

Effectiveness of Alcohol-Based Hand Hygiene Products Against the Current Pandemic Strain of H1N1

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Abstract

Background: In 2009 a novel strain of H1N1 emerged as the etiologic agent of the recent pandemic Influenza outbreak. One of the key recommendations for preventing the transmission of illness from H1N1 or other infectious pathogens is proper hand hygiene. The use of alcohol-based hand sanitizers has been recommended by the CDC to help prevent transmission of H1N1.

Objectives: The objective of this study was to determine whether CDC recommendations for use of an alcohol-based hand sanitizer to prevent transmission of H1N1 are supported. A secondary objective was to determine whether product format has an impact on the efficacy of alcohol-based hand sanitizers against H1N1.

Methods: Five alcohol-based hand sanitizers were tested: a 62% ethanol gel, 62% ethanol foam, 2 different 70% ethanol gel formulations, and a 62% ethanol wipe formulation. Samples were evaluated using the standard virucidal suspension test method (ASTM E 1052). Each sample was exposed to pandemic strain A/California/04/2009 of Swine-like Influenza A H1N1 (CDC ID # 2009712047) for 15 seconds prior to neutralization and plating. Log reductions were calculated for each product by comparison to the initial virus titer.

Results: All alcohol-based products tested achieved complete reduction ($>4.25 \log_{10}$ reduction) of the virus within the 15-second contact time.

Conclusions:

- The CDC recommendations for use of alcohol-based hand sanitizers for preventing transmission of the current pandemic strain of H1N1 are supported. Alcohol-based hand sanitizers are considered a reliable intervention for the reduction of H1N1 virus on hands.
- Since all products tested achieved complete reduction of the virus, product format (gel, foam, wipe) did not impact efficacy of alcohol-based hand sanitizers.

Introduction

The 2009 H1N1 Influenza virus was initially detected in humans in North America around April 2009¹. This strain is a unique combination of swine-related strains^{2,3} and was initially described as “swine flu”. The 2009 H1N1 Flu quickly spread around the globe and pandemic status was declared by the World Health Organization (WHO) in June 2009⁴. Influenza viruses are most frequently transmitted through person-to-person contact and may also be transmitted through contact with contaminated fomites. Influenza viruses are enveloped viruses and have previously been shown to be susceptible to alcohol-based hand sanitizers⁵⁻⁶.

The CDC guidelines for hand hygiene include recommendations for the use of alcohol-based hand sanitizers for reducing transmission of disease-causing pathogens in health-care settings⁷. Specifically, the CDC recommends washing hands with soap and water or using an alcohol-based hand rub to prevent transmission of 2009 H1N1 Flu⁸.

The aim of this study was to demonstrate the efficacy of alcohol-based hand hygiene products versus pandemic 2009 H1N1 Flu.

Additional Information

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References:

1. Ginberg et al. 2009. Swine Influenza A (H1N1) Infection in Two Children — Southern California, March–April 2009. *MMWR*. 58, 400.
2. Garten et al. 2009. Antigenic and genetic characteristics of swine-origin 2009 A(H1N1) Influenza Viruses Circulating in Humans. *Science*. 325, 197-201.
3. Smith et al. 2009. Origins and evolutionary genomics of the 2009 swine-origin H1N1 influenza A epidemic. *Nature*. 459, 1122-1126.
4. World Health Organization Website, <http://www.who.int/csr/disease/swineflu/en/index.html>
5. Fendler and Goziak. 2002. Efficacy of alcohol-based hand sanitizers against fungi and viruses. *ICHE*. 23, 61-62.
6. Bondi et al. 2007. Virucidal Performance of Various Professional Hand Hygiene Products Against Avian Influenza A H5N1. *APIC Annual Meeting 2007*.
7. Boyce, J. M., and D. Pittet for the Society for Healthcare Epidemiology of America/Association for Professionals in Infection Control/ Infectious Diseases Society of America. 2002. Guideline for hand hygiene in health-care settings: recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. *MMWR*, 51:1–45.
8. CDC Website, www.cdc.gov/hiniflu/germs/htm

Materials and Methods:

Test Products:

Five commercially available alcohol-based products were evaluated in this study. These included a 62% ethanol gel Instant Hand Sanitizer (IHS), a 62% ethanol foam IHS, a 70% ethanol gel IHS, an advanced formula 70% ethanol gel IHS, and a 62% ethanol sanitizing wipe. All products tested were manufactured by GOJO Industries, Inc., Akron, Ohio.

Test Method:

Products were tested according to ASTM 1052-06, “Standard Test Method for Efficacy of Antimicrobial Agents Against Viruses in Suspension”. The challenge virus was Swine-like H1N1 Influenza virus strain A/California/04/2009 (CDC ID#2009712047). Test products were mixed with virus suspension to give a 90% concentration of test product. After a 15-second exposure, the virus was neutralized by dilution in 1x Minimum Essential Medium. Selected dilutions of the medium/test product mixture were added to cultured host cells (Madin Darby Canis Kidney (MDCK [ATCC#CCL-34]) and incubated at 37°C with 5% CO₂ for a period of 5-14 days. Residual infectious virus was detected by viral-induced cytopathic effect, and a 50% tissue culture infectious dose (TCID₅₀) was calculated using the Spearman-Kärber calculation. Log₁₀ of infectivity was calculated, and Log₁₀ reductions were calculated by comparison to the virus control. Evaluations included a virus control, cytotoxicity control, neutralization control, and negative control.

Results:

Test Product	Log ₁₀ Reduction	Percent Reduction
62% Ethanol Gel IHS	> 4.25	>99.99%
62% Ethanol Foam IHS	> 4.25	>99.99%
70% Ethanol Gel IHS	> 4.25	>99.99%
70% Ethanol Advanced Formula Gel IHS	> 4.25	>99.99%
62% Ethanol Sanitizing Wipe	> 4.25	>99.99%

All alcohol-based products achieved complete reduction of 2009 H1N1 Flu in 15 seconds

Conclusions:

- Alcohol-based hand hygiene products ($\geq 62\%$ ethanol) all achieved a high reduction of 2009 H1N1 Flu virus *in vitro*. This data is consistent with previous data which show that $>60\%$ ethanol products are effective against various strains of Influenza^{5,6}.
- Product format (gel, foam, wipe) did not impact efficacy of alcohol-based hand sanitizers; therefore, it appears that active ingredient is the primary determinant of efficacy against 2009 H1N1 Flu, and formulation effects are minimal.
- The CDC recommendations⁸ for use of alcohol-based hand hygiene agents for preventing transmission of 2009 H1N1 Flu are supported.
- Alcohol-based hand hygiene products should be considered as an effective hand hygiene intervention whenever there are concerns about H1N1 Flu or other types of Influenza outbreaks.