Comparative Efficacy of Alcohol-based Hand Sanitizers and Antibacterial Foam Handwash against Noroviruses Using The Fingerpad Method

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Abstract

Background: Norovirus can commonly associate with outbreaks of acute gastrointestinal illness in food service establishments, and hands are a principal vehicle of this transmission. Given the spread of Norovirus out of human food handlers, the effectiveness of hand hygiene products, but little is known about their effectiveness against noroviruses on contaminated hands.

Methods: We examined the efficacy of two commercial alcohol-based hand sanitizers (one based on 62% ethyl alcohol, and one based on 70% isopropyl alcohol), a new formulation (based on 70% ethanol and a synergistic blend of polyquaternium-37 and citric acid), one commercially available antibacterial hand sanitizer, and a new synergistically formulated hand sanitizer to give significant NV removal on contaminated fingers. This new synergistically formulated hand sanitizer to give significant NV removal on contaminated fingers. This new formulation was designed to provide a 95% reduction of norovirus RNA in 15 seconds against NV, SMV, and norovirus RNA using a heat release RNA extraction method. The study also compared these hand sanitizers to a standard water rinse and a hand sanitizer approved for food-contact surfaces. We also compared these hand sanitizers' efficacy to a hand sanitizer approved for food-contact surfaces. We performed a paired t-test to examine the difference in NV reduction for each handwash agent compared to the dried virus control. The effectiveness of all these products was statistically better than the dried virus control.

Results: Table 1 demonstrates the efficacy of these hand sanitizers, hand sanitizers, antibacterial hand sanitizer, and a new synergistically formulated hand sanitizer to give significant NV removal on contaminated fingers. This new formulation was designed to provide a 95% reduction of norovirus RNA in 15 seconds against NV and SMV, and norovirus RNA using a heat release RNA extraction method. The study also compared these hand sanitizers to a standard water rinse and a hand sanitizer approved for food-contact surfaces. We performed a paired t-test to examine the difference in NV reduction, reduction for each handwash agent was calculated by subtracting the log10-transformed virus for each agent from the log10-transformed baseline control. We also performed a paired t-test to examine the difference in NV reduction between the dry control and each individual handwash product. We also performed a paired t-test to examine the difference in NV reduction between the dry control and each individual handwash product. The effectiveness of all products was statistically better than the dried virus control.

Summary and conclusions:

- PCLURELL VF447, MCRELL Antibacterial Foam Handwash, and a hard water rinse alone against NV compared to a dried virus control on two hands of 6 subjects. The graph depicts the mean log10 NV reduction compared to the baseline virus levels.

References:


Table 1. Tested Products Used in This Study

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Active Ingredient</th>
<th>Concentration</th>
</tr>
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<tbody>
<tr>
<td>PURELL FC Compliant</td>
<td>Ethanol 60%</td>
<td></td>
</tr>
<tr>
<td>Product 1 Isopropanol 70%</td>
<td>Ethanol 60%</td>
<td></td>
</tr>
<tr>
<td>Product 2 Isopropanol 70%</td>
<td>Ethanol 60%</td>
<td></td>
</tr>
<tr>
<td>MCRELL Antimicrobial Foam Handwash</td>
<td>70% Ethanol and a synergistic blend of polyquaternium-37 and citric acid</td>
<td></td>
</tr>
<tr>
<td>PURELL VF447</td>
<td>Ethanol 70%</td>
<td></td>
</tr>
<tr>
<td>PURELL Food Code Compliant</td>
<td>Ethanol 70%</td>
<td></td>
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</tbody>
</table>

Figure 1. Diagram of American Standard Test Method for in vivo evaluation of the activity of handwash agents using the fingerpad method (ASTM: E-1382-02).

Figure 2 depicts the efficacy of PURELL VF447, MCRELL Antibacterial Foam Handwash, and a hard water rinse alone against NV compared to a dried virus control on two hands of 6 subjects. The graph depicts the mean log10 NV reduction compared to the baseline virus levels.

Figure 3 demonstrates the efficacy of PURELL VF447, PURELL Food Code Compliant, Product 1 and Product 2 against NV compared to a dried virus control for 24 subjects. The graph depicts the mean log10 NV reduction by each product compared to the baseline virus levels.

Figure 4 illustrates the efficacy of PURELL VF447, MCRELL Antibacterial Foam Handwash and a regimen of MCRELL followed by VF447 against NV for 24 subjects. The graph shows the mean log10 NV reduction compared to the baseline virus levels. **Note: a total drug step using a KimWipe was used after MCRELL washes.**

Figure 5. The mean log10 NV and SMV reduction of PURELL VF447, Product 1 and MCRELL Antibacterial Foam Handwash compared to the baseline virus levels for 11 subjects using the ASTM fingerpad method.