

Klebsiella Pneumoniae Experience in an Urban Panamanian Hospital: Environmental Decontamination and a Role in Reduction of Hospital-acquired Infection Rates

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ABSTRACT

Issue

Pan-American Health Organization (PAHO) and US Centers for Disease Control and Prevention (CDC) recognize the role multiple, drug-resistant organisms play in increasing patient morbidity and mortality.

In response to increased nosocomial MDRO (*Klebsiella pneumoniae*, AB, *pseudomonas aeruginosa*) incidence in a Panamanian hospital, the Ministry of Health implemented programmatic approaches to infection prevention and control in that facility. These included intake screening, restricted visits, hand-hygiene programs, VAP-BSI-UTI bundles, placement of UVGI devices in the HVAC system along with employment of PAHO and CDC guidance for surveillance, cleaning, and monitoring of surface decontamination.

Prior to implementation of the above protocols the hospital infection rate was 45-50 infections per 1,000 devices over 10 years.

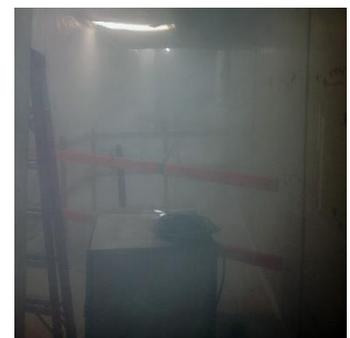
After implementation of the infection prevention and control protocols, results were reduced to 15 infections per 1,000 devices. These results were prior to the implementation of the SteraMist™ protocol.

Project/Methods

A key intervention employed in certain areas of the facility was extensive cleaning and decontamination in critical patient care areas (ICU 3 & 5, semi-intensive care, ER, delivery room, and medicine room) after patient isolation, limited use of surgical suites and transfer of patients from high-risk rooms until affected spaces could be addressed.

This presentation discusses a protocol using SteraMist™ for application of activated (ionized) hydrogen peroxide mist and fog (along with manual reduction of biomass/bio-burden on surfaces) for room decontamination as an adjunct to the infection prevention and control methods previously discussed.

More traditional (manual) terminal cleaning methods had been previously proven to be ineffective. Following development of specific SteraMist™ cleaning (mechanical) protocols, efficacy of decontamination was independently investigated and evaluated by the Ministry of Health using laboratory-based microbiology culture techniques.



RESULTS

Results before and after SteraMist™ protocol was implemented, results of the pre and post lab studies revealed the following, a significant reduction of various bacteria on critical surfaces:

Ventilator - 2,500CFU/50cm² to <1 CFU/50cm²; Enterobacter cloacae.

Food table - 1,400CFU/cm² to <1CFU/cm²; and Enterobacter cloacae.

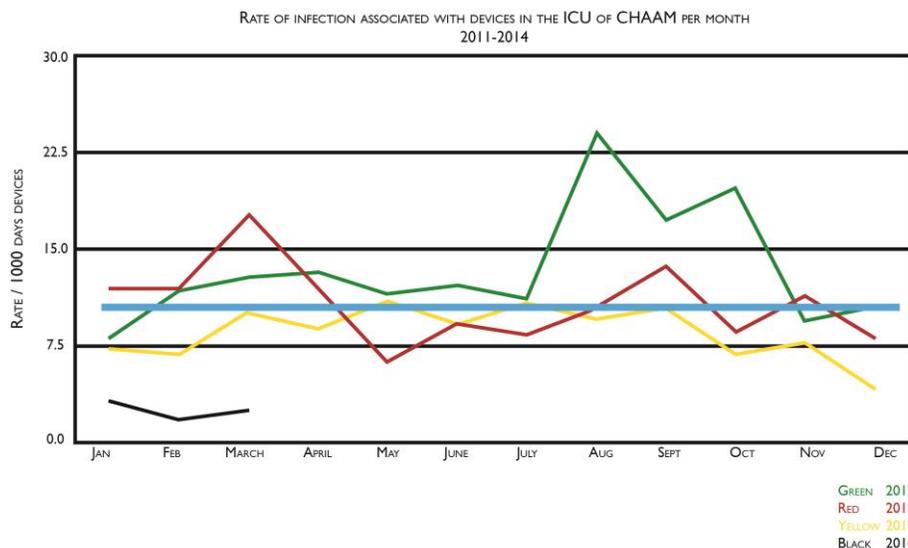
Food table - Citrobacter freundii 310CFU to <1CFU).

In the year prior to the SteraMist™ program implementation, the Ministry of Health detected 71 cases (40 fatalities) of Klebsiella pneumoniae and 65 (28 fatalities) additional cases in the month prior to the implementation of the SteraMist™ protocol.

The Ministry of Health reported that in the 2 months following implementation of SteraMist™, only 6 new cases were detected. Surveillance conducted 8 months later showed no new cases in the 2-months observed.

The hospital has also reported:

1. Current hospital overall rate for devices is 5 infections/1000 devices.
2. Current overall rate for VAP and UTI are 8 infections/1000 devices.
3. Current hospital rate per BSI are lower than 1 case per 1000 device days.
4. In their NICU unit from, October 2013 - end of April 2014, Zero (0) infections.
5. Demonstrable reduction in patient morbidity and mortality from HAI's.
6. ROI (20-1) on investment of over 30 million U.S. dollars.
7. The few cases they have, are no longer MDRO and they are responding to standard antibiotic therapies.



CONCLUSIONS / LESSONS LEARNED

1. MDRO (*Klebsiella pneumoniae*, AB, *pseudomonas aeruginosa*) outbreaks can be managed using a programmatic infection control approach integrating adequate environmental controls and verification, patient screening and surveillance, proper treatment, hygiene, and by replacing manual cleaning with more effective mechanical cleaning.
2. Traditional means and materials intended to clean and achieve sufficient reduction in surface contamination cannot be relied upon in the absence of such a program. Laboratory assay can quantify field efficacy of environmental decontamination and reduced HAI incidence is a metric for overall program effectiveness.
3. Patients with nosocomial MDRO infections become more manageable with traditional antibiotics after instituting certain guidelines including being admitted to rooms that were treated with a SteraMist protocol using activated (ionized) hydrogen peroxide as a base solution to form ROS (reactive oxygen species).

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