



# Aetna's Rush to Brush Program

**Fighting hospital-acquired pneumonia with oral hygiene**

Daniel Knecht, MD, MBA  
Vice President, Clinical Product

Mary Lee Conicella, DMD  
Chief Dental Officer

[Aetna.com](https://www.aetna.com)

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## Brush off complications and focus on recovery

**In 2018, the global health care industry held 1,218 exabytes of data.<sup>1</sup> That's a staggering figure considering that a single exabyte could hold all the printed material in the Library of Congress 100,000 times over. Moreover, health care's data storage usage is expected to grow at a 36% compound annual rate through 2025.<sup>2</sup>**

All those bits and bytes beg the question: How can health care organizations better use the patient data they have to improve the lives of the people they serve?

At CVS Health and Aetna, our data allows us to identify opportunities to really impact member health, providing consumers and customers with curated, high-quality interventions that promote behavior change, improve health and lower avoidable costs. With approximately 9,900 retail locations, approximately 1,100 walk-in MinuteClinics, and almost 23 million medical members, we are uniquely positioned to use assets in an innovative way that drives better health outcomes and allows us to redefine our relationship with members and plan sponsors.

The [Rush to Brush](#) program demonstrates how using data at 'moments that matter' can improve people's

health and even save lives. The program offers a surprisingly simple solution to a vexing problem: hospital-acquired pneumonia (HAP).

### The Problem of HAIs

Hospitals should be places of healing. But all too often, they are places where patients inadvertently acquire serious, even life-threatening, infections. Hospital-acquired infections (HAIs) — infections that appear between two and 30 days after a person receives care — are the most common complications related to hospital care and are among the top 10 leading causes of death in the United States. In 2002, an estimated 1.7 million hospital patients in the U.S. acquired HAIs; nearly 99,000 — about 1 in 17 — died as a result. The top causes of death were pneumonia (36%), bloodstream infections (31%), urinary tract infections (13%), surgical site infections (8%), and infections of other sites (11%).<sup>3</sup>

Statistics like those prompted the federal government to take action a decade ago. In 2009, the U.S. Department of Health and Human Services (HHS) set [five-year goals for HAI prevention](#) (goals it revised in 2016). That same year, the U.S. Centers for Disease Control and Prevention

<sup>1</sup><https://www.seagate.com/files/www-content/our-story/trends/files/idc-seagate-dataage-whitepaper.pdf>, Nov. 2018, Accessed Oct. 2019

<sup>2</sup><https://www.seagate.com/files/www-content/our-story/trends/files/idc-seagate-dataage-whitepaper.pdf>, Nov. 2018, Accessed Oct. 2019

<sup>3</sup><https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1820440/>, Accessed Oct. 2019



(CDC) combined several surveillance programs into the National Healthcare Safety Network, which is the nation's largest tracking system for HAIs, collecting data from more than 17,000 facilities.<sup>4,5</sup>

The attention paid to HAIs has made a measurable difference in several areas, according to HHS's **National Action Plan to Prevent Health Care-Associated Infections: Road Map to Elimination**. By 2016, for example, HHS could report a 10% reduction in central line-associated bloodstream infections. (Central lines are tubes used to deliver medication or fluids or to collect blood for testing; they are different than IVs because they access a major vein and can remain in place for weeks or even months.)<sup>6,7</sup>

It's no surprise that central lines, urinary catheters and ventilators are common sources of HAIs; after all, any time you break the skin or insert a foreign object into the body, you increase the risk of infection. But bacteria can spread in other ways. For example, according to the Association for Professionals in Infection Control and Epidemiology (APIC), multidrug-resistant bacterium can hide in a vast array of places, including floors, bedside tables, supply carts, mattresses, sinks, bedrails, toilets, sinks, doorknobs, call buttons, and even jewelry and artificial fingernails worn by health workers.<sup>8</sup>

<sup>4</sup><https://www.cdc.gov/hai/data/index.html>, Oct. 2018, Accessed Oct. 2019

<sup>5</sup><https://health.gov/hcq/prevent-hai-measures.asp>, Jan. 2020, Accessed Oct. 2019

<sup>6</sup><https://health.gov/hcq/prevent-hai-measures.asp>, Jan. 2020, Accessed Oct. 2019

<sup>7</sup><https://www.cdc.gov/hai/bsi/clabsi-resources.html>, Accessed Oct. 2019

<sup>8</sup><https://apic.org/wp-content/uploads/2019/06/APIC-AB-Guide.pdf>, Accessed Oct. 2019

## Pneumonia: A Prolific Killer

Hospital-acquired pneumonia (HAP) is the deadliest HAI and has developed increasing resistance to antibiotics. A recent study published in the *New England Journal of Medicine* found no significant reduction in HAP cases over the past several years, despite encouraging reductions in other HAIs in that same timeframe.<sup>9</sup> In 2018, HAP accounted for tens of millions of dollars in costs across Aetna's Commercial and Medicare businesses.<sup>10</sup> According to the American Thoracic Association, pneumonia is among the 10 most expensive conditions, requiring inpatient treatment in the United States, costing \$9.5 billion for 960,000 hospital stays in 2013 alone.<sup>11,12,13,14,15,16</sup>

Ventilator usage is associated with less than 40% of all cases of HAP, meaning that more often, infection comes through another route. Non-ventilator hospital-acquired pneumonia (NV-HAP) can be caused by a host of other bacteria that are ingested through the mouth and nose, as well as by viruses and fungi. And the news gets worse, according to researchers Dian Baker, Ph.D., R.N., of California State University, Sacramento, and Barbara Quinn, M.S., R.N., of Sutter Medical Center in Sacramento, Calif. Both researchers study NV-HAP. Writing in the *American Journal of Infection Control* in 2018, they described one three-year study that found that “patients who developed NV-HAP were 8.4 times more likely to die during hospitalization, more likely to require intensive care, 8.0 times more likely to require mechanical ventilation, and had a longer median hospital length of stay than participants who did not develop NV-HAP (15.9 vs. 4.4 days, respectively).<sup>17</sup>

In the same article, Baker and Quinn outlined a few simple measures that have been associated with the prevention of NV-HAP, including bed elevation, patient mobility, deep breathing exercises, and most notably, oral care. As the researchers noted, oral care is “(1) well recognized as a strategy for the prevention of V-HAP, (2) has the largest body of knowledge of all the currently known interventions for NV-HAP prevention, and (3) is



consistent with the Centers for Disease Control and Prevention's (CDC) perspective on modifiable risk factors. In addition, it is the only modifiable risk factor that applies to 100% of patients.” (The CDC recommends identifying the most modifiable risk factors and developing prevention programs to address them.)<sup>18</sup>

In a hospital setting, all patients in all types of units carry some risk for HAP. Fifty-five percent of cases occur in patients under 65 years of age. A third of HAP cases occur in the ICU; outside the ICU, cases are most common among patients who are elderly, immunocompromised, undergoing surgery, and/or intubated for feeding purposes.

“Having made rounds in hospitals for years, I have observed that patient oral care is frequently on the backburner during an inpatient stay.”  
— Dr. Knecht

<sup>9</sup>N Engl J Med 2018; 379:1732-1744DOI: 10.1056/NEJMoa1801550, Nov. 2018, Accessed Oct. 2019

<sup>10</sup>Aetna internal data 2018, Accessed Oct. 2019

<sup>11</sup><https://www.frontiersin.org/articles/10.3389/fphar.2019.00092/full>, Feb. 2019, Accessed Oct. 2019

<sup>12</sup><https://www.lung.org/lung-health-and-diseases/lung-disease-lookup/pneumonia/what-causes-pneumonia.html>, Feb. 2010, Accessed Oct. 2019

<sup>13</sup><https://share.upmc.com/2017/02/pneumonia-symptoms-causes-risks/>, Feb. 2017, Accessed Oct. 2019

<sup>14</sup><https://aricjournal.biomedcentral.com/track/pdf/10.1186/s13756-016-0150-3>, Nov. 2016, Accessed Oct. 2019

<sup>15</sup><https://www.thoracic.org/patients/patient-resources/resources/top-pneumonia-facts.pdf>, 2019, Accessed Oct. 2019

<sup>16</sup>[https://www.ajicjournal.org/article/S0196-6553\(17\)31056-8/pdf](https://www.ajicjournal.org/article/S0196-6553(17)31056-8/pdf), Oct. 2017, Accessed Oct. 2019

<sup>17</sup>[https://www.ajicjournal.org/article/S0196-6553\(17\)31056-8/pdf](https://www.ajicjournal.org/article/S0196-6553(17)31056-8/pdf), Oct. 2017, Accessed Oct. 2019

<sup>18</sup>[https://www.ajicjournal.org/article/S0196-6553\(17\)31042-8/fulltext](https://www.ajicjournal.org/article/S0196-6553(17)31042-8/fulltext), Jan. 2018, Accessed Oct. 2019

## The Importance of Oral Care

Oral care is critically important in the post-operative setting because the mouth is like a leaky petri dish. At any one time, the mouth contains some 20 billion microbes representing 700 to 1,000 species, and the mix of species has been shown to change for the worse within 48 hours of hospital admission.

In fact, one small study found presence of targeted bacteria — especially those linked to pneumonia — in 90% of patients within 72 hours.

Those bacteria don't just stay in the mouth, however; they are often aspirated (inhaled into the lungs). And aspirated saliva contains **100 million bacteria per milliliter**.<sup>19,20,21,22</sup>

Brushing the teeth greatly reduces the population of bacteria in the mouth. "When patients brush their teeth, they're basically taking their bacterial count from hundreds of millions down to just a few, and this greatly reduces their risk of pneumonia," Dr. Baker said.

Unfortunately, oral care is too often neglected in hospitals. Looking at the problem from a nursing perspective, one researcher identified four specific issues: "(i) nurses often convey oral hygiene care to their patients as being optional; (ii) nurses are inclined to preserve patient autonomy in oral hygiene care; (iii) oral hygiene care is often spontaneous and variable, and may not be informed by evidence; and (iv) oral hygiene care is not embedded into bedtime care routines."<sup>23</sup>

A few years ago, Baker and Quinn set out to address those issues — and to see if improving oral care would reduce the incidence of pneumonia.



<sup>19</sup><https://www.aha.org/2018-03-29-what-your-hospital-doing-about-1-hospital-acquired-infection>, Mar. 2018, Accessed Oct. 2019

<sup>20</sup><https://msphere.asm.org/content/1/4/e00199-16>, Aug. 2016, Accessed Oct. 2019

<sup>21</sup><https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4414413/>, Apr. 2015, Accessed Oct. 2019

<sup>22</sup><https://aricjournal.biomedcentral.com/track/pdf/10.1186/s13756-016-0150-3>, Nov. 2016, Accessed Oct. 2019

<sup>23</sup><https://www.ncbi.nlm.nih.gov/pubmed/27353475>, Jun. 2016, Accessed Oct. 2019



## Testing a Hypothesis

In 2012, Sutter Medical Center created a cross-functional HAP prevention initiative (HAPPI) team. The team first conducted a gap analysis and quickly realized the hospital's stiff, generic brushes didn't meet American Dental Association (ADA) guidelines and that basic supplies like denture cleansers and adhesives weren't available. They then updated their oral care protocol to ensure all patients received oral care four times a day. They also developed educational materials for nurses, patients and family members, recognizing that oral care, much like hand hygiene, is everyone's responsibility. Once the new protocol was in place, they conducted monthly testing and reported quarterly NV-HAP results.<sup>24</sup>

The results were impressive. As Quinn and Baker reported in *American Nursing Today*, "Patients admitted during the intervention year were 49% less likely to acquire NV-HAP than those admitted the year before the intervention. This means we'd avoided 60 NV-HAP cases and saved more than \$2.4 million by avoiding extra hospital days. With the \$117,600 expenditure for our new, higher-quality oral-care supplies, the return on

investment (ROI) was \$2.28 million. Given the economic stress for all hospitals these days, this ROI for basic nursing care can't be overlooked."<sup>25</sup>

And the outcomes at Sutter Medical Center continued to improve. Between May 2012 and December 2014, the incidence of post-operative NV-HAP dropped 70%. Quinn and Baker estimated that the initiative prevented 164 cases of NV-HAP, saving 31 lives and \$5.9 million.<sup>26</sup>

Other facilities have seen the same or better results. According to a [2018 Wall Street Journal report](#), the Department of Veterans Affairs Medical Center in Salem, Va., saw the incidence of NV-HAP drop 92% in two units that implemented a similar oral-care initiative.<sup>27,28</sup>

## Enter CVS Health and Aetna

Upon learning about this important research, we saw an opportunity to improve patient care and reduce costs by creating a touchpoint with members who were scheduled for surgery.

We reached out to Dr. Baker to learn more about the issue of HAP and her research and to explore ways to apply what she and Quinn had learned on a global scale.

Aetna's data tells us which of our members are going to have a hospital stay in the near future, which gives us an opportunity to connect with those members in advance, before they go to the hospital, and send them an oral health care kit.

Specifically, Aetna set out to use a common data asset for insurers—pre-certification requests—but in a brand new way. The team defined a list of about 25 surgeries that could require several inpatient days and that had a historical HAP incidence greater than 2%. (These are elective surgeries such as hip and knee replacements and thoracic procedures.)

Beginning in January 2019, Aetna started mailing personalized oral care kits to members scheduled for surgery, timing them to arrive in the home five to seven days before the procedure. The kits include educational materials that highlight the importance of oral health to prevent infection as well as high-quality oral health

<sup>24</sup><https://www.americannursetoday.com/using-oral-care-prevent-nonventilator-hospital-acquired-pneumonia/>, Mar. 2015, Accessed Oct. 2019

<sup>25</sup><https://www.americannursetoday.com/using-oral-care-prevent-nonventilator-hospital-acquired-pneumonia/>, Mar. 2015, Accessed Oct. 2019

<sup>26</sup><https://www.aha.org/2018-03-29-what-your-hospital-doing-about-1-hospital-acquired-infection>, Mar. 2018, Accessed Oct. 2019

<sup>27</sup><https://www.wsj.com/articles/in-hospitals-pneumonia-is-a-lethal-enemy-1518868800>, Feb. 2018, Accessed Oct. 2019

<sup>28</sup>[https://www.roanoke.com/news/local/salem/salem-va-leads-national-research-tooth-brushing-each-day-keeps/article\\_8a959bde-f3c4-11e7-a933-7b5029467621.html](https://www.roanoke.com/news/local/salem/salem-va-leads-national-research-tooth-brushing-each-day-keeps/article_8a959bde-f3c4-11e7-a933-7b5029467621.html), Jan. 2018, Accessed Oct. 2019



products. The initiative has allowed us to offer members a simple health care solution right at their fingertips. It shows the power of bringing key industry stakeholders together to solve a problem unearthed by member data. We've been really thrilled with the collaboration we've had with our plan sponsor Johnson & Johnson Consumer Inc. as well as Colgate-Palmolive Company.

Each kit also includes a personalized get-well soon card and tips on how to achieve good oral care, an educational component that we believe is critical to the program's success.

This program offers resources and actionable insights for our members, and we hope it will raise the visibility of this important health issue within the medical community.

Because oral health is inextricably linked with overall physical health, CVS Health and Aetna are focused on shifting the paradigm around oral health in hospitals.

In fact, it's actually *more* important to take care of your teeth and mouth when you go in for surgery, not less. That's why this initiative is vital.

**“We're using data to contact patients with critical information and resources at a point in their health journey that can make a real difference in their recovery.”**  
— Dr. Conicella

Of course, oral hygiene is also important when patients get home. Poor oral health is associated with cardiovascular disease, endocarditis (an infection of the inner lining of the heart chambers or valves), diabetes,



## Early results

The Rush to Brush program is identifying and supporting more than 1,000 members each month.

**In its first 6 months,  
we observed a reduction  
of HAP by up to 30%.**

Aetna recently surveyed 150 participants and found that 80%+ said they would recommend the kit to others. Among other results:



70%+ of participants took their kit to the hospital



55%+ said the kit improved their post-surgery recovery experience



95%+ had positive feelings towards the program

several forms of cancer, and even arthritis. Gum disease has also been associated with low birth weight and premature birth; one study found that an incredible 6-fold increase in low birth weight deliveries could be caused by periodontal disease.<sup>29,30,31</sup>

Moreover, oral problems affect quality of life in ways unrelated to health. For example, an American Dental Association study found that 29% of low-income adults said that the appearance of their mouth and teeth had affected their ability to interview for a job. So, the oral health education of programs like Rush to Brush could potentially have a far-reaching positive impact long after discharge.<sup>32</sup>

Sir William Osler famously said, “The good physician treats the disease; the great physician treats the patient who has the disease.” Rush to Brush shows how preventing disease serves the patient in a holistic way.<sup>33</sup>

Write-in comments revealed that the program heightened people’s awareness of the importance of oral hygiene and improved their views of Aetna. One respondent said, “It’s nice to know new scientific info and [that] someone cares about my well-being.”

<sup>29</sup><https://www.mayoclinic.org/healthy-lifestyle/adult-health/in-depth/dental/art-20047475>, Jun. 2019, Accessed Oct. 2019

<sup>30</sup><https://www.ncbi.nlm.nih.gov/pubmed/18462995>, Accessed Oct. 2019

<sup>31</sup><https://www.ncbi.nlm.nih.gov/pubmed/26513266>, Mar. 2016, Accessed Oct. 2019

<sup>32</sup><https://www.ada.org/~media/ADA/Science%20and%20Research/HPI/OralHealthWell-Being-StateFacts/US-Oral-Health-Well-Being.pdf?la=en>, Accessed Oct. 2019

<sup>33</sup><https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1924990/>, Accessed Oct. 2019

Another wrote,

“This was so kind & useful!  
I was so excited to get this —  
used it more than once a day.  
I’m 64 — never got a gift in  
mail from insurance company.  
I’ve had many surgeries.”

The survey results also highlighted the gap in care that made the program necessary in the first place. Less than half of respondents said their hospital had provided oral hygiene products or education during their stay. And the products they did receive were sometimes inadequate: One member reported receiving a sponge brush while in the hospital; another received a children’s toothbrush.



## Rush to Brush Kit Contents

- Colgate Total® toothpaste and toothbrush
- Listerine® Zero mouthwash
- CVS Health toothbrush shield
- Personalized “Get Well Soon” card
- Education piece on oral health
- Travel pouch for hospital bag



## Looking Forward

We’re working to find new ways to enhance and expand the Rush to Brush program. We also are driving toward creating new member experiences that make navigating key moments in one’s health journey simpler and more empowering. This could include avoiding other life-threatening infections, supporting our members battling cancer, and empowering pregnant women with key maternity health insights.

At CVS Health and Aetna, we are focused on using the member data we have to improve the lives of our members while reducing wasteful health care spending. We believe Rush to Brush is just one example of the difference we can make for both consumers and the U.S. health care system.



## Rush to Brush Oral Care Tips

### Each kit includes a card with these tips:

- Brush an hour before surgery.
- After surgery, try to brush four times a day, and rinse twice a day or after each meal.
- Brush your teeth for two minutes, and don’t forget your tongue.
- Rinse twice a day for 30 seconds.
- If you can’t get to the sink to brush or rinse with mouthwash, ask a nurse for help.

Contact your local  
Aetna representative

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