Novaerus Study Summary Report

Overview

Canterbury Tower Retirement Community (Canterbury) implemented Novaerus technology in selected areas in October 2015. The Novaerus technology uses Dielectric Barrier Discharge (DBD) plasma system to control airborne infections by eradicating viruses, bacteria, mold, and allergens as well as harmful contaminants such as MRSA, Clostridium difficile, norovirus, and influenza. Canterbury implemented large Novaerus technology units in hallway areas, the dining room, and the activity area in October 2015. In February 2016, Canterbury began implementing individual (small) Novaerus units for each new admission, readmission, and any residents identified with any type of infection.

This study, a non-randomized retrospective observational study, compares nosocomial (facility acquired) respiratory infections at Canterbury before and after the implementations of Novaerus technology. The entire period of review spans 35 months from October 2013 through August 2016. Specifically, this study compares respiratory nosocomial infection counts and infection rates before and after each implementation of Novaerus technologies. Additionally, this study observes the trend of nosocomial infections of respiratory spanning the entire review period.

Methodology

A 35-month review was performed to evaluate the results of implementation of the Novaerus technology. Because the facility implemented two different configurations of Novaerus technology, the review period was lengthened to capture enough data surrounding each implementation. A Nurse Risk Manager Consultant visited the facility for two days to abstract information and to review the following data:

- o Admission, transfer, and discharge data for all residents,
- o Monthly infection control records, reports, and surveillance,
- o Individual resident infection control examination results (x-rays, cultures, etc.), and
- o A map of the facility, which displays selected areas where the Novaerus system implemented.

First, the facility's nosocomial infection counts related to respiratory etiologies were tallied for the period of October 2013 – September 2014, prior to Novaerus implementation. Next, the facility's nosocomial infection counts related to respiratory etiologies were tallied for the period of October 2014 – September 2015, subsequent to Novaerus implementation. The sum totals in each category are compared and the differences presented in percent change. Due to a change in Novaerus implementation beginning February 2016, the facility's nosocomial infection counts related to respiratory etiologies were tallied for the period of February 2016 – August 2016 and compared to similar timeframes in the first two periods. Lastly, the monthly

totals spanning the entire 35-month period under review are presented with a linear trend line (via Microsoft Excel graph). Each metric is reported for house wide surveillance across the entire facility population where the technology was implemented.

The facility infection rates were also calculated and compared for these periods. The facility rate is a measure of incidence density per 1000 resident days. Rates are commonly used in public reporting and quality measures related to infection prevention. They allow better comparison taking into account facility patient volume. Statistical significance for all measures was tested using McNamar's test and is presented in the accompanying Microsoft Excel graphs.

The period selected above for initial aggregate pre-post review reflects the timeframes of October 2013 -September 2014 and October 2014 - September 2015. Data for two consecutive 12-month periods were available and included to account for seasonal variation in respiratory infections in the general population. In order to compare each different implementation design, a period of 7 months (February through August) in each year (2014, 2015, and 2016) was selected to provide equivalent seasonal timeframes for comparison in each of the different configurations of the Novaerus technology.

Conclusion

When comparing **the facility's overall nosocomial respiratory infections,** prior to and after initial implementation of the Novaerus technology, the facility counts **declined slightly by 23%,** although this was not statistically significant.   There was a single month in January 2015 where 15 infections were identified. This number is an extreme outlier compared to the other 34 months, both before and after implementation of Novaerus. After implementation of the individual Novaerus units in targeted patient rooms (February 2016), the **overall number of nosocomial respiratory infections decreased significantly by 93%** compared to the similar period in the baseline year **and 83%** compared to the same period during the previous year. Similarly, the **respiratory nosocomial infection rate** for the three similar 7-month sample periods **declined each year** (2.48, 0.96, and 0.20, respectively). **The overall** (linear) **trend lines show significant steady decrease** (as shown on the accompanying graphs) across the period. Implementation of the Novaerus technology has contributed significantly to the infection control as well as quality improvement efforts at Canterbury. The attached graphs illustrate the above conclusions.

93.33% Reduction

Total Number of Nosocomial Respiratory Infections

- Pre-Novaerus: 15
- Post-Novaerus: 6
- 1

Pre-Novaerus   Post-Novaerus

22.58% Reduction

Total Number of Nosocomial Respiratory Infections

- Pre-Novaerus: 31
- Post-Novaerus: 24

Pre-Novaerus   Post-Novaerus