Lessons Learned
from the
CDC Prevention Epicenters’
Wake Up and Breathe Collaborative

Healthcare Association of New York State
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Disclosures

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Attributable Mortality of VAEs

USA – 3 centers
_PLoS ONE_ 2011;6:e18062

USA – 8 centers
_Crit Care Med_ 2012;40:3154

Canada – 11 centers
_Chest_ 2013;144:1453

Netherlands – 2 centers
_Am J Resp Crit Care Med_ 2014;189:947

USA – 2 centers
_Crit Care Med_ 2014;ePub

USA – 1 center
_Infect Control Hosp Epidemiol_ 2014;5:502
Qualitative analysis of 153 VAEs
Royal Brisbane & Women’s Hospital, Queensland, Australia

- Pneumonia 38%
- Edema 26%
- Atelectasis 15%
- ARDS 6%
- Other 8%
- Abx + Furosemide 6%

A graph showing the decrease in VAEs per 100 episodes from November 2011 to May 2013. The graph indicates a 37% decrease in VAEs. The data is adjusted for age, sex, SOFA score, reason for intubation, and unit ID.
Ventilator-associated events
A patient safety opportunity

Broaden Awareness

• VAE surveillance provides hospitals with a fuller picture of serious complications in mechanically ventilated patients

Catalyze Prevention

• A significant portion of VAEs are likely preventable

Reflect and Inform Progress

• VAE surveillance provides an efficient and objective yardstick to track one’s progress relative to oneself and to peers

NEJM 2013;368:1472
Fewer VAEs

How do we get there?
The CDC Prevention Epicenters’ Wake Up and Breathe Collaborative

Every Patient ♦ Every Day
SATs and SBTs

Performance Rates

- SATs: 100% increase
- SBTs: 40% increase
Ventilator-Associated Events

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VAEs: 37% decrease

IVAC: 65% decrease

Am J Resp Crit Care Med 2015;191:292-301
Ventilator Days and ICU Days

ICU: 3 day decrease

Ventilator: 2.4 day decrease

Mean ICU Days / Vent Days

Am J Resp Crit Care Med 2015;191:292-301
Lessons Learned

1. Get the right people on the bus
2. Educate, educate, and re-educate
3. SATs are a means, not an end
4. SBTs are a means, not an end
5. Beware of artificial increases in performance rates
6. It’s a marathon not a sprint
7. Choose the denominator that fits the intervention
8. Wake Up and Breathe is a great start... but it’s only a start
Lesson #1:

Get the right people on the bus
Lesson #2:

Educate, educate, and re-educate
Educate, educate, & re-educate

Never assume that everyone **knows** about the protocol
Never assume that everyone **understands** the protocol
Never assume that everyone **agrees** with the protocol

Use both formal and informal teaching methods

- In-services, postings, articles, lectures
- Ask colleagues for their impressions, seek hallway discussions, bring it up at morning rounds
Lesson #3:

SATs are a **means**, not an **end**
Daily Sedation Interruption in Mechanically Ventilated Critically Ill Patients Cared for With a Sedation Protocol
A Randomized Controlled Trial

“Conclusion: For mechanically ventilated adults managed with protocolized sedation, the addition of daily sedation interruption did not reduce the duration of mechanical ventilation or ICU stay.”

SLEAP Study, JAMA 2012;308:1985-92
Midazolam Equivalents

Control  SAT

Midazolam (mg) per Patient

Kress 2000  Girard 2008  SLEAP Study

JAMA 2012;308:1985-92
Boluses Per Day in the SLEAP Study

Control

SAT

Midazolam

Fentanyl

JAMA 2012;308:1985-92
Lesson #4:

SBTs are a *means*, not an *end*
Days from Successful SBT to Extubation
Brigham and Women’s Hospital

[Graph showing days from successful SBT to extubation by Medicine, Surgery, and CV Surgery from 2009 to 2013.]
Lesson #5: Beware of artificial increases in performance rates
Compliance usually calculated as:

\[
\frac{\text{SATs performed}}{\text{SATs indicated}}
\]

Better documentation of days with contraindications will shrink the count of days where SATs and/or SBTs are indicated.

Smaller denominator will lead to higher rates.
SBT Compliance Rates
43 Hospital Collaborative Network

SBTs divided by days where indicated

SBT Performance Rate

66%
80%

0%
25%
50%
75%
100%

2012 Q4
2013 Q1
2013 Q2
2013 Q3
2013 Q4
2014 Q1
2014 Q2
2014 Q3
2014 Q4
2015 Q1

Courtesy of Sean Berenholtz, Johns Hopkins University
SBT Compliance Rates
43 Hospital Collaborative Network

SBTs divided by days where indicated

SBTs divided by all ventilator days

Courtesy of Sean Berenholtz, Johns Hopkins University
Lesson #6:
It’s a marathon, not a sprint
Lesson #7:

Choose the denominator that fits the intervention
The traditional metric for hospital-acquired infections is infections per 1000 device-days or patient days.

What if your intervention, however, is specifically designed to reduce device days?
VAEs per 100 episodes

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37% Decrease

Am J Resp Crit Care Med 2015;191:292-301
SATs and SBTs Decrease Vent Days
Opt-out protocol for paired daily SATs and SBTs, 12 ICUs

Vent Days: ↓ 2.4 days per pt

Mean Ventilator Days per Patient

Nov-11 Jan-12 Mar-12 May-12 Jul-12 Sep-12 Nov-12 Jan-13 Mar-13 May-13

Am J Resp Crit Care Med 2015;191:292-301
VAEs per 1000 ventilator-days

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No Change!

Am J Resp Crit Care Med 2015;191:292-301
Lesson #8: Wake Up and Breathe is just the start...
Strategies for preventing VAEs

- Decrease duration of mechanical ventilation
- Target the primary conditions associated with VAEs
Strategies for preventing VAEs

- Decrease duration of mechanical ventilation
- Target the primary conditions associated with VAEs
- Minimize sedation
- Paired SATs and SBTs
- Early mobility
- Low tidal volume ventilation
- Conservative fluid management
- Minimize blood transfusions
Early mobility – Wake Up & Walk!

Increasing evidence that early mobilization speeds time to extubation and decreases ICU length of stay

May also help prevent atelectasis & delirium

As with improved sedative management and weaning protocols, less time on vent means less time at risk for VAEs

Lord et al., Crit Care Med 2013;41:717
Schweickert et al., Lancet 2009;373:1874
Needham et al., Arch Phys Med Rehabil 2010;91:536
Summary

1. Get the right people on the bus
2. Educate, educate, and re-educate
3. SATs are a means, not an end
4. SBTs are a means, not an end
5. Beware of artificial increases in performance rates
6. It’s a marathon not a sprint
7. Choose the denominator that fits the intervention
8. Wake Up and Breathe is just the start … Wake Up and Walk!
Thank You!

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