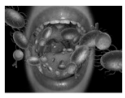
Pneumonia Prevention – The Vent and Beyond

Kathleen M. Vollman, Advanced Nursing

Teleclass broadcast sponsored by Sage Products (www.sageproducts.com)

PNEUMONIA PREVENTION - THE VENT AND BEYOND



Kathleen M. Vollman MSN, RN, CCNS, FCCM, FAAN
Clinical Nurse Specialist / Educator / Consultant
ADVANCING NURSING
kvollman@comcast.net
www.vollman.com

Hosted by Paul Webber
paul@webbertraining.com

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DISCLOSURES

- Sage Products Speaker Bureau & Consultant
- Hill-Rom
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- Merck

IT IS TIME TO CHANGE!!

- 44,000 to 98,000 preventable death in hospitals related to medical errors annually (IOM report, 1999)
- 92,888 deaths directly attributable to safety indicators between 2005-2007 (HealthGrades 2009)
  - Failure to rescue, pressure ulcers and post-op infections (VAP)
- Professional Nursing: Back to the Basics
- Quality organizations
  - Safer HealthCare Now (SHN) & IHI
  - Quebec Campaign: Together, lets improve healthcare safety
- Preventable injury is expensive

NOTES ON HOSPITALS: 1859

"It may seem a strange principle to enunciate as the very first requirement in a Hospital that it should do the sick no harm."

Florence Nightingale

Advocacy = Safety

FORTIFYING HOST DEFENSE

Implement
Interventional Patient Hygiene

INTERVENTIONAL PATIENT HYGIENE

- Hygiene…the science and practice of the establishment and maintenance of health
- Interventional Patient Hygiene….nursing action plan directly focused on fortifying the patients host defense through proactive use of evidence based hygiene care strategies

Hand Hygiene
Catheter Care
Bathing & Assessment
Comprehensive Oral Care Plan
Incontinence Associated Dermatitis Prevention Program
Pressure Ulcer Prevention

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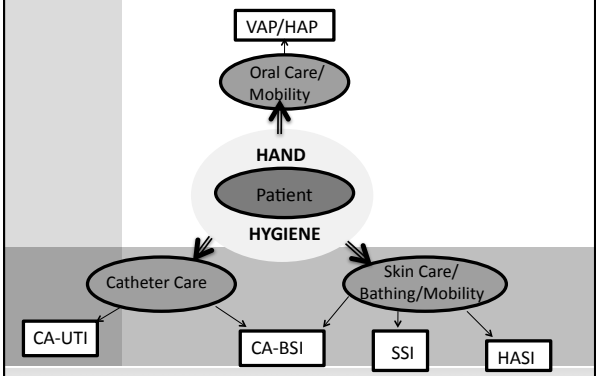
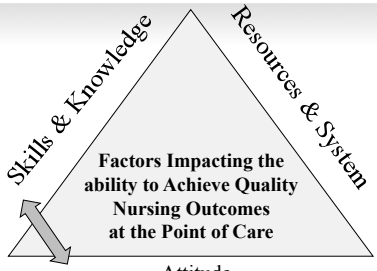
INTERVENTIONAL PATIENT HYGIENE(IPH)



Vollman KM. Australian Crit Care, 2009;22(4): 152-154

COMPONENTS OF SUCCESSFUL LONG LASTING CHANGE



Vollman KM. Australian Crit Care, 2009;22(4): 152-154

VENTILATOR ASSOCIATED PNEUMONIA

HOSPITAL ACQUIRED PNEUMONIA (HAP) AND VENTILATOR-ASSOCIATED PNEUMONIA(VAP)

- VAP crude mortality approximately 10-40%.
- HAP crude mortality 15-18%
- Pooled mean ranges 0.7 (Ped CVICU) to 7.4 (Burn ICU) per 1000 ventilator days
- HAP rates 5-15 per 1000 patient days
- Est cost $30,000-$40,000 per VAP
- Calculated loss for VAP against matched controls=$12,780
- Increase LOS up to 4-14 days
- Annual cost $2 billion dollars.

Edwards JR, et al. Am J of Infect Control, 2007;35:290-301
Kollef MH, et al. Chest, 2005:128:3854-3862
Collard HR. Ann Intern Med. 2003;138:494-501
Restrepo MI, et al. Infect Control Hosp Epidemiol, 2010;31:509-515

Rello J. Chest. 2002;12:2115-2121
ATS Guidelines for HealthCare Acquired Pneumonia 2006
Coffin SE, et al. Infect Control & Hosp Epidemiol, 2008;29(1):S31-S40
Rosenthal VD, et al. Am J of Infect Control, 2008;36:627-37

VAP IN CANADA

- Adult cases of VAP ~ 4000 per year
- 230 deaths
- 17,000 excess ICU days (2% of all ICU days in Canada)
- Costing 46 billion per year
- If 1 is prevented, cost savings of $14,000.00
- Controversy over the definition
- Safer Healthcare now supports reporting of VAP rates and compliance of bundle measures

http://www.saferhealthcarenow.ca/EN/Interventions/VAP/Documents/VAP%20Getting%20Started%20Kit.pdf

VAP DIAGNOSIS

Preventing VAP in Adult Patients

Defining VAP in Adults

Ventilator-associated pneumonia (VAP) is defined as a pneumonia occurring in patients requiring a device intermittently or continuously to assist respiration through a tracheostomy or endotracheal tube. Further, the device must have been in place within the 48-hour period before onset of infection and for at least two consecutive days.

Diagnostic criteria are as follows:

a) Radiographic abnormalities:

New or progressive, and persistent chest radiographic opacity(ies) compatible with Pneumonia, e.g. infiltrate, consolidation or cavitation

b) And at least 1 of the following:

- WBC ≥ 12,000 or < 4,000
- Temperature > 38° C with no other cause

c) And at least 2 of the following:

- tracheal secretions: new onset of purulence, or change in character, or increase in volume
- increase in suctioning requirements
- inspiratory crackles (rales) or bronchial breath sounds on auscultation
- Worsening gas exchange (e.g., O_2 desaturations; PaO_2/FIO_2< 240, an increase in oxygenation or ventilatory requirements.

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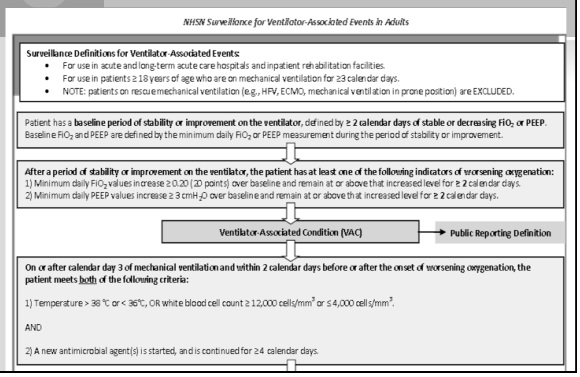
DEFINITION IS CHANGING 1/2013: VENTILATOR ASSOCIATED EVENTS

- Foundation:
  - Criteria: objective, clinical data that are expected to be readily available across the spectrum of mechanically-ventilated patients, intensive care units and facilities
- New definition only for the following patients
  - Patients ≥ 18 years of age;
  - Patients who have been intubated and mechanically ventilated for at least 3 calendar days; and
  - Patients in acute and long-term acute care hospitals and inpatient rehabilitation facilities.

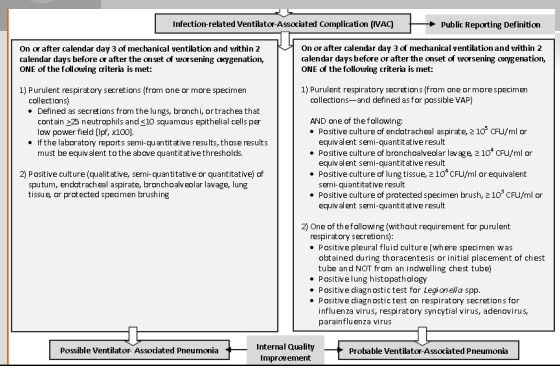
NOTE: Patients receiving rescue mechanical ventilation therapies (e.g., high-frequency ventilation, extracorporeal membrane oxygenation, or mechanical ventilation in the prone position) are excluded from surveillance using the new, proposed definition algorithm.

Improving Surveillance for Ventilator-Associated Events in Adults ***Centers for Disease Control and Prevention www.APIC.org***

PROPOSED ALGORITHM



PROPOSED ALGORITHM

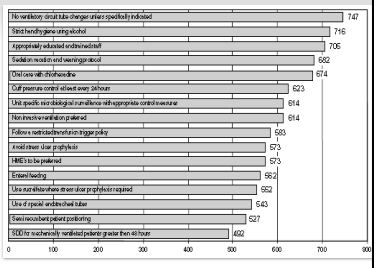


THE VENT BUNDLE…TO THE VAP BUNDLE

- Applying evidence-based practice
- 5 activities that when done 100% of the time has shown a reduction in
  - VAP
  - LOS
  - Time on Vent
  - Cost
- HOB 30°, Peptic Ulcer Disease (PUD) prophylaxis, DVT prophylaxis, Sedation vacation, Daily assessment for SBT and Oral care with an antiseptic
- Additions: Mobility, EVAC tube, OG vs. NGT

EUROPEAN VAP BUNDLE

- No ventilator circuit change unless specifically indicated
- Alcohol based hand hygiene
- Appropriately educated and trained staff
- Incorporation of sedation and weaning protocols
- Oral care with CHG



Rello J, et al. Intensive Care Medicine, 2010;36:773-780

THE VAP BUNDLE JULY 2012!

- SHNs VAP Bundle (not listed in order of importance)
  - Elevation of HOB to 45° when possible, otherwise attempt to maintain the HOB > 30° should be considered
  - Daily evaluation of readiness for extubation
  - The utilization of endotracheal tubes with subglottic secretion drainage
  - Oral care and decontamination with Chlorhexidine
  - Initiation of safe enteral nutrition within 24-48hrs of ICU admission

http://www.saferhealthcarenow.ca/EN/Interventions/VAP/Documents/VAP%20Getting%20Started%20Kit.pdf

45% reduction in VAP when using a VAP Bundle

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HEALTHCARE ACQUIRED PNEUMONIA

- Risk Factor Categories
  - Factors that increase bacterial burden or colonization
  - Factors that increase risk of aspiration

MECHANICAL VENTILATION/ INTUBATION

- 6-21 times the risk for developing a pneumonia
- Removes normal filter mechanisms
- Facilitates entry of bacteria
- Decreases clearance of bacteria
- Colonization of the endotracheal tube
- Use of non-invasive positive pressure ventilation when indicated (COPD/CHF)
- Early (6-8 days) vs. late tracheotomy(13-15 days) did not reduce the risk of VAP or 28 day mortality in adults with ARF. Early trach > VFD & ↓ stay in the ICU

Tablan OC, et. al. CDC 1994
CDC. 2003 Guidelines for Prevention of Healthcare Associated Pneumonia; MMWR; 2004:53(no RR-3)
Xue Y. Joanna Briggs Institute, 2010.
Terragni PP, et al. JAMA, 2010;303:1483-9

Mechanical Ventilation Wean Protocol Bundle Element

An automatic weaning protocol should be in place and mechanically ventilated patients should undergo assessment of readiness to wean & spontaneous breathing trial when they satisfy the 2- step process:

- **Readiness to Wean:** Arousable, Low ventilatory and end expiratory pressure requirements, No new potentially serious conditions, Hemodynamically stable without vasopressors, Requiring levels of FiO2 that could be delivered with a face mask or nasal cannula
- **Perform a Spontaneous Breathing Trial:** 30 to 120 minutes with assessment of vent pattern, gas exchange, hemodynamics & comfort

MacIntyre N. Semin Resp Crit Care Med, 2006:27:396-403
Esteban A. Am J Respir Crit Care 1999;159:512-18
Ely EW. N Engl J Med 1996;335:1864-69
Esteban A. Am J Respir Crit Care 1997;156:459465

APPROPRIATE SEDATION: IMPACTING VENTILATOR OUTCOMES

- Around the clock sedation administered via a protocol based on evaluation of sedative levels with a reliable and valid tool shorten time on vent, ICU & hospital length of stay, need for a trach*
- Daily interruption of sedative drug infusions decreases the duration of mechanical ventilation and LOS in the ICU In the group that had daily interruption, the duration of mechanical ventilation was reduced by 33% (2.4 days) and ICU LOS was reduced by 35% (3.5 days) and lower impact on PTSD.
- Wake up and breathe protocol resulted in ↓ time on ventilator,↓ ICU & hospital stay and reduced 1 year mortality (NNT=7)
- When dexmedetomine was compared to midazolam in long term sedation, it showed ↓ time to extubation, ↓ ICU stay, ↓ delirium prevalence and ↑ delirium free days, problems with Bradycardia

Kress JP, et al. AM J Respir Crit Care Med, 2003;168:1457-1461
Riker RR, et al. JAMA, 2009;301:489-499
Girard TD, et al. Lancet, 2008;371-126-134
Brook AD, et al. Crit Care Med, 1999;27:2609-2615
Kress JP, et al. N Engl J Med. 2000;342:1471-1477

SNEAK PEEK AT NEW GUIDELINES

- PAD Guidelines Coming (Evidence Based)
  - Pain (Non-pharm & Pharmacological-Remifentanil or Fentanyl)
    - BPS (Behavioral Pain Scale)
    - CPOT (The Critical Care Pain Observation Tool)
  - Agitation (non-benzodiazepine, Dexmedetomidine or Propofol) light sedation & interruption
    - RASS
    - SAS
  - Delirium (use atypical antipsychotics-Olanzapine/Quetiapine
    - ICU-CAM
    - ICU Delirium Screening Checklist
- PAD Bundle

Presented at SCCM 2012 February

ENDOTRACHEAL / NASOGASTRIC TUBE/ SINUSITIS

- Carriage of oropharyngeal bacteria during intubation
- If cuff pressure < 20 cm 4x ↑ risk VAP
- Cuff pressure range btwn 25-40cm (JBI-Level A) with maintenance at 25cm-30cm of H2O pressure.
  - Continuous monitoring resulted in a lower portion of out of range cuff pressure (11% vs. 51.7% p< 0.001)
- NGT increases risk of sinusitis/gastric reflux & increases oropharyngeal colonization
- Use oral ET versus nasal (CDC-Cat IB)
- Sinusitis increases the risk of nosocomial pneumonia by 3 fold

CDC. 2003 Guidelines for Prevention of Healthcare Associated Pneumonia; MMWR; 2004:53(no RR-3)
Davis KA. J Intensive care Med, 2006;21(4):211-226
Muscedere J & Canadian Trails Group. J of Crit Care, 2008;23:126-137
Carstens J. Joanna Briggs Institute, 2010
Sole, ML, et al. AJCC, 2011;20:109-117

HEAD OF BED/ BUNDLE ELEMENT

BODY POSITION: SUPINE VERSUS SEMI-RECUMBENT(30-45 DEGREES)

Methodology

- 19 mechanically ventilated patients
- 2 period crossover trial
- Study supine and semirecumbent positions over 2 days
- Labeled gastric contents (Tc 99m sulphur colloid)
- Measured q 30 min content of gastric secretions in endobronchial tree in each position
- Sampled ET secretions, gastric juice & pharyngeal contents for bacteria

Torres A et. al Ann Intern Med 1992;116:540-543

BODY POSITION: SUPINE VERSUS SEMI-RECUMBENT (30-45 DEGREES)

Results

- Radioactive contents higher in endobronchial secretions in supine patients
- Time dependent:
  - Supine: 298cpm/30min vs. 2592cpm/ 300min
  - HOB: 103cpm/30min vs. 216cpm/300min
- Same microbes cultured in all 3 areas 32% with HOB vs. 68% supine.

Torres A et. al. Ann Intern Med 1992;116:540- 543

HOB RESEARCH

Methodology:

- 86 patients
- Randomly assigned to supine position or HOB 45 degrees (39 semi recumbent, 47 supine)
- Monitored clinical suspected & microbiologically confirmed nosocomial pneumonias

Results:

- Microbiologically confirmed nosocomial pneumonia lower in the semi recumbent group 2/39 (5%) vs. 11/47 (23%)
- Supine position & enteral nutrition were independent risk factors for VAP & had the greatest number of VAP's 14/28 (50%)

Drakulovic MB. et. al. Lancet. 1999;354:1851-1858

HOB RESEARCH

- Methodology
  - Prospective multicenter trial randomly assigned to targeted 45° vs.10° HOB
  - 112 to targeted 45° vs. 109 patients to 10°
  - Continuous measurement of backrest elevation first wk of MV
  - Dx of VAP by bronchoscopic techniques
- Results
  - Baseline characteristics similar
  - Average elevations
    - 10° group day 1 & 7: 9.8 & 16.1
    - 45° group day 1 & 7: 28.1 & 22.6*
  - Target 45° not achieved 85% of the time
  - VAP: 10° = 6.5% vs. 45° = 10.7%

*p < .001

Van Nieuwenhoven CA, et al. Crit Care Med, 2006;34:396-402

HOB ON VAP COMPARING 45° TO 25°

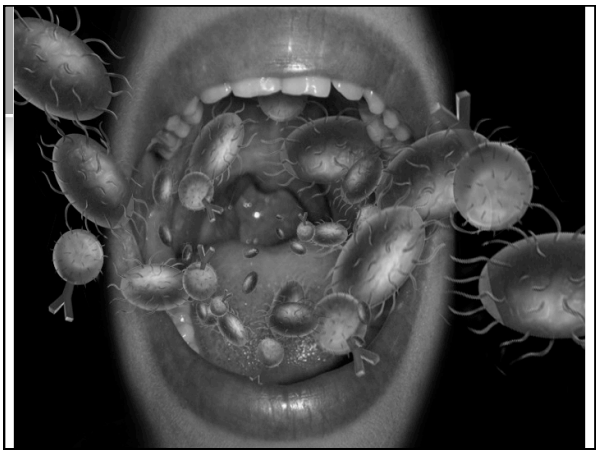
- Prospective randomized control trial comparing HOB elevation of 45 to 25 degrees on VAP rates
- There was no continual measurement of HOB or compliance with 45° was not measured
- Small sample size, 46% of randomized patients were withdrawn because of ventilation issues as well as discomfort.
- Results
  - VAP Rates: HOB 45 = 5/17
    HOB 25 = 7/13

Keeley L. Reducing the risk of ventilator-acquired pneumonia through head of bed elevation. NursCrit Care 2007; 12: 287-94.

MAKING IT HAPPEN

- Entire team involvement
- Education on what 30 and 45 really look like
- Standing orders
- Contraindications (make it safe)
- Visual strategies
  - Beds with angles built in
  - Tape on the wall
- Compliance measurements

http://www.saferhealthcarenow.ca/EN/Interventions/VAP/Documents/VAP%20Getting%20Started%20Kit.pdf



ORAL CAVITY & VAP

- 89 critically ill patients
- Examined microbial colonization of the oropharynx through out ICU stay
- Used pulse field gel electrophoresis to compare chromosomal DNA
- Results:
  - Diagnosed 31 VAPs
  - 28 of 31 VAP's the causative organism was identical via DNA analysis

Garrouste-Orgeas et. al. Am J Respir Crit Care Med. 1997;156:1647-1655

- 49 elderly nursing home residents admitted to the hospital
- Examined baseline dental plaque scores & microorganism within dental plaque
- Used pulse field gel electrophoresis to compare chromosomal DNA
- Results
  - 14/49 adults developed pneumonia
  - 10 of 14 pneumonias, the causative organism was identical via DNA analysis

El-Solh AA. Chest. 2004;126:1575-1582

ROLE OF SALIVARY FLOW

- Provides mechanical removal of plaque and microorganisms
- Innate & specific immune components (IgA, cortisol, lactoferrin)
- Patients receiving mechanical ventilation have dry mouth which in turn contributes to accumulation of plaque & reduced distribution of salivary immune factors

Munro CL & Grap MJ. AJCC. 2004;13:25-34

What Does the Evidence Tell Us?

BRUSH
CHX RINSE ALONE
CHX RINSE IN COMBINATION
SWAB/CLEAN/MOISTURIZE
SUCTION

All of the above

ORAL CARE REDUCES PNEUMONIA IN NURSING HOMES

Methodology

- 11 nursing homes in Japan over 2 year period
- 417 enrolled / 366 residents analyzed (death from other causes)
- 184 received oral care program/182 did not
- Tooth brushing after each meal (teeth or dentures) & 1x weekly review by dentist/or hygienist

Results

	No Oral	Oral Care	p value
Febrile	29%	15%	p<.01
Pneumonia	19%	11%	p<.05
Death	16%	7%	p<.01
MMSE		Increase	p<.05

Yoneyama et al. JAGS. 2002;50:430-433

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H_2O_2, CETYLPYRIDIUM CHLORIDE (CPC) & BIOTENE

H_2O_2

- >3% may cause harm, <1% no benefit in plaque removal.
- Must be diluted properly, not with normal saline.
- 3x a day mouth rinse with 1.5% H_2O_2 revealed no mucosal damage, improved plaque scores and overall gingival health.

CPC

- Cetylpyridium chloride had significant antigingivitis effects in several individual studies
- Used in some over the counter plaque reduction rinses (Crest rinse)

Biotene

- Contains salivary enzymes
- Moisturize, Some oral care kits

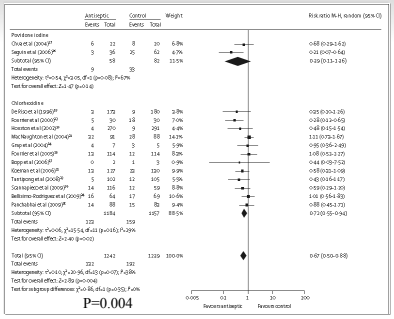
Gunsolley JC.J Am Dent Assoc 2006;137(12):1649-57
Gomes BC et.al. Clin Prev Dentistry. 1984; 6:21-25
Boyd RL. et. al. J Clin Periodontol.1989; 16:557-563
West TL et. al. Journal of Peridontol. 1983; 54(6):339
Tombes MA et. al. Nursing Research. 1993; 42(6):332-337
Beck S. Cancer Nursing. 1979; 2:185-189.

RECENT TRIALS REDUCTION IN VAP OR COLONIZATION WITH CHG OR POVIDONE-IODINE

- 2004: Grap (CHG via swab)
- 2005: Fourier (CHG) (negative trial)
- 2006: Koeman (CHG or CHG/colistin)
- 2006: Munro (CHG via swab & toothbrushing)
- 2006: Sequin (povidone-iodine)
- 2006: Mori (povidone-iodine)
- 2008: Tantipong (CHG)
- 2009, Sona (CHG)
- 2009, Panchabhai (CHG)—no decrease

PREVENTION OF VAP WITH ORAL ANTISEPSIS: A SYSTEMATIC REVIEW & META-ANALYSIS

- 14 studies evaluated from 1996 to 2011
- 2481 patients
- All randomize trials
- 9/14 blinded
- 12 trails assessed the effectiveness of CHG (2341 patients, 941 were CABG)
- 2 trials evaluated Povidone-iodine (140pts)
- Variation of additional interventions;
  - toothbrushing,
  - oropharyngeal aspiration
  - mechanical cleaning of the mouth
  - Frequency of antiseptic



Labaeu SO, et.al. Lancet. 2011;11:845-854

COMPREHENSIVE ORAL CARE PROGRAM/BUNDLE ELEMENT

- Soft suction tooth brush x2 daily
- CHG rinse .12% 2x daily,
- Suction Oral Swab, use of a 1.5% H_2O_2 peroxide mouth rinse or CPC for in between cleaning
- Deep oral suctioning catheter used 4x daily
- Covered yankauer for non-traumatic oral suctioning
- Dedicated oral suction line for infection control and ease of use.

Schleder B. et al. J Advocate Health 2002;4(1):27-30
Murray TM et al. AACN Advanced Critical Care. 2007;18(2):190-199

COMPREHENSIVE ORAL CARE PROTOCOL: THE GOOD SHEPHERD STUDY

Methodology:

- Retrospective study 10 bed Med-Surg
- Protocol included: Covered Yankauer for non-traumatic oral suctioning, soft-suction toothbrush, Suction Oral Swab, use of a 1.5% H_2O_2 peroxide mouth rinse for cleansing, subglottic suction catheter used 4x daily, dedicated oral suction line for infection control and ease of use.
- Education provided and presence of clinical champion.

Schleder B. et al. J Advocate Health 2002;4(1):27-30

LITERATURE REVIEW: ORAL CARE IMPACT OF VAP

Comprehensive Oral Care:

- Reduction in VAP from 5.6 to 2.2 (Schleder B. et al. J Advocate Health 2002;4(1):27-30)
- Reduction in VAP from 4.10 (2005) to (2.15) in 2006 with addition of CPC & comprehensive oral care. Vent bundle & rotational therapy already being performed
- Reduction in VAP from 12.0 to 8.0 (p=.060) with 80% compliance, vent bundle already being preformed, 1538 patients randomized to control or study group, Additional outcomes; ↓ vent days (p=.05), ↓ ICU LOS (p=.05) ↓ time to VAP (p= <.001) & reduction in mortality (p=.05) **(Garcia R et al** AJCC, 2009;18:*523-534)*

LITERATURE REVIEW: ORAL CARE IMPACT OF VAP

Comprehensive Oral Care & CHG:

- Reduction in VAP to zero for 2 years, vent bundle, mobility, oral care & CHG with comprehensive education preformed (Murray TM et al. AACN Advanced Critical Care. 2007;18(2):190-199)
- Dickinson S et al. SCCM Critical Connections, Feb 2008

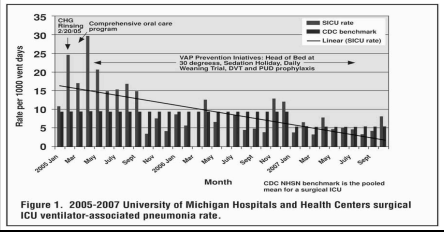


Figure 1. 2005-2007 University of Michigan Hospitals and Health Centers surgical ICU ventilator-associated pneumonia rate.

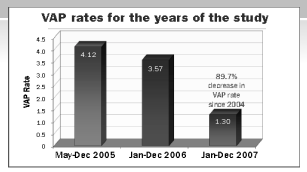
ORAL SUCTIONING WITH POSITION CHANGE

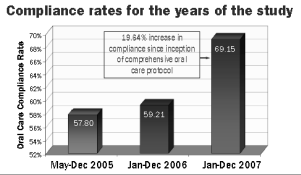
- Prospective time sequenced non-randomized study
  - 237 control (observation phase 9 months)
  - 227 Interventional (7 months interventional)
  - Difference in nursing protocol was oral suctioning prior to position change (11 additional suctions)
  - All other nursing care the same
- Results:
  - VAP: 6.51 to 2.04 per 1000 ventilator days (p<0.002)
  - Vent days: 28.8 ± 17.2 vs. 20.2 ± 4.0 (p <0.009)
  - ICU LOS: 27.6 ± 17 vs. 20.3 ± 4.0 (p < 0.012)
  - Suctioning before positional change only independent factor responsible for VAP decrease (p=0.003)

Tsai, HH, et al. Am J of Med Sci, 2008;336;397-401

DOES COMPLIANCE MAKE A DIFFERENCE?

Oral care compliance & use of the ventilator bundle resulted in a 89.7% reduction in VAP





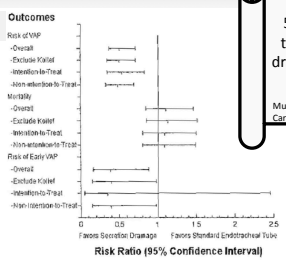
Hutchins K, et al. Presented at APIC Annual Conference June 2008

SUBGLOTTIC SECRETION DRAINAGE/ BUNDLE ELEMENT

Risk of VAP

Mortality

Risk of Early VAP



5 level 2 trials conclude that subglottic secretion drainage is associated with a reduction in VAP

Muscedere J & Canadian Trials Group. J of Crit Care, 2008;23:126-137

Dezfulian C. et al. Am J of Med, 2005;118,11-18

ENTERAL FEEDING WITHIN 24-48HRS BUNDLE ELEMENT

ENTERAL FEEDING WITHIN 24-48HRS BUNDLE ELEMENT

- Early EN vs Late EN
  - Decrease in infectious complications
  - Reduced LOS
  - Reduced mortality
- How to Make it Happen
  - Large bore in the mouth/small bore in the nose
  - Confirmation of the tube site and mark it
  - Address issues of intolerance but do not hold feeding until residuals > 500cc's
  - Continuous administration
  - Use of a protocol to drive early EN

http://www.saferhealthcarenow.ca/EN/Interventions/VAP/Documents/VAP%20Getting%20Started%20Kit.pdf

SSCM NUTRITIONAL GUIDELINES (2009)

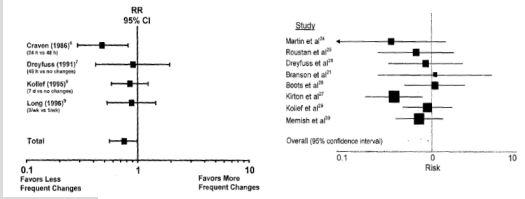
- Targeted for ICU pts > 2 - 3 day LOS
- ARDS/Severe ALI=EN formula with anti-inflammatory lipid profile (Grade A)
- Nutritional therapy in form of EN should be initiated in patients unable to maintain voluntary intake (Grade C)
- EN preferred route (Grade B), EN start 24-48hrs (Grade C), advance towards goal over next 48-72hrs (Grade E)
- EN withheld until unstable patient fully resuscitated (Grade E)
- Neither presence or absence of bowel sounds, or passage of flatus or stool required before initiation (Grade B)
- Either gastric or small bowel feeding acceptable. If at high risk feed via small bowel (Grade C)
- Hold for gastric residuals > 500 ml in absence of other signs of intolerance (Grade B)

Martindale RG, et al. Crit Care Med, 2009;37:1757-1761

ADDITIONAL CARE PRACTICES TO IMPACT VAP

Ventilator Circuit Change

Heat Wired Exchange

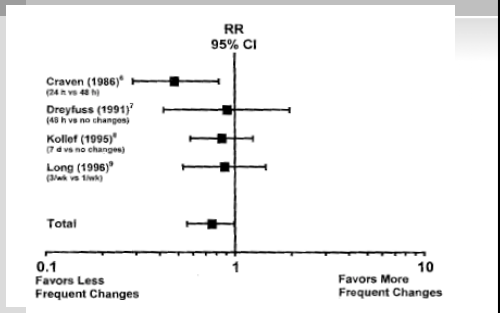


No Routine Change unless visibly soiled

Kola A. Intensive Care Med, 2005;31(1):5-11.

Hess DR et al, Respir Care 2003;48(9):869-879

VENTILATOR CIRCUIT CHANGE



Hess DR et al, Respir Care 2003;48(9):869-879

CONTINUOUS LATERAL ROTATIONAL THERAPY REDUCES VAP

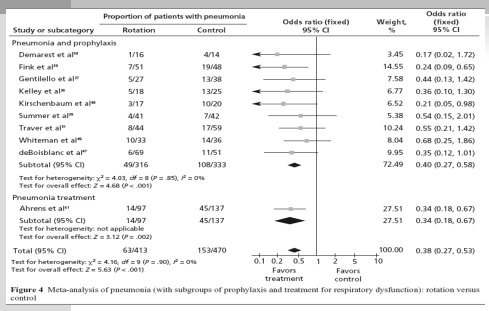


Figure 4 Meta-analysis of pneumonia (with subgroups of prophylaxis and treatment for respiratory dysfunction): rotation versus control

Goldhill DR et al. Amer J Crit Care, 2007;16:50-62

CLRT TO PREVENT VAP

Methodology

- Prospective randomized controlled trial, 3 medical ICUs at a single center
- Eligible if ventilated < 48 hours & free from pneumonia, ALI or in ARDS
- 150 patients with 75 in each group
- 35 CLRT patients allocated to undergo percussion before suctioning
- Measures to prevent VAP were standardized for both groups including HOB

Results: CLRT vs. Control

- VAP: 11% vs. 23% p = .048
- Ventilation duration: 8 ± 5 days vs. 14 ± 23 days, p = .02
- LOS: 25 ± 22 vs. 39 ± 45 days, p = .01
- Mortality: no difference

Staudinger t, et al. Crit Care Med, 2010;38:486-490

PROGRESSIVE MOBILITY PROGRAMS

Journey to tolerating upright position, tilt, sitting, standing and walking can occur quicker through the use of technology

OUTCOMES OF A PROGRESSIVE MOBILITY PROGRAM

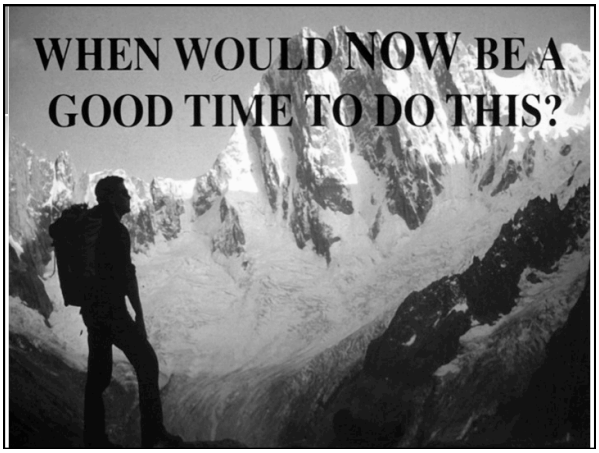
- ↓ incidence of skin injury
- ↓ time on the ventilator
- ↓ incidence of VAP
- ↓ days of sedation
- ↓ delirium
- ↑ ambulatory distance
- Improved function

Staudinger t, et al. Crit Care Med, 2010;38.
Abroung F, et al. Critical Care, 2011;15:R6
Morris PE, et al. Crit Care Med, 2008;36:2238-2243
Pohlman MC, et al. Crit Care Med, 2010;38:2089-2094
Schweickert WD, et al. Lancet, 373(9678):1874-82.
Thomsen GE, et al. CCM 2008;36;1119-1124
Winkelman C et al, CCN,2010;30:36-60

Intervention to Decrease VAP Statewide Collaborative-Keystone ICU

- 112 ICU's from 72 hospitals reported data
- Examine 550,800 ventilator days
- Implementation of the CUSP/VAP Bundle/checklist
- **Results: 71% ↓ in VAP rates in MI**
  - Median rate of VAP per 1000 vent days went 5.5 cases to 0 0 at 16-18 months (p<0.001) & 0 at 28-30 months (p<.001)
  - Mean rate of VAP per 1000 vent days went 6.9 to 3.4 at 16-18 month follow up (p<0.001) & 2.4 at 28 to 30 months (p<.001)
  - Composite compliance measured ↑ from 32% at baseline, 75% at 18 months & 84% at 28 months
  - Inclusion of oral care was not measured

Berenholtz SM, et al. Infect Control Hosp Epidemiol, 2011;32:305-314



- **A** AWAKE
- **B** BREATHE
- **C** CHOICE OF SEDATION
- **D** DELIRIUM
- **E** EARLY MOBILITY
- **F** FEEDING

FOUR E'S

- Engage: help staff understand the preventable harm
  - Share stories about patients affected
  - Estimate number of patients harmed
  - Develop a business case
- Educate: ensure staff and senior leaders understand what they need to do to prevent injury and improve teamwork and communication
  - Conference calls, webcasts, meetings
- Execute: how given the resources and culture they would ensure that all patients received the evidence
  - Share with working, what's not
  - Coaching calls
- Evaluate: project leader monitors that teens are using standardized definitions, report their data and make it transparent at the unit level

Goeschel CA, et al. Nursing in Critical Care, 2011;16:35-42

IN GOD WE TRUST!

Everyone else please bring data

And a Story

Pneumonia Prevention – The Vent and Beyond

Kathleen M. Vollman, Advanced Nursing

Teleclass broadcast sponsored by Sage Products (www.sageproducts.com)

FOUR E'S

- Engage: help staff understand the preventable harm
  - Share stories about patients affected
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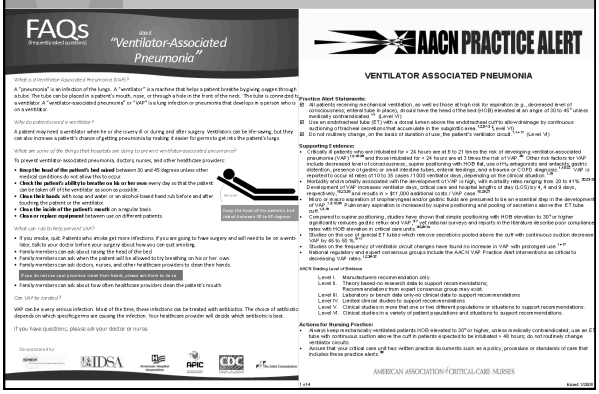
Goeschel CA, et al. Nursing in Critical Care, 2011;16:35-42

EXECUTE



FAQs about "Ventilator-Associated Pneumonia"

AACN PRACTICE ALERT

VENTILATOR ASSOCIATED PNEUMONIA

EXECUTE

Board Checklist

Prevent Ventilator Associated Pneumonia "VAP"	Leader Responsible	Date Initiated
1. Set organization aim to assess annually safety and teamwork climate annually and improve it using valid measures.		
2. Hold Executive team accountable for explicit action plan to improve safety and teamwork climate. Review progress monthly.		
3. Establish policy that requires science of safety training for all current and new employees and board members (www.safercare.net)		
4. Set expectation that a senior leader is an active member of the VAP team and meets with the team on the unit at least monthly.		
5. Hear at least one patient-level Story of Harm from infection at each board meeting.		
6. Work with CEO and CMO to establish interdisciplinary patient rounds as an organization standard of practice.		
7. Define organization goal of VAP reduction over 1-3 years. Target is a mean VAP rate of <1 infection per 1000 ventilator days and a median of zero.		
8. Review unit level VAP rates at least quarterly at full board meeting.		
9. Establish accountability process to investigate each infection, close the loop, and report back to the board.		
10. Require CFO to provide quarterly review of VAP cases subject to CMS pay for performance and the financial impact per case.		
11. Establish audit mechanism to assure adherence with rigorous data quality standards. Review audit reports quarterly.		
12. Hold CEO and Executive team accountable for VAP reduction through performance-based compensation		
13. Require a monthly report of harm that includes the number of people infected each month, compliance rate for following the evidence based guidelines to prevent VAP, and hand hygiene compliance		
14. Assure that the board reviews all infection-related sentinel events, liability claims, medical staff disciplinary actions, and patient complaints.		

Executive/Senior Leader Checklist

Prevention of Ventilator Associated Pneumonia "VAP"	Leader Responsible	Date Initiated
1. Ensure science of safety training for all current and new employees (www.safercare.net)		
2. Assign leader (CEO or another leader) as an active member of the VAP team; meet with the team on the unit at least monthly. (Let the staff know senior leaders are invested and will work as hard as they do to make it a success.		
3. Set clear project goals and expectations for the leaders and staff in critical care units. Provide opportunities for project teams to meet with senior leaders and the board to discuss the project.		
4. Create a policy for unit level accountability: document learning from at least one defect per month.		
5. Foster organizational learning: disseminate learning from defect lessons with expectations for local adaptation.		
6. Require use of a patient specific daily goals checklist.		
7. Codify interdisciplinary rounds as an organization-level standard of practice; support local interpretation based on unit characteristics.		
8. Acknowledge work of teams: celebrate success through stories in hospital newsletter, opportunities for teams to share with management and other teams.		
9. Make elimination of VAP an organization-wide goal; include in strategic plan.		
10. Develop a coordinated plan for VAP reduction throughout the organization.		
11. Provide protected time for VAP reduction team leaders: doctor, nurse, data collector (approx. 10%		

EXECUTE

Infection Preventionist Checklist

Prevent Ventilator Associated Pneumonia "VAP"	Leader Responsible	Date Initiated
1. Meet with CEO and hospital project leader to understand the initiative and the Infection Prevention roles. (Units must own and lead the project, but infection preventionists [IP] have a critical "expert" role)		
2. Introduce the project to all IP staff and explain their role		
3. Require science of safety training for all current and new IP staff (www.safercare.net)		
4. Assign an IP to VAP team, expect them to contribute actively to monthly team meetings.		
5. Participate in project meetings		
6. Learn from Defects: work with unit teams to investigate each VAP and report findings across institution		
7. Shadow nurses; arrange for nurses to shadow IP's		
8. Identify and mitigate barriers to prevent VAP. Observe Ventilator Management Care. Ask clinicians what is difficult. Collaborate to remove barriers		
9. Collaborate with Clinical and Administrative leaders to develop a coordinated plan for VAP reduction throughout the organization		
10. Assure that all IP staff are skilled in use of CDC VAP definitions and surveillance methods		
11. Maintain active infection surveillance program using CDC criteria		
12. Monitor hand hygiene no less than quarterly and report performance to all employees and the Board		
13. Ensure accuracy and efficacy of staff education on strategies to prevent VAP		
14. Provide monthly unit level VAP data to project leads for P POSTING and transparent tracking		
15. Send senior hospital leaders unit specific, weekly reports of the number of people infected with VAP, the weeks without VAP, and quarterly VAP rates.		
16. Lead efforts to assess utility and necessity of infection related technologies: special OET Ts with continuous subglottic suctioning , HOB Alert/Indinator, bainless bath care, Chlorhexidine oral care kits.		
17. Enter VAP data into the *NHSN/CDC website* to ensure accuracy and focused analysis, data integrity		

Nurse Leader (Unit Director/Manager) Checklist

Prevention of Ventilator Associated Pneumonia "VAP"	Leader Responsible	Date Initiated
1. Meet with CEO and hospital project leader to understand the initiative and the Infection Prevention roles. (Units must own and lead the project, but infection control practitioner [ICP] have a critical "expert" role)		
2. Introduce the project to all unit staff and explain their role		
3. Require science of safety training for all current and new staff (www.safercare.net)		
4. Assign a team leader or unit champion; expect them to contribute actively to monthly team meetings.		
5. Learn from Defects: work with the unit team leader to investigate each VAP and report findings across institution		
6. Train the Unit Leader to Shadow nurses; arrange for nurses to shadow ICP's		
7. Identify and mitigate barriers to prevent VAP. Audit compliance to evidence based VAP prevention bundle. Validate by observing ventilator management care on the bedside. Ask clinicians what is difficult. Collaborate to remove barriers.		
8. Collaborate with Clinical and Administrative leaders to develop a coordinated plan for VAP reduction throughout the organization		
9. Collaborate with the ICP staff on surveillance methods		
10. Maintain active infection surveillance program using CDC criteria		
11. Collaborate with the ICP on Monitoring hand hygiene. Report performance to all employees and senior leaders.		

FOUR E'S: EVALUATE

- Engage: help staff understand the preventable harm
  - Share stories about patients affected
  - Estimate number of patients harmed
  - Develop a business case
- Educate: ensure staff and senior leaders understand what they need to do to prevent injury and improve teamwork and communication
  - Conference calls, webcasts, meetings
- Execute: how given the resources and culture they would ensure that all patients received the evidence
  - Share with working, what's not
  - Coaching calls
- Evaluate: project leader monitors that teens are using standardized definitions, report their data and make it transparent at the unit level

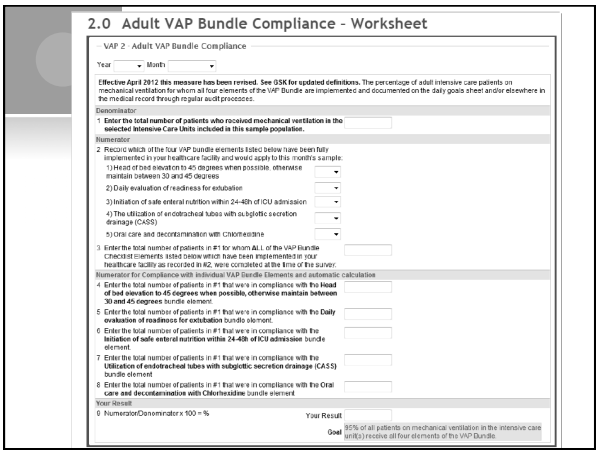
Goeschel CA, et al. Nursing in Critical Care, 2011;16:35-42

> The things included in the measurement becomes relevant, the things omitted are out of sight out of mind
>
> Peter F. Drucker

A Webber Training Teleclass

Hosted by Paul Webber paul@webbertraining.com

www.webbertraining.com



2.0 Adult VAP Bundle Compliance - Worksheet

VAP 2 Adult VAP Bundle Compliance

Year Month

Effective April 2012 this measure has been revised. See GSK for updated definitions. The percentage of adult intensive care patients on mechanical ventilation for whom all four elements of the VAP Bundle are implemented and documented on the daily goals sheet and/or elsewhere in the medical record through regular audit processes.

Denominator:

1 **Enter the total number of patients who received mechanical ventilation in the selected Intensive Care Units included in this sample population.**

Numerator:

2 Record which of the four VAP bundle elements listed below have been fully implemented in your healthcare facility and would apply to this month's sample:

1) Head of bed elevation to 45 degrees when possible, otherwise maintain between 30 and 45 degrees
2) Daily evaluation of readiness for extubation
3) Initiation of safe enteral nutrition within 24-48h of ICU admission
4) The utilization of endotracheal tubes with subglottic secretion drainage (CASS)
5) Oral care and decontamination with Chlorhexidine

3 Enter the total number of patients in #1 for whom ALL of the VAP Bundle Checklist elements listed below which have been implemented in your healthcare facility as recorded in #2, were completed at the time of the survey.

Numerator for Compliance with individual VAP Bundle Elements and automatic calculation

4 Enter the total number of patients in #1 that were in compliance with the **Head of bed elevation to 45 degrees when possible, otherwise maintain between 30 and 45 degrees** bundle element

5 Enter the total number of patients in #1 that were in compliance with the **Daily evaluation of readiness for extubation** bundle element.

6 Enter the total number of patients in #1 that were in compliance with the **Initiation of safe enteral nutrition within 24-48h of ICU admission** bundle element.

7 Enter the total number of patients in #1 that were in compliance with the **Utilization of endotracheal tubes with subglottic secretion drainage (CASS)** bundle element

8 Enter the total number of patients in #1 that were in compliance with the **Oral care and decontamination with Chlorhexidine** bundle element

Your Result

9 Numerator/Denominator x 100 = % Your Result

Goal 95% of all patients on mechanical ventilation in the intensive care unit(s) receive all four elements of the VAP Bundle.

EVALUATE

Congratulations

It has been…

53	54	55	56	57	58	59	60	61	62	63	64	65
66	67	68	69	70	71	72	73	74	75	76	77	78
79	80	81	82	83	84	85	86	87	88	89	90	91
92	93	94	95	96	97	98	99	100	102	103	104	

weeks since _____ Unit last VAP!!!!

POTENTIAL BARRIERS

- Perception of lack of time or the importance
- Lack of evidence based education…just do it!!!!
- Absence of a define protocol/procedure
- Staff turnover/Replacement staff
- Inaccessibility of needed supplies
- No real clinical lead on the unit
- Lack of feedback on progress
- Lack of accountability/responsibility

O'keefe-McCarthy S, et al. Worldviews on Evidence Based Nursing, 2008:193-204
Abott CA, et al. Worldviews on Evidence Based Nursing:2008:193-204

INTERVENTIONS TO ENSURE PATIENTS RECEIVE EVIDENCE

- Evidence based education
- Recognition of value and reinforcement
- Products/Processes that make it easy for the frontline caregiver to provide the care (make it part of the bundle)
  - Bathing kits
  - Placement on the med record
  - Automated charting with flag reminders
- Frequent rounding/reinforcement of standard
- Multidisciplinary rounds/Checklists

Westwall S. Nursing in Critical Care, 2008;13(4):203-207
Abbott CA, et al. Worldviews on Evidence Based Practice, 2006:139-152
Fuchs MA, et al. J Nurs Care Qual, 2011;26:101-109

INTERVENTIONS TO ENSURE PATIENTS RECEIVE EVIDENCE

- Setting targets/Celebrating successes
- Placement of new practice/education in orientation
- Attractive signs to outline protocol in the patient rooms near the products
- Compliance program with feedback to all caregivers
- Outcome measurement/Feedback*
- Include RN's in Morbidity & Mortality peer review for VAP increased compliance/accountability & ↓VAP rates

Westwall S. Nursing in Critical Care, 2008;13(4):203-207
Abbott CA, et al. Worldviews on Evidence Based Practice, 2006:139-152
Fuchs MA, et al. J Nurs Care Qual, 2011;26:101-109
Nolan SC, et al. JONA, 2010:40(9):374-383

BE COURAGEOUS

We all are responsible for the safety of our patients……Own the Issues

- "If not this, then what??"
- "If not now, then when?"
- "If not me, then who??"


Coming Soon
15 August (Free WHO Teleclass … Europe) Processing Medical Devices in Settings With Limited Resources
Speaker: Dr. Nizam Damani, Craigavon Area Hospital, Northern Ireland
Sponsored by WHO First Global Patient Safety Challenge – Clean Care is Safer Care
30 August (Free Teleclass … Broadcast Live from New Zealand NDICN Conference)
'Contagion' … the Movie, How Realistic Is It?
Speaker: Prof. Lance Jennings, University of Otago, New Zealand
5 September (Free WHO Teleclass … North America) Successes and Challenges in Developing and Implementing Bundles in Infection Prevention
Speaker: Prof. Don Goldmann, Harvard University School of Public Health
Sponsored by WHO First Global Patient Safety Challenge – Clean Care is Safer Care
13 September The Hand is Quicker Than a Sneeze in the Spread of Disease
Speaker: Prof. Chuck Gerba, University of Arizona
Teleclass sponsored by GOJO (www.gojo.com)
www.webbertraining.com/schedulep1.php