Surveillance of VAP Prevention Bundle Compliance as a Tool for the Rapid Detection and Control of an Outbreak Due to Stenotrophomonas maltophilia

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ABSTRACT

Background: Starting in May 2014, a combination surveillance method to prevent and detect the re-emergence of VAP, including the infectious disease control team and the ICU staff, was established in our hospital. In August 2014, an increase in the number of cases of S. maltophilia VAP in the ICU was noticed. We used a VAP prevention bundle to control the outbreak.

Study Objectives: The objectives were to establish the efficacy of the VAP prevention bundle and to assess the following: adherence to the bundle, mean VAP rate per 1,000 ventilator-days, and median ICU length of stay.

Methods: The VAP prevention bundle consisted of bronchoscopy, use of chlorhexidine mouthwash, oro-tracheal suction, use of head-of-bed elevation, administration of head-of-bed elevation, parenteral nutrition, use of prophylactic antibiotics, and use of antacid. Calculation of the mean VAP rate per 1,000 ventilator-days was evaluated and analyzed along with the mean ICU length of stay, all during the period of May 2014 to July 2015.

Results: Fifteen cases of S. maltophilia VAP and 170 controls with VAP due to other etiologies were identified in our database. Eight cases of S. maltophilia VAP were related to the 2014 outbreak (figure 1). Table 1. A total number of cases of VAP in the ICU, January 2014 – July 2015.

Conclusions: We found a significant effect of the bundle components on reducing VAP caused by S. maltophilia. The ICU bundle covered the VAP prevention strategies recommended by the CDC and allowed us to detect and control the outbreak after the implementation of specific, targeted preventive measures.

INTRODUCTION

Our hospital is a 188-bed tertiary referral center in Mexico City that offers medical and surgical care and its ICUs are an adult ICU and a pediatric ICU. Starting in May 2014 a bundled approach for prevention of hospital-acquired infections was started. An active surveillance method was used to detect an outbreak of VAP caused by S. maltophilia right from its onset in August 2014. The objectives were to establish the efficacy of the VAP prevention bundle and to assess the following: adherence to the bundle, mean VAP rate per 1,000 ventilator-days, and median ICU length of stay, all during the period of May 2014 to July 2015.

METHODS

A case-control study was designed. Cases were defined as ICU patients with clinical, radiological or microbiological evidence of VAP fulfilling CDC criteria. Controls were ICU patients with VAP due to other etiology. We extended our observations as far back as 2010. We evaluated the following:

- Clinical risk factors for VAP due to S. maltophilia (retrospective analysis).
- Prospective analysis of adherence to the VAP bundle (consisting of tooth brushing, mouth rinses with 0.12% chlorhexidine, head-of-bed elevation to 35 degrees and patient mobilization).
- Environmental cleaning and disinfection procedures (real-time direct observation).

Statistical analysis of categorical values was performed with Chi square or Fisher’s exact test (as appropriate), and U Mann-Whitney test was used for continuous data. A p value less than 0.05 was considered significant.

RESULTS

All of the S. maltophilia isolates were obtained from bronchosalveolar lavage samples and only one was resistant to levofloxacin and trimethoprim/sulfamethoxasulfone. As expected, the median time for isolation of S. maltophilia (considering day 1 as the first day in the ICU) was 24 days (IQR: 12-24) as compared to 10.5 days (IQR: 5-21.5) for other microorganisms. Analysis of clinical risk factors is summarized in table 1.

We plotted the mean percentage of adherence to the VAP bundle against the VAP rate per 1,000 ventilator-days in our ICU for the time period of May 2014 – July 2015. The result is shown in figure 2.

We observed an improvement in the adherence to the individual components of the bundle, as shown in figure 3.

CONCLUSIONS

Known risk factors for S. maltophilia infections were identified in our study (such as prolonged antibiotic use and presence of invasive devices and procedures). The ICU staff observed these factors were not modified in the short term. The VAP bundle adherence tool allowed us to find the reasons underlying the outbreak. The improvement in the adherence rate to simple and low-cost preventive measures was the key to the control of the outbreak in a rapid manner.

REFERENCES


Figure 1. Total number of cases of VAP in the ICU, January 2014 – July 2015.

Figure 2. Relationship between adherence to the VAP bundle and VAP rate, May 2014 – July 2015.

Figure 3. Adherence to individual components of the VAP bundle.