

A renaissance in disinfection

Today, the concern for HAIs, potential for cross-contamination, increasingly restrictive reimbursement models, and rise of superbugs has spurred the exploration of new methods of infection prevention. In addition, in the same way that distributed energy generation like rooftop solar challenged the paradigm of central power generation, so the notion of distributed care is challenging the paradigm of hospitals as a first line of service.

Against this, the medical device industry is re-examining the role UVC light can play in the fight to control infection and as a solution to these promising new market challenges. However, the mercury lamp is no longer the sole source for germicidal UVC wavelengths. Innovators are instead turning to UVC light emitting diodes (LEDs) to enhance disinfection protocols, enable new product innovation, and achieve healthier environments for both patient and clinician.



UV Lamps Versus UVC LEDs

LEDs that emit light in the UVC wavelengths from 250 nm – 280 nm provide significant design advantages over traditional mercury lamps. Not only are they compact and durable, they also provide product innovators with greater flexibility and creativity over the system footprint, portability and application of UVC light.

UVC LEDs offer

- » Instant on/off
- » Shock resistant, durable packages
- » A directional emission pattern with no forward heat

DESIGNS USING MERCURY LAMPS VERSUS UVC LEDs

	Designs using Mercury Lamp	Designs using UVC LEDs
Operation	Warm up time required for on-demand disinfection, consequently most systems are left on even when disinfection is not required.	System is turned on only when needed for disinfection—without requiring a warm up or cool down period
Package	Fragile glass envelope must be enclosed in a shock resistant package to reduce the risk of lamp breakage. As the lamp is a long, cylindrical shape, the disinfection unit must conform to the lamp footprint.	Durable package without any hazardous materials enables portable and mobile units. The small footprint of the LED allows the disinfection to conform to the target—not the other way around.
UV Light Dispersion	Lamps emit light and heat in a full 360-degree pattern, so units use thermal filters and baffles to protect surfaces and patients from unwanted heat and direct UV radiation.	LEDs have directional emission with no forward heat, so the LEDs can be pointed at the sole target for disinfection, easily avoiding unwanted exposure to UV wavelengths.

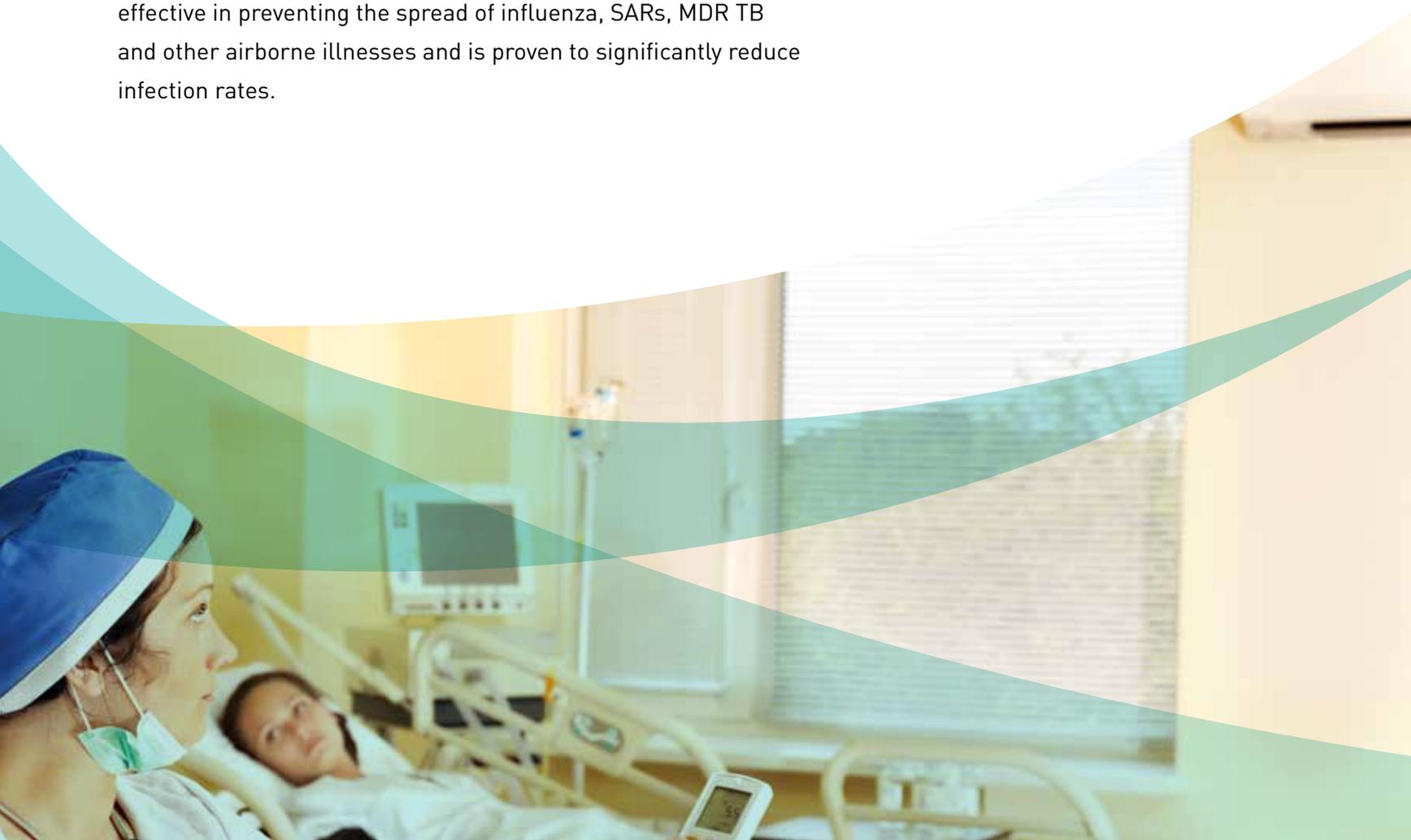
Klaran UVC LEDs in Air Disinfection

Ultraviolet germicidal irradiation (UVGI) can be used to reduce airborne pathogens in healthcare environments and is primarily delivered in two types of stationary systems—in-duct units for airstream disinfection or upper-room installations to prevent infection transmission within a confined space. Upper room UVGI units eliminate airborne pathogens within a space and are especially advantageous when the source of infection is localized.

While in the United States, transmission of airborne pathogens such as multi-drug resistant tuberculosis (MDR TB) have been successfully tackled with the implementation of controlled mechanical ventilation systems, outside the US there exists a far higher incidence of poorly ventilated treatment centers. UVGI is effective in preventing the spread of influenza, SARs, MDR TB and other airborne illnesses and is proven to significantly reduce infection rates.

KLARAN ENABLES MORE EFFICIENT AIR DISINFECTION SYSTEMS:

- » Directional emission ensures that light can be redirected from room occupants without baffles, using all the energy emitted from the LED for disinfection
- » Small footprint allows for better uniformity of disinfection which reduces “cold” spots, particularly in irregular shaped rooms



Klaran UVC LEDs in Surface Disinfection

Keeping hospital rooms clean is important to prevent the spread of infection from one patient to another. However the cleanliness of surfaces extends beyond surgical instruments and diagnostic tools to devices like stethoscopes, catheters, and portable or mobile electronics. By employing UVC disinfection as a part of their disinfection protocols, hospitals are increasing the safety of patients, healthcare professionals and directly reducing the risk of HAIs.

Additionally, the healthcare landscape continues to evolve as first line patient care transitions out of hospitals to pharmacies, urgent care centers and even home care. The exposure to a broader microbial footprint requires robust, effective and easy-to-use devices suitable for a new generation of healthcare providers and caretakers.

KLARAN FACILITATES INNOVATION IN SURFACE DISINFECTION:

- » Small footprint, durability and low power requirement enable portable, battery-run disinfection devices
- » Directional light output enables for complete disinfection of irregular shapes and surfaces
- » Instant on/off supports programmable, timed operation for ease-of-use

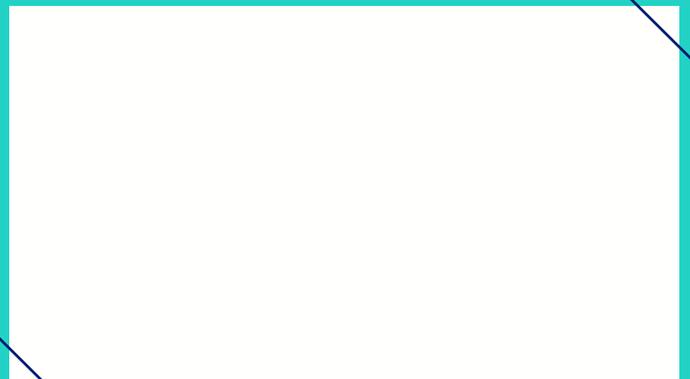




THE UVC LED SOLUTION

Crystal IS manufactures high performance UVC LEDs that are integrated into our customers' products to disinfect water, air and surfaces in a variety of applications. These UVC LEDs are manufactured on our low-defect density, single crystal aluminum nitride (AlN) substrates and our proprietary technology in crystal growth. The resulting devices have higher light output and greater reliability than other commercial UVC LEDs.

Discover how UVC LEDs can help today. Contact us.





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