

# Nimbus Disinfection Protocol Efficacy Validated by Two Arizona Hospitals for Pathogen Reduction

## ABSTRACT

Healthcare Associated Infections (HAIs) are a huge problem for patients and acute healthcare facilities. The impact of HAIs is detrimental to patient outcomes and increases the cost of provider care. In hospitals alone, the Centers for Disease Control and Prevention (CDC) estimate HAIs account for 1.7 million infections and more than 98,000 deaths each year.<sup>1</sup> Approximately \$45 billion in direct hospital costs are associated annually for the treatment of HAIs.<sup>2</sup> Hospital environment, health care staff, visitors and patient medical conditions are contributing factors to the development of HAIs.

To reduce HAIs, hospitals are employing innovative technology and new cleansers to supplement manual cleaning practices. One disinfectant, Hypochlorous acid (HOCl), is rapidly emerging as an exceptionally effective healthcare disinfectant.<sup>3</sup> A new disinfection protocol using HOCl combines the Nevoa® Inc., Nimbus™ robot with a modified Environmental Services (EVS) cleaning practice. This Nimbus Disinfection Protocol (NDP) has been proven to deliver significant environmental surface pathogen reduction compared to manual cleaning alone.

Nimbus atomizes Nevoa Microburst Solution™, an EPA-registered, hospital-grade disinfectant, whose active ingredient is HOCl. This new protocol using Nimbus atomization is creating a paradigm shift in hospital practice for terminal room disinfection. With customizable atomization cycles and reduced EVS touch labor, every patient room receives the Nimbus disinfection protocol upon patient discharge.

## METHOD

In a recent clinical study conducted at a large, Arizona Integrated Delivery Network (IDN), two diverse, acute care facilities evaluated the effectiveness of the Nimbus Disinfection Protocol and its impact on pathogen reduction. A small, regional hospital (Hospital A) and a large, university hospital (Hospital B) both selected Oncology and Bone Marrow Transplant (BMT) units for evaluating the efficacy of this protocol. Each nursing unit had more than 25 patient rooms and were selected because of the patients' compromised immune conditions and susceptibility to contracting HAIs. Trained EVS staff implemented the Nimbus Disinfection Protocol as part of their terminal, modified cleaning procedure for every discharged patient room over a minimum of five months.

To determine the microbial population present in patient rooms

and the efficacy of the disinfection intervention, Microchem Laboratory, based in Round Rock, Texas, was contracted to conduct environmental surface swab sample analysis. Aseptic swabbing was performed on eight different surfaces per room both immediately after patient discharge and again after disinfection using the Nimbus Disinfection Protocol. Each sample was quantitatively assayed and selectively plated to isolate for MRSA and *C. difficile*. Selective media employed were CHROMagar MRSA and standard *C. difficile* media BHIY-HT. Swabbed surfaces included: bed rail, nurse call remote, bedside table, floor, door handle, bathroom sink, toilet grab bar and visitor chair.

These areas provided an assortment of surface textures and locations that typically harbor bacteria and are sites routinely used in healthcare surface contamination studies.



Nine patient rooms were randomly sampled at Hospital A and eight rooms were randomly sampled at Hospital B. In all, 272 samples were collected and 271 were analyzed (one sample was contaminated during the collection process).

## RESULTS

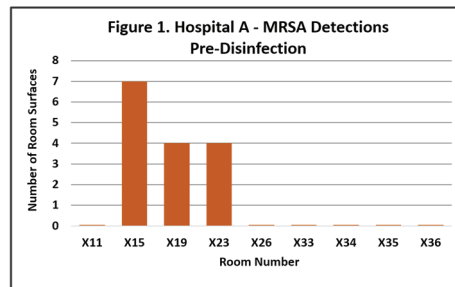
### HOSPITAL A

Prior to the Nimbus Disinfection Protocol, three of the nine rooms sampled (33%) at Hospital A tested positive for MRSA (Figure 1). No patients occupying these rooms at discharge had a MRSA diagnosis. Therefore, the presence of MRSA in these rooms is attributed to human transfer. Of the three rooms which tested positive for MRSA, 63% of the swab sites contained MRSA before disinfection. The visitor chair arm in one room had the most MRSA colony forming units (CFUs), which measured  $9.90E+02$  CFU/Sample.

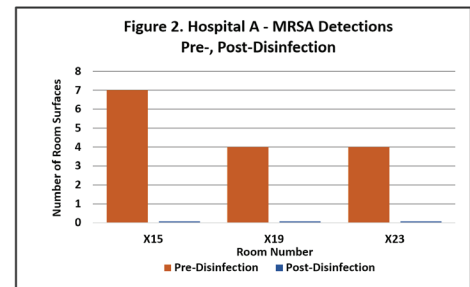
No MRSA or *C. difficile* was found in any sampled room post-NDP (Figure 2). Therefore, in Hospital A, the Nimbus Disinfection Protocol was completely effective.

### HOSPITAL B

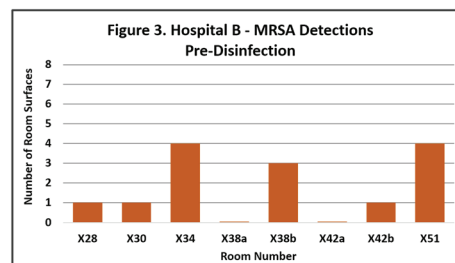
The same eight surface locations were swabbed at Hospital B in eight, randomly-selected patient rooms. At Hospital B, six of the eight rooms swabbed (75%) immediately after patient discharge (before Nimbus Disinfection Protocol) were found to have MRSA (Figure 3). No patients occupying these rooms at discharge had a MRSA diagnosis; again, the presence of MRSA in these rooms is attributed to human transfer. MRSA colony counts were detected in 13 of the 64 samples (20%) prior to implementing the Nimbus Disinfection Protocol. Highest CFU



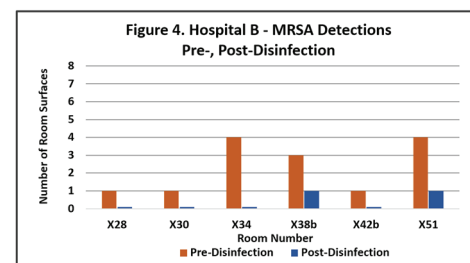
**FIGURE 1.** At Hospital A, nine patient rooms were sampled, and three tested positive for MRSA. Since no patients in Hospital A had a MRSA diagnosis at discharge, the presence of the MRSA pathogen was attributed to human transfer.



**FIGURE 2.** Of the three MRSA-positive patient rooms at Hospital A, the Nimbus Disinfection Protocol was completely effective, eliminating the MRSA pathogen during the disinfection process.



**FIGURE 3.** At Hospital B, nine patient rooms were sampled, and six tested positive for MRSA. Again, no patients in Hospital B had a MRSA diagnosis at discharge, therefore the presence of the MRSA pathogen was attributed to human transfer.



**FIGURE 4.** Of the six patient rooms at Hospital B that tested positive for MRSA, the Nimbus Disinfection Protocol was greater than 99.8% effective at eliminating the MRSA pathogen.

counts pre-NDP were found on a toilet grab bar, which measured  $4.67E+03$  CFU/Sample.

Following Nimbus Disinfection Protocol, only two locations had measurable MRSA CFU detection, and at these two sites, only one (1) CFU was detected during incubation (Figure 4). At this miniscule level, patient risk is negligible. No *C. difficile* colonies were detected. In Hospital B, the Nimbus Disinfection Protocol was greater than 99.8% effective, which is exceptional in real-world hospital conditions.

## CONCLUSION

In two acute-care hospital facilities, known HAI pathogens were found on a significant number of patient room

surfaces immediately following patient discharge. Independent lab analysis of these rooms showed the Nimbus Disinfection Protocol – using the Nimbus robot atomizing Microburst solution, combined with a hospital-determined, modified, manual cleaning process – eliminated pathogens while improving labor efficiencies. Nimbus Disinfection Protocol was proven to be effective for complete whole-room disinfection. To reduce HAIs, this innovative, smart technology should be a required part of a hospital's comprehensive terminal cleaning plan for all patient rooms.

#### Sources

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