

# **Electronic Hand Hygiene Surveillance and Feedback Monitoring Compels Compliance Through Behavior Change**

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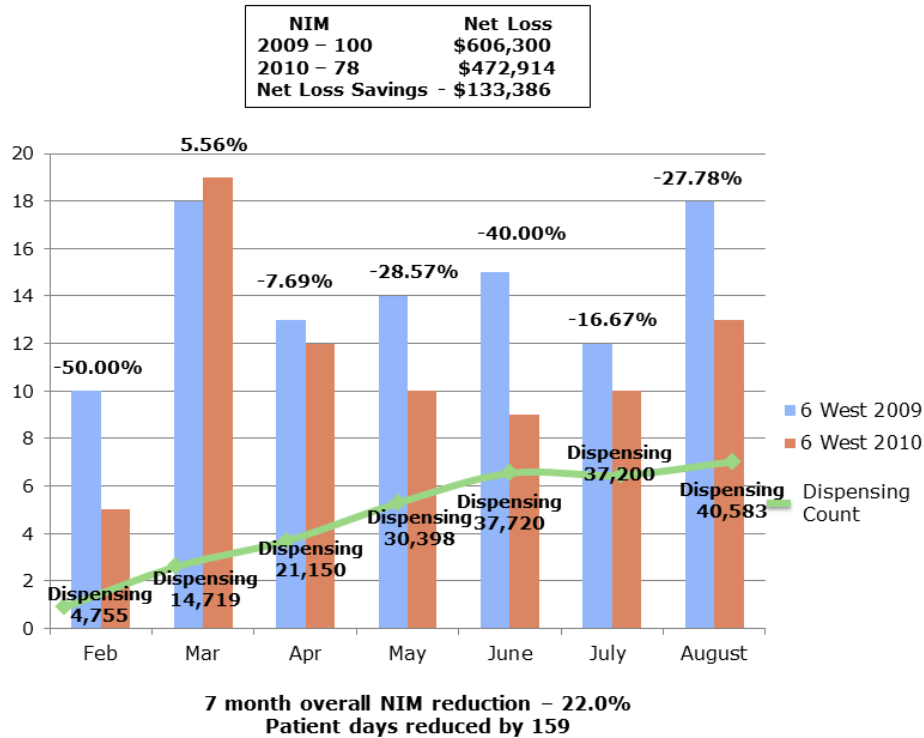
The medical profession struggles against healthcare associated infections (HAIs) that account for thousands of lives and millions of dollars lost each year. For each HAI that occurs, costs per patient increase by \$20,549,<sup>1</sup> the length of stay for a patient increases by 8.12 days and hospital net loss for the care is \$5,206 per patient.<sup>2</sup> The Centers for Disease Control and Prevention (CDC), The World Health Organization (WHO) and the Joint Commission indicate that effective hand hygiene is the single most important way to reduce infection risk. Despite the importance of hand hygiene practices, sustained high levels of hand hygiene compliance have remained elusive when using traditional monitoring methods such as periodic surveillance, self-reporting, and aggregate volume measurements.<sup>3</sup>

In the late 1840's, Dr. Ignaz Semmelweis observed that mortality of deliveries by medical students, having just completed autopsies, were drastically higher than those of midwives. By requiring the students to wash their hands in chlorinated water, the student-delivered mortality rates dropped to approximately one percent. Despite the early recognition of the importance of hand hygiene, the healthcare industry still lacks a consistent method for measuring hand hygiene compliance to prevent harm to patients. In his commentary published in the *Journal of the American Medical Association*, Peter Pronovost, MD, states, "To be accountable for patient harms, healthcare needs valid and transparent measures, knowledge of how often harms are preventable, and interventions and incentives to improve performance."<sup>4</sup>

Acknowledging that hand hygiene compliance involves behavioral change as much as it does monitoring, the Transtheoretical Model by James Prochaska, Ph.D., John Norcross, Ph.D., and Carlo DiClemente, Ph.D can be used to uniquely and effectively apply the science of behavioral change. Gross messaging, in-service lectures, brochures and pamphlets fail to create sustained hand hygiene compliance in hospitals. According to Whitby, et al., "The inability to motivate healthcare worker compliance with handwashing guidelines suggests that handwashing behavior is complex." Without a behavioral modification program that accompanies hand hygiene compliance, Whitby believes that providing soap and sanitizer alone will not result in sustained improvements in compliance to the point that HAIs will be reduced.<sup>5</sup>

Princeton Baptist Medical Center, a full service general hospital in Birmingham, and Proventix Systems, Inc. implemented the nGage™ system developed by Proventix on a clinical floor. Utilizing the Transtheoretical Model, healthcare workers are compelled to make behavior changes regarding hand hygiene compliance through individualized feedback based on their personal compliance or through other messages that engage them either personally or professionally. The feedback from individual messages at the display unit provides relevant information to the healthcare worker that encourages behavior change by motivating rather than punishing.

Regina Yarborough, Director of Nursing, commented, “Of course, we look at ways to improve patient care and reduce cost. It is unique to find both in the same package. We are extremely pleased.” Implementation began January 2010 and by August, a baseline increase of 88% occurred for sanitizer and soap dispensings. This site recorded month-to-month decreases in infection, morbidity, length of stay, and cost per patient day. At the end of seven months, nosocomial infection markers™ (NIMs), an electronic proxy that indicates the high likelihood of infections present, had decreased by 22.0% as compared to the previous year, net losses had been reduced by \$133,386 and patient days were decreased by 159.



These numbers indicate opportunities for hospital-wide and national reductions in healthcare costs and patient lives lost if applied across the country. Using national statistics of 1.7 million HAIs<sup>6</sup> with an average per patient cost of \$20,549 per HAI (based on adjusted 2007 dollars), results in a national cost of more than \$35 Billion.<sup>7</sup> Applying a 22.0% reduction nationwide would correlate to a national savings of over \$7.8 Billion.

During the seven months, it was observed that hand hygiene events were increased by both patients and visitors as well. The system, through the use of reporting methods and personal messages to the healthcare workers, will help sustain the culture of change that has been created at Princeton by applying behavior modification principles. We will continue to monitor hand hygiene compliance and will expand messaging to include trivia and games at the dispenser to engage healthcare workers, to continue to increase compliance and to sustain the culture change. We will also expand to offer healthcare workers the opportunity to improve nurse workflow, patient safety goals, patient satisfaction, employee efficiencies, and risk reductions.

**About Dr. H. E. Logue:** Dr. Logue is a medical director at Princeton Baptist Medical Center Geriatric Behavioral Health Unit and can be reached at [heloguemd@amhsinc.net](mailto:heloguemd@amhsinc.net).

**About Princeton Baptist Medical Center:** Princeton Baptist Medical Center is one of the four facilities belonging to Baptist Health System, located in Birmingham, Alabama. As a faith-based, not-for-profit health care system, Baptist Health System is committed to ministering quality health care - physically, mentally and spiritually – while serving as a witness to the love of God as revealed through Jesus Christ. The Baptist Health Centers are located throughout north and central Alabama.

**About Proventix Systems, Inc.:** Proventix, a company in Birmingham, Alabama, has developed the technology to decrease the rates of HAIs through application of a point-of-care compliance monitoring and communication system. nGage is an electronic hand hygiene surveillance and feedback monitoring technology that encourages and motivates healthcare workers to seek out hand hygiene opportunities

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## REFERENCES:

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<sup>2</sup> MedMined, Financial Impact of Nosocomial Infection Markers; 3.1 million Admission study Cardinal Health. July 24, 2008.

<sup>3</sup> Marra AR, Moura DF Jr., Paes AT, Dos Santos OF, Edmond MB. Measuring rates of hand hygiene adherence in the intensive care setting: a comparative study of direct observation, product usage, and electronic counting devices. *Infect Cont Hosp Ep*. 2010;31(8):796-801.

<sup>4</sup> Pronovost, PJ. Learning accountability for patient outcomes. *J Am Med Assoc*. 2010;304(2):204-205.

<sup>5</sup> Whitby M, McLaws ML, Ross MW. Why healthcare workers don't wash their hands: a behavioral explanation. *Infect Cont Hosp Ep*. 2006;27(5):490.

<sup>6</sup> Klevens RM, Edwards JR, Richards CL, Horan T, Gaynes R, Pollock D, Cardo D. Estimating healthcare-associated infections in U.S. hospitals, 2002. *Public Health Rep*. 2007;122:160-166.

<sup>7</sup> Scott RD II. *The direct medical costs of healthcare-associated infections in U.S. hospitals and the benefits of prevention*. Atlanta, GA: Division of Healthcare Quality Promotion National Center for Preparedness, Detection, and Control of Infectious Diseases Coordinating Center for Infectious Diseases Centers for Disease Control and Prevention, 2009.

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