Point-of-use water disinfection system

Country of origin | United States of America

Health problem addressed

Worldwide, gastrointestinal illness (GI) is estimated to cause over 1.5 million deaths annually. In addition, an estimated 4 billion cases every year make GI the third highest cause of morbidity globally. Unsafe drinking water is recognized as one of the major pathways responsible for the transmission of GI causing pathogens.

Product description

The UV tube is easy to operate and maintain point-of-use water disinfection system that uses ultraviolet light to inactivate pathogens at a fast flow rate of 5 liters per minute, without producing unpleasant or harmful disinfection by-products. The UV Tube is appropriate for households, schools, clinics, and small communities.

Product functionality

The UV tube uses a 15 watt germicidal lamp to deliver a UV-C (254nm) dose of 900 J/m^2 to inactivate virus, protozoa, and bacteria suspended in water.

Developer's claims of product benefits

The UV tube was developed by an interdisciplinary team of students and professors, who recognize that a wide array of safe water options are urgently needed in order to address the severe and widespread health problems caused by drinking water contaminated with pathogens. Through rigorous laboratory and extensive field testing, the UV Tube was designed to be an effective, easy to use, low-cost, and adaptable point-of-use safe water solution. The dose is more than twice the minimum recommended by the US NSF/ANSI Standard 55, providing a safety factor that guarantees its effectiveness even in certain non-ideal conditions.

Operating steps

To disinfect water, a user has to: (1) turn on the switch; (2) confirm that the lamp is on; (3) open the water valve; (4) wait for the safe storage container to fill up, 1 minute for each 5 liters; (5) close the water valve; (6) drain the system; (7) turn off the switch. No consumables required, but every 1-3 years some components need replacement.

Development stage

The product was validated in the laboratory and a prototype tested in 24 households in Mexico in 2005. Positive water quality and user acceptance results led to piloting the technology in 150 households, 3 schools and 13 communities between 2007 and 2008. Successful results motivated the development of a scalable model in 2009. In 2010, 450 household systems were installed in Mexico as part of a stepped-wedge cluster randomized trial. In 2011 the UV tube will be installed in at least 8 schools and 38 community systems serving approx. 10,000 people.

Future work and challenges

As most water treatment technologies seeking to make real improvements, the device must be implemented as part of a program that allows for needs assessment; adaptation to local conditions; hygiene education; operation and maintenance training. For this reason, we see the UV tube being scaled up through partnerships with institutions, organizations, and/or companies that have local presence and are committed to improving the health of the populations they serve.

User and environment

User: Self-user, family member, nurse, technician

Training: Although the system is easy to use and most people can learn how to operate it from a manual, it is recommended that they participate in a basic (20-30 minute) training session

Maintenance: Trained nurse / community member, technician

Environment of use

Requirements: Access to electricity. The product consumes 20 watts. To disinfect 1,000 liters it only uses 0.1 kilo watt hours of electricity. The source can be direct current (e.g. 12-24 volts from a solar powered battery) or alternate current (e.g. 110-220 volts from the grid). If water is turbid or contaminated, pre-disinfection filtration is required.

Product specifications

Dimensions (mm): 600 x 150 x 150

Weight (kg): 3

Life time: 3-5 years

Retail Price (USD): 45

Other features: Reusable, can run on batteries.

Year of commercialization: 2009

Currently sold in: Mexico, but projects can be established in new countries.

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