

## Technical note on spraying for disinfection

At the request of IFRC WASH Team Geneva, Dr. Daniele Lantagne of Tufts University, widely acknowledged in the WASH sector as an expert on chlorine disinfection, provided the following summary of available evidence on the efficacy of surface spraying.

If you have additional questions, please contact William Carter, Senior Officer WASH in Emergencies at [william.carter@ifrc.org](mailto:william.carter@ifrc.org)

---

I am writing to respond to your questions on household spraying of streets with chlorine to prevent COVID-19 transmission.

### Household Spraying

- Household spraying is commonly used cholera and Ebola outbreaks, done as early as the 1960's in China.
- There was previously quite limited information on it - we completed systematic reviews and found no efficacy (lab) or effectiveness (field) data on household spraying for surfaces.
- We received a grant from R2HC to fill this evidence gap in late 2017, we completed systematic reviews, lab testing, and field testing, all described below.

### Systematic Reviews:

In a systematic review of the evidence on disinfection on surfaces, we found one manuscript with data on chlorine spraying: "The resistance of *Vibrio cholerae* to chlorine was evaluated in a study focused on improving US preparedness to bioterrorism threats (46). Chlorine (pH-amended bleach, 6,200 ppm, pH 6.8) was dosed by a hand-held sprayer until coupons of glass, aluminum, wood, carpet, and concrete **were visibly wetted**. Reported reductions were >6 log on glass and aluminum after 15 minutes exposure time (CT = 93,000 mgÅ~min/L) and approximately 5 log on carpet after two disinfectant 19 applications and 30 minutes exposure time (CT = 186,000 mgÅ~min/L)."\*

### Laboratory Efficacy Testing:

- We tested 10 surfaces (from stainless steel to tarp to packed dirt) with different chlorine disinfectant (HTH, NaOCl, NaDCC) applications (spraying, wiping) and contact times (1, 10 minutes) against the bacteria *V. cholerae*. We found spraying with 0.2%/2.0% chlorine is efficacious at removing the cholera from all surfaces IF you spray until it is fully wet (e.g. the surface is fully covered with chlorine - there is Ebola spraying research that also shows it only works if fully covered, not just "droplets" on the surface\*); and, spraying is more efficacious than wiping.

In summary, yes, **if you spray until wetted**, the intervention can be efficacious (it can work) against a bacteria. This makes sense because you are spraying a relatively high amount of chlorine, which

overcomes organic demand of surfaces. Based on some other work we did on E. coli and Phi6 (an Ebola surrogate that is also a COVID-19 potential surrogate) on surfaces, I would expect these results could be applicable to COVID-19 as well. However, just because something can work in the lab doesn't mean it will work in practice.

### **Field Effectiveness Testing:**

We traveled to evaluate three programs (in Haiti and DRC) to evaluate spraying effectiveness. The results showed:

- When sprayers arrived at the house, 2 of the 3 programs did NOT spray households systematically until surfaces were wetted.
- One program (the one that sprayed systematically until wet) had decreased V. cholerae contamination at 30 minutes and 24 hours, the others did not. We did not test beyond 24 hours. There could be recontamination (although that could be addressed with household hygiene (see below)).
- There was a real benefit to using the arrival to the household with the sprayers as an entry point to doing household hygiene promotion activities - this was a real add-on value.

Our interpretation of all this data was: "If spraying is implemented, spraying agents should: disinfect surfaces systematically until wet using 0.2/2.0% chlorine solution, including kitchen spaces, patients' beds, and latrines; arrive at households quickly; and, concurrently deploy hygiene promotion activities."

### **Environmental Spraying:**

I would expect environmental spraying to have quite limited efficacy or effectiveness, because: a) the information above - that surfaces need to be "wetted"; and, b) the fact many streets are quite filled with a lot of stuff; It would be a "very visual" activity - but I worry about people thinking there would be more protection than there actually is, and I worry about how streets are often filled with food stalls, things, people, etc and I worry about the chlorine exposure. When people have asked, I have recommended not doing this practice in bustling cities.