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Title: Preventing the #1 Hospital-Acquired Infection and Saving Lives: One Clean Mouth at a Time

Topical Areas: Patient Safety: Keeping patients safe by preventing pneumonia  
Quality Improvement: Improving and sustaining performance with change management strategies

### **Executive Director Statement**

On behalf of the Sutter Health system I am honored to support this submission for the Hospital Quality Institute's C. Duane Dauner Quality Award 2018.

Barbara Quinn, MSN, ACNS-BC, Clinical Nurse Specialist at Sutter Medical Center Sacramento (SMCS) has successfully implemented an oral care program targeted at eliminating the incidence of non-ventilator associated hospital acquired pneumonia (NV-HAP). Through her research she has identified a simple oral care bundle that is easily adopted in acute care clinical practice. Implementation of the oral care bundle has significantly driven down in-hospital mortality associated with NV-HAP as well as improved overall patient morbidity. We are disseminating her work across all of the Sutter Health acute care operations and have set a goal of zero incidence of NV-HAP by 2025.

Barbara's contribution to this new area of research and patient outcomes have been published nationally and internationally. She has received external recognition for her research on NV-HAP from professional associations – such as the American Dental Association. We believe that Barbara's work could easily be applied to ALL patient experiences across all age groups. We see great opportunity in disseminating this work to post-acute care providers such as skilled nursing homes (SNFs), home health agencies, hospice/palliative care programs, ambulatory surgery centers and primary care office practices. We believe that a lack of education and simple instructions on oral care are contributing to hospitalizations – both initial and extended stays (as a result of developing a complication such as hospital acquired pneumonia).

Being recognized with this award would allow for easier dissemination of Barbara's work both at a state level and nationally. We hope you find Barbara's results of interest and worthy of the HQI C. Duane Dauner Quality Award 2018.

## **Executive Summary**

Historically, the only hospital-acquired pneumonia that has been monitored, measured and reported is ventilator-associated pneumonia (VAP). Recent literature reveals that Non Ventilator Hospital Acquired Pneumonia (NV-HAP)—although not yet reportable-- is now the most common hospital-acquired infection (HAI), with highest cost and mortality.

According to the CDC, the pathogenesis of HAP (VAP and NV-HAP) is a three-step process: 1) bacteria/viruses in the oropharyngeal cavity; 2) micro aspirated into the lungs; 3) in an immune-compromised patient. (See figure 1) Our first step: address source control by reducing germs in the mouth in order to modify the #1 modifiable risk factor for pneumonia.

In 2010, Sutter Medical Center, Sacramento (SMCS) identified 115 adults who acquired NV-HAP during their hospital stay. SMCS began a NV-HAP prevention program--HAPPI (Hospital-Acquired Pneumonia Prevention Initiative) in 2012 -- and within 2 1/2 years reduced NV-HAP by 70% by implementing a comprehensive oral care program<sup>1</sup>.

In a baseline measure of NV-HAP incidence for all Sutter hospitals for 2015-17, there were approximately 3011 cases, with an estimated annual burden of \$40.15M, 100 preventable deaths, and 4,016 extra patient days. Rates per 1000 patient days ranged from 0.55 to 2.65 (See Tables 1 & 2), similar to NV-HAP rates across the United States<sup>12, 13</sup>.

The HAPPI program to prevent NV-HAP at every Sutter hospital was launched in 2018.

## **Background and Relevance**

Focus on reducing the incidence of VAP has resulted in adoption of successful prevention strategies and reduction of patient harm and overall cost of care. A recent CDC Point Prevalence Study has shown that hospital-acquired pneumonia is now the most common hospital-acquired infection (HAI) in U.S. hospitals. Of those, 2/3 have been further identified as NVHAP<sup>2-3</sup>. A 2016 study of the impact of NV-HAP on patient outcomes found that patients with NV-HAP had an 8.4 times greater odds of death, were more likely to end up in ICU and on a ventilator, as well as experience an extended length of stay<sup>4</sup>.

In a 3-year study comparing the incidence of VAP and NV-HAP from all the reported HAPs in the state of Pennsylvania showed NV-HAP occurred twice as much as VAP with essentially the same mortality rate<sup>5</sup>. NV-HAP—a hospital-acquired condition that is not currently being reported publically -- is a much larger threat to patient safety than VAP.

The most effective way to prevent HAP, according to the CDC, is to “...identify the most modifiable risk factors and put programs in place to address them.” (See Figure 1)

Pathogenic bacteria in the mouth is one of the most modifiable risk factors for HAP and comprehensive, evidence-based oral care is an effective, proven intervention to reduce NV-HAP. Several studies from 2002-2016 have found statistically significant reduction of NV-HAP

with oral care as the only intervention<sup>6-8</sup>. Research shows that patients in the hospital are missing oral care 70% of the time<sup>9</sup>.

### **Pneumonia Prevention Program**

To address the prevalence of NV-HAP in 2012 at SMCS by targeting source control, nurses began a comprehensive oral care program for ALL patients, not just those on ventilator treatment. The success was so significant, Sutter Health determined this was an initiative worthy of spread to all 20 Sutter acute care campuses.

The outcome metrics: the rate of NV-HAP per 1000 patient days and per 100 patients (%). The process metric is frequency of oral care, with a goal of 4 in 24 hours for non-ventilated patients and 6 in 24 hours for ventilated patients. Rather than depend on labor-intensive audits, reports have been built, providing both real-time and monthly data for oral care frequency and rates of NV-HAP (See Figure 4).

The first challenge was getting staff to change behavior. We found that most registered nurses and aids do not know that the most common source of pathogens that cause pneumonia start in the mouth and that evidence-based oral hygiene is an effective intervention. To address behavior change, Vital Smarts<sup>R</sup> Influencer Model was utilized to address all 6 spheres of influence (See Figure 2). Classes, 1:1 education, in-services, and just-in-time teaching was provided. A special emphasis was placed on unlicensed staff, as they deliver the majority of this care: mandatory classes were held for unlicensed patient care staff, demonstrating importance of care they provide, with volunteer dental professionals teaching the correct way to provide oral care. Staff who were successful with integrating more frequent oral care into daily workflow were acknowledged and encouraged to share with their peers. Staff were coached on how to hold one another accountable at change of shift. Patients and families were included as part of the care team with the support of the Sutter Patient-Family Advisory Council. Council members helped to develop patient-friendly educational material, including flyers, self-monitoring care forms, and table-tents. Weekly and monthly data, including patient stories and case studies, were shared at the facility and unit level to keep staff engaged and motivated. Evidence-based oral care equipment, an updated policy, and at-a-glance protocol were provided.

Another challenge was the lack of evidence-based oral hygiene equipment in the facilities. An oral care gap analysis revealed disposable toothbrushes with harsh bristles that fell out in patient's mouths, poor quality toothpaste, and other basic equipment missing, including those needed for denture care. The American Dental Association (ADA) formally approved the HAPPI Oral Care Protocol for Hospitalized Adult Patients in 2017. The ADA agreed that basic oral care for hospitalized patients should include the following: a soft-bristled toothbrush, therapeutic toothpaste to remove plaque, alcohol-free antiseptic mouth rinse, and moisturizer. In addition, oral care equipment should be available to meeting special needs of patients, such as denture care for edentulate and suction toothbrushes for those at higher risk for aspiration (Figure 3).

The Sutter Health Nurse Products Advisory Council selected new oral care supplies that met the ADA recommendation, now standardized throughout the Sutter system. Our Supply Chain Director coordinated a complicated transition from “old” to “new.” Supply Chain Directors at every facility received clear communication, product lists, and assistance to assure a smooth transition.

Even with the right oral care tools, special patient populations are at greater risk of pneumonia than others. It was critical to address these patients and caregivers. For example, the perioperative patient population was an area of focus. Data shows that NV-HAP is one of the most common complications that can occur postoperatively<sup>10</sup>. At SMCS, oral care prior to surgery was correlated with a 75% decrease in post-operative pneumonia (See Table 3). Therefore, the HAPPI program includes providing oral care prior to all surgical procedures. Stroke patients are at a high risk for aspiration; we engaged Speech Language Pathology and Occupational Therapy to include oral care in their swallow evaluations and activity of daily living therapy encounters. Respiratory Care Practitioners were enlisted, as they commonly assist in managing the patients receiving high-flow oxygen therapy—another high risk patient type.

#### **Sustainability & Scaling:**

Although managing a practice change for 3000 patient care staff at one large acute care facility can be difficult; spreading that practice change throughout a large, multi-hospital system is even more daunting. At Sutter Health, however, we were up to the challenge. Not underestimating the complexity, we first formed the HAPPI Steering Committee. Members included major stakeholders at a high enough level to remove system barriers to standardization: Chief Nursing Officer, Sutter System, Director of Professional Nursing Practice, Director of Supply Chain, Informatics, Academic Nurse Research Community Partner, Director of Infection Prevention, Clinical Nurse Specialist, and Project Management expert.

There were three crucial elements for the Sutter System HAPPI project: 1) Executive Leadership, 2) Project Management, and 3) Change Management. Similar to the 3 legs of a stool, diligent attention to each was important for our successful implementation and results.

We received excellent nursing leadership from our Chief Nursing Officer (CNO) and Director of Professional Practice and Nursing Excellence. Our nursing leaders embraced the science, acknowledged nurse ownership of the practice change, and played a major role in socializing to other organizational leaders. Nursing leaders removed barriers, provided ongoing direction and guidance, as well as encouragement to the rest of the HAPPI team. For example, our CNO learned that our hospitals were stocked with poor quality toothbrushes at one of our meetings and she had new toothbrushes ordered for every hospital before the end of the day!

Committee members with experience in project management set a timeline and kept us on track. Meeting every 2 weeks propelled us forward. Checklists, action items, toolkit and policy development, and a comprehensive communication plan were all important elements. References, minutes, and education materials were stored on a new collaboration site. An online education module was written and assigned to every Registered Nurse, Nursing Assistant, Respiratory Care Practitioner, Speech Language Pathologist, and Occupational Therapist. The electronic health record team assisted to optimize documentation that better reflected best practice and our oral care protocol. Automated

reports were designed for oral care compliance and incidence of NV-HAP. A real-time tool was developed to track frequency of oral care compliance with green indicating oral care provided, yellow indicating almost time for oral care, and red indicating oral care was late. This report is serving as a valuable tool for real-time education at the unit and individual staff level.

Managing change by acknowledging the “people side” was an important element. When it comes down to it, no results will be experienced without staff adopting the new behavior. This is why we used the scientific Influencer Model and developed targeted activity in all 6 domains of influence.

#### **Results:**

By 2014 at SMCS oral care frequency increased by 380%. In addition, there was an observed overall reduction of NV-HAP by 70%, with a 75% decrease in post-operative patients ( $p < .0001$ ; OR = 0.51; 95% CI = 0.38, 0.70) (See Table 4). Between May 2012 and December of 2014, SMCS avoided 164 cases of NV-HAP, saving 31 lives, \$5.9M, and 1100 excess hospital days. Improvement has been sustained<sup>1</sup>.

In April of 2018, the HAPPI program began rolling out to all Sutter hospitals. Adoption is picking up and preliminary results are promising. If Sutter can reduce the previous annual rate of NV-HAP by even 50%, we will save an estimated 50 patient lives, 4016 excess hospital days, and \$20M annually.

#### **Significance of Results:**

Results of the SMCS experience and program of research have been published in peer review journals,<sup>1, 6, 11-13</sup> picked up by the Wall Street Journal as a notable healthcare concern<sup>14</sup> presented at national and international conferences<sup>15-21</sup>, the Oral Care Protocol approved by the American Dental Society, and has recently gotten interest from the California Hospital Association, the Joint Commission, and Centers for Medicare Services.

Our results demonstrate that we are reaching beyond reportable measures to address potential patient harm and improve quality of care we provide. It is significant that Sutter Health is investing in a prevention of a HAI that most hospitals don't even track. Basic care such as oral hygiene is foundational to nursing and our work has demonstrated a connection with evidence-based nursing care and improved patient outcomes. Sutter Health is poised to be the premier organization to address this often overlooked patient complication and comorbidity with a system wide adoption of basic nursing practices centered on comprehensive oral care.

#### **Key Lessons and Advice**

Don't underestimate the impact of the basics and don't assume oral care is being done. According to research both patients and nurses agree: oral care is one of the most often missed type of care in the hospital. Providing for the most basic needs of our patients is the foundation of nursing practice and patient advocacy. By addressing the maintenance of homeostasis while patients are treated for other life-threatening injuries and illness, we are truly meeting all the needs of our patients and protecting them from complications.

Engage those who do the work. Explain how their contribution is of value and essential to patient safety. Allow them to “co-create” ways to successfully build the new practice into a current workflow. One of our orthopedic nursing assistants decided to add “oral care 4X/day” to the patient’s whiteboard, adding 4 squares for the patient/family to check when oral care was completed. This resulted in an increase of patient participation and improved documentation. One nursing assistant expressed her excitement after class, previously discouraged by the lack of impact in her role, stated: “Now when I come to work I know I can help save lives!”

Invest in change management. Success of all change relies on those whom we are asking to change. A comprehensive plan that includes the “people part of change” will pay off in an improved culture of safety, staff engagement, and sustainability.