What’s toothbrushing and mouthwash have to do with hospital-acquired pneumonia?

Using Data to Drive Change
Disclosures

2014 – received unrestricted grant from Sage Products LLC (now Stryker) for data collection and a national study on impact of hospital-acquired pneumonia. Stryker is a multi-national company, and one branch makes oral care supplies for hospitals.

2019 – designed educational webinar for Medline, Inc. on NV-HAP

2019 – Consulted with Sunstar, GUM division an oral care company
3 Key Ideas

1. Get the Story and Share the Story - over and over

2. Get the Data and Share the Data - over and over

3. Create an interprofessional team to design solutions
The Story
CDC: Hospital-acquired infections
Top ten public health concerns in 2016

Photo from: https://newoldage.blogs.nytimes.com/2013/05/30/trapped-in-the-hospital-bed-2/
Meet
May

Photo from: Emma Winn Healthy Elderly --
not a real patient
http://www.fhms.surrey.ac.uk/nutritionandbone/swiss.html
How did May get non-ventilator hospital-acquired pneumonia (NV-HAP)?
Most Hospital Acquired Pneumonia Starts in the Mouth

Microbiome of Oral Cavity
- 200 billion oral microbes
- 700 -1000 species
- Replicate 5x in 24 hours

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

http://helios.bto.ed.ac.uk/bto/microbes/biofilm.htm
Loesche, W. 2012/
Micro-aspirations

Huggnagle and Dickson (2017) *newer idea* – lung microbiome have proposed that the entire respiratory tract should be considered a “single ecosystem extending from the nasal and oral cavities to the alveoli, which includes gradients and niches...” (p.1).

The Data
What did the data tell us?

Results from Sutter Medical Center, Kaiser Permanente, and the VA (all three sites were similar): 2010-2011

From Sutter Medical Center, Sacramento, CA
- 24,482 patients and 94,247 patient days
- **115 cases of NV-HAP**

Total estimated annual effect of NV-HAP:
- $4.6 million
- 23 deaths
- 1035 extra days in hospital

What is the harm?

Incidence: How common is NV-HAP?
• 1 in every 4 hospital infections is pneumonia (CDC 2018)
• Majority of these are NV-HAP

Associated Mortality: How many patients may die?
• 15.5 to 30.9% (Davis, 2012 & 2018, Micek, Quinn, Baker, Giuliani)
• 8 ½ X more likely to die than equally sick patients who do not acquire PNA (Micek et al 2016)
What is the harm?

**Morbidity: What other harm besides death?**
- #1 associated cause of sepsis  (Angus, 2013 NEJM; Mayr, 2014 Virulence)
- Increases incidence of long-term care post discharge  *(Baker & Quinn, 2018)*

**Cost: How many healthcare dollars are being spent?**
- Overuse of antibiotics for a potentially preventable infection (antibiotic stewardship)
- Increases hospital stay by 7-9 days = *MILLIONS OF DOLLARS*  *(Micek, Giuliani, Baker)*
- $28K - $43K per case  *(Giuliano, Baker, Quinn)*
- Readmissions (20%); ICU utilization (46%); Long term care (25%)  *(Baker & Quinn, 2018)*
In general for the non-ventilated patient….

Health professionals were not associating the potential for non-ventilator, hospital–acquired pneumonia with the mouth.

Missing the importance of maintaining the oral indigenous microbiota. And noting that ALL patients, on all type of hospital units have some risk of HAP.
Form the Solution Team: Interprofessional Collaboration

◦ HAPPI team
◦ Patients and families

○ Sacramento Area Dental Society &
○ Dental Hygienists
○ American Dental Association
Pneumonia prevention, like all infection prevention efforts requires

**Infection Control Principal #1 -- primary source control to contain infections**

Patients are lacking *daily host protection* from pneumonia (e.g., oral care, mobility, consistent tube care protocols, etc.)
Infection Control Principal #2:
Clean the surface first
Mechanical removal of biofilm (plaque) = tooth brushing

Double Whammy
In addition to germs growing....
Germ colonies develop chemical communication to secrete proinflammatory cytokines that reduce immune response

Kellum et al 2007 Understanding inflame cytokine response in PNA and sepsis
GenIM5 Arch Intern Med 2007;167(15):1655-1663
Primary source control of lung infections
ADA protocol for acute care hospitals

Soft-bristled, effective **tooth brush**

**Toothpaste** with dentifrice (removes biofilm)

Antiseptic **mouth rinse** (alcohol-free)
  ◦ *Save chlorhexidine for vent and cardiac surgery patients*

**Moisturizer** for mouth and lips
  ◦ Petroleum-free

Denture care equipment
  ◦ Storage cup, denture cleanser, denture brush, adhesive
More Data
Post Intervention
Hospital-wide Oral care from .25/ day to almost 3x/ day (red line)
Avoided **164** cases of NV-HAP
- **31** lives saved
- **$5.9 million** not spent
  - ($117,000 cost for supplies)
- **656-1476** hospital days avoided
  - days in the hospital avoided

More importantly, odds are much higher that May would go back home to her family.
To get change; Get Leadership

Asked our Board:
  - Try your patients’ experience

Tell the story and provide the data – update over and over – keep the message on their minds...

Packed Board agenda – how will they remember your project?
What’s on the safety radar?

2010
- Focused on device-related infection
- Non-ventilator hospital-acquired pneumonia not monitored

2019
- Hospital-acquired pneumonia now #1 hospital-acquired infection
- Non-ventilator hospital-acquired pneumonia still not monitored
In Hospitals, Pneumonia Is a Lethal Enemy

Pneumonia is the No. 1 hospital-acquired infection in America and hospitals aren’t doing enough to fight it. The best weapon: a toothbrush.

By Lucette Lagnado

Feb 17, 2018 7:00 a.m. ET

At a time when the public is concerned with drug-resistant superbugs, researchers have identified another danger of going to the hospital: contracting pneumonia.

Hospital-acquired pneumonia is more pervasive and urgent than most people realize, a new study warns, and hospitals in America aren’t adequately addressing prevention. “Given the mortality, hospitals should be doing a lot more,” says Dr. Alan S. Tomson, lead author of the study, which was published in January in the American Journal of Infection Control.

Sutter Medical Center cut pneumonia by 70%. The key? 50,000 toothbrushes.

10:06 AM - February 26, 2018

Pneumonia is the most common hospital-acquired infection in the United States, and many hospitals are fighting it with a simple solution: toothbrushes. Lucette Lagnado writes for The Wall Street Journal.

Learn how we can help you improve hand hygiene and infection rates ➤

The persistent problem of pneumonia

According to the CDC, pneumonia is the most common hospital-acquired infection in the United States. In one study, Lagnado writes, researchers found that 15% to 24% of patients with hospital-acquired pneumonia die, and one CDC study even found that 13% of deaths with hospital-acquired pneumonia were due to non-pneumonia causes.

According to another study from Iowa State University, patients with hospital-acquired pneumonia were 6.7 times more likely to die than those patients who were equally sick.

“Given the mortality, hospitals should be doing a lot more,” Tomson, a named professor at Sacramento State University’s school of medicine, said.
California Health Care Quality Institute (HQI)
  ◦ 2018 awarded C. Duane Dauner Award for Quality and Safety
  ◦ Oral care reduction in NV-HAP at Sutter Medical Center

American Hospital Association – webinar
  ◦ Hospital-acquired pneumonia prevention initiative (HAPPI) toolkit now available

VA Health Care - launching national hospital oral care program

CDC & The Joint Commission – hosting webinars with national experts

AETNA Insurance – sending out oral care kits to all the pre-approved surgical clients
What can we all do right now?

Dental professionals can remind patients... “If you’re going into the hospital – be sure to brush your teeth several times a day” Ask your nurse for help if you need it

Everyone, including patients, should be asking their local hospitals – “what is your oral care policy, to keep me healthy during my hospital stay?”