Prevention of Ventilator Associated Pneumonia in Skilled Nursing Facilities

Presented by: Amber Griffin, RN, MSN, PHN

Assistant Program Specialist

Acute Communicable Disease Control Program

Objectives

- Review the epidemiology and pathogenesis of pneumonia and Ventilator-associated pneumonia (VAP), targeted towards modifiable risk factors
- Discuss evidence-based VAP prevention strategies applicable to skilled nursing facilities
- Discuss adherence monitoring practices for VAP prevention

Ventilator-Associated Pneumonia (VAP)

- Up to 50% of patients with VAP die
  - Varies with patient population and organism type
  - Highest mortality occurs in patients with severe illness and infection with non-fermentative Gram negative bacilli (e.g. Acinetobacter or Burkholderia species)
- Increases length of stay >6 intensive care unit (ICU) days
  - Cost is $10,000-$40,000

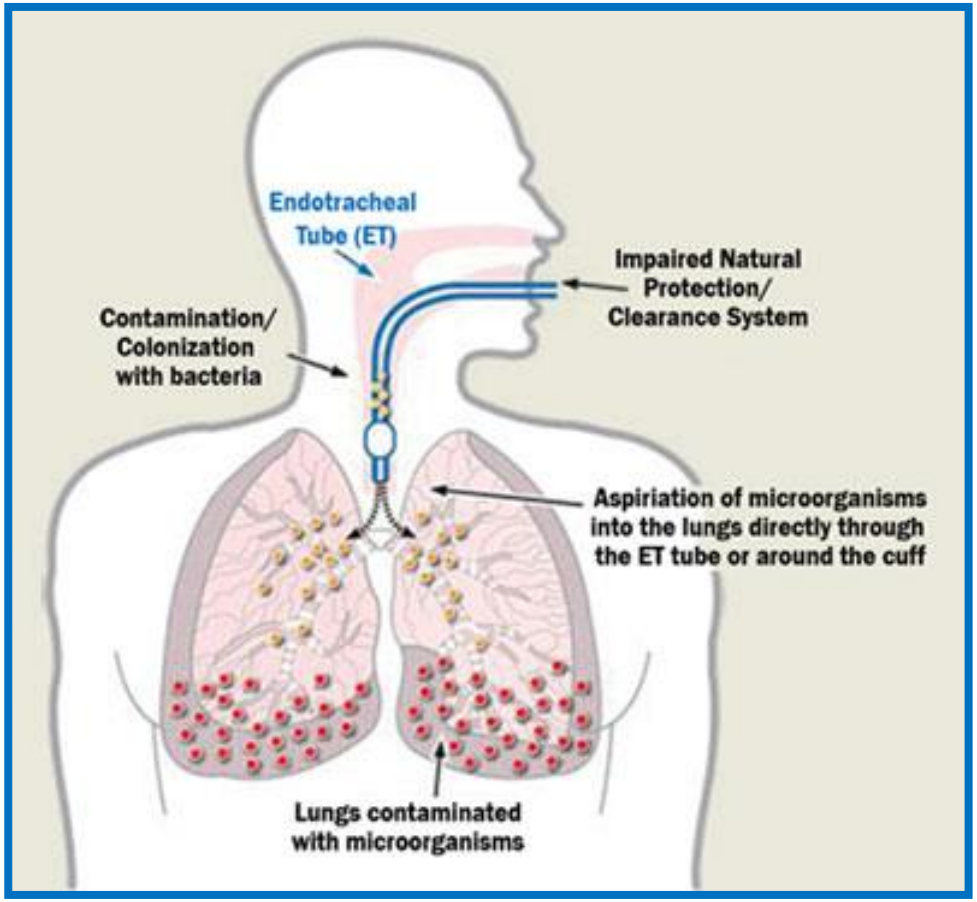
Etiology of VAP

- Early onset
  - Occurs within the first 4 days of hospitalization
  - More likely to be associated with non-multidrug-resistant organisms such as *E.coli, Klebsiella spp., Proteus spp., S.aureus, H. influenzae, and S. pneumoniae*
- Late onset
  - Occurs 5 or more days into hospitalization
  - Often caused by Gram-negative bacilli, multi-drug resistant organisms such as *Psuedomonas aeruginosa, MRSA, and Acinetobacter spp.*

Pathogenesis of VAP

Results from:

- Aspiration of secretions
- Colonization of aero-digestive tract
- Contaminated respiratory or other medical equipment



Common VAP Pathogens

- *Staphylococcus aureus* - 24.7%
- *Pseudomonas aeruginosa* - 16.5%
- *Enterobacter spp* - 8.3%
- *Acinetobacter spp.* - 6.1%
- *Klebsiella pneumoniae/oxy – 10.2%*

NHSN Antimicrobial Resistance Report: Distribution of all Pathogens Reported by HAI Type, Appendix to Table 4, 2011-2014
https://www.cdc.gov/nhsn/xls/reportdatatables/2014-appendix-pathogens.xlsx

Identifying VAP

- Monitor ventilated residents for:
  - Positive cultures
  - Changes in WBC's
  - Temperature chart/log
  - Pharmacy reports of antimicrobial use
  - Change in respiratory secretions

Challenges in VAP Prevention

- Pre-existing conditions (Non-modifiable risk factors)
  - Head trauma
  - Coma
  - Nutritional deficiencies
  - Immunocompromised
  - Multi organ system failure
  - Acidosis
  - Co-morbidities
  - History of smoking or pulmonary disease

VAP Prevention Strategies (Modifiable Risk Factors)

- Prevent aspiration of secretions
  - Maintain elevation of head of bed (HOB) 30-45 degrees
  - Avoid gastric over-distention
  - Avoid unplanned extubation and re-intubation
  - Use cuffed endotracheal tube with in-line or subglottic suctioning
  - Encourage early mobilization of patients with physical/occupational therapy
- Reduce duration of ventilation
  - Conduct “sedation vacations”
  - Assess readiness to wean from vent daily
  - Conduct spontaneous breathing trials

VAP Prevention Strategies cont.

- Reduce colonization of aero-digestive tract
  - Use non-invasive ventilation methods when possible (i.e. CPAP, BiPAP)
  - Use oro-tracheal over naso-tracheal intubation
    - Naso-tracheal may cause sinusitis, which increases VAP risk
  - Use cuffed Endotracheal Tube (ETT) with inline or subglottic suctioning
    - Minimizes secretions above cuff; prevents contamination of lower airway
  - Avoid acid suppressive therapy for patients not at high risk for stress ulcers or stress gastritis
    - Increases colonization of the digestive tract

VAP Prevention Strategies cont.

- Reduce colonization of aero-digestive tract (continued)
  - Perform regular oral care with an antiseptic agent (i.e. chlorhexidine gluconate)
  - Reduce the opportunities to introduce pathogens into the airway
    - Practice good hand hygiene
    - Ensure glove use for contact with respiratory secretions or contaminated objects; follow with hand hygiene
    - Educate staff to avoid contaminating the ETT from the patient's mouth, HCW's hands, introducing pathogens from patient's other body sites or the environment

VAP Prevention Strategies cont.

- Prevent exposure to contaminated equipment
  - Use sterile H20 to rinse reusable respiratory equipment
  - Remove condensate from ventilator circuits
  - Change ventilator circuit only when malfunctioning or visibly soiled
  - Store and disinfect respiratory equipment effectively

Measuring Adherence to VAP Prevention Practices

- Engage leadership
- Implement VAP bundle in your facility
- Ensure staff are competent to care for ventilated residents by:
  - Providing ongoing trainings
  - Clarifying roles
  - Point-of-care coaching for the application of the VAP bundle
  - Skills validation
  - Providing real-time feedback for improvement

Measure Adherence to VAP Prevention Practices cont.

- Consider monitoring adherence for:
  - Compliance with hand hygiene
  - Compliance with daily sedation vacation/interruption and assessment of readiness to wean, if possible (e.g. may not be feasible for patients on long term ventilator support)
  - Compliance with regular antiseptic oral care
  - Compliance with semi-recumbent position of all eligible patients

References and Resources

- California Department of Public Health. 2018. Healthcare Associated Inefections Program presentation on Ventilator Associated Pneumonia: https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/9h.Pneumonia.VAP.Prevention._Approved5.4.18.pdf
- Guthrie, Patricia F., Shelley Rayborn, John Boatright, Valinda Pearson, Rosemary Wieting, and Molly Danahy. "Improving Resident Oral Health and Adherence to a Ventilator-Associated Pneumonia Bundle in a Skilled Nursing Facility." *Journal of Nursing Care Quality* 33.4 (2018): 316-25. Web.
- Institute for Healthcare Improvement (IHI):
    - http://www.ihi.org/resources/Pages/Tools/HowtoGuidePreventVAP.aspx

References and Resources cont.

- Coffin, S, et al. Strategies to Prevent Ventilator-Associated Pneumonia in Acute Care Hospitals. *Infect Control Hosp Epidemiol* 2008; 29:S31-S40.
- Greene LR, Sposato K, Farber MR, Fulton TM, Garcia RA. (2009). Guide to the Elimination of Ventilator – Associated Pneumonia. Washington, D.C.: APIC.
- Greene LR, Sposato K, Farber MR, Fulton TM, Garcia RA. Guide to the Elimination of Ventilator – Associated Pneumonia, 2009. APIC. 2009.
- Hidron AI, et.al., *Infect Control Hosp Epidemiol* 2008;29:996-1011
- Magill, SS. (2010). Surveillance for ventilator-associated pneumonia at CDC: Current Approach, Challenges, and Future Directions. Retrieved from lecture notes online website: http://www.hhs.gov/ash/initiatives/hai/Events/progresstoward-day2-magill.pdf

Questions?

- Contact Information
  - Acute Communicable Disease Control Program
  - Phone: 213-240-7941
  - Email: Agriffin@ph.lacounty.gov