

# What is your hospital doing about the #1 hospital-acquired infection?

Dian Baker, PhD, RN, APRN-BC ([dibaker@csus.edu](mailto:dibaker@csus.edu))

Barbara Quinn, MSN, RN ACNS-BC

Shannon Munro, PhD, APRN, BC, NP  
Karen K. Giuliano, PhD, RN, FAAN, MBA



# The story of May and how we began this journey



- May is a 57 year old grandmother who develops non-ventilator associated hospital acquired pneumonia (NV-HAP)
- *Why does this keep happening?*

We knew VAP  
was a problem –

But what about  
NV-HAP?

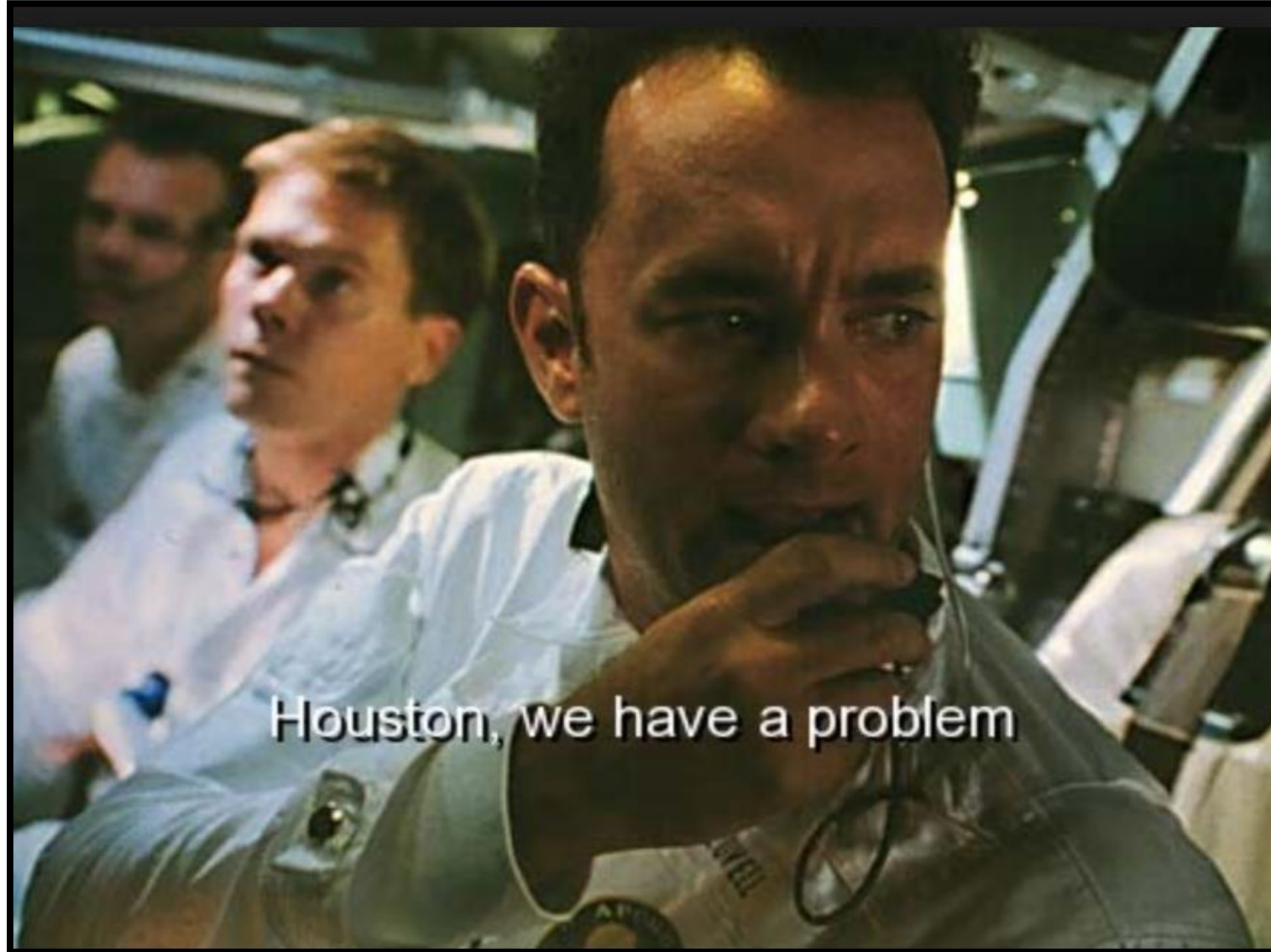
Is it a problem  
too?

**Our story led to questions and research**

How much non-ventilator pneumonia was occurring in the hospital? Why was no one talking about it?

- Was it happening in other hospitals?
- If so, who was “at-risk”?
- Can it be prevented? How?

# #1: Hospital-Acquired Pneumonia (non-vent most of the cases)



Study	Incidence/ Cases	Associated Mortality	+LOS	Cost
Davis & Finley (2012)	5,600 /3 yrs	18.9%	Not queried	\$28,000
Giuliano Baker Quinn (2018) 2012 HCUP National database (AHRQ)	2/100 pts	14.5%	4 days	\$36,400
Magill et al. CDC Point Prevalence	2011 - PNA 22 % of all HAIs 2015 - #1 25% 1 in 4 hospital infections			\$40,000
Micek, Chew, Hampton & Kollef (2016)	174 cases NV-HAP Matched controls equally sick	15.5%vs. 1.6% 8.4 more likely to die	15.9 days vs. 4.4	
See et al. (2016)	Retrospective review 8 hospitals in PA 2011-2012 VAP excluded 30% of 838 cases reviewed by CDC epidemiologists	30.9%	Davis & Finely (2012). Penn Pt Safety Authority, 9(3). Giuliano, et al. (2018). AJIC Magill, et.al. (2014) NEJM. 370(13), p 1198-1208 Micek, et. al. (2016). CHEST, 150(5), 1008-1014. See, et. al. (2016). ICHE, 37, 818-824 doi:10.1017/ice.2016.74	

# Pneumonia and Sepsis

(Mayr et al, 2014, Virulence)

**50%** of sepsis cases  
initiate as pneumonia  
(Angus, 2013, NEJM, p.841)

Site of infection	Frequency %		Mortality %	
	Male	Female	Male	Female
<b>Respiratory</b>	<b>41.8</b>	<b>35.8</b>	<b>22.0</b>	<b>22.0</b>
Bacteremia	21.0	20.0	33.5	34.9
Genitourinary	10.3	18.0	8.6	7.8
Abdominal	8.6	8.1	9.8	10.6
Device related	1.2	1.0	9.5	9.5
Wound/ soft tissue	9.0	7.5	9.4	11.7
Central nervous system	0.7	0.5	17.3	17.5
Endocarditis	0.9	0.5	23.8	28.1
Other/ unspecified	6.7	8.6	7.6	6.5

***NOT ON YOUR DASHBOARD:  
What HAIs are you working on right now?***

Type	% Prevalence	% Associated Mortality	Cost
CAUTI	13%	1.5%	\$1,108
CLABSI	5-10%	12%	\$33,618
SSI	22%	3%	\$19,305
HAP	25% (2015 data)	19%	\$40,000

# Centers for Disease Control and Prevention

- Included for the first time in its *top TEN public health* concerns:



**Healthcare-associated infections**  
**#1 Hospital-acquired pneumonia**  
**1 in 4 hospital-acquired infections**





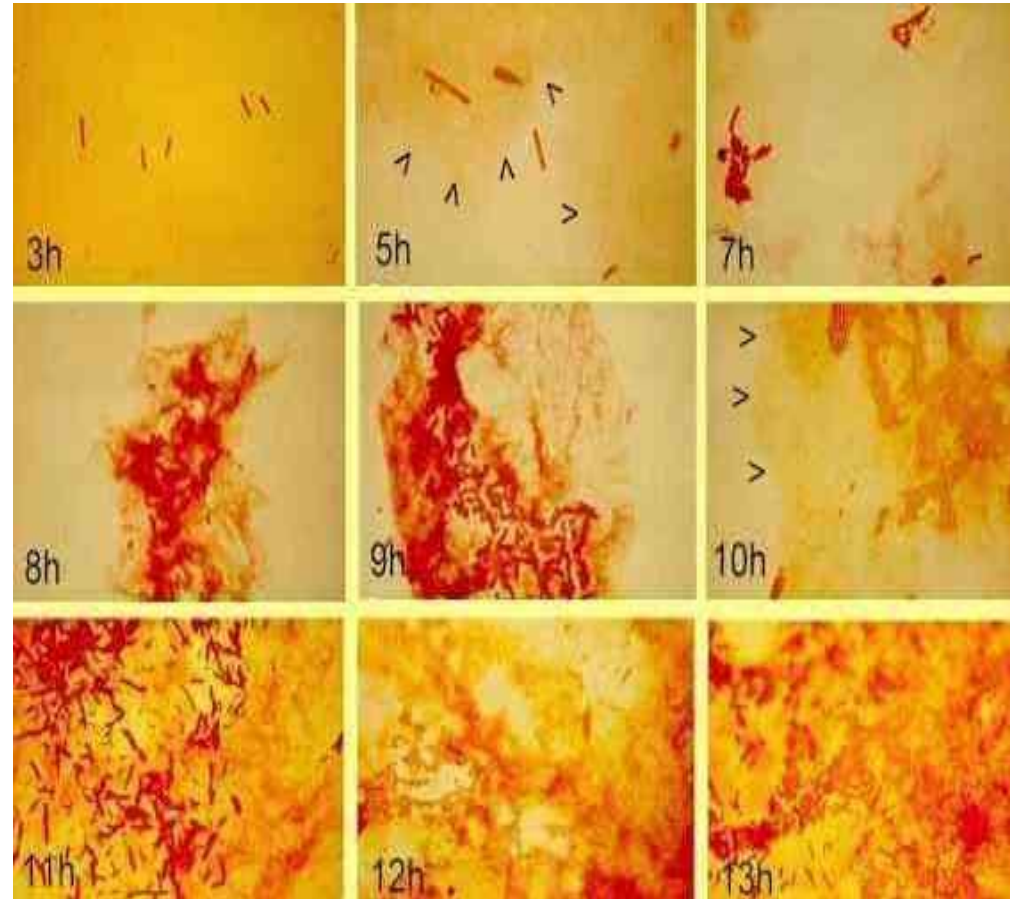
# Most Hospital Acquired Pneumonia Starts in the Mouth

## Microbiome of Oral Cavity

- 200 billion oral microbes
- 700 -1000 species

## Disruption of Microbiome

- Risk with hospitalization
- Changes in saliva pH and production
- 48 hours for HAP pathogens in mouth
- *If aspirated =100,000,000 bacteria/mL saliva into lungs*
- *PLUS – MICROASPIRATIONS*



Why might NV-HAP by the “bigger beast”?



Photo: <http://www.molartron.com/super-heroes/bristle-beast/>

“Identify the most modifiable risk factors and develop prevention programs to address them.” (CDC, 2003)

**Germs**

- **SOURCE CONTROL:**
- Reduce harmful pathogens -Comprehensive oral care \* **applies to all patients/ most modifiable**

**Aspiration**

- **Reduce aspiration with:**
- Swallow evaluation
- HOB elevated
- Tube Care

**Host**

- **Increase host resistance with:**
- **Early mobility** Keep patients warm during surgery
- Pulmonary toilet Stabilize glucose
- Limit use of acid suppressive meds

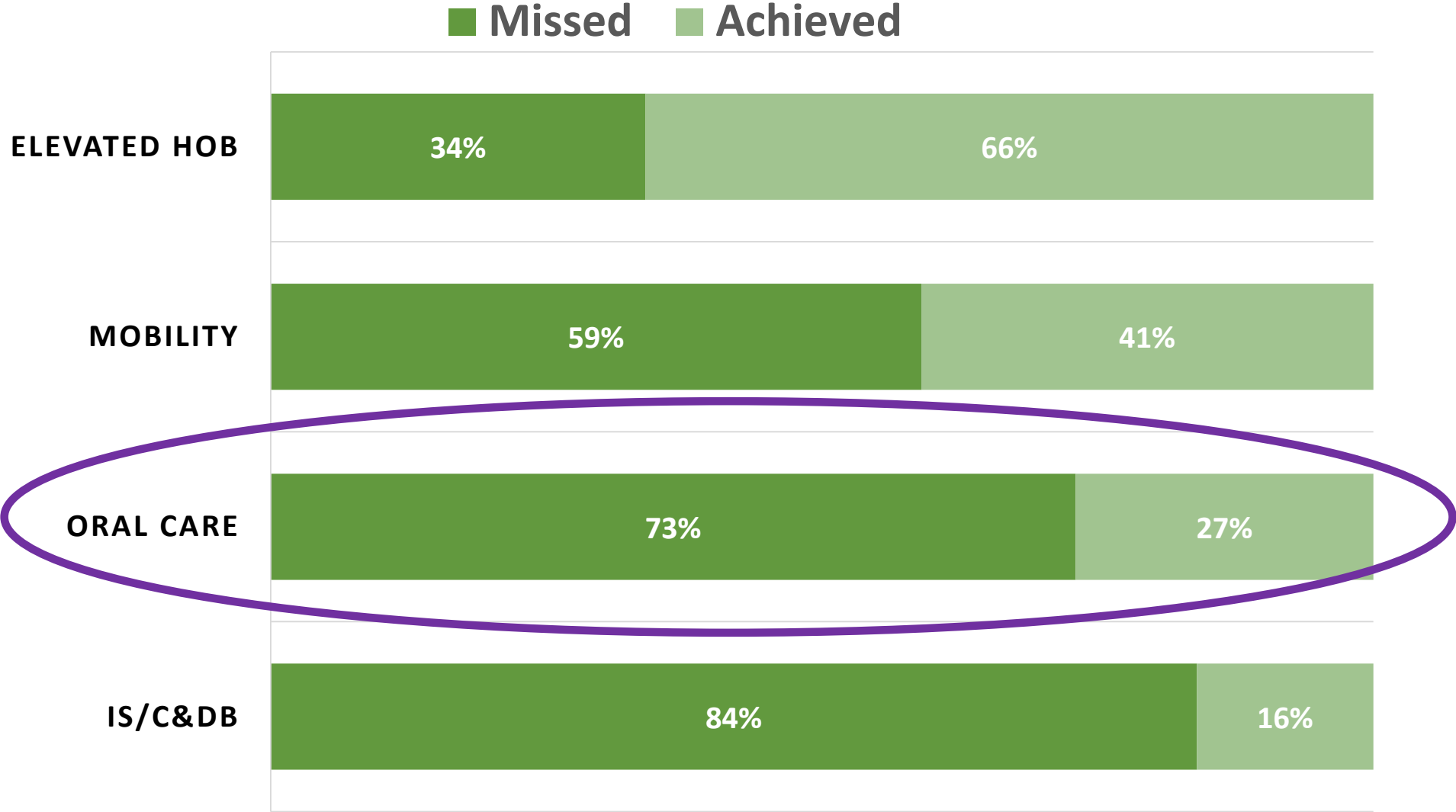
**Prevent HAP**



# Daily Host Protection is Challenging



# Missed Prevention Opportunities = Missed Nursing Care



# A Pneumonia Prevention Story

From the field:  
Barbara Quinn RN, MS, ACNS-BC,



# Incidence of NV-HAP:

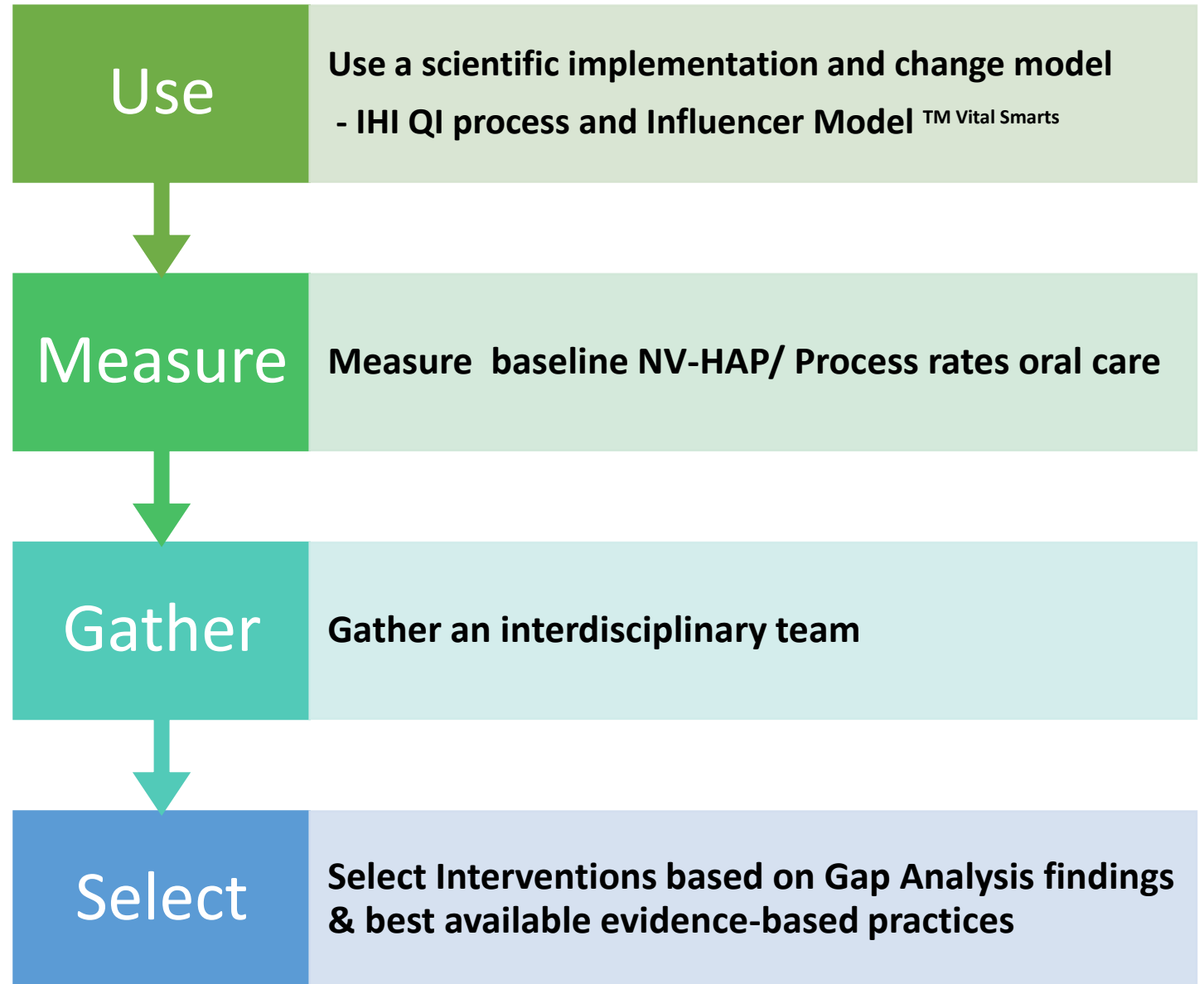
(2012 used 2010 data)  
*similar results from Kaiser and the VA*

- Sutter Medical Center:
  - 24,482 patients; 94,247 patient days
  - 115 NV-HAP
  - 1 NV-HAP/125 patients
  - Most on Med/Surg Units
  - This served as our baseline data
- Estimated cost in one year:
  - \$4.6 million
  - **23 deaths**
  - 1035 days





# How We Addressed NV-HAP & Post-Op Pneumonia at our facility



1

**Focus on one intervention at a time, beginning with the most modifiable risk factors**

2

**Monitor process and outcome measures; calculate return on investment (ROI)**

3

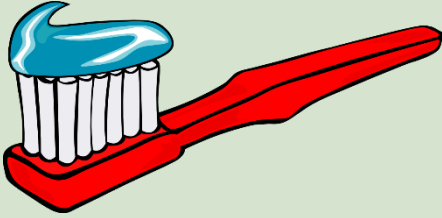
**Provide feedback to staff, patients, and leadership**

4


**Celebrate and share your successes**

# Process for Change

# Gap Analysis

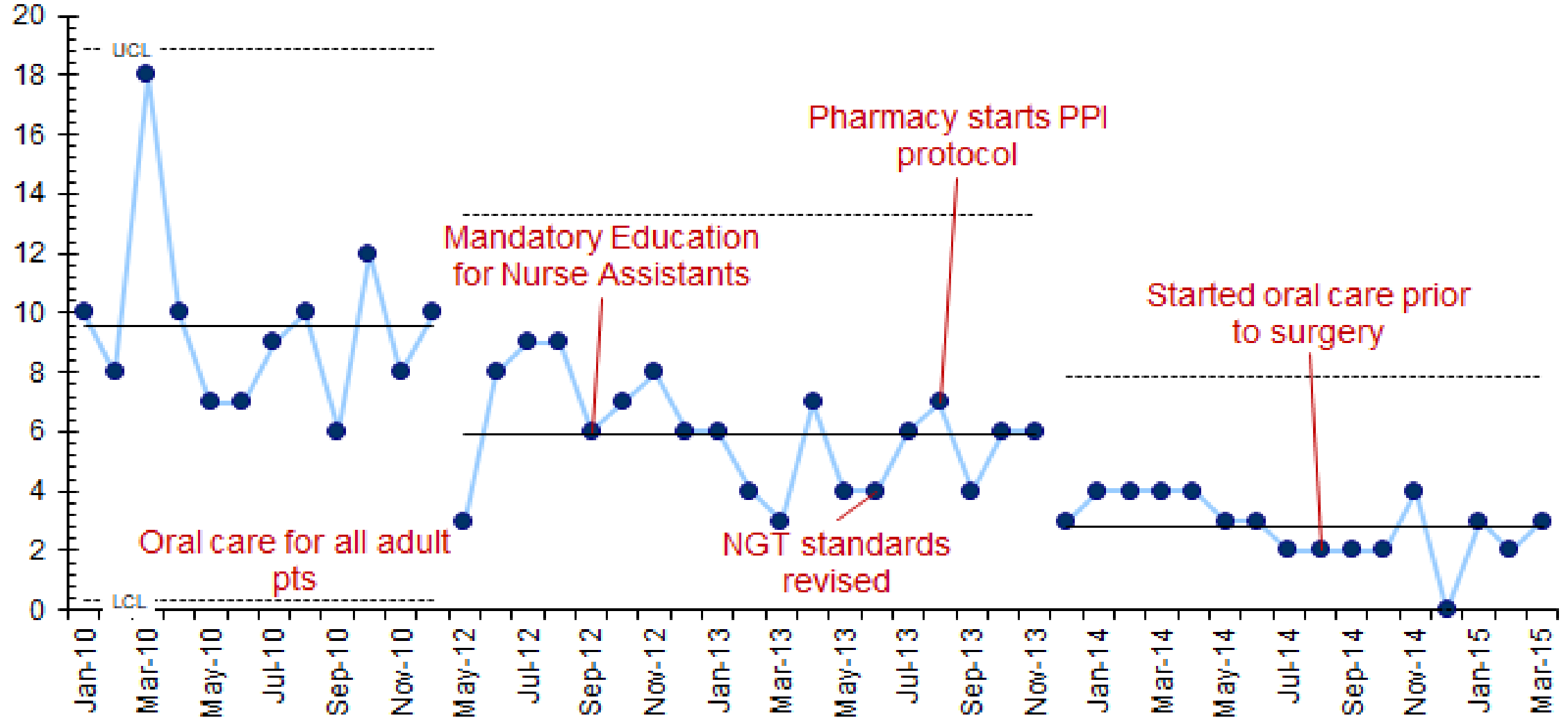
Best Practice	Our Gaps	Action To Take
Comprehensive oral care for all (CDC, SHEA)	ICU vent patients only	Develop inclusive oral care protocol
Oral CHG (0.12%) periop adult CV surgery and vent pts. (CDC, ATS, IHI).	Not using CHG on these patients.	Added to physician orders, and to protocol
Therapeutic oral care tools (ADA) 	Poor quality oral care tools. Absence of denture care supplies.	Upgraded tools and supplies.  SHEA = Society for Healthcare Epidemiology of America CDC = Centers for Disease Control & Prevention ADA= American Dental Association IHI= Institute for Healthcare Improvement

# American Dental Association approved Oral Care Protocol

Patient Type	Tools	Procedure	Frequency
Self Care / Assist	Brush, paste, rinse, moisturizer	Provide tools Brush 1-2 minutes Rinse	4 X / day
Dependent / Aspiration Risk / Non-vent	Suction toothbrush kit (4)	Brush 1-2 minutes, suctioning as needed. Apply moisturizer	4 X / day
Dependent / Vent	ICU Suction toothbrush kit (6) CHG	Brush/swab 1-2 minutes, suctioning as needed. Apply moisturizer	6 X / day CHG 2X / day
Dentures 	Tools + Cleanser Adhesive	Brush dentures with warm water after each meal. Brush/swab gums, mouth. Remove dentures and soak at night.	4X / day

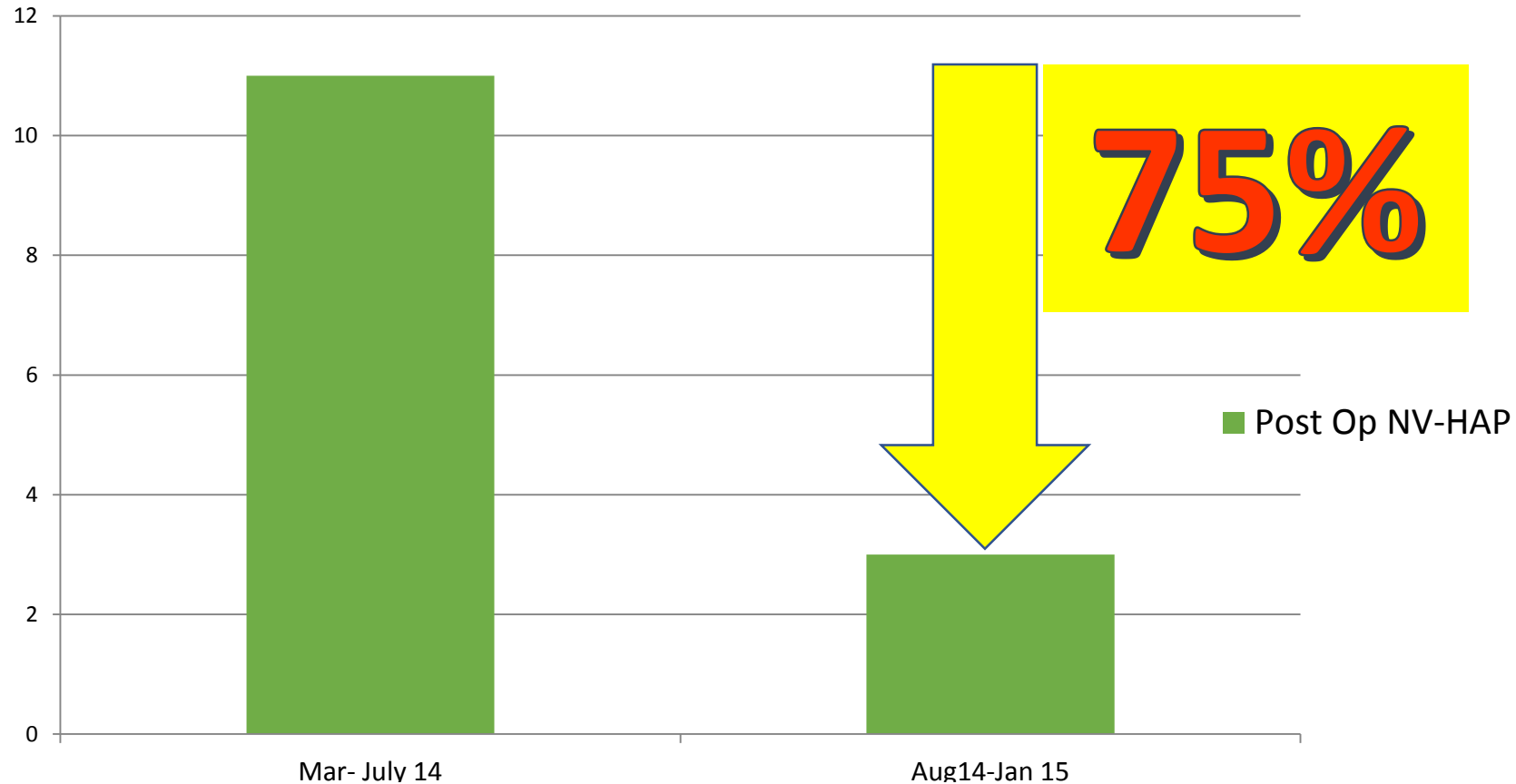
Count of cases

## Non-Ventilator HAP Cases (C-chart)



Acknowledgement: Thank you to Dr. Richard Scoville for his assistance with our Control Charts

# Post operative NV-HAP (all adult inpatient surgery) Incidence 6 months pre oral care vs. 6 months after



# Return on investment: What does pneumonia prevention mean?

- Between May 2012 and December 2014
- we avoided **164** cases of NV-HAP
  - **31** lives saved
  - **\$5.9** million not spent
  - **656-1476** hospital days avoided



**HAPPI**<sup>®</sup>

Hospital Acquired Pneumonia Prevention Initiative

# What is the VA doing about NV-HAP?

Shannon Munro, PhD, APRN, BC, NP  
Nurse Researcher  
VA Medical Center, Salem, Virginia

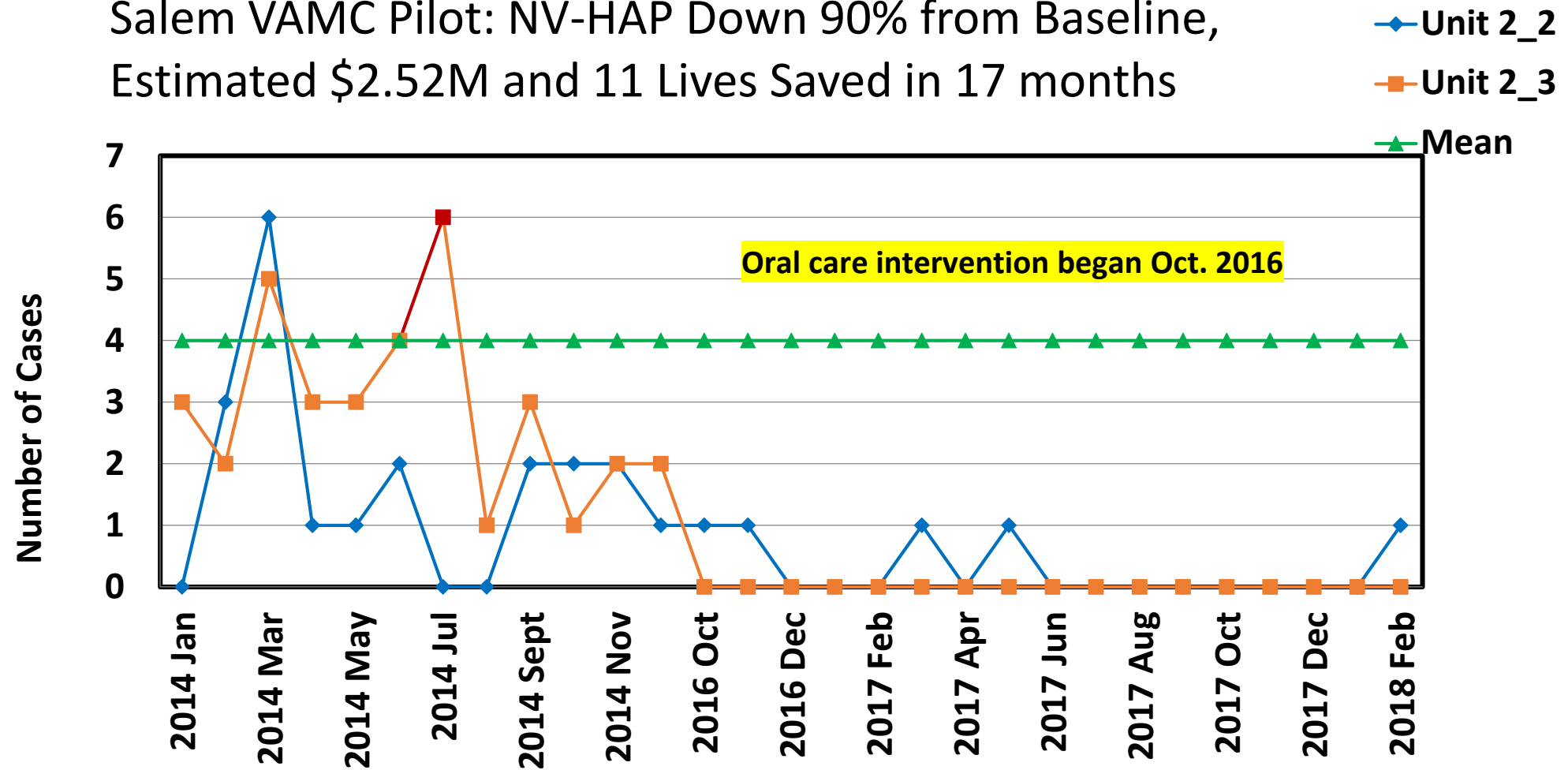


The Roanoke Times <http://www.roanoke.com/>

Diffusion of  
**EXCELLENCE** >>>>>  
Diffusing Best Practices Across VHA >>>>>



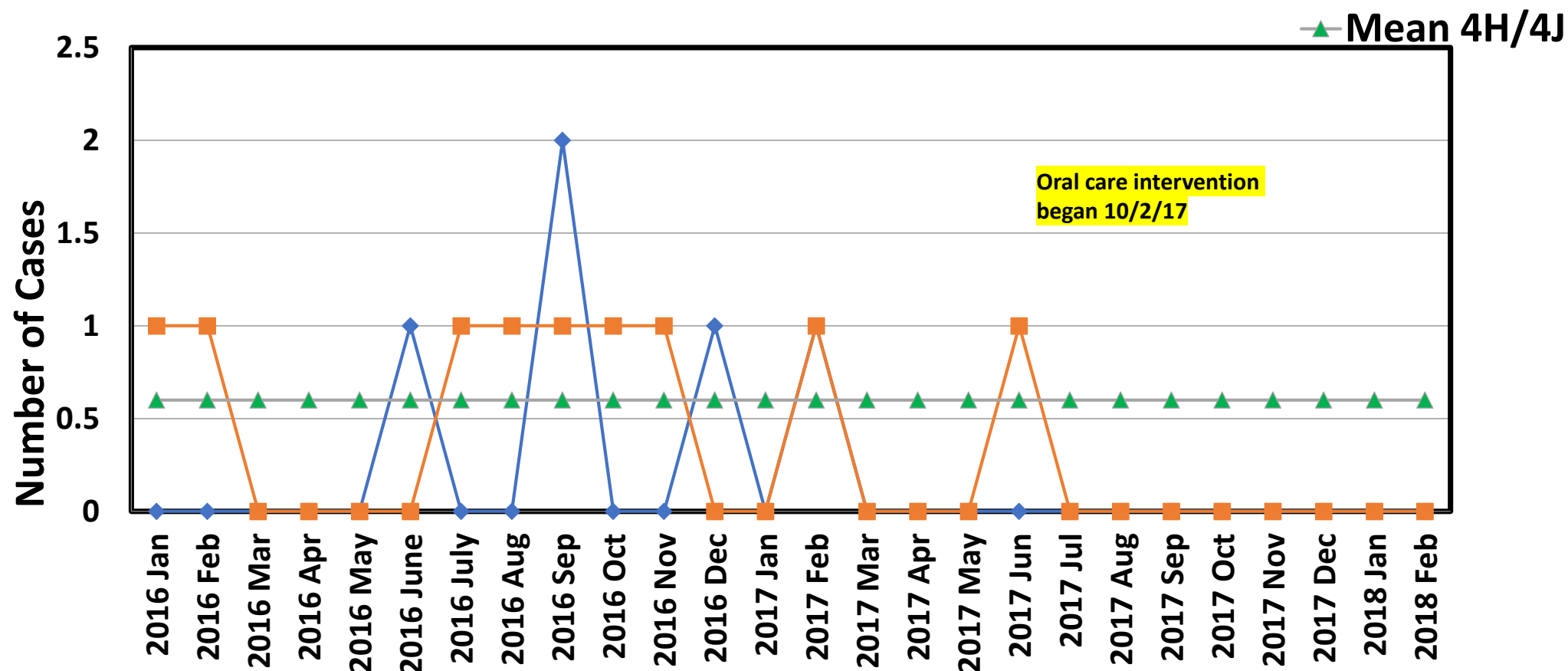
## Salem VAMC Pilot: NV-HAP Down 90% from Baseline, Estimated \$2.52M and 11 Lives Saved in 17 months



50 beds: 2 geriatric long term care units, 63 cases prevented  
at average cost of \$40,000 each; note the mean is combined  
for both units

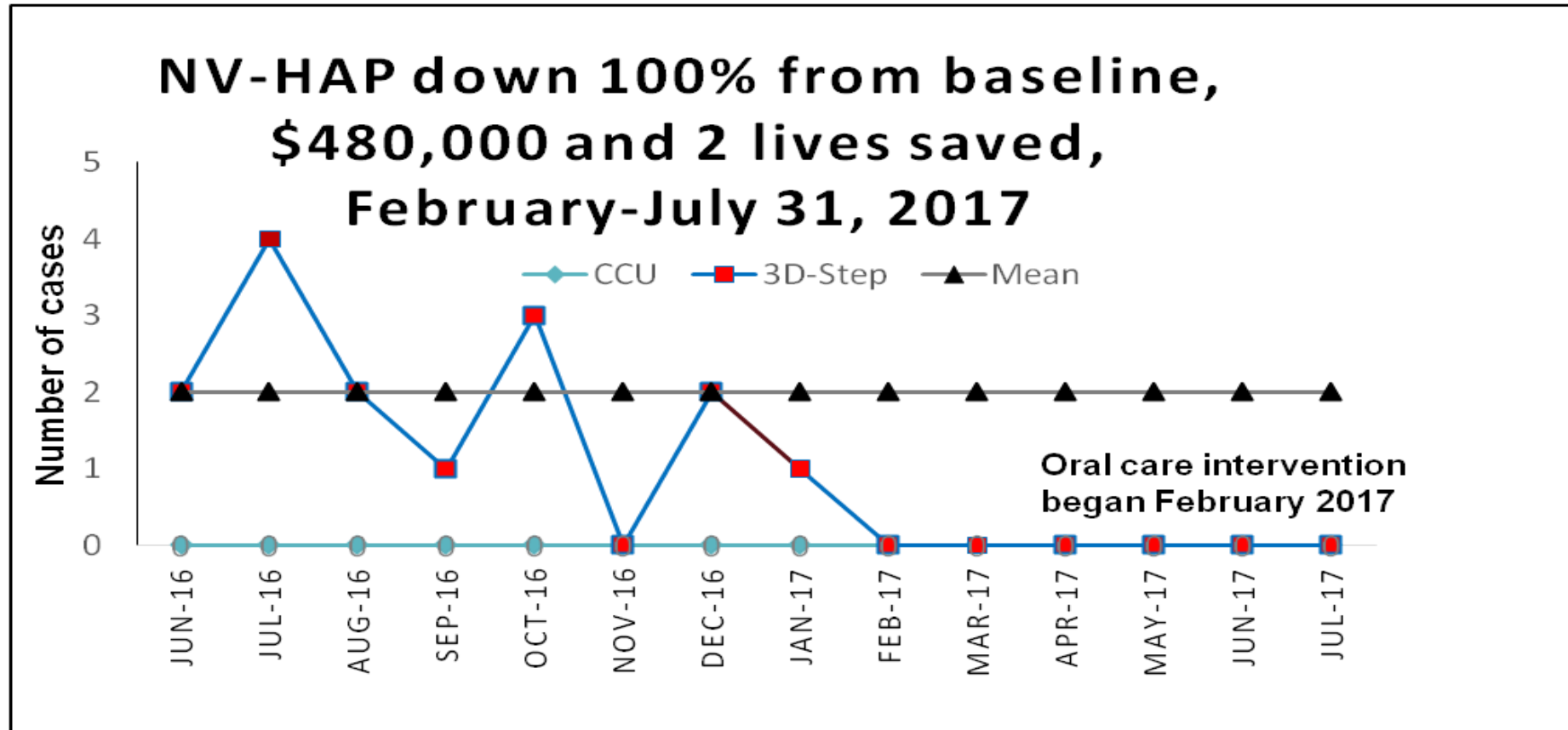
Salem VAMC NV-HAP 4H/ 4J (Oct. 1, 2017-Feb. 28, 2018)

5 Month Est. Post-intervention Savings=\$120,000



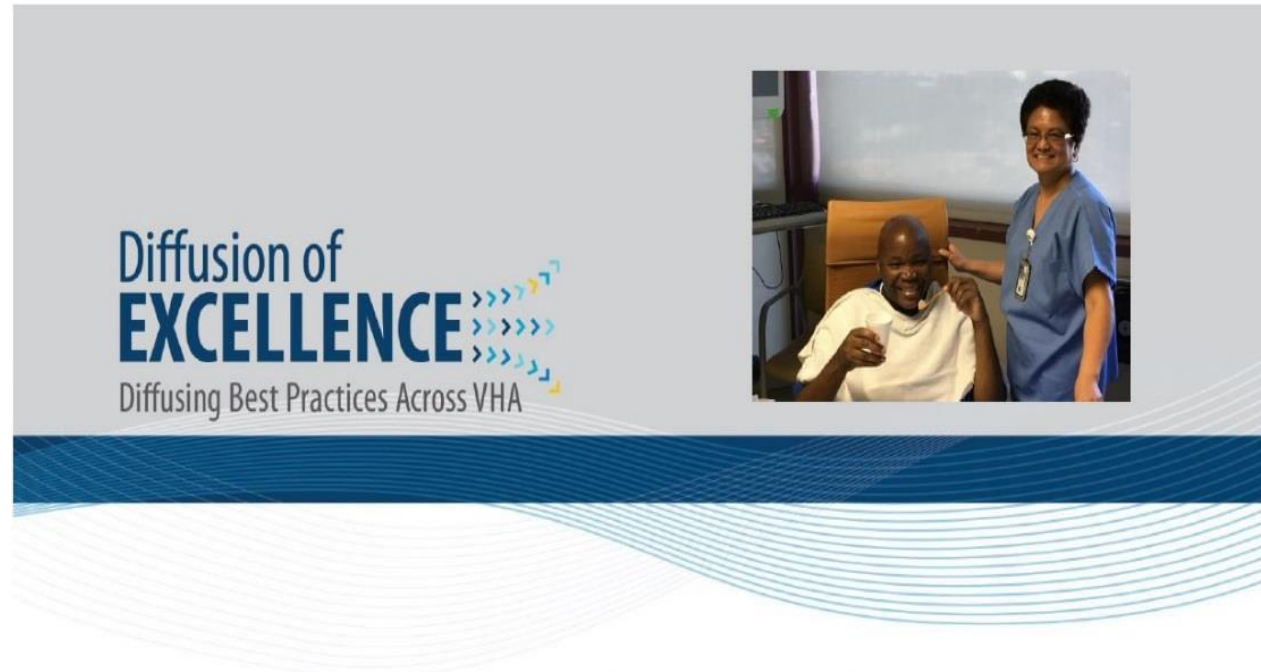
44 beds: Medical surgical units

## Houston VAMC Chosen as 2<sup>nd</sup> VA Implementation Site



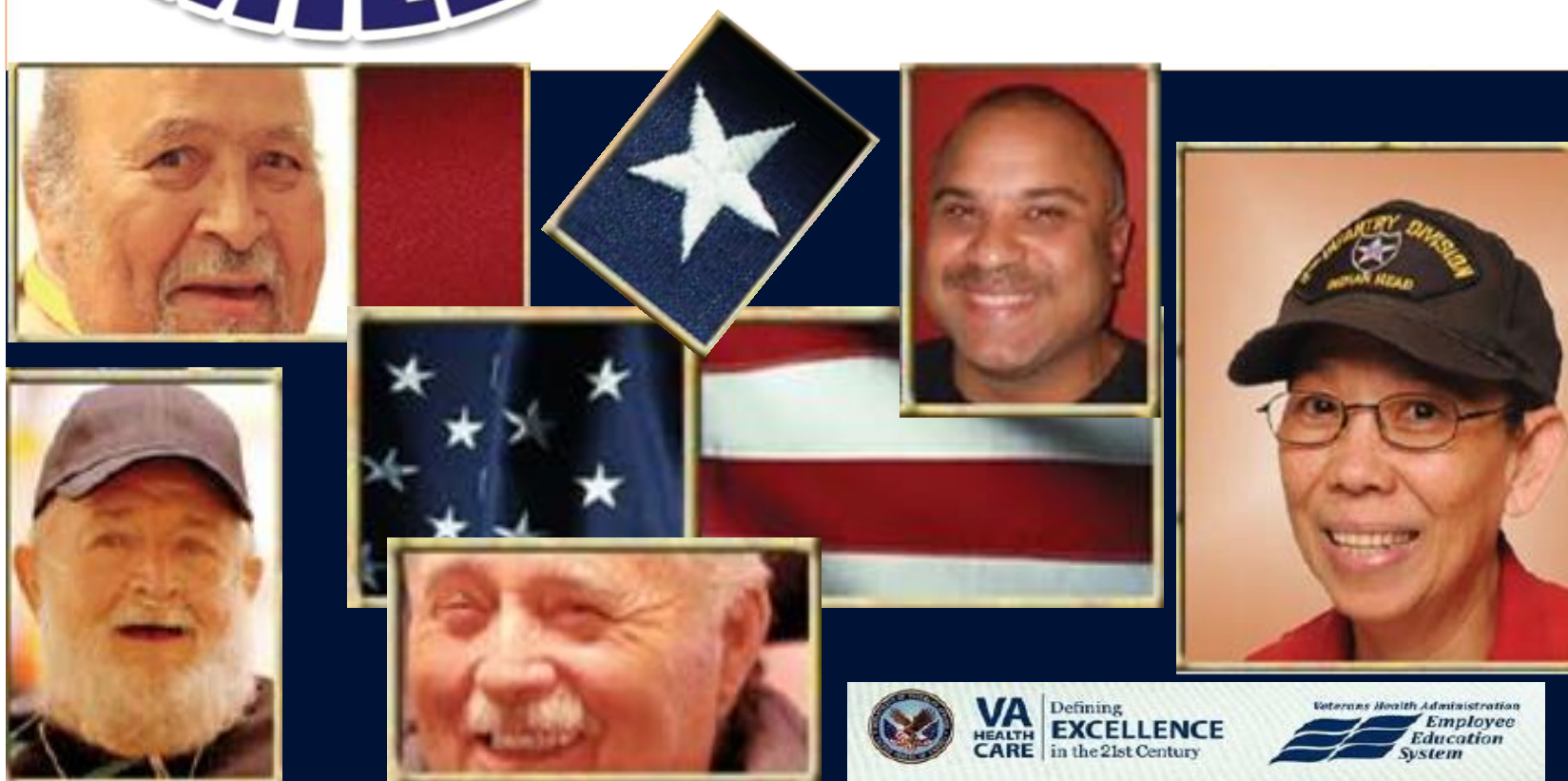
45 beds: Houston VAMC CCU and 3D SDU

# National Implementation Toolkit



Preventing Non-Ventilator Associated  
Hospital-Acquired Pneumonia (NV-HAP)  
by Engaging Nurses to Complete  
Inpatient Oral Care

# HEALTHY SMILES *for* Veterans



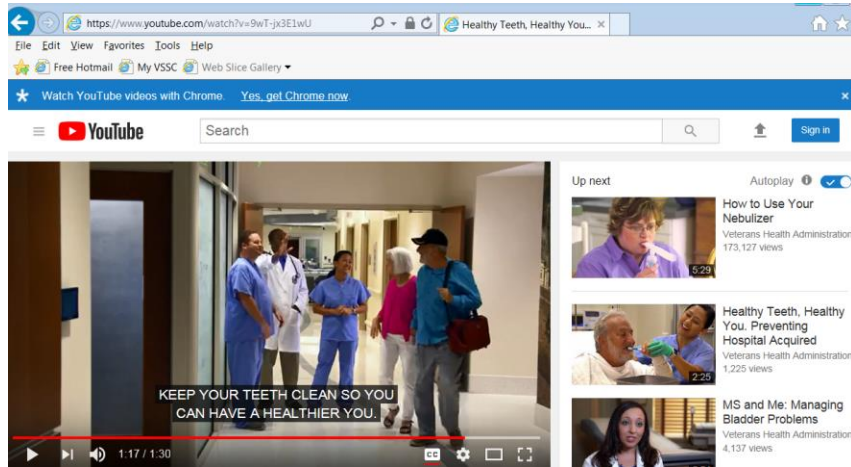
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Veterans Health Administration  
**Employee  
Education  
System**



# Sharing the Message



A message for Veterans and Families:

<https://bcove.video/2yIDPFw>

A message for VA Clinicians:

<https://bcove.video/2xivuXG>



# Brochures and Posters

## Did you know that brushing your teeth can prevent many health problems including pneumonia?

Oral health is an important part of your overall health. In your own mouth, you may have noticed that rough, fuzzy, or unclear feeling if you don't brush your teeth. This is from plaque – a sticky film that builds up on the surfaces of your teeth and contains billions of germs. The germs found in plaque feed on the sugar in foods you eat.



Germs in your mouth can make your gums red, swollen, and infected. Germs can also cause tooth decay (cavities), gum disease, and even pneumonia.

The germs in your mouth multiply five times every 24 hours and are frequently swallowed into your lungs during sleep. When you swallow these germs into your lungs, they can cause pneumonia. **Regular tooth brushing lowers the number of germs in your mouth and the risk of developing pneumonia by 30%.**

## What is pneumonia?

Pneumonia is a serious infection of the lungs, in which oxygen has trouble reaching your blood, causing your body's cells to not work properly. A person with pneumonia might find it harder to breathe, especially if the pneumonia affects both lungs. The most common cause of pneumonia is bacteria (germs).

Most patients with pneumonia experience fever, chills, cough, chest pain, and shortness of breath. Some patients also experience headache, low energy, loss of appetite, and confusion.

Patients who develop pneumonia in the hospital often have to stay 10-14 days longer. Additionally, 40% of Veterans who develop pneumonia while in the hospital are discharged to a long-term facility for additional care.

If you have any questions or concerns about pneumonia and how brushing your teeth can help, consult your health care team.

## What can you do to prevent pneumonia?

**Brushing your teeth at least twice a day** – after meals and before bedtime – will keep you healthier and reduce your chances of developing pneumonia. This will also help you leave the hospital sooner.

Be sure to brush your teeth **gently and thoroughly** to remove plaque and germs, trying not to miss any areas as you brush. Your nurse can help you with this! Keep in mind that **it's not how hard you brush that matters.**

Be sure to continue brushing your teeth twice a day once you are at home. Use a toothbrush that is soft with flexible bristles. Soft bristles can flex and are gentle on delicate gum tissue surrounding the teeth. Use a small amount of fluoride toothpaste, about the size of a pea. If you are unable to use toothpaste, we recommend brushing your teeth with tap water alone.

A worn out toothbrush does not remove plaque effectively. **Toothbrushes should be replaced about every 3 months** or sooner, before bristles look bent, worn, or flared.

## DID YOU KNOW?

During sleep, mouth germs are frequently **swallowed into the lungs** and can cause pneumonia



Brushing your teeth **lowers your chances** of developing hospital acquired pneumonia by 30%

Brushing your teeth **at least twice a day** will keep you healthier and help you leave the hospital sooner by preventing pneumonia



## BRUSH YOUR TEETH TO PREVENT PNEUMONIA

Regular tooth brushing lowers the number of germs in your mouth and the risk of pneumonia



*Healthy Mouth. Healthy Body.*



During sleep, mouth germs are frequently **swallowed into the lungs** and cause pneumonia



Brushing your teeth **lowers your chances** of developing hospital acquired pneumonia by 30%



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# Next steps: Surveillance and gap analysis

## Pneumonia

- Measuring population health in your hospitals – surveillance
- ICD codes (See et al study found ICD codes to be reliable in PA hospitals)
- CDC definition
- Point prevalence surveys for quality checks and monitoring
- Monitor for changes in external and internal forces that may impact data

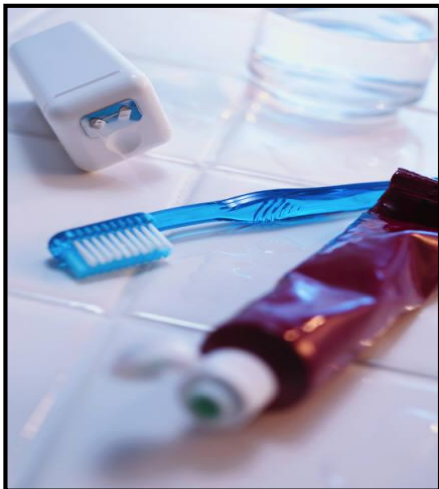
## Process Measures

- Check EHRs – may not have basic care data points for assessments and daily care
- Equipment use (oral care supplies, etc.)
- Perioperative checklists & flow sheets



# Education is not enough

- Evaluate current practices including input from nurses, physicians, infection control, speech therapists, occupational therapists & dentists.
- Simplify standard operating procedures.
- Assure effective oral care supplies are readily available.
- Share evidence: educate patient, family, & staff.
- Actively monitor & celebrate progress and successes.





**HAP #1 hospital-  
acquired  
infection, costing  
patient lives and  
dollars  
(NV-HAP 60%)**

**NV-HAP can  
be  
prevented  
and harm to  
patients  
reduced**

**Monitoring for  
NV-HAP and  
prevention  
programs must  
rise to the same  
level of attention  
as other hospital-  
acquired  
infections**

Questions ??

**One must always be aware, *to notice*, even though the cost of noticing is to become responsible.**

***Thylías Moss***