Title: Impact of the Ventilator Bundle on Ventilator Associated Pneumonia (VAP) Rates in Intensive Care Units (ICU).

Background/Objectives: VAP is a serious patient safety issue in ICUs across the country. Bundled interventions are increasingly endorsed to improve care of ventilated patients. However, little is known about the extent of the adoption of the Ventilator bundle in ICUs, as well as the effectiveness of the individual bundle elements and the bundle as a whole on VAP rates.

Methods: A web-based survey was sent to 441 hospitals participating in the National Healthcare Safety Network (NHSN) in 2008. Hospitals provided data on: NHSN-reported VAP rates, ICU-specific policies and rates of compliance, setting and infection department characteristics. Descriptive statistics and ordinary least square regressions with Huber-White standard errors were conducted. First, we examined the effect of individual bundle elements from the full Ventilator bundle (Model 1) on VAP rates. For models 2-4, we only used the 2 bundle elements which directly relate to VAP (raising of the head of bed and sedation vacation). Model 2 tested the additive value of complying with 1 or more elements by adding the number of elements met. In model 3, we examined the impact of complying with any 1 element. Finally, we tested if compliance with both elements was necessary for a significant reduction in VAP rates (Model 4).

Results: 250 hospitals participated and provided data on 415 ICUs (57% response rate). The mean VAP rate was 2.67/1000 ventilator days in 279 ICUs. Two thirds of the ICUs reported presence of a full Ventilator bundle policy. However, only 68% of those ICUs monitored implementation of the policy and, of those, only 39% reported full (≥95%) compliance. The presence of policy was not associated with lower VAP rates. Only when an ICU had a policy, monitored compliance and achieved full compliance were rates lower. None of the individual bundle elements from the full Ventilator bundle, were individually associated with decreased VAP rates in Model 1. In model 2, there was an additive association with lower VAP rates (β=-0.817, p<0.01). Model 3 showed that compliance with just one of the two elements was not associated with lower rates (β=-0.785, p=0.153). However, there was a strong association between complying with both elements and lower VAP rates (β=-1.807, p<0.01).

Conclusions: The VAP bundle is not effective in reducing VAP rates unless it is monitored and correctly implemented. Compliance with both elements related to VAP was necessary in order to decrease VAP rates.