Are those Disinfecting Wipes safe for you?
Managing Occupational Exposures of Healthcare Workers Using Chlorine Dioxide Wipes

BACKGROUND
Non-lumened flexible nasendoscopes used in Otolaryngology clinics are expensive, heat-sensitive, delicate instruments that cannot be sterilized in an autoclave but must be disinfected by means of high level disinfection (HLD). In Singapore General Hospital, the method of disinfection was recently changed to the use of commercial chemical-impregnated wipes which generates less than 1% chlorine dioxide upon activation.

AIM
The aim of this project is to evaluate the use of these wipes on potential exposure of healthcare workers (HCWs) to airborne chlorine dioxide during disinfection.

METHODOLOGY
1. Hazard Identification

1a. Review of safety data sheet

**CHLORINE DIOXIDE**

<table>
<thead>
<tr>
<th>EINECS</th>
<th>CAS</th>
<th>CLP Classification</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>233-162-8</td>
<td>10049-04-4</td>
<td>Acute Tox. 3: H301; Skin Corr. 1B: H314; Aquatic Acute 1: H400</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

1b. Observation of work activity

- Ocular exposure = Insignificant
- Oral exposure = Insignificant
- Dermal exposure = Insignificant
- Inhalation exposure = To be determined by inhalation exposure assessment

2. Inhalation Exposure Assessment

2a. Development of sampling strategy for air monitoring

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Task</th>
<th>Exposure Concentration (ppm)</th>
<th>Type of sample</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultation’s table</td>
<td>Monitoring air in ventilation zones</td>
<td>0.001 ppm</td>
<td>Type I Nursing Staff</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Nurse’s room</td>
<td>Monitoring air in ventilation zones</td>
<td>0.001 ppm</td>
<td>Type II Nursing Staff</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Housekeeper’s room</td>
<td>Monitoring air in ventilation zones</td>
<td>0.001 ppm</td>
<td>Housekeeper</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Doctor’s consultation table</td>
<td>Monitoring air in ventilation zones</td>
<td>0.001 ppm</td>
<td>Doctor</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

2b. Air monitoring (Method: OSHA ID-202)

RESULT
The chlorine dioxide concentrations and upper confidence limit at 95% confidence level (UCL95%) for long-term (10 hours) and short-term (15 mins) personal samples and long-term (10 hours) area samples collected were all below the permissible exposure limits (PELs) as stipulated in the Workplace Safety and Health (General Provisions) Regulation, First Schedule: Permissible Exposure Levels of Toxic Substances for Chlorine dioxide.

![Figure 1: Chlorine Dioxide Level for Long-term Area Sample](image1)

![Figure 2: Chlorine Dioxide Level for Long-term Personal Sample](image2)

![Figure 3: Chlorine Dioxide Level for Short-term Personal Sample](image3)

CONCLUSION
The study presented evidence that the exposure of HCWs to chlorine dioxide during high-level disinfection of flexible nasendoscopes were deemed insignificant. Despite the insignificant exposure of HCW to chlorine dioxide during nasendoscope disinfection, risk control measures should be maintained for this activity and those would be:
- To maintain a minimum of 10 air change per hour (ACH) at those rooms where HLD is performed;
- Staff to perform the HLD with the chemical-impregnated wipes away from breathing zone;
- To conduct refresher training to reinforce the HCWs with the proper skills to perform the HLD safely.

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