

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

VAP Prevention: Nurses' Perspective

Dr. SO Hang Mui, Nurse Consultant (Intensive Care), HKEC

18th January 2019



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



Pamela Youde Nethersole Eastern Hospital



3 Lok Man Road, Chai Wan, Hong Kong

Tour to ICU PYNEH



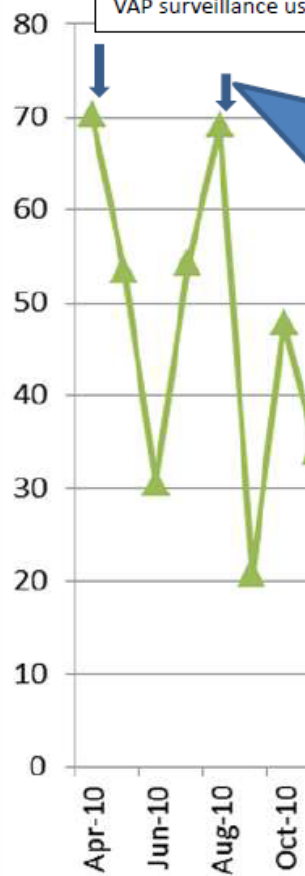
PYICU background data

- 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

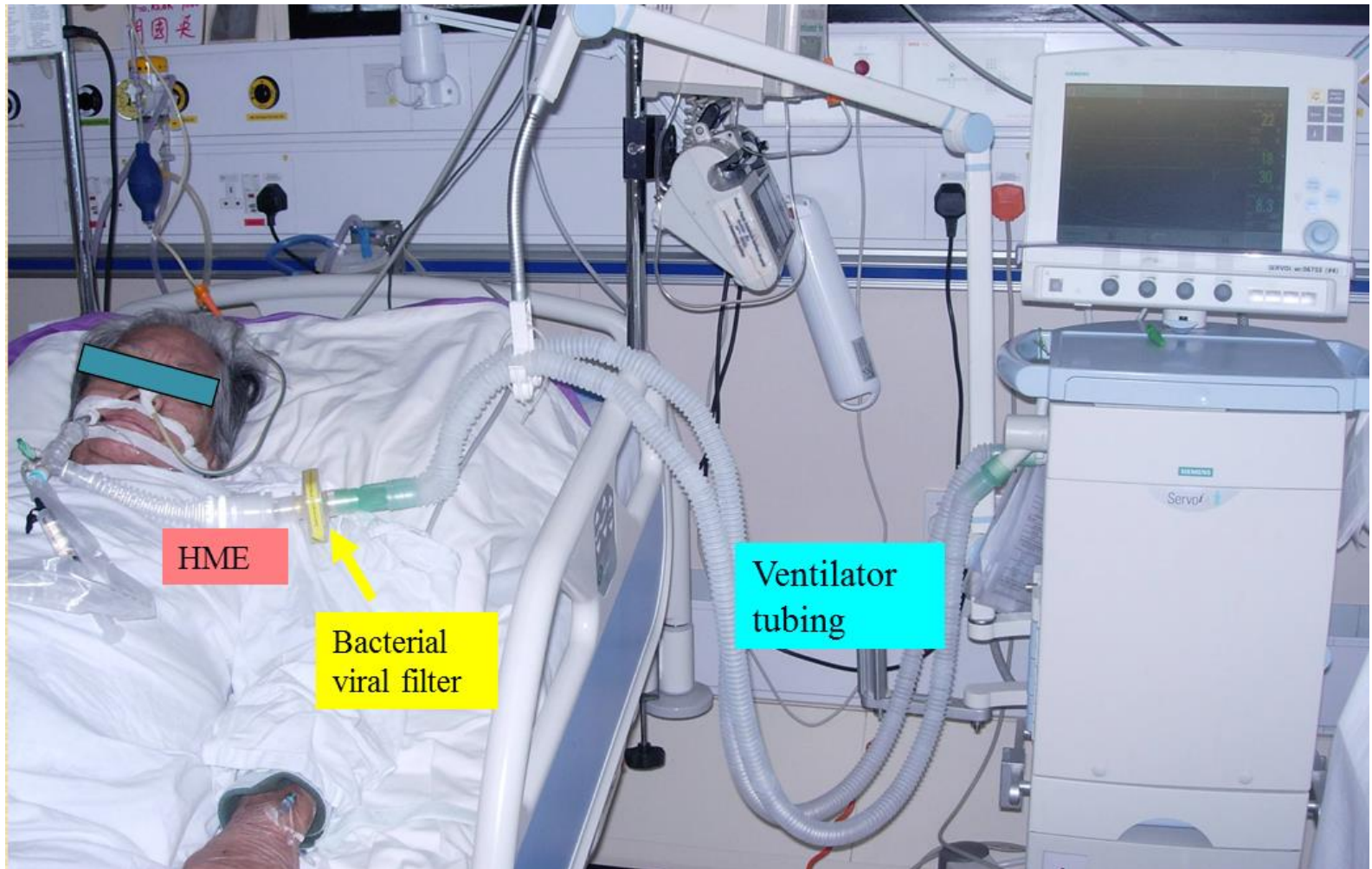
VAP rate per 1000 ventilator days, ICU PYNEH

VAP surveillance using CDC PNU 1

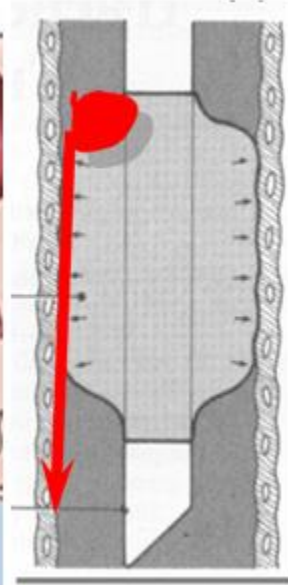
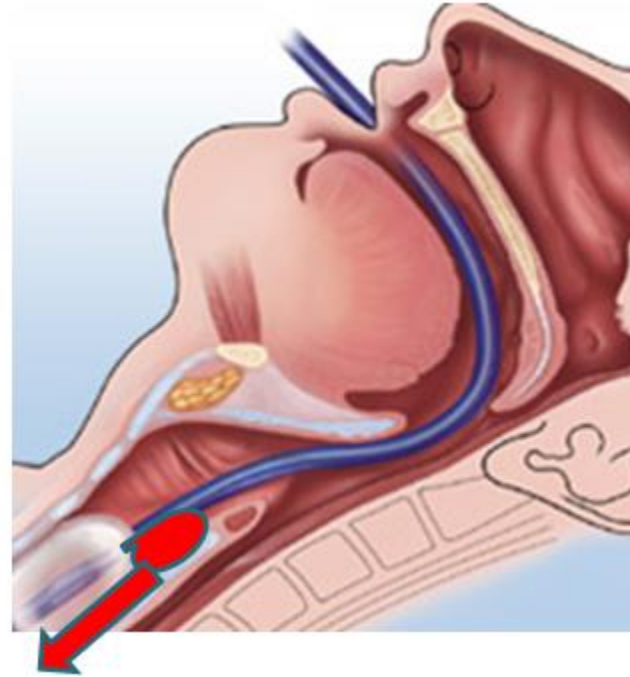


High VAP rate
at 40-70 VAP cases / 1000 ventilator days

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



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

Prevent ventilator-Associated
Pneumonia

How-to Guide

...on endotracheal tubes (ETT) and
positioning of tracheal secretions that are
not routinely change, on the basis of

Existing Evidence:
...ally ill patients who are intubated for
pneumonia (VAP)^{1,2,18-20} and those intubated
with a decreased level of consciousness
...ation, presence of gastric or small intestine
...rted to occur at rates of 10 to 35 cases



www.INICC.org
International Nosocomial
Infection Control Consortium

2012

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



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

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**



衛生防護中心
Centre for Health Protection

Recommendations on
Prevention of Ventilator-associated
Pneumonia

2nd Edition

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

Nov 2018



衛生防護中心乃衛生署
轄下執行疾病預防
及控制的專業機構
The Centre for Health
Protection is a
professional arm of the
Department of Health for
disease prevention
and control

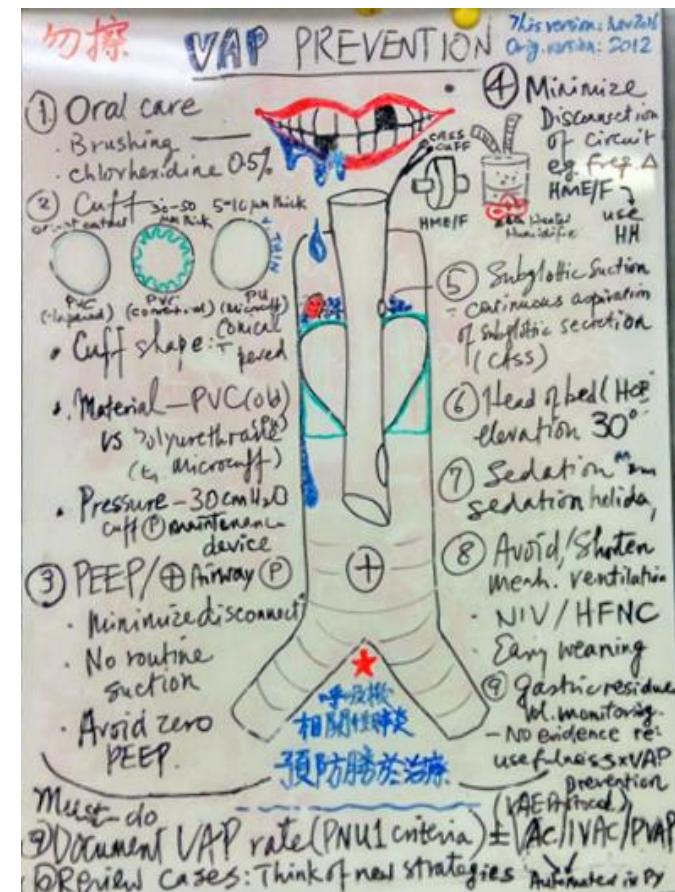


From evidence to practice

Multi-pronged Strategic Approach

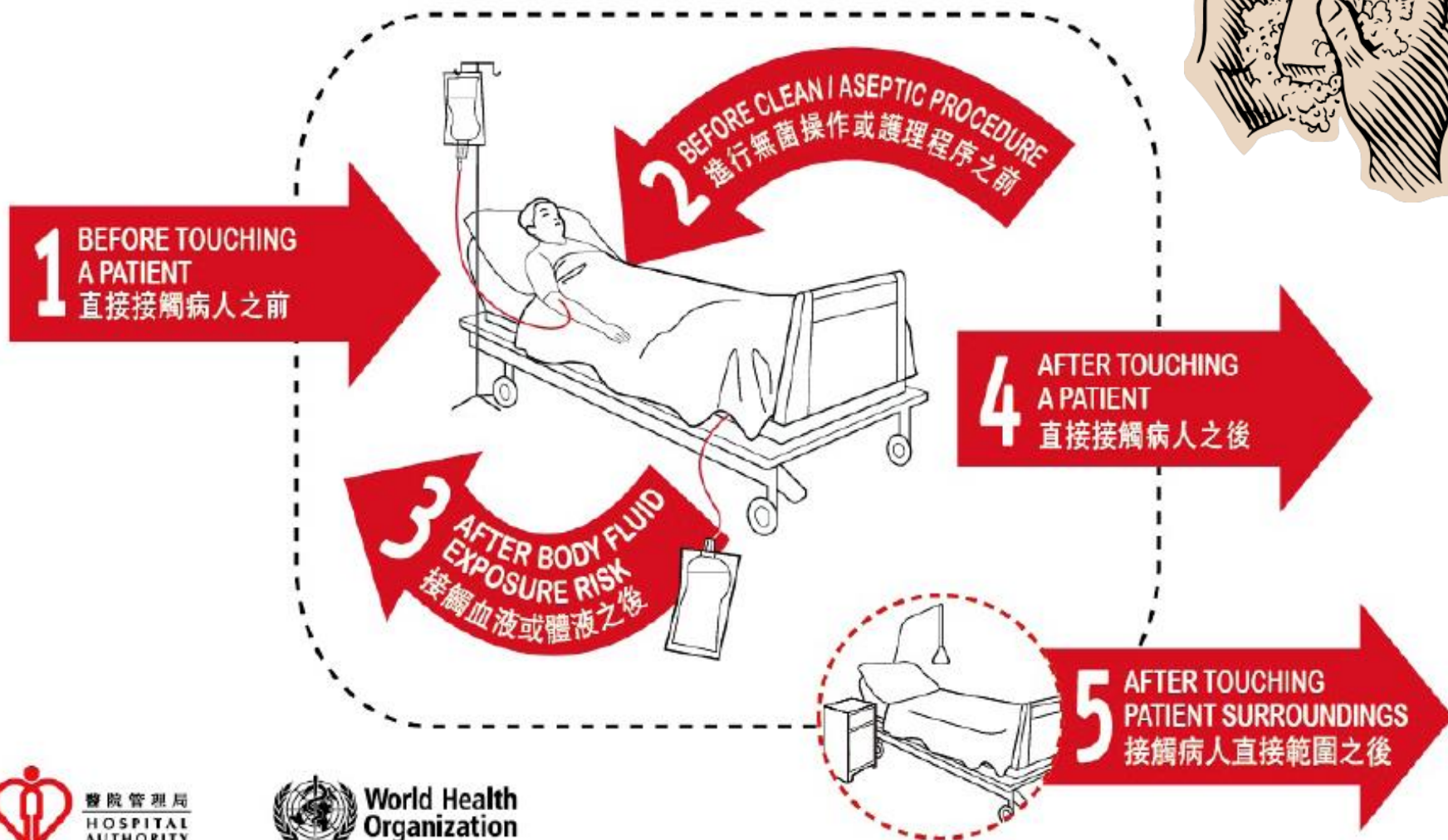
B : Do the Basics Properly

- **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

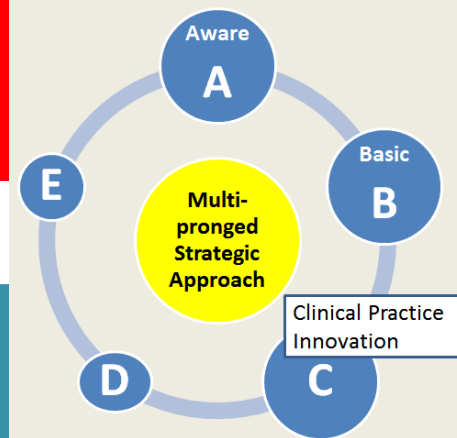


5 moments for hand hygiene

五個必須潔手的時刻



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.ihl.org
Michael Klompas Current opinion Volume 23 Number 5 October 2017

Results of a research on novel ETT

ORIGINAL
ARTICLE

Benchtop study of leakages across the Portex, TaperGuard and Microcuff Endotracheal tubes under simulated clinical conditions

Arthur CW Lau 劉俊穎
SM Lam 林倩雯
WW Yan 殷榮華

ONLINE FIRST

DOI: 10.12809/hkmj133930

This article was published on
22 July 2013 at <www.hkmj.org>.

This version may differ from the
print version.



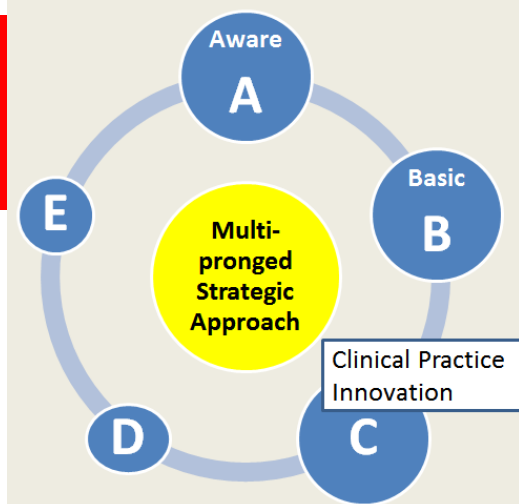
Objectives To compare three endotracheal tubes for leakage across the cuff (microaspiration) under a comprehensive set of simulated clinical situations. These were the Mallinckrodt TaperGuard (Covidien, US) with a tapered polyvinyl chloride cuff; KimVent Microcuff (Kimberly-Clark Health Care, US) with a cylindrical polyurethane cuff, and a conventional Portex (Smith Medical International Ltd, UK) with a globular polyvinyl chloride cuff.

Design A benchtop experimental study.

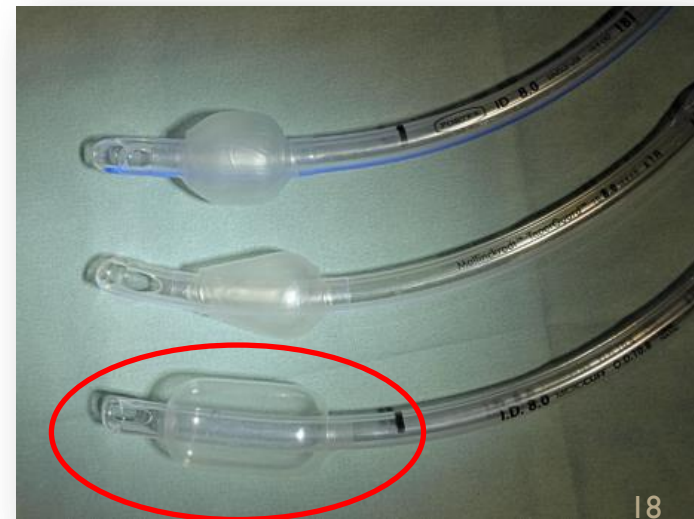
Setting and materials A silicone cylinder serving as the model trachea was connected to each of the three endotracheal tubes, one at a time. 20 mL of water were added above the cuff. Leakages were measured every minute for 20 minutes under three simulated mechanical ventilation scenarios, including: (1) positive end-expiratory pressure levels, and disconnection with and without spontaneous breathing efforts. Each scenario was studied under three cuff pressures of 10, 20 and 30 cm H₂O, and then repeated with the application of a continuous suction force of 200 cm H₂O, and leakage measured every minute for 3 minutes.

Results The outcome of interest was the cumulative amount of leakage. The Microcuff endotracheal tubes with an ultrathin polyurethane cuff consistently provided the best protection against microaspiration under all simulated clinical situations, followed by TaperGuard with a tapered cuff, and lastly Portex with a globular polyvinyl chloride cuff. Clinical scenarios associated with the greatest leakage were mechanical ventilation with zero positive end-expiratory pressure, circuit disconnection with spontaneous breathing efforts, application of suction, and a low cuff pressure.

Conclusions Microcuff endotracheal tubes outperformed TaperGuard and Portex endotracheal tubes in preventing microaspiration,



Microcuff ETT provide the best protection against microaspiration



VAP Preventive Devices: prevent micro-aspiration



Try Taper Guard ETT with subglottic drainage port



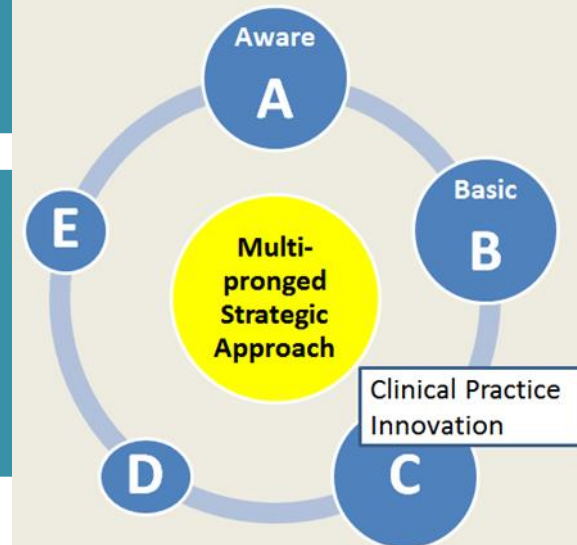
Try Novel microcuff ETT



Heated humidifier



Uncertain benefit



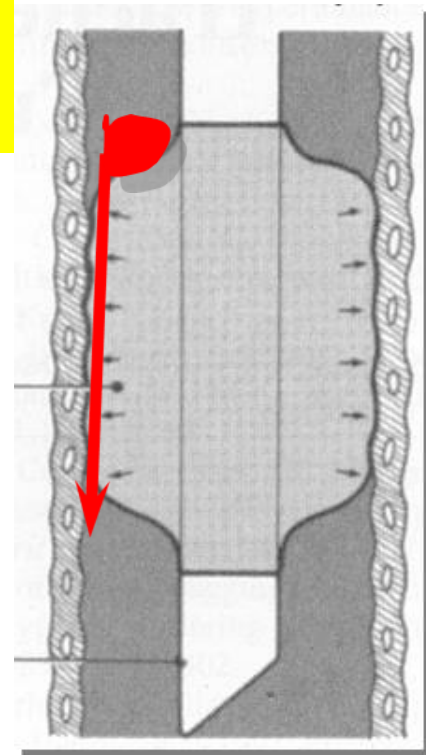
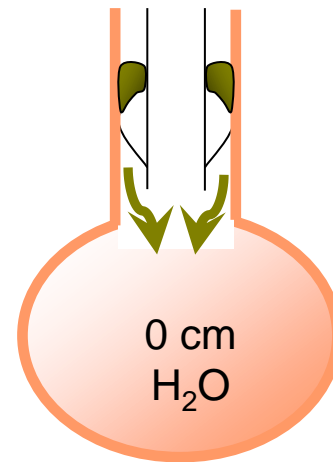
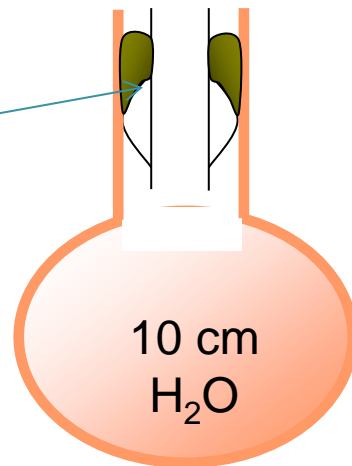
Alert!

Circuit breaks promote aspiration especially in high PEEP

**On
mechanical
ventilation**

**During
disconnection of
ventilator circuit**

**secretion
above ETT cuff**



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



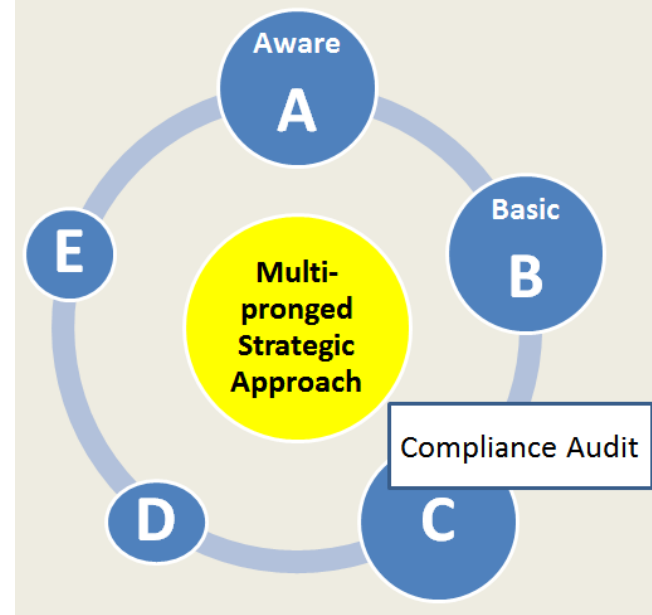
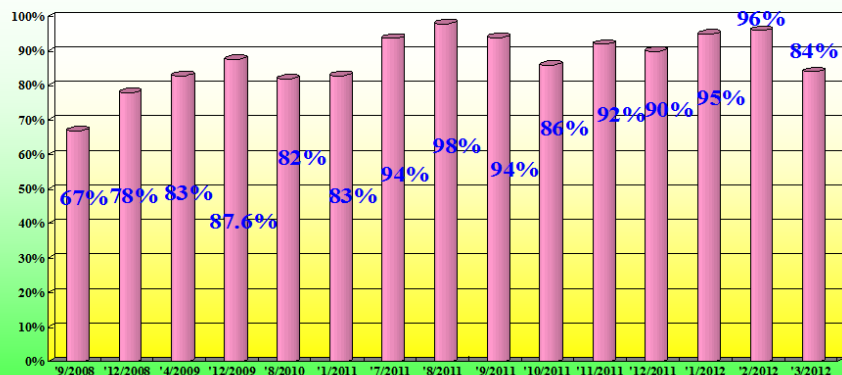
- Oral care with chlorhexidine mouthwash

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

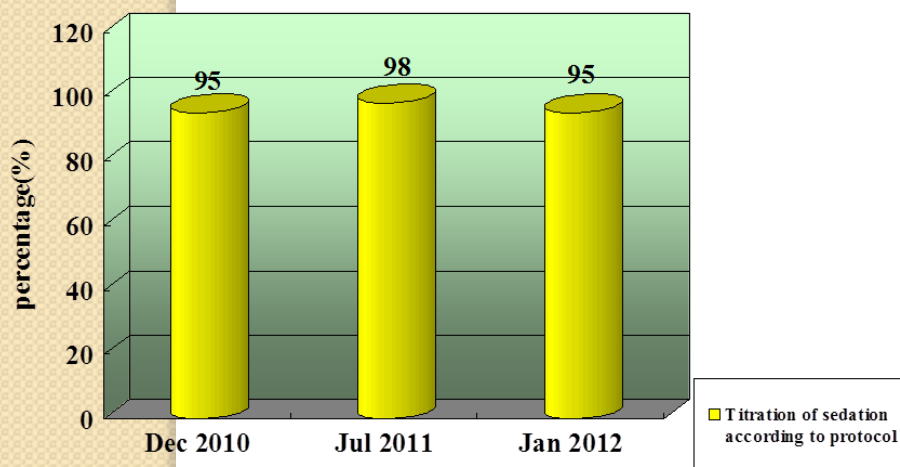


Chlorhexidine may be potentially harmful
Michael Klompas .Semin Respir Crit Care Med 2017; 38:381–390.

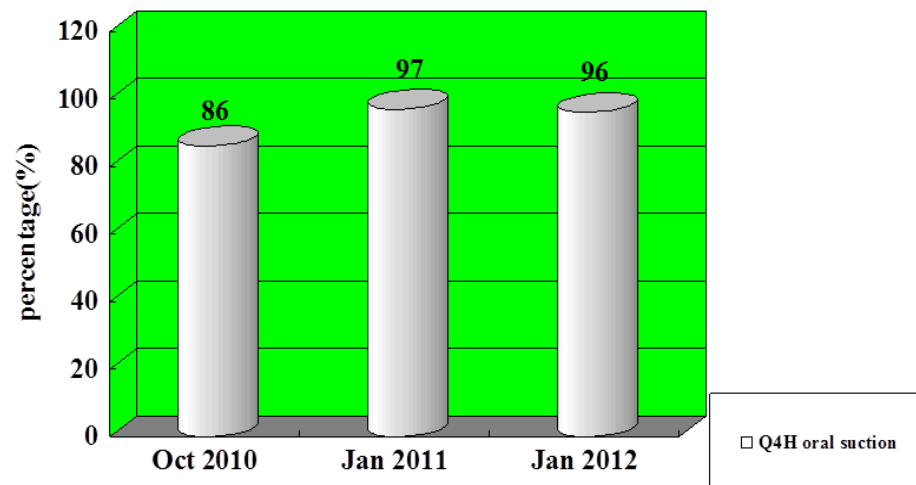
Compliance of HOB>30°



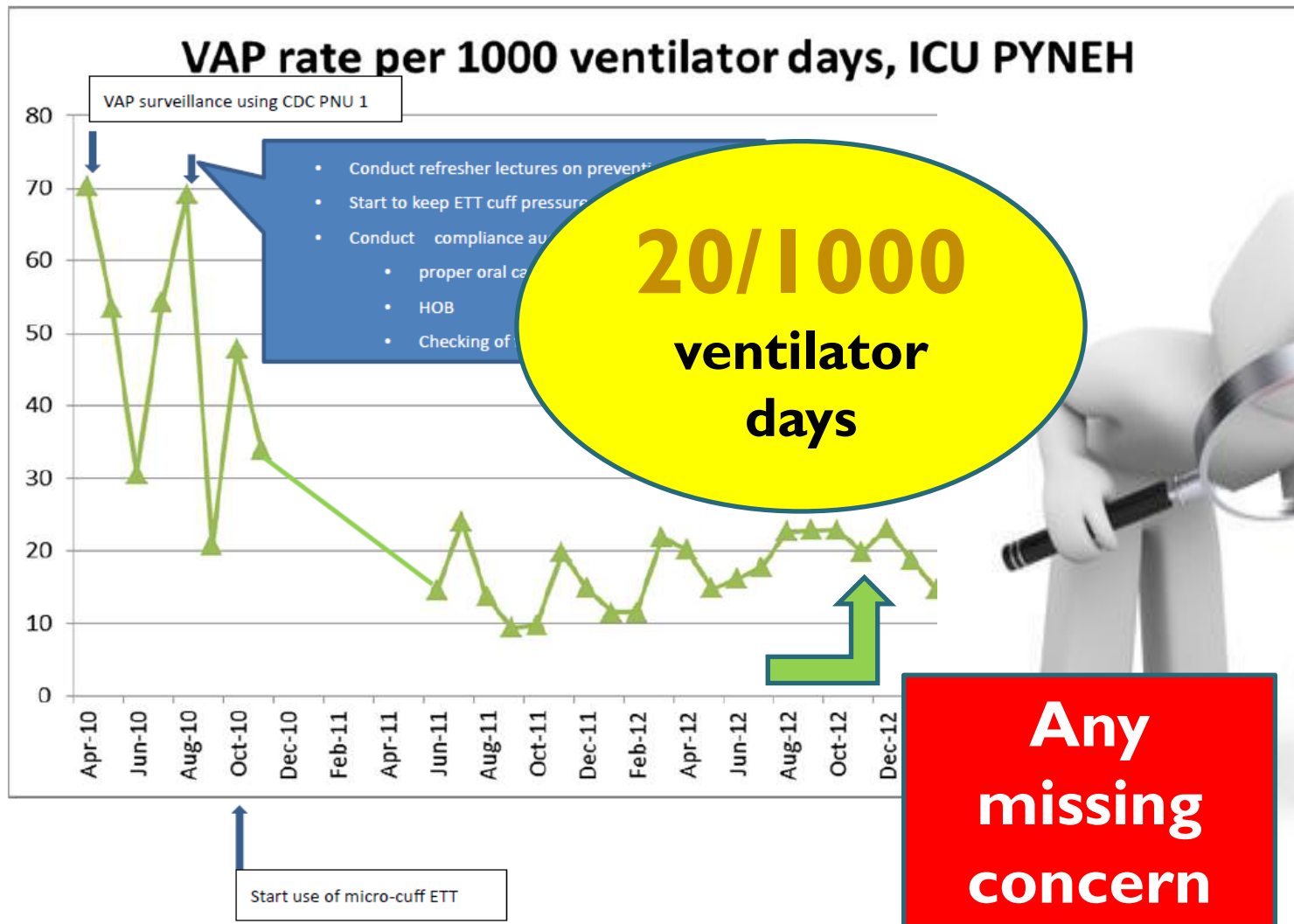
The compliance on titration of sedation



The compliance on oral suction



2012: VAP rate similar, rising?



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



Task Force from Department and Cluster Level





Daily round to capture any VAP

A Quality System in Place

- Discuss VAP issue at regular ICU meeting

513th ICU Meeting

Date: 18th October 2018 (Thursday)
Time: 14:45 hour
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 / Middle East Respiratory Syndrome / Infection Control / VAP
- 5 OSH / AIRS
- 6 CIS

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

Ensure
persistent
and
consistent
effort

A Quality System in Place

	PAMELA YOUDE NETHERSOLE EASTERN HOSPITAL Intensive Care Unit Guideline on Mechanical Ventilation	Doc. no.	PYN-ICU-AA-GL-046-R0
		Effective date	30 Oct 2009
		Review date	3 Jan 2012
		Custodian	COS (ICU)

	PAMELA YOUDE NETHERSOLE EASTERN HOSPITAL Department of Intensive Care	Doc. no.	PYN-ICU-AA-GL-046-R2
		Effective date	31 July 2017
		Last Review date	15 September 2017
	Guideline on Mechanical Ventilation	Custodian	DOM (ICU)
		Approver	COS (ICU)

1 Objectives

1.1 This document is intended to provide guideline for junior medical staff as reference for the use of mechanical ventilation and the prescription of initial ventilator settings

2.10 Preventive measures to prevent ventilator associated pneumonia (VAP)

- 2.10.1 Elevate head of bed so that patient's back is at 30-45 degree and the head is sliding down
- 2.10.2 Maintain ETT cuff pressure at 30 cmH₂O
- 2.10.3 Perform regular tooth brushing and oral care with 0.2% chlorhexidine mouthwash and cotton tipped applicator
- 2.10.4 Perform ETT suction only if necessary, e.g. obvious large amount of sputum in

Plan to update the unit guideline & will not use Chlorhexidine anymore

Advocate protocol-driven mechanical weaning (for sharing)

Affix Patient Gum Label

Bed No: _____ Date: _____ Trial: 1 / 2 / 3.

Diagnosis: _____

Department of Intensive Care, PYNEH

Mechanical Ventilator Weaning Protocol

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:

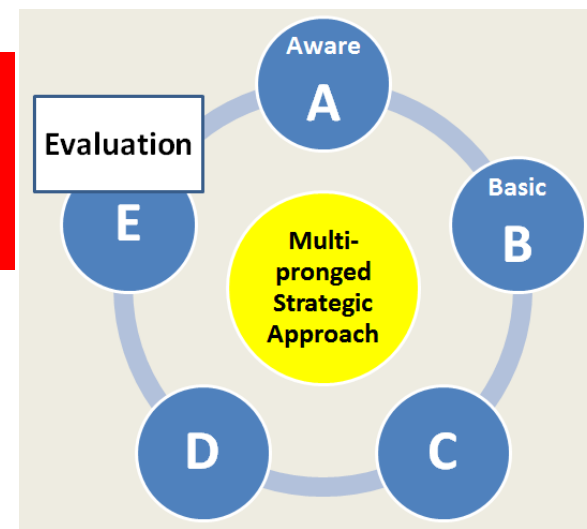
1. Wake and wean: Time _____ Date(D/M/Y) _____

2. Sedation stopped: Time _____ Date(D/M/Y) _____

Case nurse assesses weaning criteria Q1H within 0700-1700

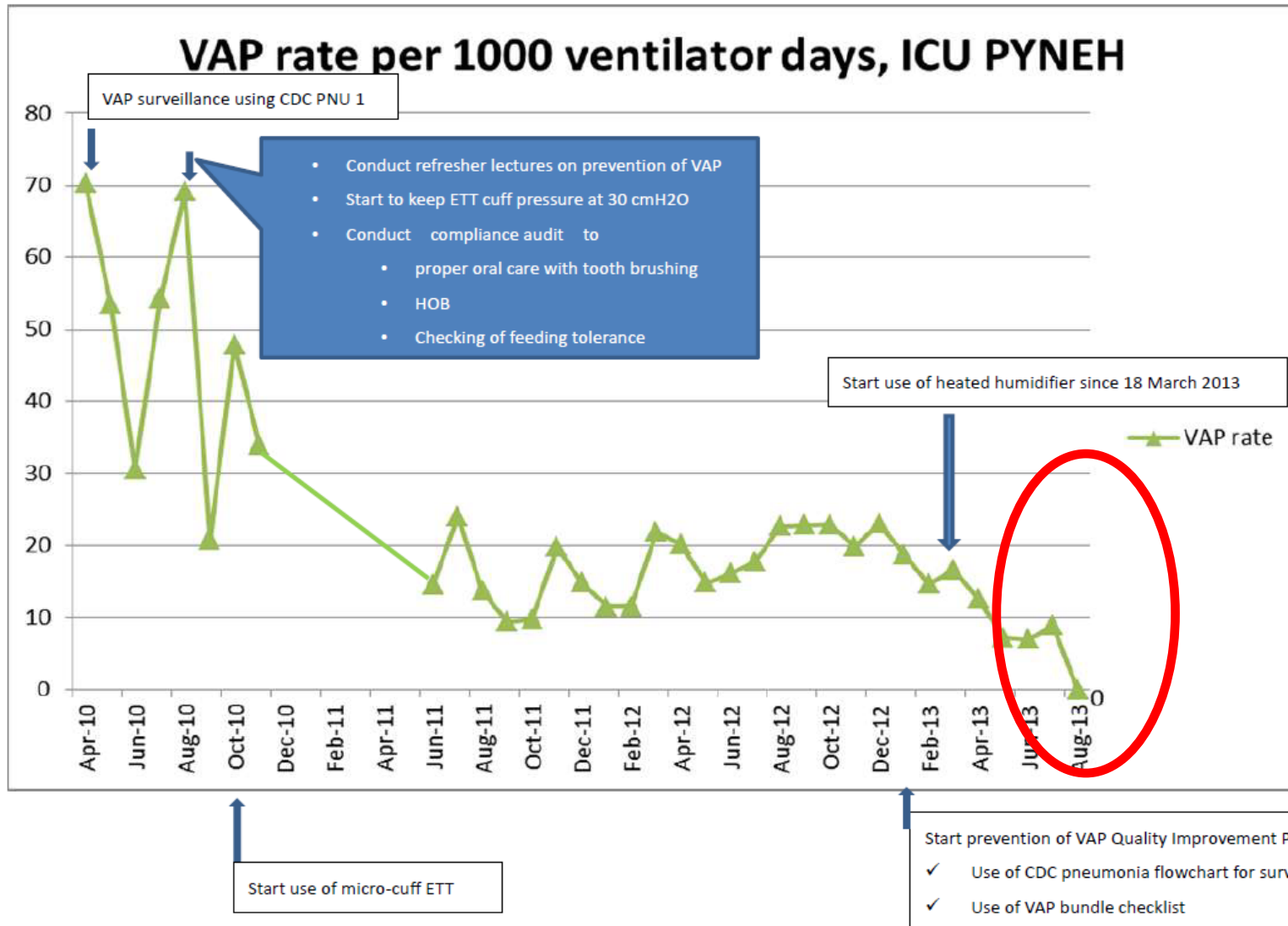
Weaning criteria	Initial assessment	All criteria fulfilled	Not all criteria fulfilled
√ = Yes, x = No (Time)	at _____	at _____	at _____
1. FiO ₂ < 0.4 & RR 8-30 /min,	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Process Evaluation



- Obtain baseline compliance rate on ventilator bundle
- Conduct compliance audit at regular period

2013: VAP rate seems



Sharing: Publications/ Conference/ Poster Display

Ref: Lau ACW, Lam SM, Yan WW. HKMJ 2014, Vol.20

ORIGINAL ARTICLE Benttop study of leakages across the Portex, TaperGuard and Microcuff Endotracheal tubes under simulated clinical conditions

Arthur CW Lau 劉俊穎
SM Lam 林倩雯
WW Yan 殷榮華

Objectives To compare three endotracheal tubes for leakage across the cuff (microaspiration) under a comprehensive set of simulated clinical situations. These were the Mallinckrodt TaperGuard

Microcuff ETT provide the best protection against microaspiration



Prevention of Ventilator-associated Pneumonia:

An Old Topic with New Tricks



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

SO Hang Mui
Nurse Consultant (Intensive Care),
Pamela Youde Nethersole Eastern Hospital
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-

treating mechanically ventilated patients 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

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graph LR; A((Clinical)) --> B((Administrative)); B --> C((Education and research));
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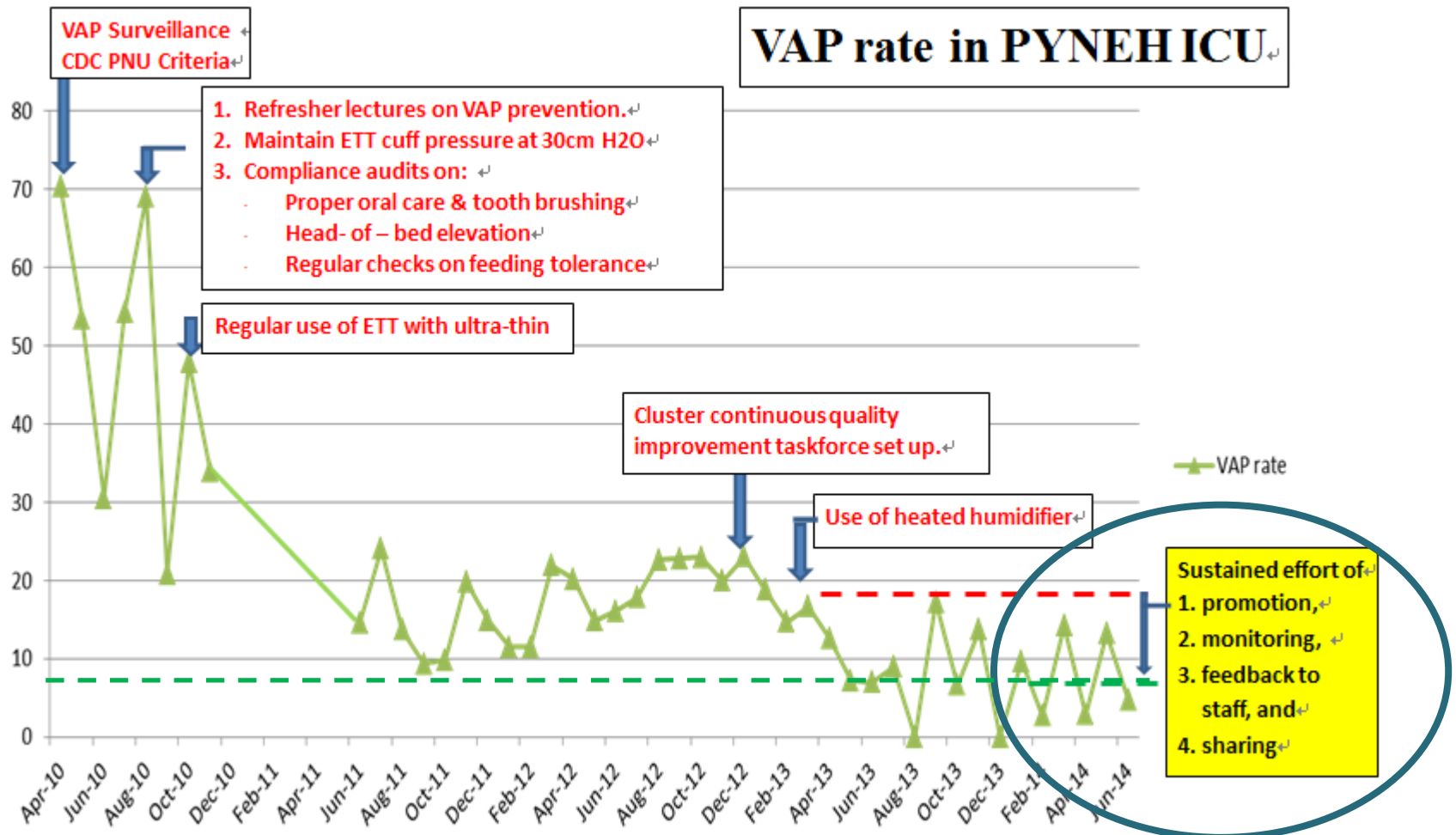
Clinical

Administrative

Education
and
research

2014 :VAP rate still fluctuating

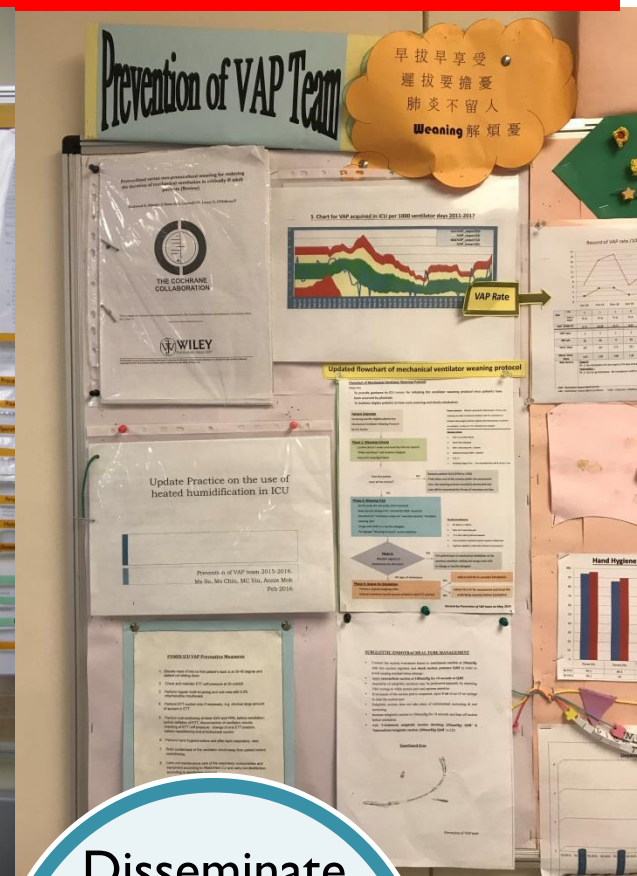
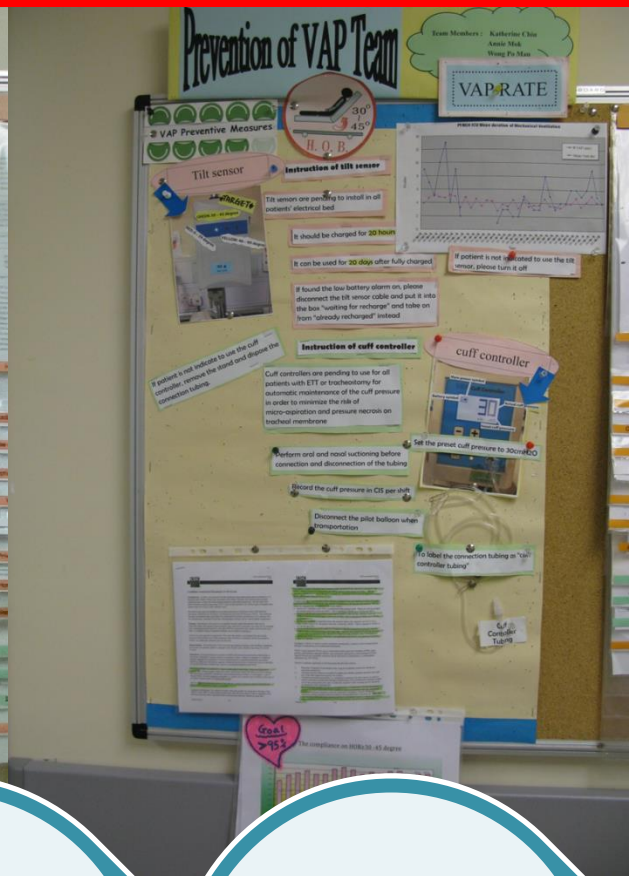
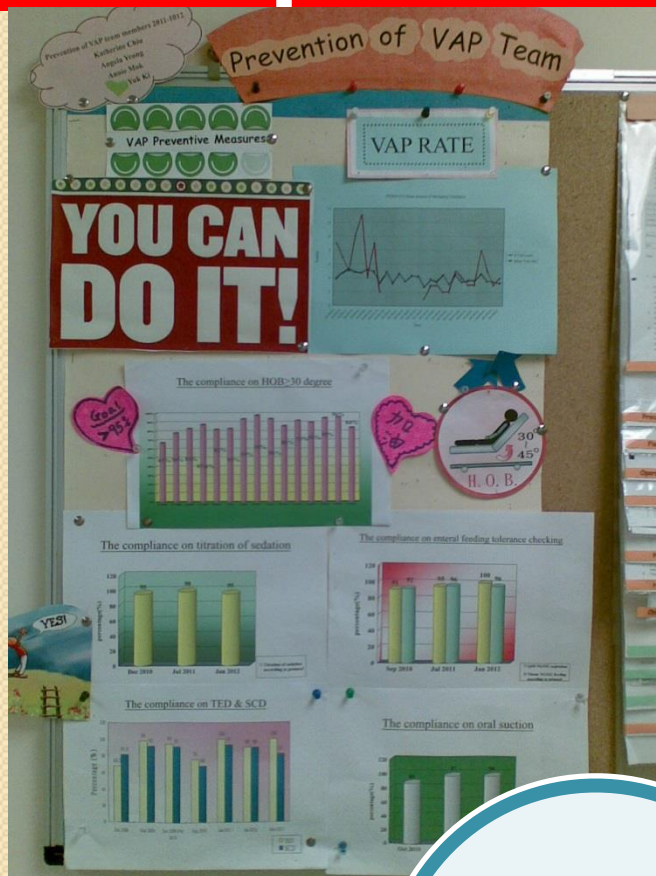
mean VAP rate < 10 /1000 vent. days



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

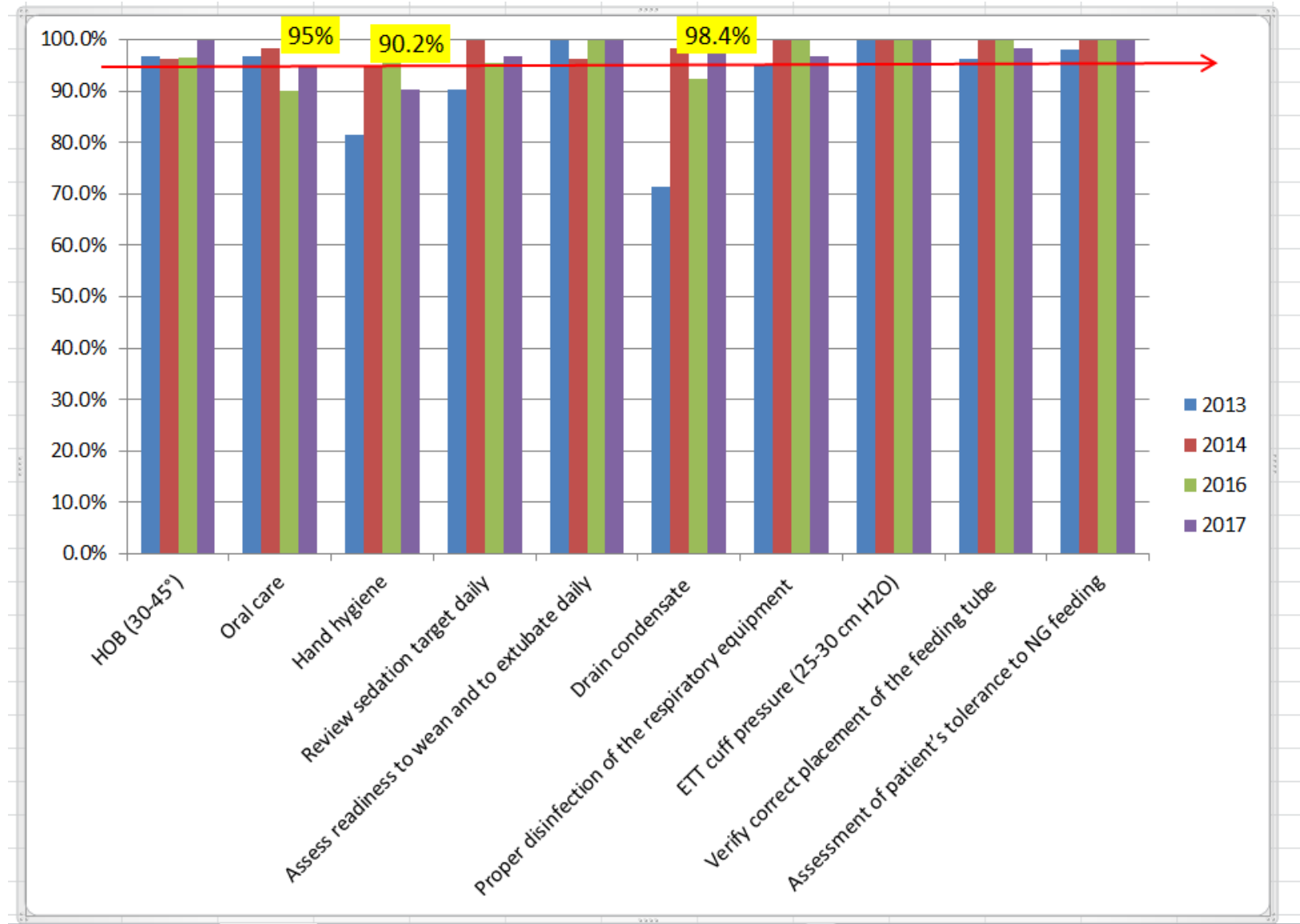


Team approach

Quality system in place

Disseminate Staff performance & patient outcomes

Staff performance: ventilator bundle compliance audit

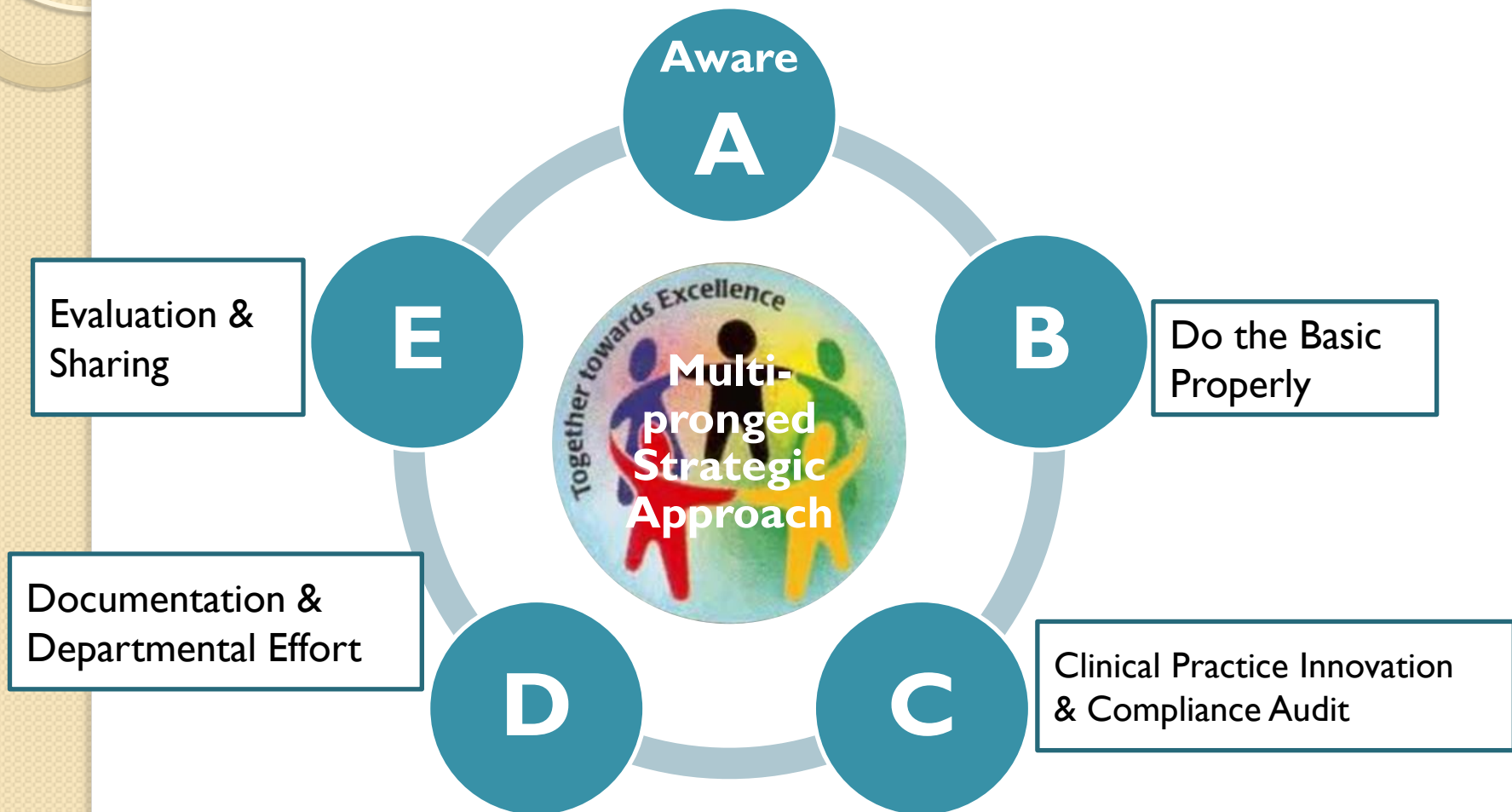


VAP rate

- 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

