Effect of Nebulizer and/or Inhaler on Ventilator – Associated Pneumonia in King Narai Hospital

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Background: Ventilator associated pneumonia (VAP) is a common infection observed in adults receiving care in intensive care unit (ICU). Factors associated with VAP are related to patients, environment, contact from medical personnel, technical use of a mechanical ventilator, care of a ventilator circuit, medical use of nebulizer and humidifier. The empirical study showed that the use of inhaler costs less than nebulizer, while both can yield the same efficiency. There are few studies on the risk of VAP between nebulizer and inhaler using.

Objective: To analyze the risk factor of using nebulizer and/or inhaler on ventilator associated pneumonia (VAP) and to compare the effect of using nebulizer and/or inhaler on VAP.

Methods: A retrospective study was conducted in patients, aged over 15 years, who were on mechanical ventilator more than two calendar days and received nebulizer and/or inhaler treatment more than 48 hours. Data were collected during April – July 2016 in patients admitted at King Narai hospital. Patients were followed for VAP development by using criteria of CDC (NHSN). Data were analyzed through descriptive and inferential statistics using SPSS program.

Results: Out of 307 patients who were on mechanical ventilator more than two calendar days, 76 patients received nebulizer and/or inhaler treatment, while 21 cases were treated with both nebulizer and inhaler. There were only 25 cases (8.20%) of nebulizer treated, followed by 30 cases (9.84%) of inhaler treated, and 229 cases (75.08%) for none of them. Among 76 cases of ventilated patients who received nebulizer and/or inhaler, 42 cases (55.26%) were male and 34 cases (44.74%) were female. Comorbidity diseases were DM 21 cases (27.63%), COPD 21 cases (27.63%), and CVA 10 cases (13.6%). Also, 53 cases (69.74%) received proton pump inhibitor, followed by 25 cases (32.89%) of steroid treatment, and 19 cases (25%) of sedative drugs. Mean age and mean APACHE II score were not different in the three groups. Twelve cases (48.00%) developed VAP from nebulizer use, followed by only 5 cases (16.67%) of using inhaler, and 9 cases (42.86%) of using both nebulizer and inhaler. Results from X2 test showed that the use of nebulizer was associated to VAP (P < 0.01), while the use of inhaler showed no association to VAP. Results from logistic regression analysis on VAP demonstrated that the use of nebulizer yielded significant odds ratio of 5.867 (95% CI 1.71 – 20.01); whereas, the use of both nebulizer and inhaler demonstrated significant odds ratio of 5.416 (95% CI 1.26 – 18.27). Nonetheless, the use of inhaler showed non significant association with VAP.

Conclusion: In 76 patients nebulizer, and/or inhaler treated in 307 mechanical ventilated patients more than two calendar days, VAP developed in groups of patients using only nebulizer, inhaler, and both nebulizer and inhaler of 48.00%, 16.67%, 42.86%, respectively. The statistical analysis showed that the use of nebulizer is significantly associated with VAP, while the use of inhaler showed non significant association with VAP.

Keywords: VAP, Nebulizer, Inhaler, Risk factors