



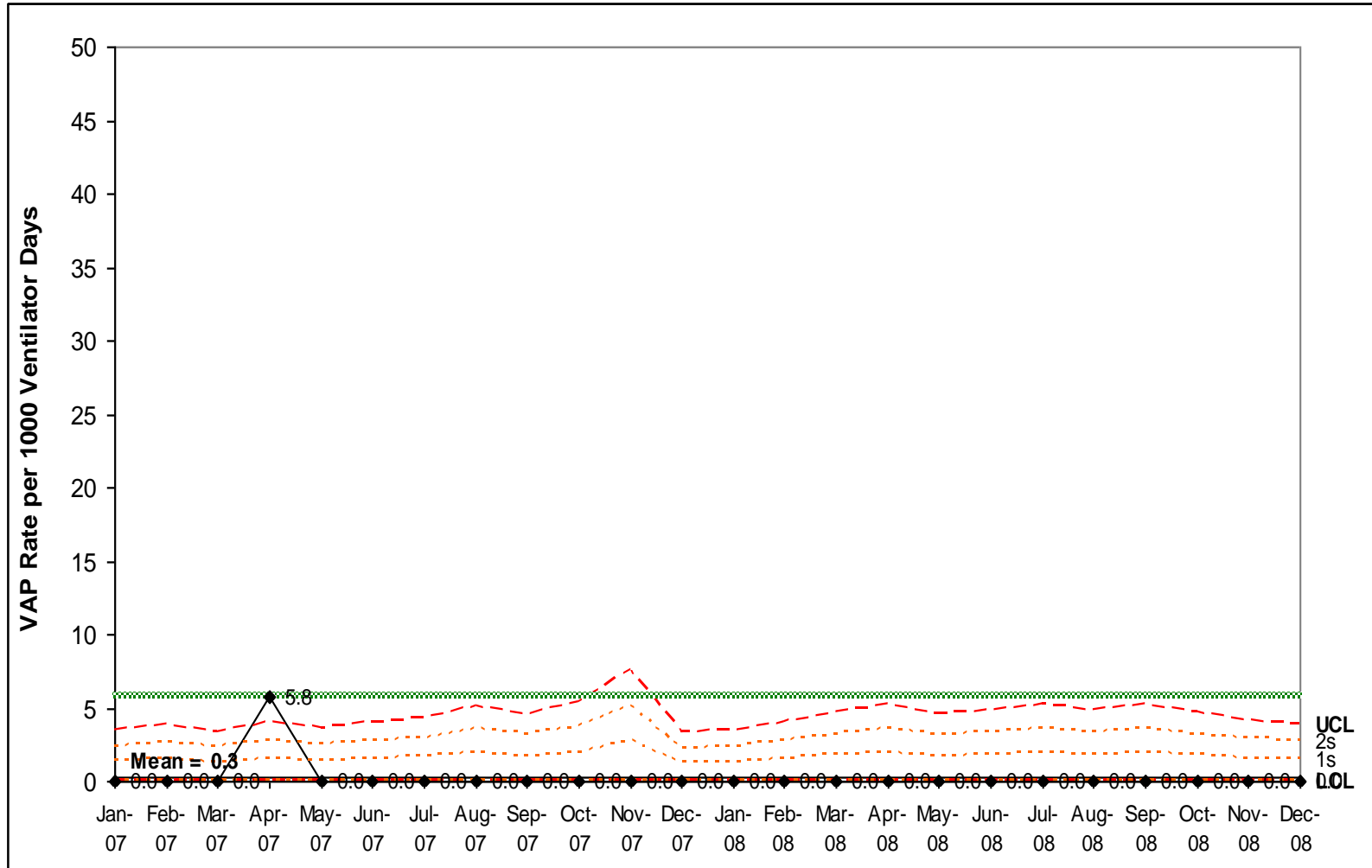
# Denial Doesn't Count: Improving the Safety of Ventilated Pediatric Patients

Ventilator-associated Respiratory  
Infections: When a VAP isn't a VAP

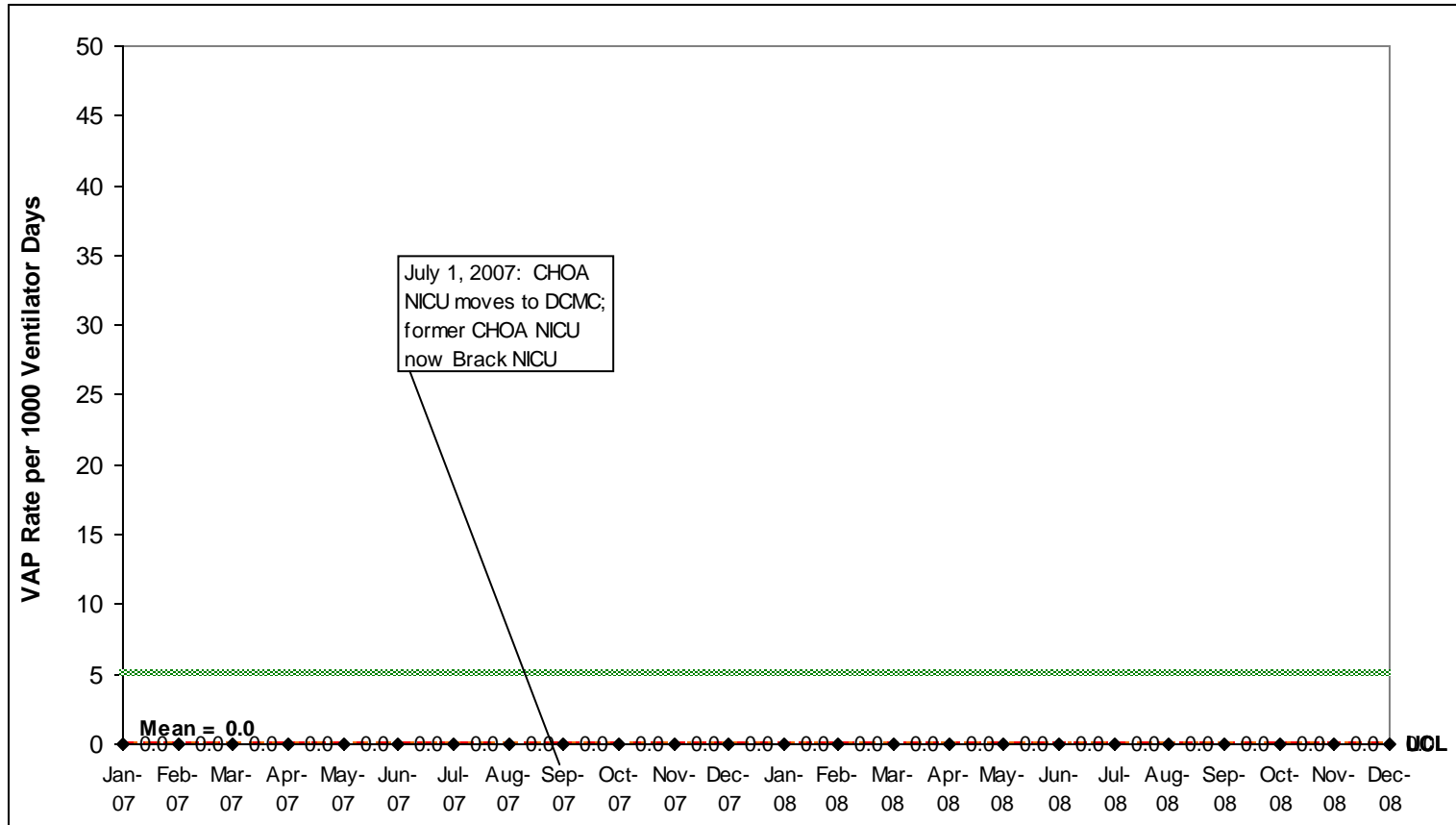
# Brief History – Ventilator Bundles and Infections

- Developed VAP bundle in early 2004 – adapted adult bundles
- Started review of all positive respiratory cultures in the Pediatric and Neonatal ICUs in June 2004
- As of January 19, 2009, we have had only 3 VAPs during this time
- Use the CDC definition for pneumonia and all other healthcare-acquired infections

# PICU VAP rate



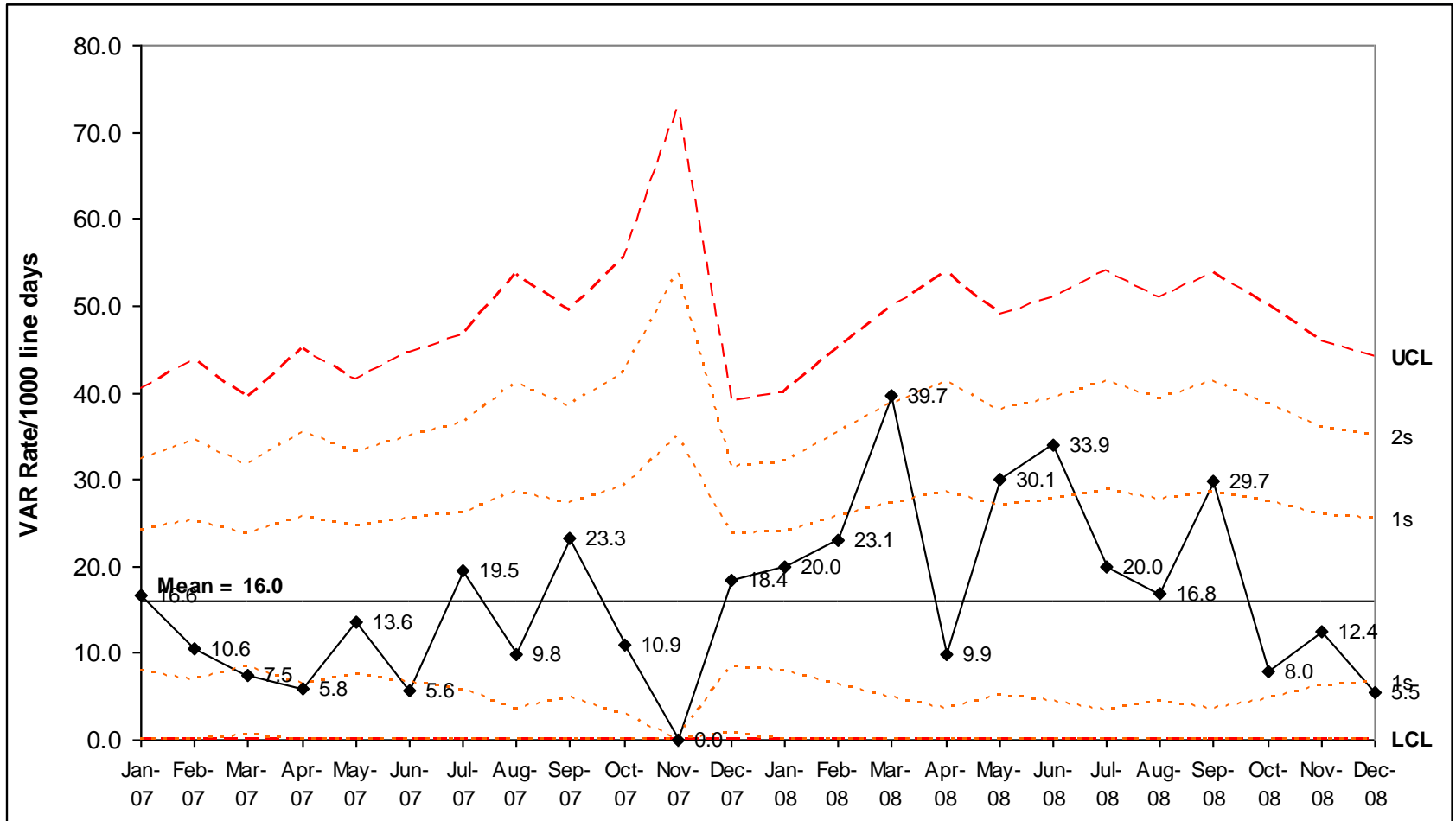
# NICU VAP Rate



# A Cause for Celebration?

- No reported VAPs = No problems
- Physicians feel it is VAP so why not in the numbers? (PICU)
- Why isn't it a VAP?
- If it isn't a VAP, what is it? Denial?
- Ventilator-associated lower respiratory infections

# PICU Vent-associated Respiratory Infection Rate

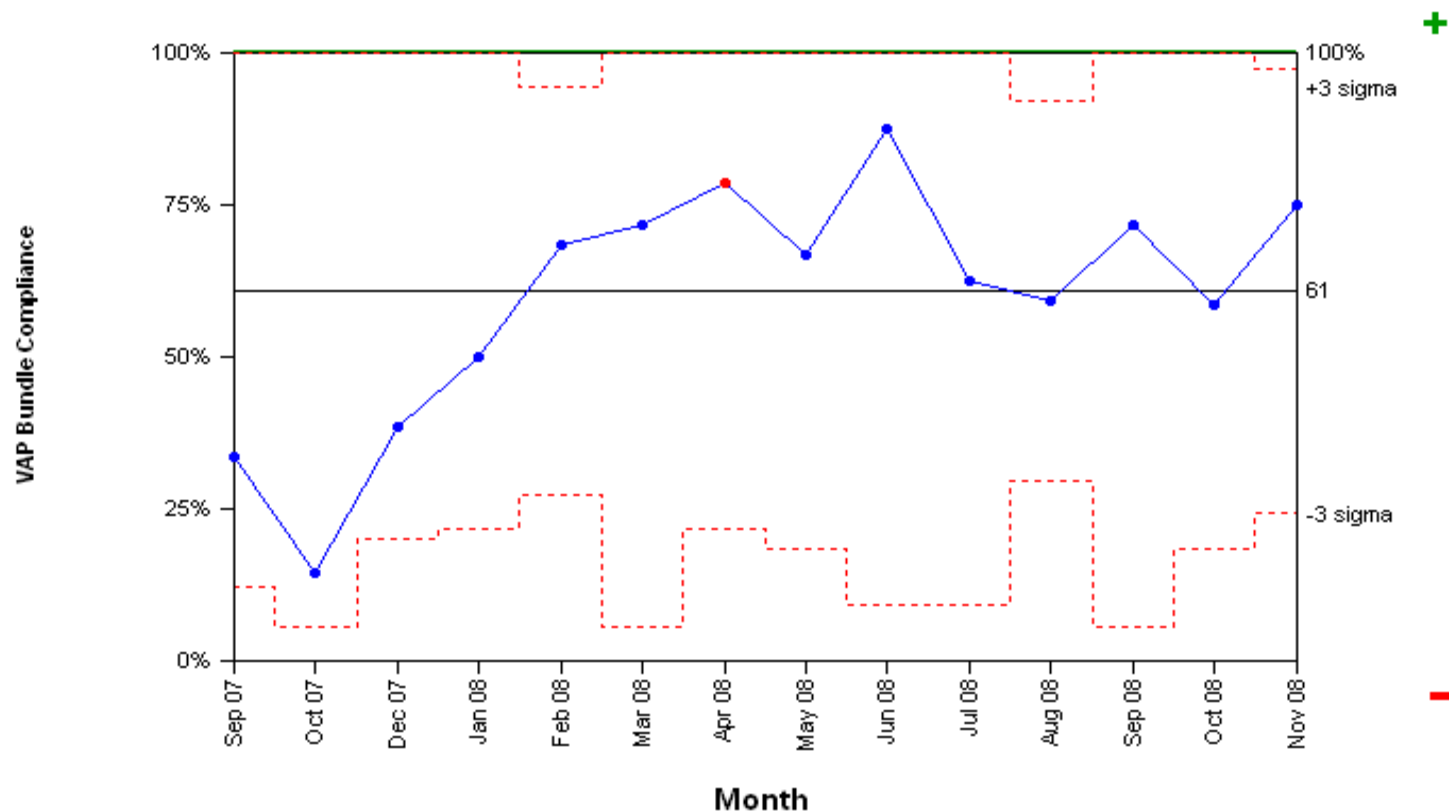




# PICU Bundle Compliance

P Chart

## VAP Bundle Compliance (DCMC)



Jan 12, 2009 15:03:24

# So Why isn't it a VAP?

- Using the CDC Pneumonia definition (age specific)
- Radiographic evidence x 1-2 consecutive days
  - New or progressive and persistent infiltrate
  - Consolidation or cavitation or pneumatocele  $\leq 1$ yr.
- At least 1 of the following:
  - Fever ( $> 38$  degrees C) with no other recognized cause
  - Leukopenia ( $< 4,000$  WBC/mm<sup>3</sup>) or leukocytosis ( $> 12,000$  WBC/mm<sup>3</sup>)
- At least 2 of the following:
  - New onset of purulent sputum or change in character of secretions
  - New onset or worsening cough, dyspnea, or tachypnea
  - Rales or bronchial breath sounds
  - Worsening gas exchange ( $\downarrow$  sats, P:F ratio  $< 240$ ,  $\uparrow$  O<sub>2</sub> req.)

# So why isn't it a VAP?

- Chest X-rays fall out
  - Difficult to interpret due to radiologist verbiage
  - Rarely do x-ray findings persist – wax/wane
- If Chest X-ray does fit, rare to meet other criteria
- Education to physicians on CDC criteria
- Does it meet CDC criteria for lower respiratory tract infection?

# Ventilator-associated Respiratory Infections



- Lower Respiratory Tract Infection – CDC criteria
- No clinical or radiographic evidence of pneumonia AND
- For >1 yr: at least 2 of following w/ no other recognized cause: fever  $>38^{\circ}\text{C}$ , cough, new or increased sputum, rhonchi, wheezing AND at least 1 of the following: positive culture by tracheal aspirate or bronchoscopy or positive antigen test on respiratory secretions
- For  $\leq 1$  yr: at least 2 of following w/ no other recognized cause: fever  $>38^{\circ}\text{C}$ , cough, new or increased sputum, rhonchi, wheezing, respiratory distress, apnea, or bradycardia AND at least 1 of following: organism from tracheal aspirate or bronchoscopy; positive antigen test on respiratory secretions; or diagnostic single antibody titer (IgM) or 4-fold increase in IgG for pathogen

## VAR Data

- Spreadsheet with patient data on all positive respiratory cultures and what, if any, criteria they meet
- Separate run chart for VAR and VAP – PICU only
- Report quarterly to Joint Practice group
- Discuss any questionable cases with Infectious Disease

## Next Steps

- Continue surveillance of all positive respiratory cultures
- VAP team created
- Ascension Children's Healthcare Quality Collaborative
- Adapt VAP bundle



# Next Steps

# Why Revise?

- Desire to align bundles between PICU, NICU and Intermediate Care
  - Inclusion of chronically ventilated children in critical care areas
- Desire to treat all ventilated patients with a consistent standard
- Inclusion of Respiratory Therapy in development process
  - Previous VAP bundle did not have RT involvement or ownership of any part of it.

# Old VAP Bundle Components

- HOB elevation—30 degrees; neonates 15 degrees
- Peptic ulcer disease prophylaxis
- Deep vein thrombosis prophylaxis
- Oral care Q12 hours
- Readiness to extubate

# VAP Bundle Revision Process

- Creation of a multidisciplinary hospital VAP team
  - Inclusion of RT, RN, MD, Infection Preventionist
- Goal development
- Review of potential bundle elements
  - IHI Pedi VAP Supplement
  - Practices of other children's hospitals via list serves
  - Pediatric literature

# Collaborative Work

- Ascension Children's Healthcare Initiative
  - Spread learnings between other children's hospitals in Ascension Health
  - Collaboration with Cincinnati Children's Hospital to develop model for improvement
    - Aim statements
      - Specific and measurable
    - Measurement
    - Learning Structure
      - Key drivers to meet global aim
    - PDSA cycles
      - Plan
      - Do
      - Study
      - Act



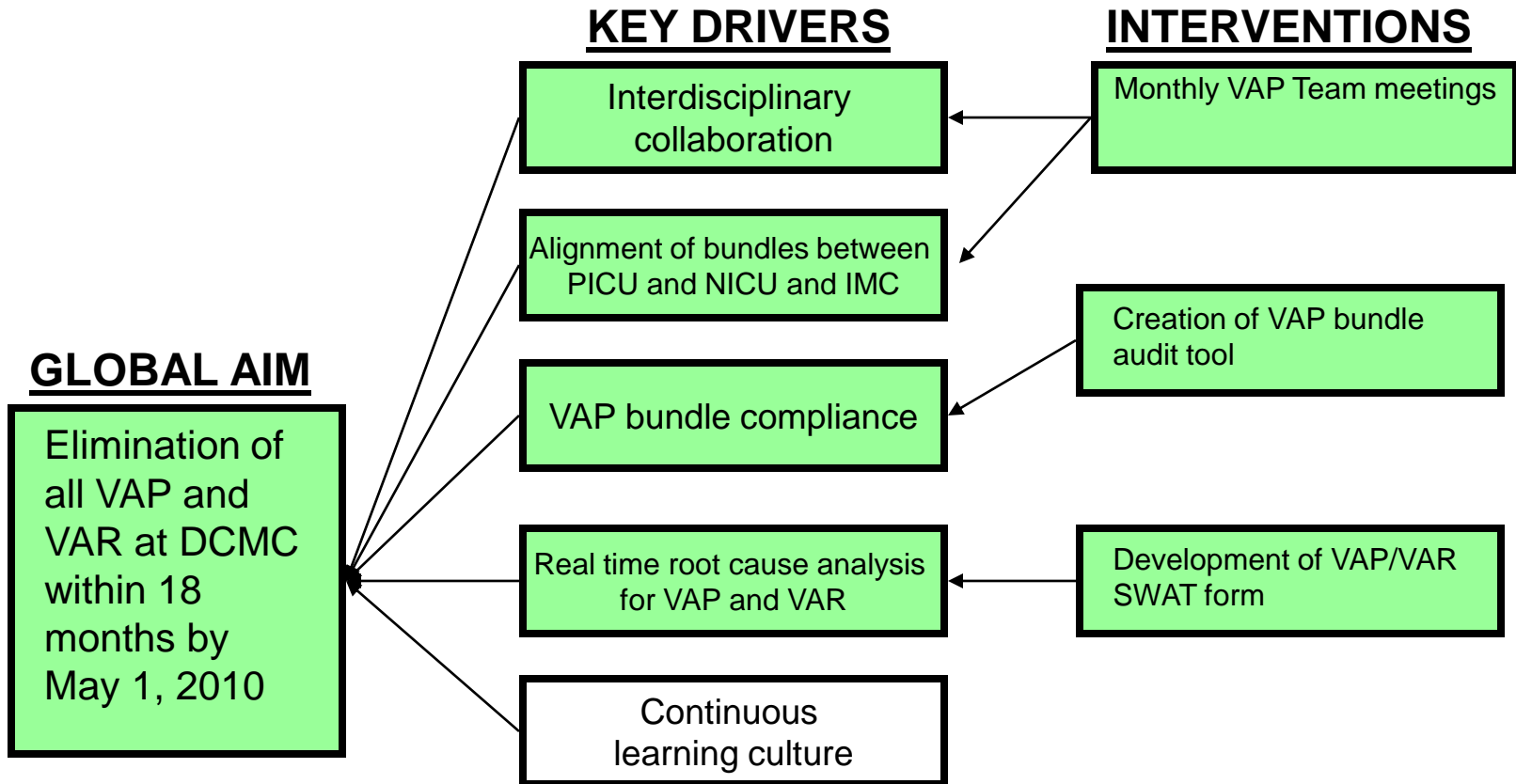
## **Global Aim:**

Eliminate all VAP and VAR at DCMC by May 1, 2010

## **Specific Aim:**

Design and implement a consistent VAP bundle in PICU/NICU/IMC at DCMC by March 1, 2009 with 80% compliance on all bundle elements by April 1, 2009

# Key Drivers



# VAP Bundle Revision Process

- Once bundle elements agreed upon, a trial of bundle elements was held for one week in PICU and NICU to identify potential barriers
  - Used PDSA methodology
  - No barriers identified by staff nurses or respiratory therapists
- Trial of one page VAP bundle compliance tool for documentation of all bundle elements by RT and RN
  - Not received well

# New VAP/VAR Bundle

- **Drain vent circuit prior to repositioning**
- **Follow mouth care policy:**
  - **PICU—Q4hr**
  - **NICU—Q4-6hr**
- **Daily assessment of readiness to extubate**
- **Peptic ulcer disease prophylaxis**
- **Separate suction set up for ETT and oral/nasal suction**
  - **PICU—when possible (need more wall vacuum outlets to do this always)**
  - **NICU—always**
- **Suction mouth prior to ETT suctioning or repositioning patient**

# New VAP/VAR Bundle

- **Change vent circuits and in-line suction catheters only when visibly soiled and Q 30 days**
- **Drain condensate from vent circuit every 2-4 hours**
- **Store oral suction devices in non-sealed plastic bag at bedside when not in use**
- **Wash/sanitize hands before and after contact with vent circuit; gloves recommended**
- **Elevate HOB unless contraindicated and by written order:**
  - **PICU/IMC—30 degrees**
  - **NICU—15 degrees**



## How Do We Make Small Changes?

- Utilize rapid PDSA cycles on small number of patients for quick turn-around
- Example for Oral Care Product
  - Plan: Trial use of biotene for oral care on 4 patients in PICU December 15-19, 2008
  - Prediction: Staff will like biotene but will need other oral care supplies.
  - Study: Staff liked biotene but want suction toothbrush for bigger kids
  - Act: Adopt—biotene will be stocked in PICU and IMC and will keep current oral care kits as well until alternative suction toothbrush can be found.

# Measurement of Success

- Will the new VAP/VAR bundle help us meet our goals?
  - **VAP/VAR bundle compliance**
    - Measured for each component of VAP bundle audited as well as overall compliance
    - Measurement of each component allows more focused work
  - **VAP rates per 1000 ventilator days**
    - PICU, NICU, and IMC
  - **VAR rates per 1000 ventilator days**
    - PICU, NICU, and IMC
- Utilization of control charts to distinguish normal variation from special cause variation

## Where We Are Now

- Combined education module for RN's and RT's created with involvement from all team members
- Short education module for UAP covering stocking of oral care supplies and change out of oral/nasal suction as well as reminding nursing about HOB elevation
- New auditing form created
- VAP/VAR "SWAT" form created
- Education rolled out February 1, 2009
- New VAP bundle and auditing of new bundle began March 1, 2009

# Where We Are Headed

- Inclusion of VAP bundle education for new employees
- VAP policy
- Scheduled times for RT to complete oral care
- VAP bundle reminders posted on ventilators
- HOB elevation reminders
- Possible documentation changes
- Obtaining new and more cost-effective supplies
  - New oral care supplies
  - Covered yankauer with yankauer holder for older kids

# Lessons Learned

- Respiratory Therapy enthusiastically wanted to be involved in bundle development and small changes
- Buy in from staff nurses and RT's is critical—make them the owners=Empowerment
- Necessary tools have to be readily available for nursing in order to promote compliance
- Need to make meaningful for staff by inclusion of data