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Anaesthesiology

VENTILATOR ASSOCIATED PNEUMONIA-REVIEW ARTICLE

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ABSTRACT Ventilator-associated pneumonia (VAP) is one of the most frequent ICU-acquired infections and a leading cause of death among patients in Intensive Care Unit (ICU). VAP is associated with prolonged duration of mechanical ventilation and ICU stay. The estimated mortality of VAP is around 10%. There are many risk factors including host related, device related and personnel related. For prevention of VAP it is recommended to minimize the exposure to mechanical ventilation and encouraging early liberation. VAP bundle as a group of evidence-based practices that, results in decrease in the incidence of VAP should be used. Patients should be reassessed daily to confirm ongoing suspicion of disease, antibiotics should be guided by cultures reports, and clinicians should consider stopping antibiotics if cultures are negative.[1]

KEYWORDS : Ventilator-associated pneumonia, Mechanical ventilation, Endotracheal aspirate, Antibiotics, Prevention, ICU.

INTRODUCTION:

Ventilator-associated pneumonia (VAP) is defined as pneumonia or infection in lung parenchyma acquired in patients after invasive mechanical ventilation after 48–72 hours. New or progressive infiltrates, systemic infection (fever, altered white blood cell counts), changes in sputum characteristics, and the detection of a causative agent are seen in VAP patients.[2] VAP is one of the most common ICU acquired infection. VAP is a major issue in ICU's of developing countries associated with mortality, longer length of stay, and associated cost burden among patients [3–5].

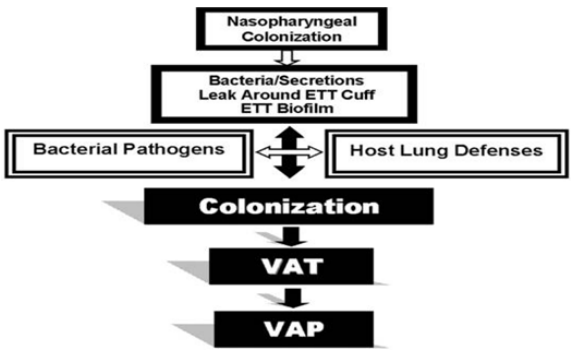
RISK FACTORS:

1. Host related- Underlying medical condition, surgery, alcoholism, supine position, level of consciousness, sedation, previous antibiotic use and immobilization.
2. Device related- mechanical ventilation for >24 hours, reintubation, orogastric tubes, cuff under inflation.
3. Personnel related- Improper hand washing, failure to change gloves between contacts with patients, not wearing personal protective equipment when antibiotic resistant bacteria have been identified.

ETIOLOGIC AGENTS :

VAP is commonly caused by aerobic gram negative bacilli (peudomonos, E.coli, klebsiella, acinetobacter),while Staphlococcus. aureus is predominant gram positive organism.

EPIC-II study confirmed that pseudomonos & staph aureus are most common isolated pathogens in ICU.



Preventive Strategies For Nosocomial Pneumonia:

1. Implementation, as VAP bundle, of nosocomial pneumonia preventive strategies that have proven efficacy in reducing morbidity & mortality.
2. Implementation of education programs and frequent performance feedbacks & compliance assessment.
3. Strict alcohol based hand hygiene.
4. Avoidance of tracheal intubation & use of NIV.
5. Daily sedation vacation & implementation of weaning protocols.
6. No ventilatory circuit tube changes unless soiled or damaged.
7. Use of tracheal tubes with cuff made of novel materials (polyurethane; & LVLP cuffs made of silicone & latex) & shape(conical).
8. Application of low level PEEP (5-8cm H2O) during tracheal intubation.
9. Use of silver coated ETT – NASCENT trial concluded that silver coated ETT has ↓ incidence of VAP, ↓ mortality in patients with VAP, is cost effective & has greatest impact during first 10 days.
10. Aspiration of subglottic secretions(every 4-6hrs).
11. Internal cuff pressure maintained within 25-30 cm H2O & carefully controlled during transport of patients outside ICU.
12. Routine saline instillation before tracheal suctioning not recommended.
13. Intubated patients should be kept in semi-recumbent position (30-45°), rather than supine to prevent aspiration ;especially when enterally fed.
14. Continuous lateral rotation of bed helps to reduce extravascular lung water, improve V/Q mismstch & enhance mobilization of secretions.
15. Post pyloric feeding in patients with impaired gastric emptying.
16. Risk of VAP associated with early enteral feeding didn`t translate into ↑ risk of death, so early enteral feeding advised.
17). Stress ulcer prophylaxis in high risk patients (coagulopathy, ↑ duration of mechanical ventilation and history of GI bleed.
18. Oral care with 2% chlorhexidine.
19. SELECTIVE DECONTAMINATION OF DIGESTIVE TRACT (SDD) : consists of nonabsorbable antibio. Against gram negative(tobramycin.polymyxin E) + nystatin/ampho B for candida administered into GI to prevent oropharyngeal & gastric colonization. SDD reduces incidence of VAP & it's the only strategy that has shown survival benefit.SDD may promote growth of MRSA & enterococcus, so its highly recommended to conduct appropriate surveillance of antibiotic resistance pattern.

CLINICAL DIAGNOSIS:

The Modified Clinical Pulmonary Infection Score (CPIS)			
VARIABLES	POINTS		
	0	1	2
Temperature (°C)	≥ 36.1 to ≤ 38.4	≥ 38.5 to ≤ 38.9	≤ 36 or ≥ 39
WBC Count (per mm^3)	≥ 4,000 to ≤ 11,000	< 4,000 or >11,000	< 4,000 or > 11,000 with > 500 bands
Secretions	Rare	Abundant but non-purulent	Abundant, purulent
P_aO_2 / F_iO_2	> 240 or ARDS	---	≤ 240 and no ARDS
Chest Radiography	No infiltrate	Diffuse or patchy infiltrate	Localized infiltrate
Microbiology	Negative	---	Positive

Modified CPIS > 6 → suggestive of VAP

Adult Vap Bundle:

VAP bundle is a group of evidence-based practices that, when implemented together, should result in reductions in the incidence of VAP. The components of VAP Bundle are -

1. Elevation of the head of the bed to 45° when possible, otherwise attempt to maintain the head of the bed greater than 30° should be considered.
2. Daily evaluation of readiness for extubation.
3. The utilization of endotracheal tubes with subglottic secretion drainage.
4. Oral care and decontamination with Chlorhexidine.
5. Initiation of safe enteral nutrition within 24-48h of ICU admission.

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