

The Effect of Instant Hand Sanitizer Format on Nosocomial Infection Rate: Do Foam and Gel Instant Hand Sanitizers Have Equivalent Efficacy?

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Abstract

Background/Objectives: The importance of hand hygiene for the prevention of infection transmission in the healthcare setting has been described as early as 1842. More than a century later, hand hygiene has become the most important measure for preventing healthcare associated infections and the spread of antimicrobial resistant pathogens. Due to the need for quick use products and skin friendly formulations, hand hygiene products have evolved to meet the needs of healthcare workers. Recently, non-aerosol foaming alcohol-based instant hand sanitizers (foam ABIHS) have been introduced into the healthcare setting and have been well received. To date, no data exist regarding the effect of the implementation of foam ABIHS on infection rates compared to other instant hand sanitizer formats (i.e. gel). To generate such data, this outcomes study evaluated a surrogate for nosocomial infection rates (nosocomial infection marker rates), retrospectively for gel and prospectively for foam ABIHS implementation.

Methods: A bi-phasic approach was used to evaluate changes in Nosocomial Infection Marker™ (NIM) rates with use of a gel ABIHS versus foam ABIHS. The monthly NIM rates (total NIM/total hospital admissions) of Akron General Medical Center in Akron, Ohio, were pooled from the Cardinal Health MedMined™ Infection Control Surveillance Service for each study phase. Phase I was a 21 month PURELL® Instant Hand Sanitizer gel (62% ethanol active) phase, and phase II was a 12 month PURELL Instant Hand Sanitizer Foam (62% ethanol active) implementation phase. A paired samples t-test ($\alpha = 0.05$) was used to evaluate if the implementation of a foam ABIHS significantly changed hospital NIMs overall. Site specific NIM rates for blood, respiratory and urine were also evaluated.

Results: Laboratory efficacy data indicate foam and gel alcohol based hand sanitizers have equally high antimicrobial efficacy. Hospital NIM rates ranged from 3.58% to 5.92% for the 21-month gel IHS phase and from 4.09% to 5.99% for the foam ABIHS implementation phase. Analysis of overall NIM rates revealed no significant difference between the gel ABIHS phase and the foam ABIHS implementation period ($p > 0.05$). Site specific infection rates for blood, respiratory and urine infections were not significantly different pre-foam and post-foam ($p > 0.05$).

Methods

Nosocomial Infection Marker (NIM) is a validated electronic surrogate measure of the incidence of hospital-acquired infections that is exclusive to the Cardinal Health MedMined Infection Control Surveillance System. NIM incidence was pooled from the MedMined system using a bi-phasic approach; PURELL Instant Hand Sanitizer gel Phase (2005-2006) and PURELL Instant Hand Sanitizer Foam Phase (2007). Data from Infection Control Practitioner Monitoring of hospital units for number of hand hygiene attempts pre- and post- patient or equipment contact were collected. The percent compliance was calculated using the equation outlined in the CDC Guideline for Hand Hygiene in Healthcare Settings¹:

[# Hand Hygiene Episodes / # Hand Hygiene Opportunities]

NIM frequencies between years were analyzed using a paired samples t-test ($\alpha = 0.05$) to determine if foam implementation resulted in a significant change in NIM incidence overall and by infection site. Hand hygiene compliance measurements were analyzed using the same analysis at an alpha of 0.05.

Conclusions

Recently, non-aerosol foaming alcohol-based instant hand sanitizers (foam ABIHS) have been introduced into the healthcare setting and have been well received. Until now, the effect of the implementation of foam ABIHS on infection and compliance rates compared to other instant hand sanitizer formats (i.e. gel) was unknown. We have demonstrated that while ABIHS format is not a determinant of nosocomial infection rate, an improvement in hand hygiene compliance may exist.

Nosocomial Infection Rates:

- Foam and gel instant hand sanitizer formats with similar efficacy profiles perform equivalently under actual use conditions.
- Changing from a well formulated gel ABIHS to a well formulated foam ABIHS will not significantly impact the rate of nosocomial infection.
- The relationship between product volume per use and nosocomial infection rate requires further investigation.

Hand Hygiene Compliance:

- Implementing foaming ABIHS in a healthcare setting does not negatively impact the compliance in the first year after implementation.
- Foaming ABIHS hand hygiene compliance appears to have less variability than gel.
- The data suggest that implementing a foaming ABIHS may increase compliance over time, although additional data and statistical analyses are required to draw a definitive conclusion.

Reference:

1. Boyce JM, Pittet D. Guideline for hand hygiene in healthcare settings. MMWR 2002;51(RR1):1-44.

Results

Figure 1: Nosocomial Infection Marker Rates Are Equivalent For Gel and Foam Alcohol-Based Instant Hand Sanitizer Use

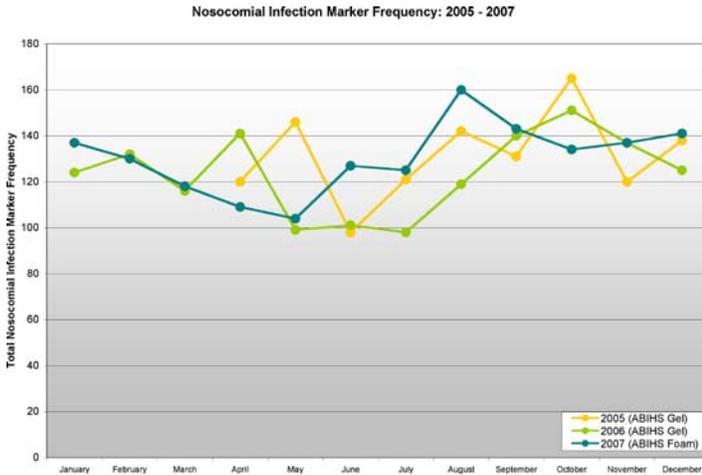


Figure 1: Hospital NIM rates ranged from 3.58% to 5.92% for the 21-month gel IHS phase (April 2005 - December 2006) and from 4.09% to 5.99% for the 1 year foam ABIHS implementation phase (January 2007-December 2007). Analysis of overall NIM rates revealed no significant difference between the gel ABIHS phase and the foam ABIHS phase ($p>0.889$). Therefore, PURELL® Instant Hand Sanitizer gel and PURELL Instant Hand Sanitizer Foam provide the same level of nosocomial infection control and prevention.

Figure 2: Significant Differences in Nosocomial Infection Overall and by Infection Site Do Not Exist

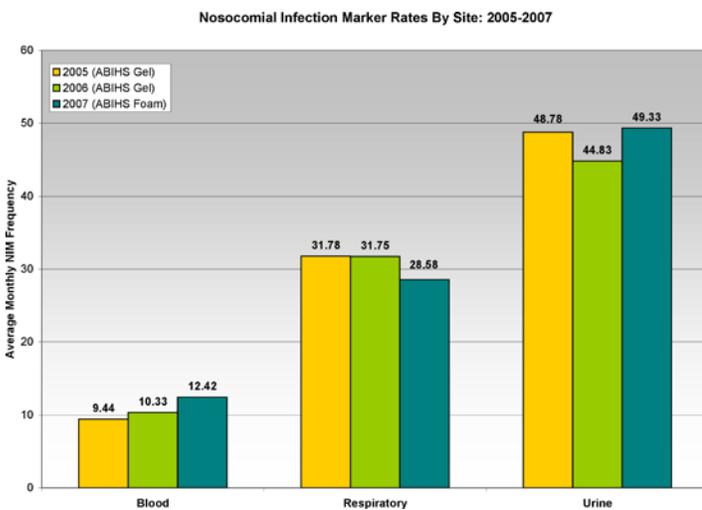


Figure 2: Site specific infection rates for blood, respiratory and urine infections were not significantly different pre-foam (2005-2006) and post-foam (2007) implementation ($p>0.05$). The increase in urine infection rates from 2006 to 2007 is hypothesized to be due to improper collection procedures rather than actual nosocomial infections. As such, changing from gel to foam ABIHS did not significantly change site specific infection rates.

Figure 3: Compliance Rates of a Foaming ABIHS and a Gel ABIHS are Statistically Equivalent, But May Increase Over Time for Foam

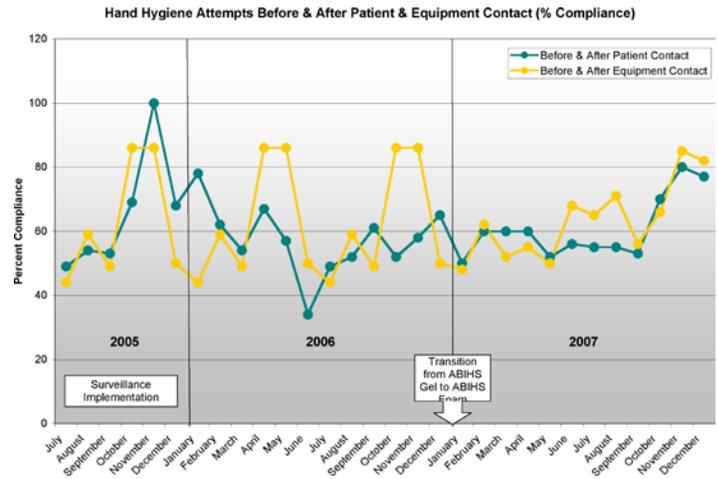


Figure 3: Compliance rates before and after equipment and patient contact were not significantly different between the foam and gel phases (patient contact $p>0.740$, equipment contact $p>0.869$). However, compliance rates for foam had less variability than gel and appeared to improve during the last three months of 2007. The improvement in variability and compliance may be related to institutional hand hygiene programs and improvement in ICP inter-rater reliability, although additional analyses are required to draw strong conclusions.

- Front cover footnotes:**
- 1. Akron General Medical Center, Akron, OH**
 - 2. GOJO Industries, Inc., Akron, OH**
- Financial Disclosures: Bondi and Arbogast are employees of GOJO Industries, Inc.

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