The Prevention of Ventilator-associated Pneumonia: Local Practice in ICUs of Hong Kong

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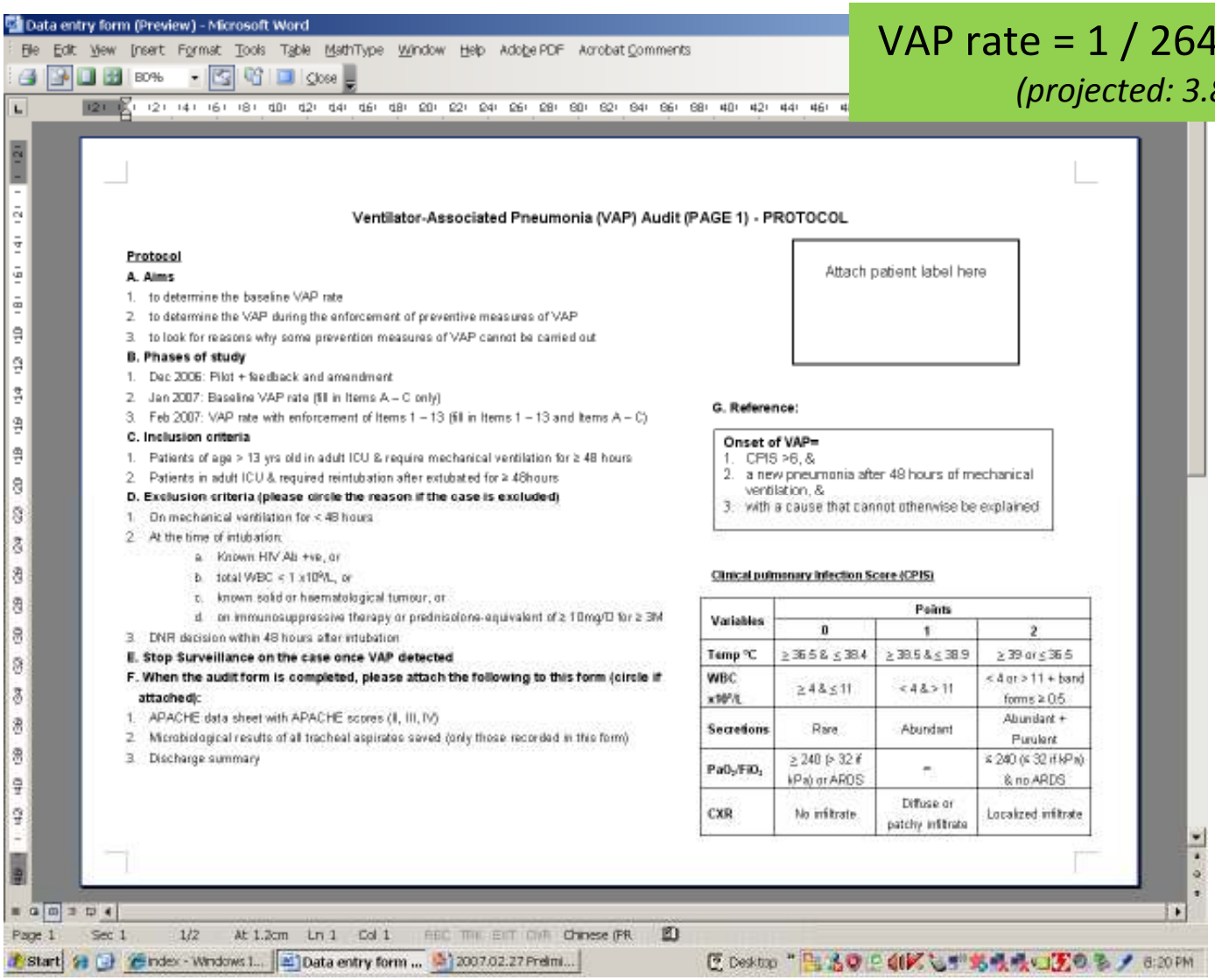
HKEC

Our First VAP Prevention Program in ICU of PYNEH

VAP rate = 1 / 264 ventilator-days
(projected: 3.8 per 1000)



Data entry form (Preview) - Microsoft Word

Ventilator-Associated Pneumonia (VAP) Audit (PAGE 1) - PROTOCOL

Protocol

A. Aims

1. to determine the baseline VAP rate
2. to determine the VAP during the enforcement of preventive measures of VAP
3. to look for reasons why some prevention measures of VAP cannot be carried out

B. Phases of study

1. Dec 2006: Pilot + feedback and amendment
2. Jan 2007: Baseline VAP rate (fill in Items A – C only)
3. Feb 2007: VAP rate with enforcement of Items 1 – 13 (fill in Items 1 – 13 and Items A – C)

C. Inclusion criteria

1. Patients of age > 13 yrs old in adult ICU & require mechanical ventilation for ≥ 48 hours
2. Patients in adult ICU & required reintubation after extubated for ≥ 48hours

D. Exclusion criteria (please circle the reason if the case is excluded)

1. On mechanical ventilation for < 48 hours
2. At the time of intubation:
   a. Known HIV Ab +ve, or
   b. total WBC < 1 x10⁹/L, or
   c. known solid or haematological tumour, or
   d. on immunosuppressive therapy or prednisolone-equivalent of ≥ 10mg/D for ≥ 3M
3. DNR decision within 48 hours after intubation

E. Stop Surveillance on the case once VAP detected

F. When the audit form is completed, please attach the following to this form (circle if attached):

1. APACHE data sheet with APACHE scores (II, III, IV)
2. Microbiological results of all tracheal aspirates saved (only those recorded in this form)
3. Discharge summary

Attach patient label here

G. Reference:

Onset of VAP=
1. CPIS >6, &
2. a new pneumonia after 48 hours of mechanical ventilation, &
3. with a cause that cannot otherwise be explained

Clinical pulmonary infection Score (CPIS)

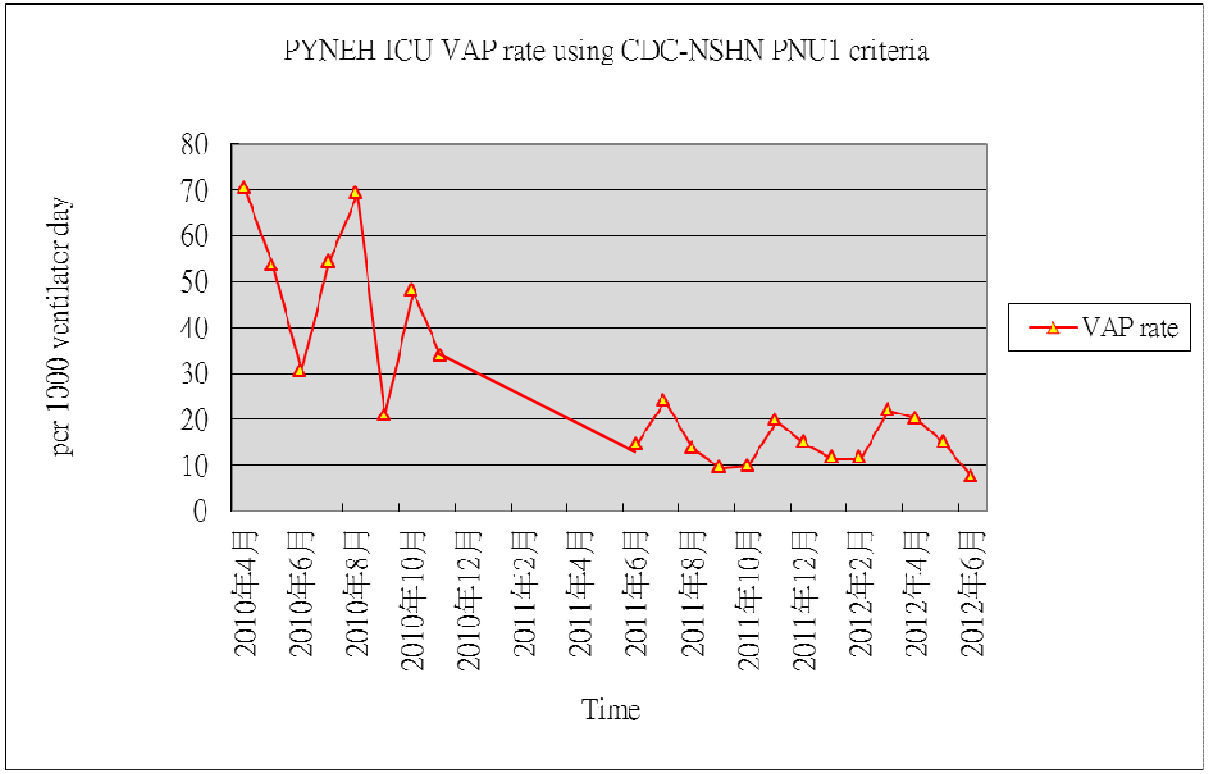
Variables	Points		
	0	1	2
Temp °C	≥ 36.5 & ≤ 38.4	≥ 38.5 & ≤ 38.9	≥ 39 or ≤ 36.5
WBC x10⁹/L	≥ 4 & ≤ 11	< 4 & > 11	< 4 or > 11 + band forms ≥ 0.5
Secretions	Rare	Abundant	Abundant + Purulent
PaO_2/FiO_2	≥ 240 (> 32 if kPa) or ARDS	"	≤ 240 (≤ 32 if kPa) & no ARDS
CXR	No infiltrate	Diffuse or patchy infiltrate	Localized infiltrate

Low VAP Rate Creates a Comfort Zone

3.5 per 1000 ventilator days in 2007

High VAP Rate in our ICU whenPNU1 Criteria are used

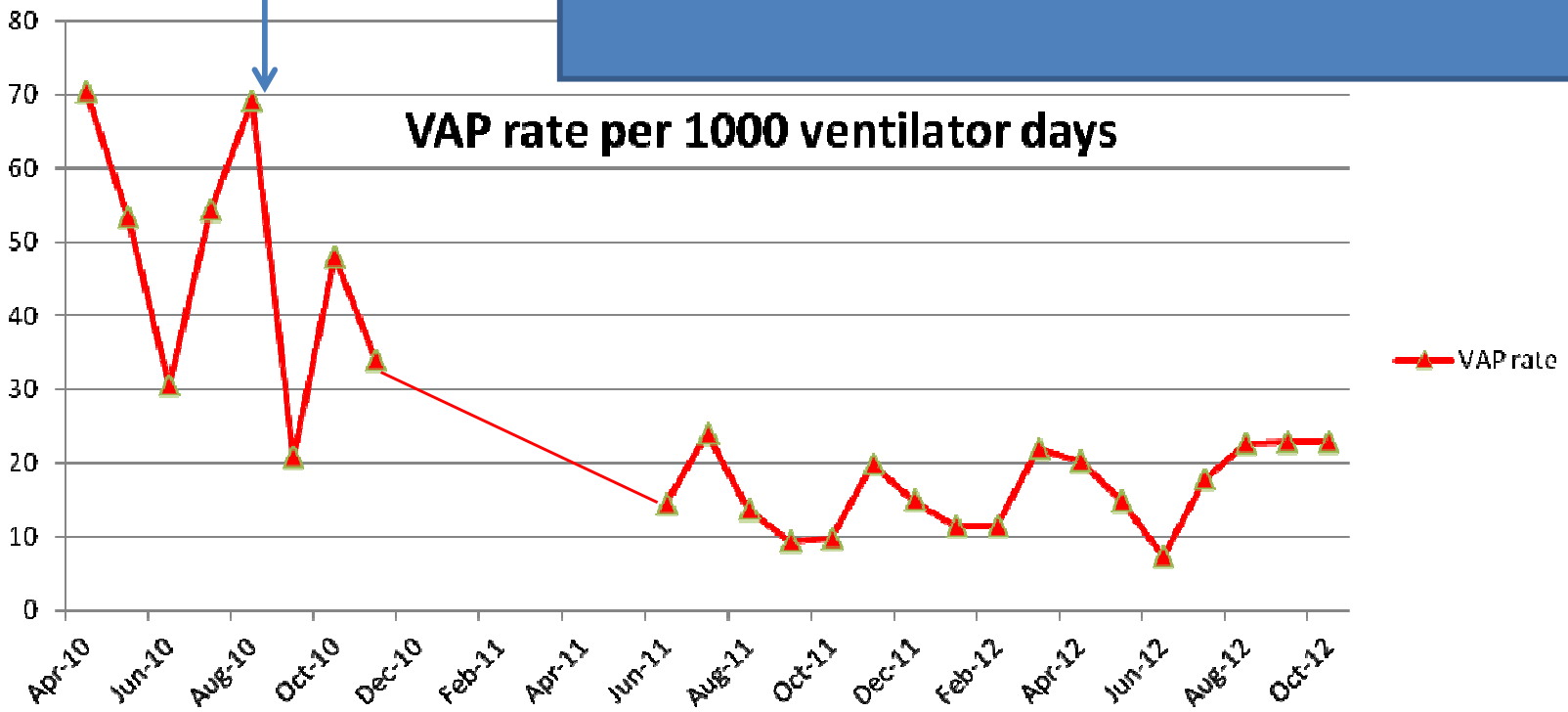
Definition by: CPIS	PNU 1	PNU 1
2007	Before intervention 2010	After intervention 2010
3.8 per 1000 ventilator days	51 per 1000 ventilator days	44 per 1000 ventilator days



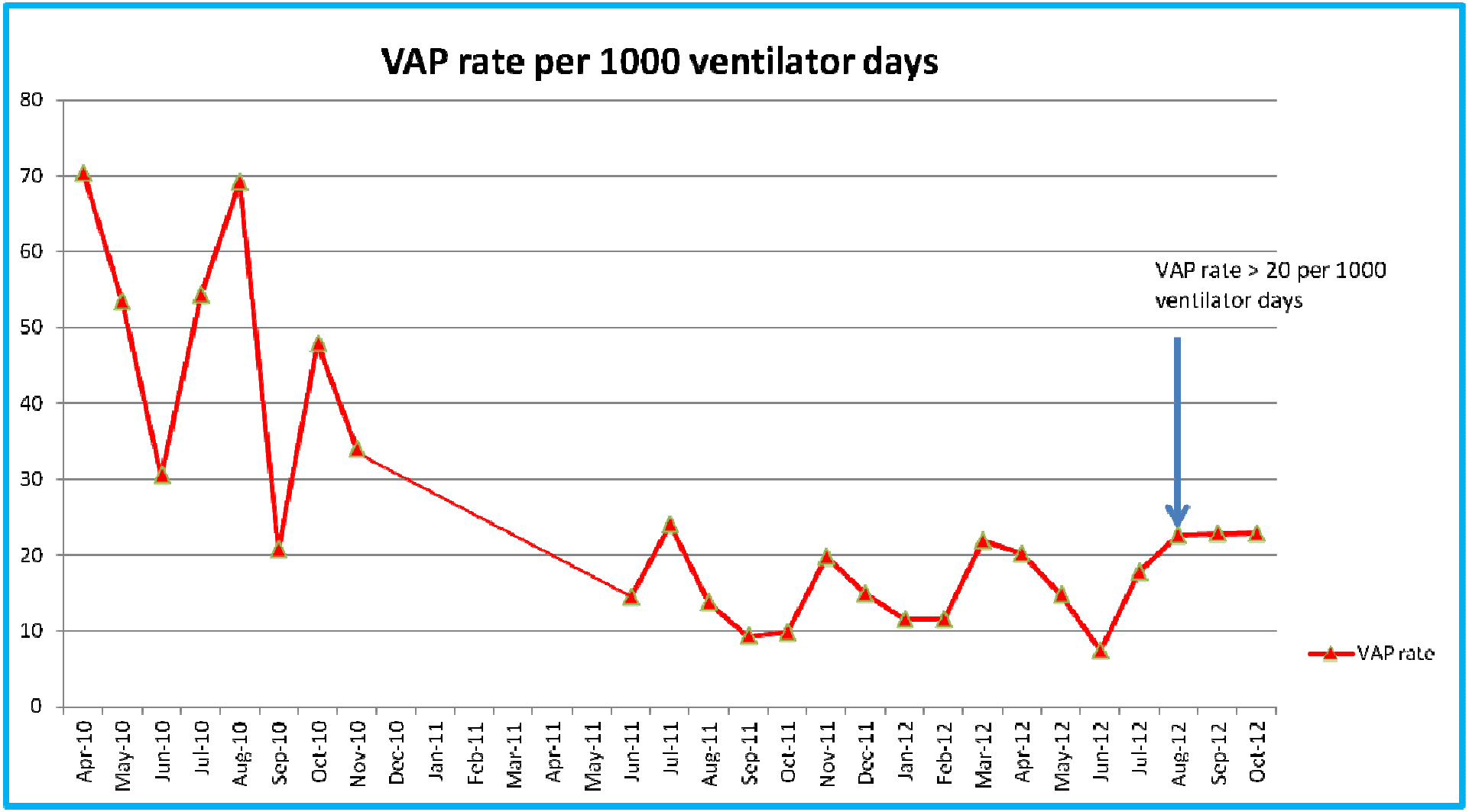
What are These Interventions ?

Interventions

- Conduct refresher lectures on prevention of VAP
- Maintain ETT cuff pressure at 30 cmH2O
- Conduct compliance audit to
  - proper oral care with tooth brushing
  - HOB

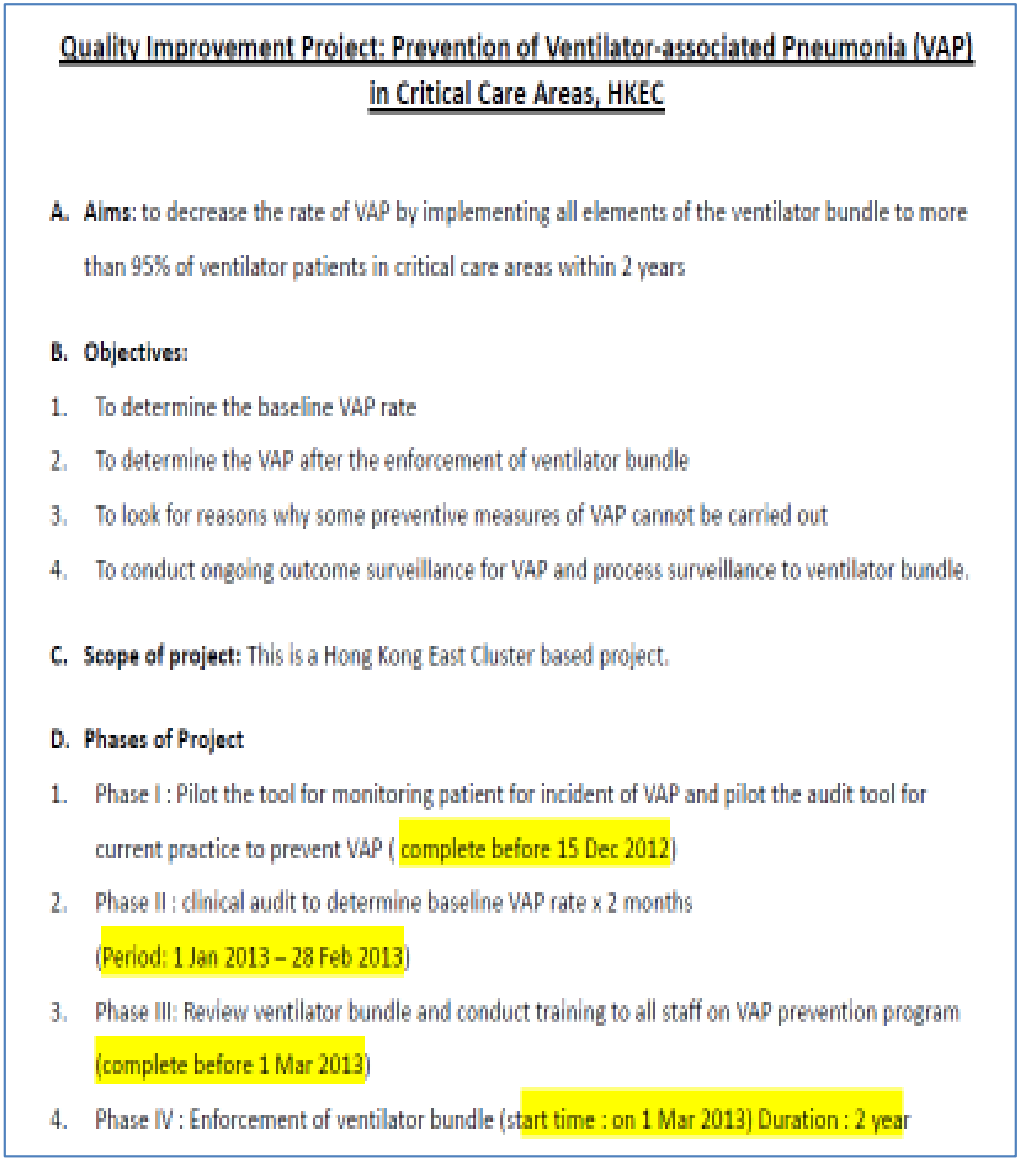


Still High VAP Rate: Where was The Gap?



What Can We DO?

- Set up a task force
- Set clear aim of the Prevention of VAP project
  - Reduce VAP rate
  - Achieve compliance rate of 95% to the ventilator bundle
- Gain senior endorsement
- Invite ICU /CCU to participate
- Brainstorming
- Revisit the VAP process, we found……



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.

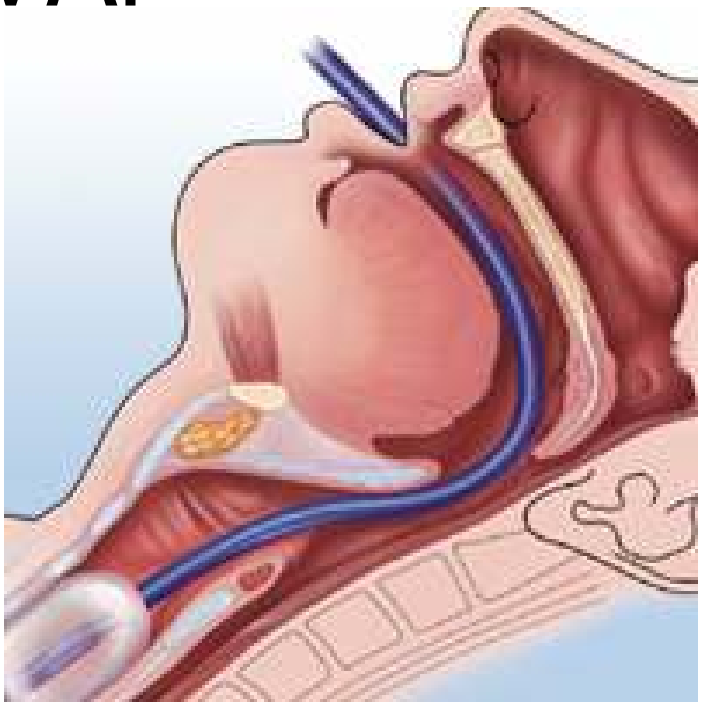
C. **Scope of project:** This is a Hong Kong East Cluster based project.

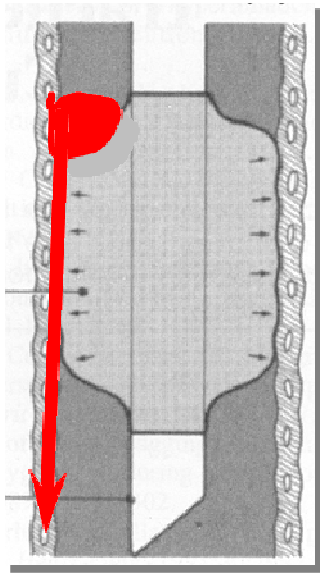
D. **Phases of Project**

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

Pathogenesis of VAP

- Bacteria enter the lower respiratory tract via two pathways:
  - Aspiration of organisms from the oropharynx and GI tract (most common cause)
  - Via ventilatory circuit & tracheal tube





Lots of Evidences

2004

CLINICAL GUIDELINES

Evidence-Based Clinical Practice Guideline for the Prevention of Ventilator-Associated Pneumonia

Peter Dodek, MD, MHSc; Sean Keenan, MD, MSc(Epid); Deborah Cook, MD, MSc(Epid); Daren Heyland, MD, MSc(Epid); Michael Jacka, MD, MSc; Lori Hand, RRT; John Muscedere, MD; Debra Foster, RN; Nav Mehta, MD; Richard Hall, MD; and Christian Brun-Buisson, MD, for the Canadian Critical Care Trials Group and the Canadian Critical Care Society

Background: Ventilator-associated pneumonia (VAP) is an important patient safety issue in critically ill patients.

Purpose: To develop an evidence-based guideline for the prevention of VAP.

Data Sources: MEDLINE, EMBASE, and the Cochrane Database of Systematic Reviews.

Study Selection: The authors systematically searched for relevant randomized, controlled trials and systematic reviews that involved mechanically ventilated adults and were published before 1 April 2003.

Data Extraction: Physical, positional, and pharmacologic interventions that may influence the development of VAP were considered. Independently and in duplicate, the authors scored the validity of trials; the effect size and confidence intervals; the homogeneity of results; and safety, feasibility, and economic issues.

Data Synthesis: *Recommended:* The orotracheal route of intubation, changes of ventilator circuits only for each new patient and if the circuits are soiled, use of closed endotracheal suction systems that are changed for each new patient and as clinically indicated, heat and moisture exchangers in the absence of contraindications, weekly changes of heat and moisture exchangers, and semi-recumbent positioning in the absence of contraindications. Consider subglottic secretion drainage and kinetic beds. *Not recommended:* Sucralfate to prevent VAP in patients at high risk for gastrointestinal bleeding and topical antibiotics to prevent VAP. Because of insufficient or conflicting evidence, no recommendations were made about systematically searching for maxillary sinusitis, chest physiotherapy, the timing of tracheostomy, prone positioning, prophylactic intravenous antibiotics, or intravenous plus topical antibiotics.

Limitations: No formal economic analysis was performed, and patient perspectives were not considered.

Conclusion: If effectively implemented, this guideline may decrease the morbidity, mortality, and costs of VAP in mechanically ventilated patients.

Ann Intern Med. 2004;141:305-313. www.annals.org

For author affiliations, see end of text.

AJCC American Journal of Critical Care

2007

Evidence-Based Practice: Use of the Ventilator Bundle to Prevent Ventilator-Associated Pneumonia

Arlene F. Tolentino-DelosReyes, Susan D. Ruppert and Shyang-Yun Pamela K. Shiao

Am J Crit Care 2007;16:20-27

Published online http://www.ajcconline.org

衛生防護中心 Centre for Health Protection

Recommendations on Prevention of Ventilator-associated Pneumonia

Scientific Committee on Infection Control, and Infection Control Branch, Centre for Health Protection, Department of Health

June 2010

June 2010

2006

PROTECTING 5 Million lives FROM HARM

Getting Started Kit:
Prevent Ventilator-Associated Pneumonia
How-to Guide

1/2008

AACN PRACTICE ALERT

VENTILATOR ASSOCIATED PNEUMONIA

e Alert Statements:

patients receiving mechanical ventilation, as well as those at high risk for aspiration (e.g., decreased level of sciousness; enteral tube in place), should have the head of the bed (HOB) elevated at an angle of 30 to 45° unless dically contraindicated.[1-7] (Level VI)

s an endotracheal tube (ET) with a dorsal lumen above the endotracheal cuff to allow drainage by continuous tioning of tracheal secretions that ac not routinely change, on the basis o

rting Evidence:

cally ill patients who are intubated fo umonia (VAP)[1,2,15-23] and those intub ude decreased level of consciousnes antion, presence of gastric or small i rted to occur at rates of 10 to 35 ca

2012

INICC www.INICC.org International Nosocomial Infection Control Consortium

www.FLIN.org.ar Foundation to Fight Against Nosocomial Infections FLIN

INICC Bundle to Prevent Health Care Associated Pneumonia in Intensive Care Units: An International Perspective.

Hong Kong bundle to prevent VAP

- Elevate head of patient to at least 30º
- Provide antiseptic oral rinse to ventilated patients
- Perform hand hygiene before and after each respiratory care
- Assess patient's readiness to wean and to extubate on daily basis
- Prevent condensate from entering patient's airway
- Maintain proper care to respiratory consumables and equipments
- Conduct ongoing active VAP surveillance

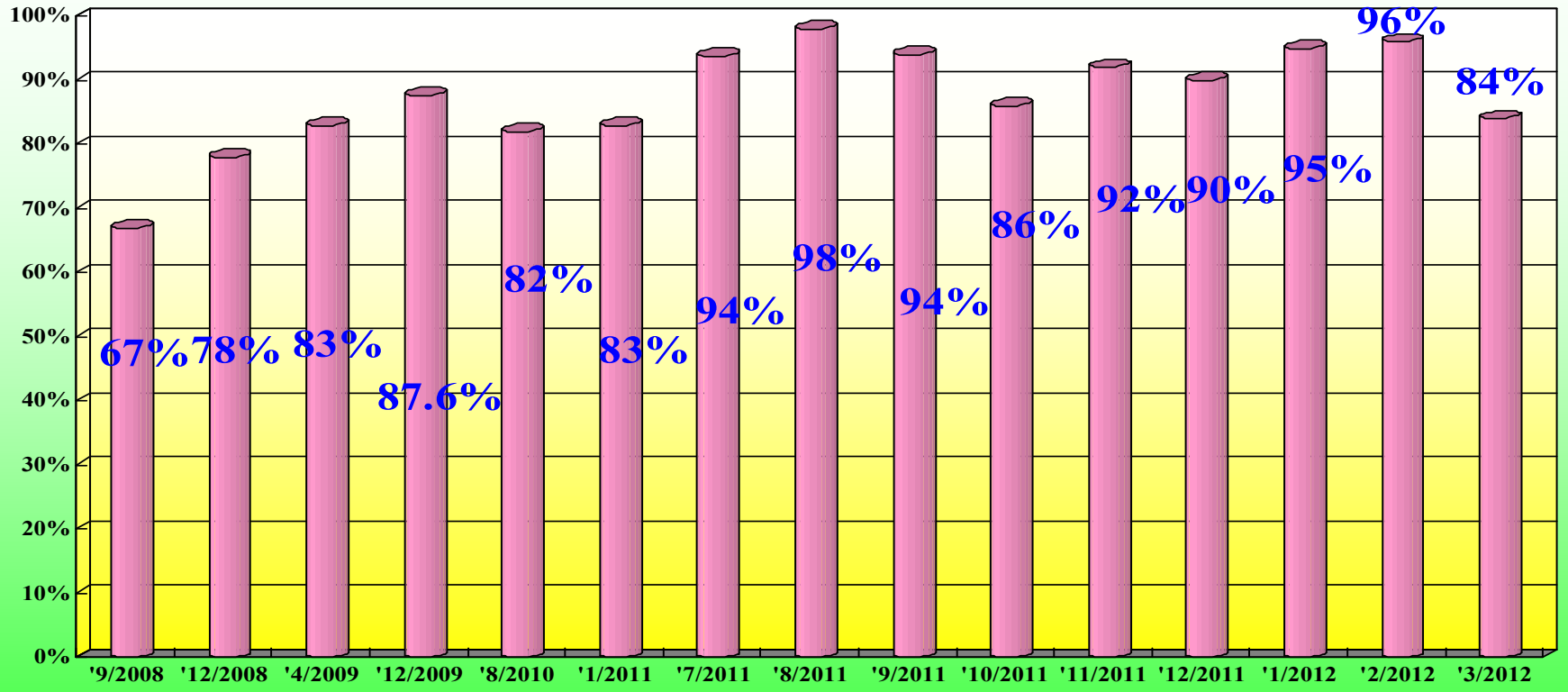
Recommendations on prevention of VAP, June 2010
Centre for Health Protection, Dep. of Health

The situation is ....

- We know VAP and ventilator bundle to prevent VAP
- But we do not know our compliance to ventilator bundle

- We may not know the emerging evidence
- We want to improve patient care with international standard

Not Easy to Maintain Bed Head Elevation



Target: ≥ 95% compliance

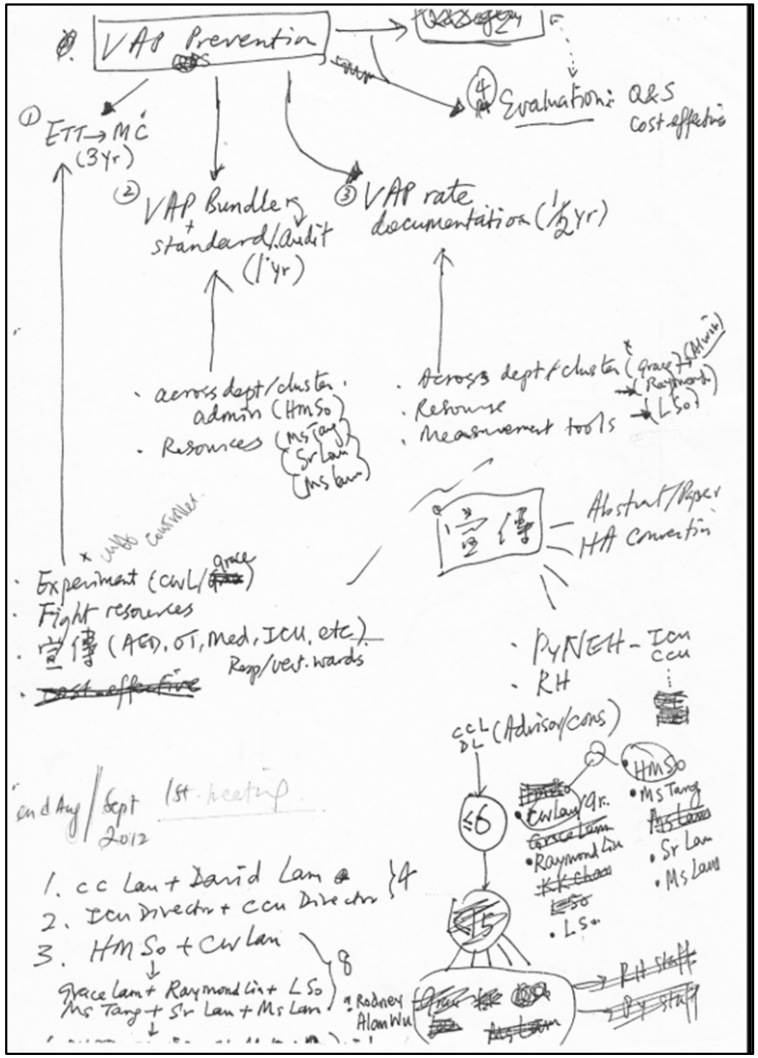
What's New about VAP & VAP bundle

- Old topic
- New paradigm

- VAP diagnosis criteria: CPIS vs PNU1 (CDC)
- Align international standard

- Increasing the rigor surveillance vs
- objective measures of adherence to VAP preventive measures

Brainstorm for Better Strategies



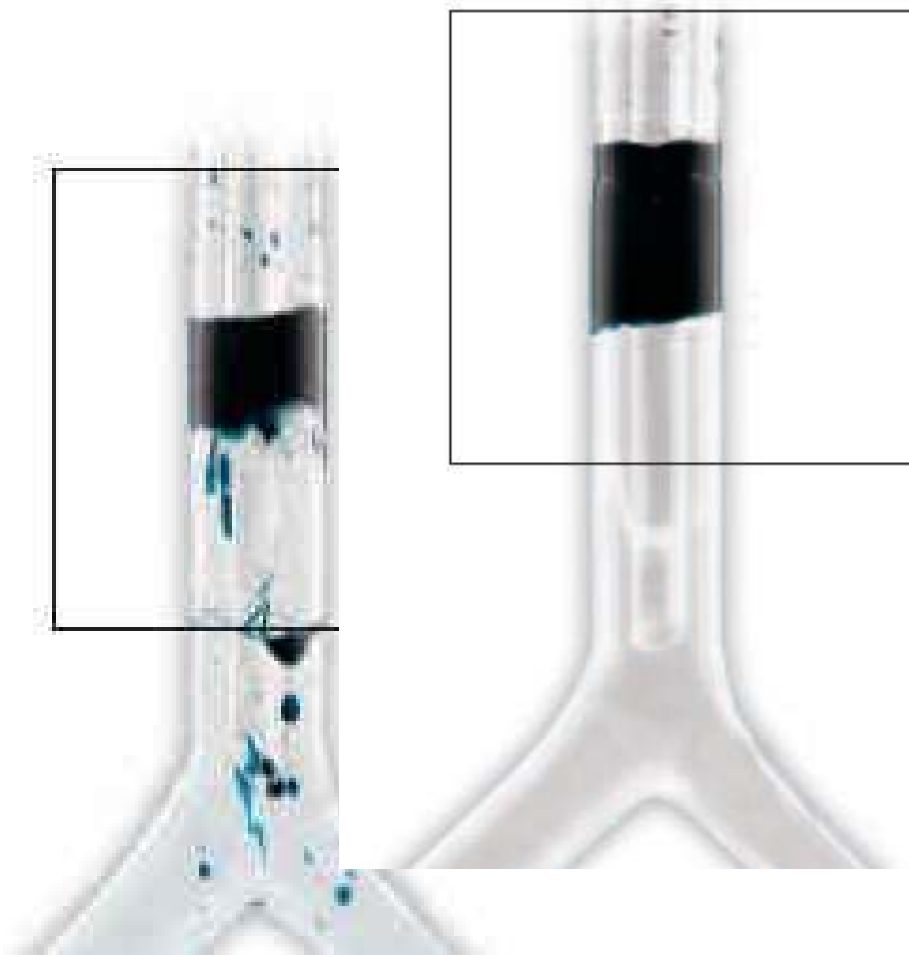
- Need bundle of measures
- Repeated administration of these measures over time is critical
- Dedicated staff to
  - promote & monitor the process,
  - engage and motivate staff and
  - finally share the success to keep the momentum of change

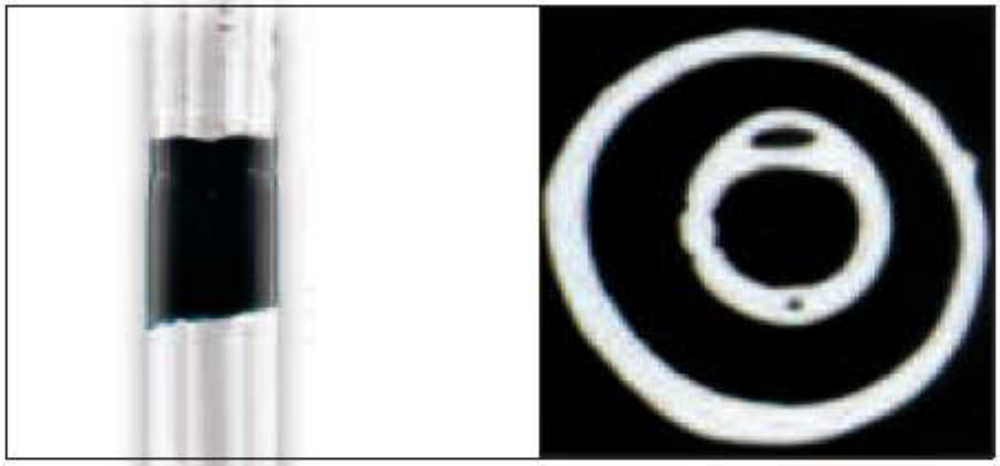
Strategy 1: Multi-dimensional Approach (1)

- Reinforce ventilator bundle, and
- Promote
  - use of novel Microcuff

  - use of continuous cuff monitoring device

New ETT to prevent aspiration of subglottic secretion





Note the absence of visible channel openings in the MICROCUFF* tube

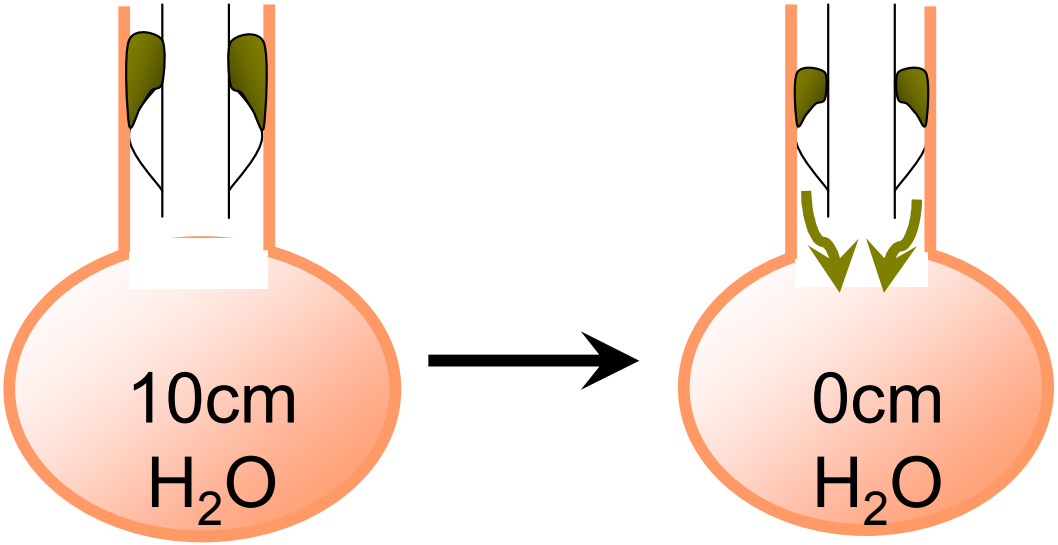
CT scan[3,4] (transversal) of an inflated KIMBERLY-CLARK* MICROCUFF* Tube in excised animal trachea (cuff pressure: 20 cm H_2O)

The MICROCUFF* tube has advanced microthin polyurethane cuff material that allows the channels to "self-seal," reducing the possibility of leakage

Strategy 1: Multi-dimensional Approach (2)

- Promote
  - minimal disconnection of ventilator circuit

  - Circuit breaks promote aspiration especially in high PEEP



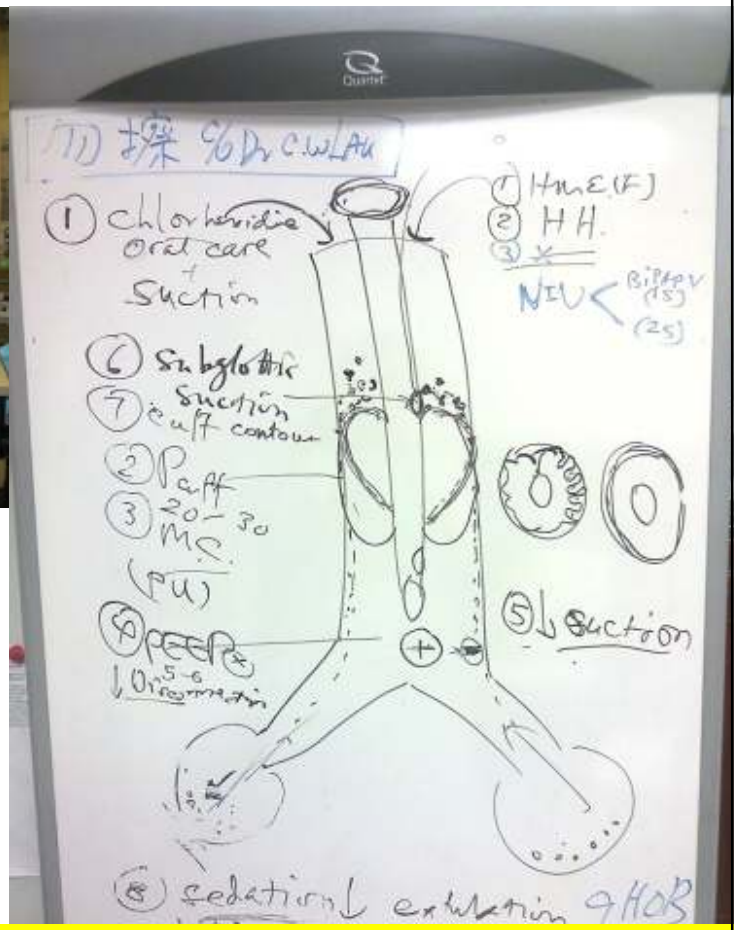
Strategy 2: Multi-disciplinary Approach

- Doctors, nurses, Health Care Assistance and physiotherapist

Strategy 3 : Multi-effort Approach

Refresher lecture on VAP

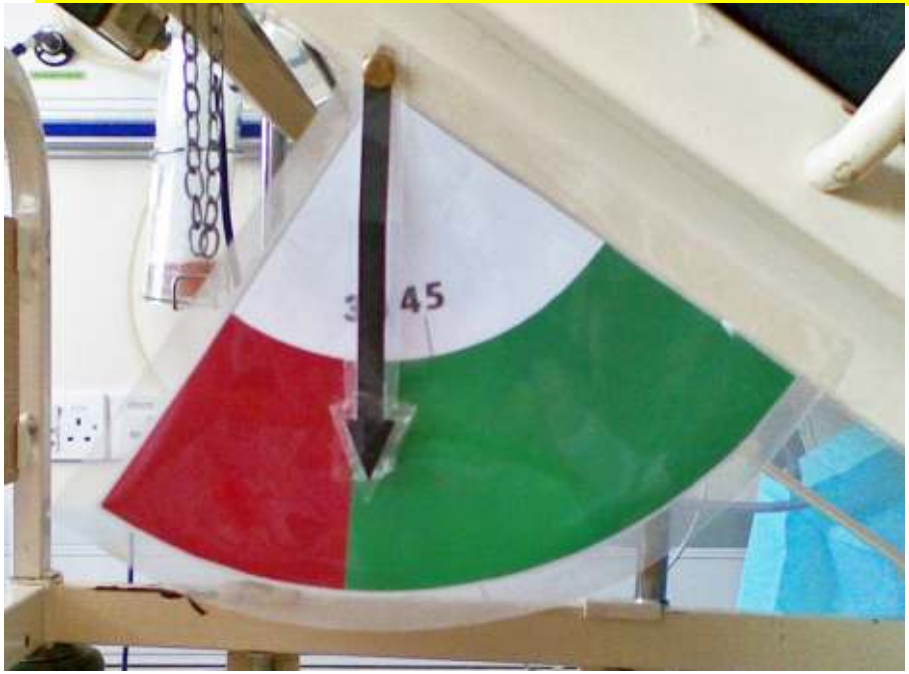
Brief talks at bedside



Visual display for better promotion

Strategy 3 : Multi-effort Approach (2)

Innovative home-made HOB indicator



Reverse trendelenberg

Strategy 3 : Multi-effort Approach (3)

Quality Improvement Project:

Prevention of Ventilator-associated Pneumonia (VAP) In Critical Care Areas, HKEC

Data collection form (updated on 24th Jan 2013)

Fill in, circle or put a √ where it is appropriate.

D10/B10 Bed no. _____

Date of ICU admission _____

Affix patient label here

Transfer in from AED/ OT/ general ward/ other hospital

Admission : Elective/ Emergency/ Trauma

Specialty : Surgery/ Medicine/ Neurosurgery/ Others

Date of intubation _____ Type of ETT : Standard/Microcuff/Others

Date & time of extubation _____ _____

Date of reintubation _____ _____

Date of tracheostomy _____ _____

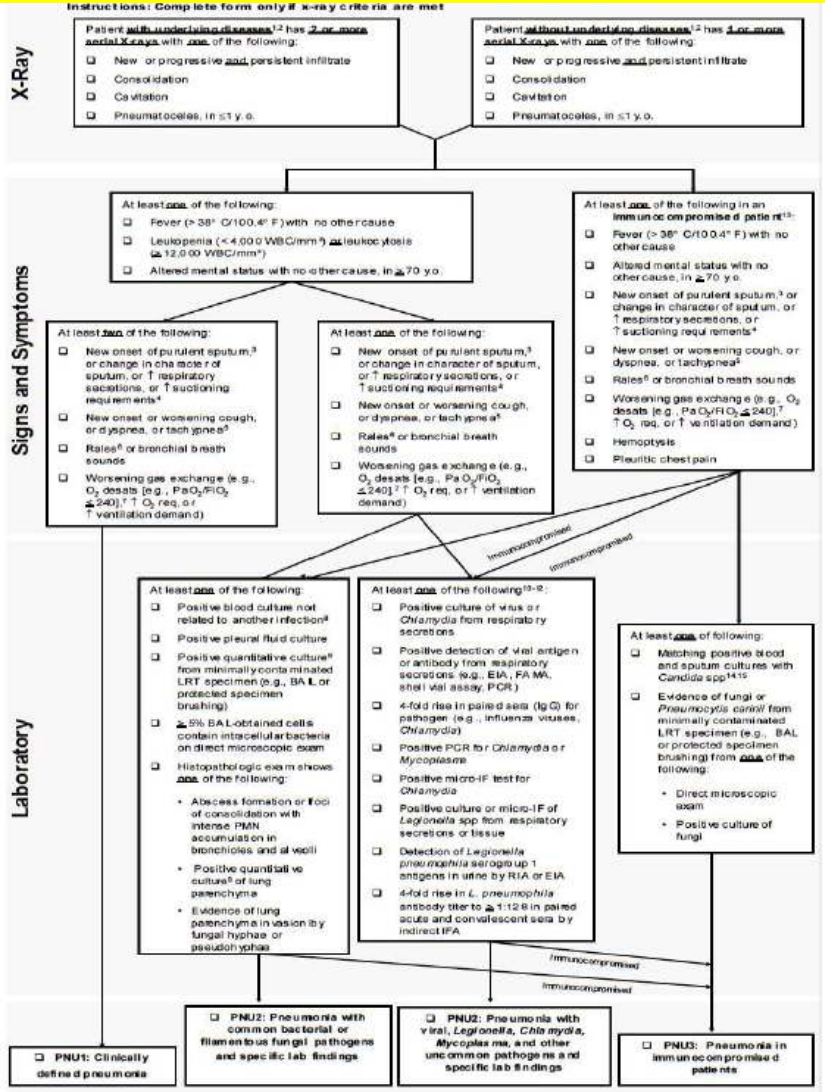
Refer to the flowchart overleaf for different criteria (PNU1, PNU2, PNU3) used in defining VAP.

Continue to fill in the form and monitor for VAP until 48 hours after extubation (include those patients having extubation in OT &being transferred to ICU post-op)

Assess patient for VAP and fill in the form daily by case MO preferably before 1pm.										
Date										
VAP	Yes									
	No									
Dr's Signature										

Daily round to capture any VAP

CDC surveillance- Pneumonia flow diagram



Strategy 3 : Multi-effort Approach (4)

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

Ventilator Bundle Checklist updated on 28 Feb 2013

Affix patient label here

Put "√" if done, "NA" if not applicable & specify reason

Item No.	Check once daily in the morning shift Ventilator Bundle Date																							
1	Elevate HOB (30 - 45°) & patient not sliding down																							
2	Perform regular oral care with antiseptic oral rinse if needed																							
3	Perform hand hygiene before and after each respiratory care																							
4	Review sedation target daily																							
5	Assess readiness to wean and to extubate daily																							
6	Drain condensate of the ventilator circuit before repositioning of patient																							
7	Carry out disinfection of the respiratory consumables and equipment a/c to protocol																							
8	Check & maintain appropriated ETT cuff pressure (25 - 30 cm H_2O)																							
9	Verify correct placement of the feeding tube at regular interval																							
10	Regular assessment of patient's tolerance to NG feeding																							
	Signed by nurse																							

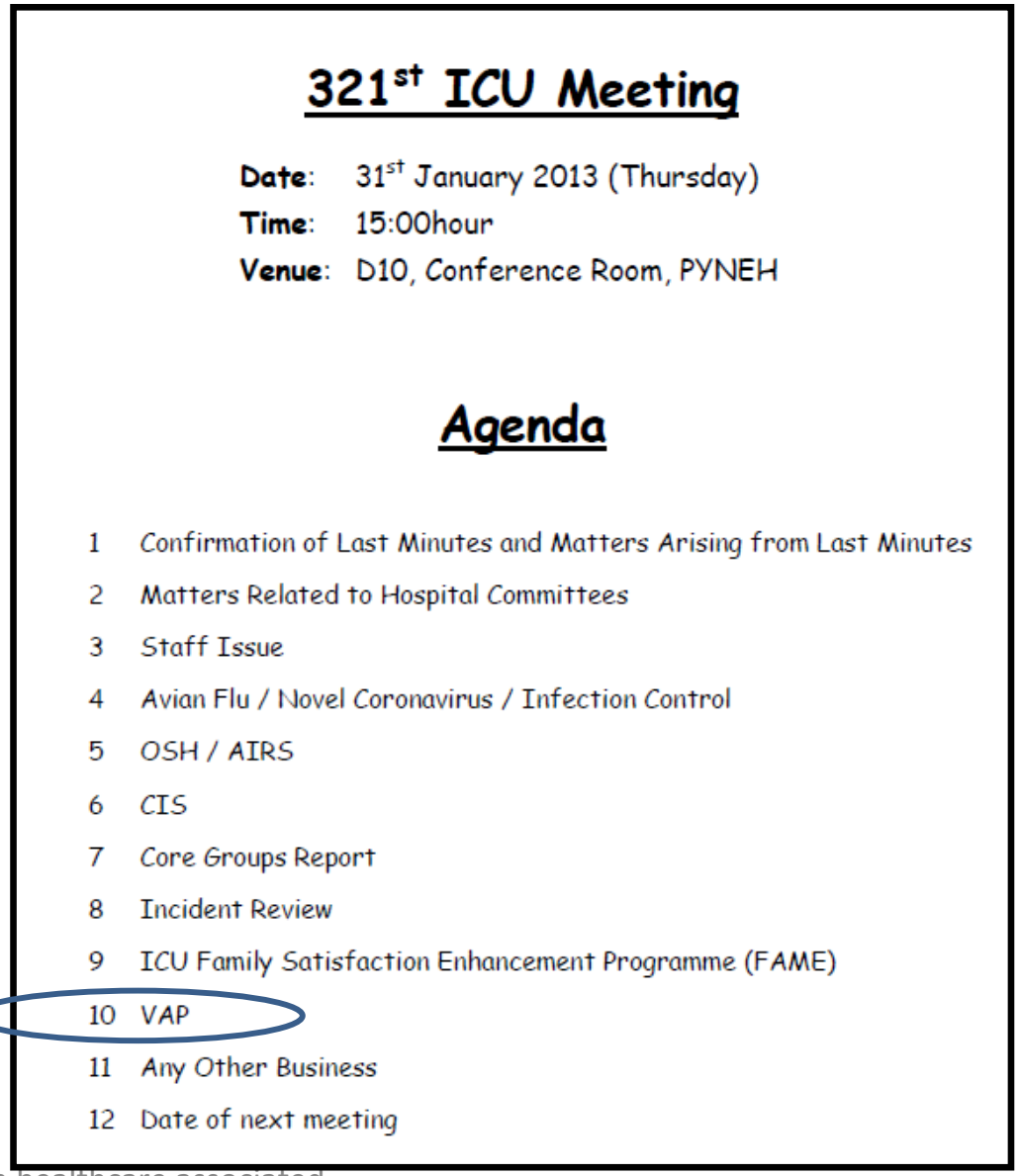
Specific reason if "not applicable" is selected

Date	Item No.	Reason	Date	Item No.	Reason

Get familiar with the ventilator bundle with a checklist

Strategy 3 : Multi-effort Approach (4)

- Discuss VAP issue at regular ICU meeting



321st ICU Meeting

Date: 31st January 2013 (Thursday)
Time: 15:00hour
Venue: D10, Conference Room, PYNEH

Agenda

1 Confirmation of Last Minutes and Matters Arising from Last Minutes
2 Matters Related to Hospital Committees
3 Staff Issue
4 Avian Flu / Novel Coronavirus / Infection Control
5 OSH / AIRS
6 CIS
7 Core Groups Report
8 Incident Review
9 ICU Family Satisfaction Enhancement Programme (FAME)
10 VAP
11 Any Other Business
12 Date of next meeting

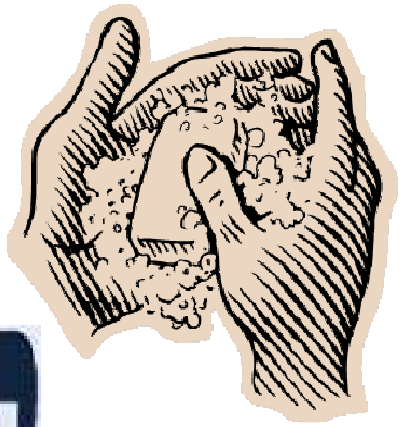
Process Evaluation

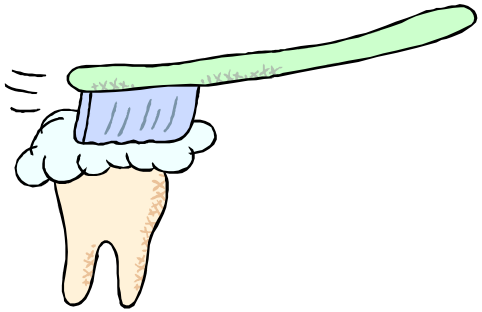
- Obtain baseline compliance rate on ventilator bundle
- Plan to conduct compliance audit at a six month period

Outcome Evaluation

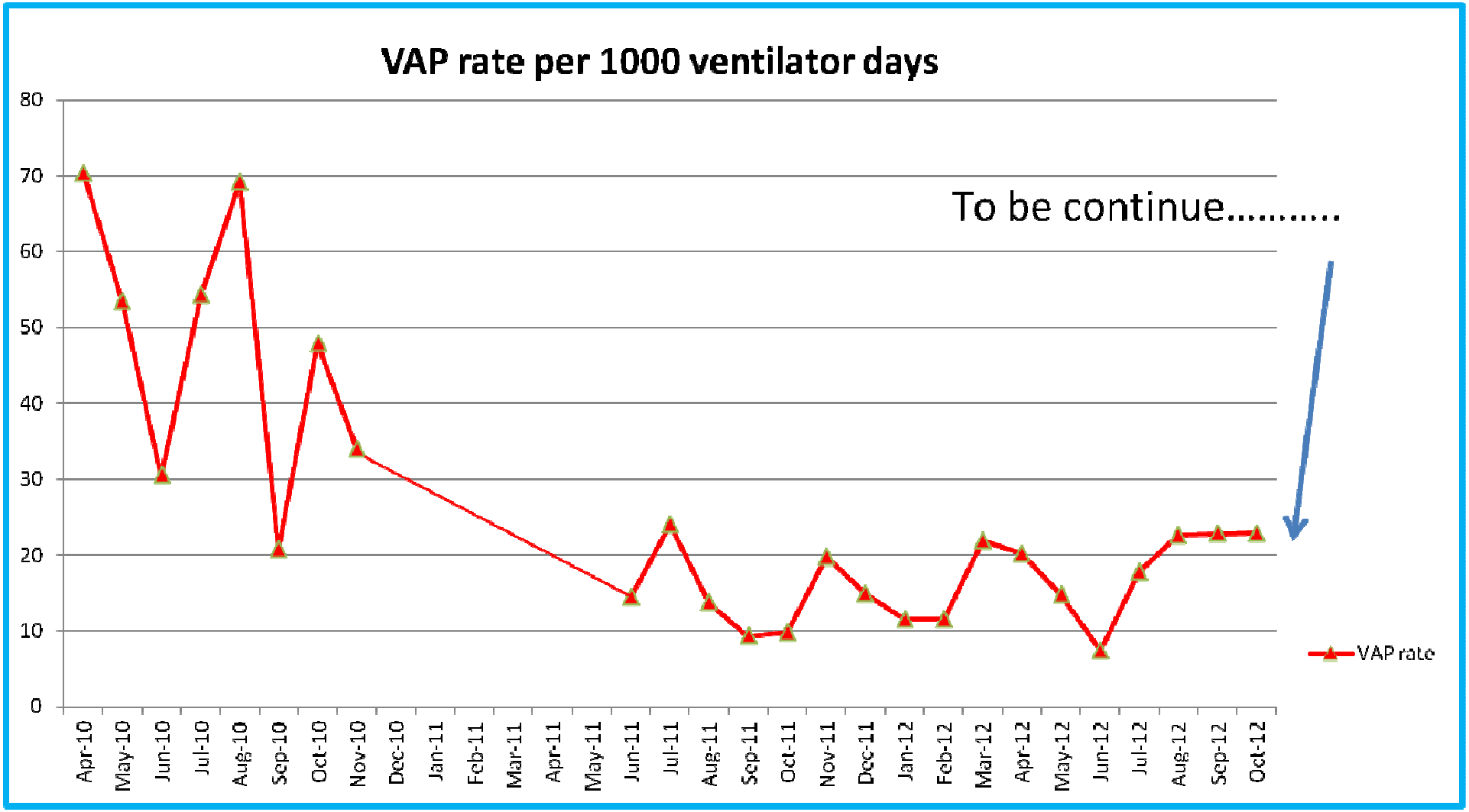
- Monitor VAP rate at a monthly basis
- Post up the VAP rate on display board at a prominent place
- Disseminate compliance audit results

Way Forward





VAP rate


VAP rate per 1000 ventilator days
To be continue.....
VAP rate
80
70
60
50
40
30
20
10
0
Apr-10
May-10
Jun-10
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10
Jan-11
Feb-11
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Mar-12
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May-12
Jun-12
Jul-12
Aug-12
Sep-12
Oct-12

Thank You


why
when
who
where
what
why
QUESTIONS
who
how
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