Symposium on Prevention of Healthcare-associated Infections in Hospital and Community Institutions

VAP Prevention: Nurses’ Perspective

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In this session, we will share

- What strategies have we adopted to prevent VAP since 2012?
- How to organize and start the VAP prevention project?
- How to actually do it?
- Measures to sustain VAP prevention
The 7 Clusters of Hospitals
PYICU background data

- About 1600 ICU admission /year
- 23 beds
- Mean ICU LOD : 4.5 days
- 60-80 patients required mechanical ventilation /month
- Mean ventilator days ~ 4 days
- VAP rates high at 40-70 /1000 ventilator days (2010 data)
Alarming VAP rate

High VAP rate at 40-70 VAP cases / 1000 ventilator days
Our ICU Patient (10 yrs ago)
Mechanism of Ventilator Associated Pneumonia (VAP)

Aspiration of bacteria into the lower respiratory tract from oropharynx and gastrointestinal tract

Kollef M. Chest 2004; 32: 1396
Review Evidences

- Head of bed at 30°
- Antiseptic oral rinse
- Perform hand hygiene
- Assess patient’s readiness to wean and to extubate
- Prevent condensate from entering patient’s airway
- Maintain proper care to respiratory consumables
- Conduct ongoing VAP surveillance
Updated CHP Guideline Nov 2018

- Head of bed at 30°
- Antiseptic oral rinse
- Perform hand hygiene
- Assess patient’s readiness to wean and to extubate
- Prevent condensate from entering patient’s airway
- Maintain proper care to respiratory consumables
- Conduct ongoing VAP surveillance
- Minimal or no sedation
From evidence to practice

Multi-pronged Strategic Approach
Multi-pronged Strategic Approach: from embryo to actions

A: Aware
B: Do the Basic
C: Clinical Practice Innovation & Compliance Audit
D: Departmental Effort & Documentation
E: Evaluation & Sharing

Multi-pronged Strategic Approach
B : Do the Basics Properly

- **At start**, reinforce Hong Kong ventilator bundle through repeated educational talks to
  - Health care providers

- **As a standard practice**, introduce VAP & ventilator bundle to new staff at unit-based induction program
5 moments for hand hygiene

1. BEFORE TOUCHING A PATIENT (直接接觸病人之前)
2. BEFORE CLEAN / ASEPTIC PROCEDURE (進行無菌操作或護理程序之前)
3. AFTER BODY FLUID EXPOSURE RISK (接觸血液或體液之後)
4. AFTER TOUCHING A PATIENT (直接接觸病人之後)
5. AFTER TOUCHING PATIENT SURROUNDINGS (接觸病人直接範圍之後)
C: Clinical VAP Preventive Devices

- Home made HOB indicator
- Green light indicator
- Continuous cuff pressure Monitoring device

VAP when compared with intermittent pressure control device. Lorente, et al. (2014). Critical Care, 18: R77
Head of Bed: at least 30°

Home made HOB indicator

Infect Control Hosp Epidemiol 2008; Suppl 1: S31-S40
J Antimicrob Chemother 2008; 62(1): 5-34
IHI. 5 Million Lives Campaign; www.ihi.org
Michael Klompas Current opinion Volume 23 Number 5 October 2017
Results of a research on novel ETT

Microcuff ETT provide the best protection against microaspiration
VAP Preventive Devices: prevent micro-aspiration

- Try Taper Guard ETT with subglottic drainage port
- Try Novel microcuff ETT
- Heated humidifier

Uncertain benefit
Alert! Circuit breaks promote aspiration especially in high PEEP

On mechanical ventilation

During disconnection of ventilator circuit

secretion above ETT cuff

10 cm H₂O

0 cm H₂O
To do less by ..... 

- Promote minimal disconnection of ventilator circuit
  - Use of heated humidification
  - Perform ETT suction only as needed
  - Perform oropharyngeal suction
    ✓ at regular interval and
    ✓ before disconnection of ventilator circuit
Oral hygiene care

- Tooth brushing is effective to remove dental plaque
- Prevent colonization

Grap, Munro, Ashtiani & Bryant, 2003

- Oral care with chlorhexidine mouthwash

Shi Z et al. (2013) Cochrane Database Syst Rev: CD008367

Chlorhexidine may be potentially harmful
Compliance of HOB>30°

The compliance on titration of sedation

The compliance on oral suction

Process audit on staff compliance to VAP prevention measures, ICU PYNEH
2012: VAP rate similar, rising?

VAP rate per 1000 ventilator days, ICU PYNEH

- Conduct refresher lectures on prevention
- Start to keep ETT cuff pressures
- Conduct compliance audits
  - proper oral care
  - HOB
  - Checking of plans

VAP surveillance using CDC PNU 1

20/1000 ventilator days

Any missing concern
Departmental Effort

Quality Improvement Project: Prevention of Ventilator-associated Pneumonia (VAP) in Critical Care Areas, HKEC

A. Aims: to decrease the rate of VAP by implementing all elements of the ventilator bundle to more than 95% of ventilator patients in critical care areas within 2 years.

B. Objectives:
1. To determine the baseline VAP rate
2. To determine the VAP after the enforcement of ventilator bundle
3. To look for reasons why some preventive measures of VAP cannot be carried out
4. To conduct ongoing outcome surveillance for VAP and process surveillance to ventilator bundle.

C. Scope of project: This is a Hong Kong East Cluster based project.

D. Phases of Project
1. Phase I: Pilot the tool for monitoring patient for incident of VAP and pilot the audit tool for current practice to prevent VAP (complete before 15 Dec 2012)
2. Phase II: clinical audit to determine baseline VAP rate x 2 months (Period: 1 Jan 2013 – 28 Feb 2013)
3. Phase III: Review ventilator bundle and conduct training to all staff on VAP prevention program (complete before 1 Mar 2013)
4. Phase IV: Enforcement of ventilator bundle (start time: on 1 Mar 2013) Duration: 2 year

+ Hospital Management Support
Structured Surveillance

Ventilator bundle checklist (2012)

Daily round to capture any VAP
A Quality System in Place

Discuss VAP issue at regular ICU meeting

Ensure persistent and consistent effort
A Quality System in Place

Plan to update the unit guideline & will not use Chlorhexidine anymore
Advocate protocol-driven mechanical weaning (for sharing)

Objective: Facilitate early wake and wean and promote timely extubation.

Patient selection (tick as appropriate):
- Exclusion: □ Neurosurgery case □ Tracheostomy case □ On ventilator ≥14 days □ PS mode ≤ 10 cmH₂O.
- Inclusion: All cases with mechanical ventilation
  - Duration ≥ 6 hours; and
  - Any mode of setting with PS ≤ 15 cmH₂O.

Phase I: Weaning Criteria:

ICU doctor orders:
1. Wake and wean: Time__________ Date(D/M/Y) ____________
2. Sedation stopped: Time__________ Date(D/M/Y) ____________

Case nurse assesses weaning criteria Q1H within 0700-1700.

<table>
<thead>
<tr>
<th>Weaning criteria</th>
<th>Initial assessment at</th>
<th>All criteria fulfilled at</th>
<th>Not all criteria fulfilled at</th>
</tr>
</thead>
<tbody>
<tr>
<td>√ = Yes, x = No</td>
<td>(Time)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. FiO₂ &lt; 0.4 &amp; RR 8-30/min,</td>
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Process Evaluation

- Obtain baseline compliance rate on ventilator bundle
- Conduct compliance audit at regular period
2013: VAP rate seems to have decreased significantly.

VAP rate per 1000 ventilator days, ICU PYNEH

- Conduct refresher lectures on prevention of VAP
- Start to keep ETT cuff pressure at 30 cmH2O
- Conduct compliance audit to:
  - proper oral care with tooth brushing
  - HOB
  - Checking of feeding tolerance

Start use of heated humidifier since 18 March 2013

Start prevention of VAP Quality Improvement Project in Jan 2013
- Use of CDC pneumonia flowchart for surveillance of VAP
- Use of VAP bundle checklist

Start use of micro-cuff ETT
Microcuff ETT provide the best protection against microaspiration.

Prevention of Ventilator Associated Pneumonia (VAP) in The Intensive Care Unit (ICU): A Multi-pronged Strategic Approach

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Hong Kong East Cluster
3 August 2014
Prevention of ventilator-associated pneumonia

Arthur CW Lau *, HM So, SL Tang, Alwin Yeung, SM Lam, WW Yan; Hong Kong East Cluster Task Force on Prevention of Ventilator-associated Pneumonia in Critical Care Areas

ABSTRACT

Ventilator-associated pneumonia is the commonest, yet mostly preventable, infection in mechanically ventilated patients. Successful control of ventilator-associated pneumonia requires a multidisciplinary approach with comprehensive strategies. Healthcare providers caring for patients who are mechanically ventilated should have a ventilator-associated pneumonia prevention protocol in place, and ventilator-associated pneumonia should be seriously considered as a key performance indicator in local intensive care units.

HKMJ 2015

Summary of strategies

Clinical

Administrative

Education and research
2014: VAP rate still fluctuating
mean VAP rate < 10 / 1000 vent. days

1. Refresher lectures on VAP prevention
2. Maintain ETT cuff pressure at 30cm H2O
3. Compliance audits on:
   - Proper oral care & tooth brushing
   - Head-of-bed elevation
   - Regular checks on feeding tolerance

- VAP Surveillance
- CDC PNU Criteria

- Use of heated humidifier

Regular use of ETT with ultra-thin

Cluster continuous quality improvement taskforce set up

Sustained effort of:
1. Promotion
2. Monitoring
3. Feedback to staff
4. Sharing
Challenges

- New staff
- Staff rotation
- Staff attitude: VAP is not a top priority
- Subjective vs objective findings related to VAP diagnosis
- Set a system in place to monitor the updated evidence
Measures to sustain good practice on VAP prevention

- Team approach
- Quality system in place
- Disseminate Staff performance & patient outcomes
Staff performance: ventilator bundle compliance audit
VAP rate

- Under surveillance
- Fluctuating rate
- Still need continuing reminder to staff to do the basic properly
- Consider organizing weekly VAP round to normalize the best practice on VAP prevention
Conclusion: Multi-pronged Strategic Approach: consistent right actions to improve outcomes
Thank You