Incidence of Hospital Acquired: Ventilator Associated Pneumonia

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Background and objectives:
Abstract: *Ventilator associated pneumonia (VAP) is a form of nosocomial pneumonia that occurs in patients receiving mechanical ventilation for more than 48 hours. Our study aim to find out the incidence, recognise causative microbes and their antibiotic sensitivity pattern. The clinical profile and mortality were also studied in VAP patients.*
Materials and Methods: *All patients on mechanical ventilation admitted in intensive care units of Mahatma Gandhi hospital, Jaipur affiliated to Mahatma Gandhi University of Medical Sciences & Technology for approximately 2 years from November 2012 to November 2014 were considered. The patients who developed VAP and fulfilled inclusion criteria as per WHO definition of VAP were studied. Detail history, physical examination was done and all routine haematological and biochemical investigation were done including chest x-ray. Endotracheal aspirate suction tip was sent for culture and sensitivity.*
Results: *In study period total 780 patients were put on mechanical ventilator out of which males were 500 & female 280. Out of them 100 (12.8%) patients developed VAP. The Patients were classified into early (< 48 hours) and late (> 48 hours) VAP group and differences in 2 groups were analysed. Out of 100 patients 44 developed early onset and 56 developed late onset VAP. The most common sign in both early and late onset VAP was Tachycardia (68% and 43%) respectively this difference is significant. Commonest organism isolated in early onset VAP were Acinobacter (25%) and Pseudomonas (18%) while in late onset VAP Acinobacter (32%) and Pseudomonas (23%). Cefeperazone (36%) in early onset VAP and imepenem (33%) in late onset VAP were the commonest antibiotics for which cultures were sensitive. Probable risk factors in both early onset and late onset VAP was use of ryles tube and proton pump inihibitor 54% and 88% in early VAP and 64% and 90% in late VAP respectively. This difference is significant. The total mortality was 36% whereas in late onset VAP it was 37.5% and in early onset VAP-32.5%- a significant difference.*
Interpretation and conclusion: *The incidence of VAP in our study is 12.8%. Acinobacter was commonest cultured microbe. The total mortality was 36%. Significanty higher mortality was recorded in late onset VAP (37.5%) than in early onset (32.5%).*

I.   Introduction

Ventilator-associated pneumonia (VAP) refers to bacterial pneumonia developed in patients who have been mechanically ventilated for a duration of more than 48 h. It ranges from 6 to 52% and can reach 76% in some specific settings. Hospital-acquired pneumonia (HAP) is the pneumonia after 48 h or more after admission, which did not appear to be incubating at the time of admission. The presence of HAP increases hospital stay by an average of 7–9 days per patient also imposes an extra financial burden to the hospital. The risk of VAP is highest early in the course of hospital stay, and is estimated to be 3%/day during the first 5 days of ventilation, 2%/day during days 5–10 of ventilation and 1%/day after this.

Lack of a gold standard for diagnosis is the major culprit of poor outcome of VAP. The clinical diagnosis based on purulent sputum may follow intubation or oropharyngeal secretion leakage around airway, chest X-ray changes suspected of VAP may also be a feature of pulmonary oedema, pulmonary infarction, atelectasis or acute respiratory distress syndrome. In fact, it was proven that colonization of airway is common and presence of pathogens in tracheal secretions in the absence of clinical findings does not suggest VAP. This study aims to critically review the incidence and outcome, identify various risk factors and to conclude specific measures that should be undertaken to prevent VAP.

II.   Methods

The study was conducted over a period of 2 years, extending from Nov 2012 to Nov 2014, in an intensive care unit (ICU) of a tertiary care centre. A total of 100 patients who were kept on mechanical ventilator were randomly selected. Cases included were patients of both sexes who were kept on mechanical ventilator for more than 48 hours. Patients who died or developed pneumonia within 48 hours or those who were admitted with pneumonia at the time of admission and patients of Respiratory Diseases were excluded from the study. Most of the patients put of ventilator support were primarily treated elsewhere with antibiotics either in

the indoor ward or in other health care centres that was not traceable. A questionnaire was prepared and each patient selected to be included in the study was screened and monitored according to the questionnaire. Age, sex, date of admission to ICU, date of initiating mechanical ventilation and mode of assess to the patients' airway, i.e. orotracheal or tracheostomy, were recorded. Indication of mechanical ventilation was noted patients vitals, general and physical examination, oxygen saturation and position of the patients were monitored regularly. During the initial stage of ventilation, patients were adequately sedated. All necessary measures were taken for prevention of hospital-acquired infections. A battery of routine investigations was performed and special investigations, like culture of tracheal tube, blood and urine and others like serum cholinesterase levels when needed, were performed. Sputum from the patients were collected from the tip of the suction catheter and transported to the laboratory in a sterile tube. Patients were monitored from the date of inclusion in the study to the final outcome in the ICU. Oxygenation status, quantity and purulence of tracheal secretions, type of radiographic abnormality and result of sputum culture and Gram stain. The VAP group was classified into two groups, early-onset type within and late-onset type.

III.   Results

The study comprised of 100 patients of various cases of poisoning, neurological disorders, sepsis and others. The mean age of the patients ranging from 16 to 82 years having a predominance of male population. Of the 780 patients, 100 patients developed VAP during the ICU stay. Out of 100 patient studied 44 had developed early onset and 56 had developed late onset.

The clinical examination revealed the patients to have increased body temperature, tachycardia, tubular breath sound and crepitations. The patients with associated pleural effusion had decreased air entry with dull note on percussion.

The most common sign evident in early onset VAP was Tachycardia (68%) followed by fever (63%) and crepitation (43%), bronchial breath sounds (25%) and pleural effusion (23%).

The most common sign evident in late onset VAP were fever and tachycardia (43%) followed fever (41%), bronchial breath sounds (34%), pleural effusion (25%).

59% of early onset and 73% of late onset VAP had leucocytosis.

Most common organisms isolated in early onset VAP were Acinobacter (25%) and pseudomonas (18% each). Followed by Klebsiella (16%), S. Aures (14%), Citrobacter (11%).

Most common organism isolated in late onset VAP was Acinobacter (32%), followed by pseudomonas (23%) and Klebsiella (11%) Staphylococcus aureus (11%), E-coli (7%)

Commonest antibiotic for which most bacteria were sensitive in early onset VAP was Colistin (32%). Other were Pipercillin (27%), Gentamycin (25%), Ceftriaxone (30%), Augmentin (30%), Cefeperazone (36%), Amikacin (32%), Vancomycin (25%), Ceftizidime (32%) respectively.

Commonest antibiotic for which most bacteria were sensitive in late onset VAP were Colistin (37%) Gentamycin (28%) and Ceftriaxone (26%). Followed by Ciprofloxacin (8%), Vancomycin (27%), Cefeperazone (36%), Amikacin (33% each), Ceftizidime (36%) and Pipercillin (30%) and Augmentin (28%).

The commonest risk factor predisposing to early onset VAP was use of proton pump inhibitors (PPI) (80%), followed by Ryle's tube feeding (57%), fever (51%), steroids (34%), DM (25%), COPD (23%) and surgical interventions (10%).

In early onset VAP totally 67.5% of patients recovered and 32.5% expired. In late onset VAP 62.5% expired and 37.5% recovered.

The Commonest organism found in expired patients in both late & early VAP was acinobacter.

IV.   Interpretation And Conclusion

VAP continues to be an important challenge to the critical care physician and is the most common nosocomial acquired infection among patients. It is difficult to diagnose accurately, and high index of suspicion is required. Bacteriological sampling is important, it should not significantly delay the start of treatment. As appropriateness of the initial antibiotic regimen is a vital determinant of outcome, microbiological advice should be sought. The mortality caused by VAP increases if it is caused by resistant bacteria. Good management strategies for VAP like adequate infection control practices, early and accurate diagnosis and more specific antimicrobial use may significantly improve patient's outcome.