The Virucidal Efficacy of A Spray & Wipe Microbicide on Hard Non-porous Surfaces

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Abstract

Microbial contamination of inanimate surfaces is a serious public health risk. Contamination and cross-contamination result from the everyday procedures. The objective of this study was to evaluate the virucidal efficacy of the spray and wipe Sani-Shield for the control of viruses on surfaces. Poliovirus type 1 (PV1), Hepatitis A virus (HAV) and Murine Norovirus (MNV) were propagated using BGM, FRhK-4 and RAW cell lines, respectively.

Materials and Methods

Preparation of Test Material

For all three test viruses tested at appropriate concentration; an aliquot of 0.2 mL of stock virus was spread, with the cell scraper, over glass surface and allowed to dry at room temperature. After the carrier preparation, 2 mL of test product (Sani-Shield RTU 25) was sprayed on the inoculated test surface. The test surface was then wiped with Kimwipes for at least 30 seconds until the surface was completely dry.

Recovery of Test Viruses

The viruses remaining on the glass surface and in wipes were recovered by vortexing the surface and the wipe in Tris Buffer. Serial ten-fold dilutions of viruses recovered from surface and the wipe were assayed in cell culture system.

Calculations

Cultural assays used to calculate the number of infectious viruses in each sample. The TCID₉₀ was calculated using Karber equation.

Controls

Experimental design included inoculated non-treated surfaces. The controls were

Results and Discussion

Table 1: Summary of virus inactivation by Sani-Shield RTU 25 using a spray & wipe dry procedure

<table>
<thead>
<tr>
<th>Test Organism</th>
<th>Percent inactivation (log₁₀ reduction)</th>
<th>Repeat #1 Wipe</th>
<th>Repeat #1 Surface</th>
<th>Repeat #2 Wipe</th>
<th>Repeat #2 Surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis A Virus</td>
<td>99.992 (4.18)</td>
<td>99.996 (4.64)</td>
<td>99.992 (4.18)</td>
<td>99.998 (4.80)</td>
<td></td>
</tr>
<tr>
<td>Poliovirus type 1</td>
<td>99.976 (3.61)</td>
<td>99.998 (4.61)</td>
<td>99.966 (3.47)</td>
<td>99.988 (3.92)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Procedural recovery efficiency of virus after spray & wipe dry procedure of Sani-Shield RTU 25

<table>
<thead>
<tr>
<th>Influent (PFU)</th>
<th>Wipe (PFU)</th>
<th>Recovered (%)</th>
<th>Not Recovered (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wipe</td>
<td>900,000</td>
<td>490,000</td>
<td>54.4</td>
</tr>
<tr>
<td>Surface</td>
<td>900,000</td>
<td>31,000</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Results of virucidal efficacy of Sani-Shield and procedural recovery efficiency are presented in Tables 1 & 2. The viral recovery and analysis methods used in this study resulted in greater than 54% recovery efficiency. Application of RTU 25 of test formulation consistently resulted in greater than 3 log₁₀ of the all three test viruses. Spray and wipe operation of Sani-shield on surfaces resulted in more than 4 log inactivation of murine norovirus and hepatitis A. According to the US EPA, the test formulation passes the virucidal effectiveness test if it results in four log reduction in the titer of the challenge viruses. The results indicates that product meets the USEPA criteria for registration as virucidal agent.

Conclusions

- Sani-Shield RTU 25 passed the EPA's test for virucidal effectiveness when surfaces inoculated with hepatitis A virus, murine norovirus and poliovirus type 1 containing 5% organic loads were sprayed with Sani-Shield and were wiped for at least 30 seconds until the surface was completely dry.
- The wipes employed to dry the surface were also more than 99.9% free of infectious virus; proving that the surface inoculums were inactivated and not merely transferred from the surface to the wipes.

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STUDY OBJECTIVE: To study the virucidal efficacy of Sani-Shield spray and wipe microbicidal formulation on hard surfaces.