BACKGROUND
Air quality is crucial for the success of IVF.

70% ethanol is the most commonly used IVF laboratory disinfectant. This is a concern, as alcohol based disinfectants release VOCs which are directly toxic to embryos.

Hydrogen peroxide is a potential alternative cleaning product, which decomposes to water and oxygen.

Oosafe® is a commercially available product that contains quaternary ammonium compounds and no VOCs.

Aims
1) To evaluate efficacy of 6% hydrogen peroxide, 70% ethanol and Oosafe® using differential bacterial counts
2) To evaluate safety of the three products on mouse embryonic development

Method
Differential bacterial counts
Samples were obtained using Difco™ Hycheck™ non-selective agar slides. Replicates were taken from various locations in a student embryology laboratory.

Mouse embryo testing
Ethical approval was obtained from Monash Medical Centre Animal Ethics Committee. At the two-cell stage, embryos were exposed to:
1) Direct disinfectant contact
2) Disinfectant residue
3) Media equilibrated in MINC™ incubators recently cleaned by wiping with disinfectant or water (control). Blastocyst formation at 72 h was the experiment end point.

Sperm toxicity testing
Semen samples with 90% motility were analysed after a 2h incubation in disinfectant cleaned chambers.

Results
Differential bacterial counts

<table>
<thead>
<tr>
<th>Treatment group</th>
<th>Average colony growth per Difco™ side (24 h)</th>
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</thead>
<tbody>
<tr>
<td>Control</td>
<td>13.0 ± 1.0a</td>
</tr>
<tr>
<td>Dry wipe</td>
<td>0.3 ± 0.3b</td>
</tr>
<tr>
<td>6% hydrogen peroxide</td>
<td>0.0b</td>
</tr>
<tr>
<td>Oosafe®</td>
<td>0.0b</td>
</tr>
<tr>
<td>70% ethanol</td>
<td>0.3 ± 0.3b</td>
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</tbody>
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*Different superscripts within the same column indicate significance difference (P<0.05).

Significance
Embryos are extremely sensitive to disinfectant residue and fumes. There is no completely safe option and all IVF laboratories are encouraged to re-evaluate their cleaning protocols.

This study indicates that Oosafe® poses the least risk to embryo development and sperm viability. Ethanol and hydrogen peroxide both had a detrimental effect on embryos and sperm, but could still be used for general laboratory cleaning. A combination of disinfectants might be ideal for effective cleaning protocols.

Great care must be taken so that embryo growth and subsequent pregnancy rates are not affected by essential cleaning protocols.

Figure 1 72 h incubation in disinfected MINC™. Control (A), 6% hydrogen peroxide (B), Oosafe® (C) and 70% ethanol (D) treatment. Scale bar: 50 μm.