Decommissioning considerations: IPC and WASH

WHO Technical briefing, February 2015

Input from individuals at UNICEF, CDC, WHO

Guidelines for Drinking-water Quality Experts
Overview

• Evidence: Ebola survival in the environment
  – Surfaces
  – Faeces and urine

• Principles of cleaning and disinfection

• Procedures for terminal cleaning

• Considerations for sanitation infrastructure
Background (1)

• While the Ebola virus may remain on environmental surfaces, being an enveloped virus, it is relatively fragile and decreases over time

• Ebola virus was not detected by either nucleic acid amplification or culture in any sample collected from sites that were not visibly bloody in African hospitals under real world conditions.*

• The virus was detected in a blood-stained glove and bloody intravenous insertion site by nucleic acid amplification, which may detect the non-viable virus, but not by culture for living, infectious virus.**

*CDC, Interim Guidance for Environmental Infection Control in Hospitals for Ebola Virus August 1, 2014
Background (2)

- No virus recovered from Glass or plastic surface at first test (2 days) when incubated at room temperature (Piercy et al 2010)
- No virus recovered from metal (316 stainless steel) surface at first test (2 days) when incubated at either 4°C or room temperature (Piercy et al 2010)
- In dark on glass, plastic and aluminium at 20-25°C, log decline in 35h (Sagripanti et al 2010)
- Ebola virus was found, relative to other enveloped viruses, to be quite sensitive to inactivation by ultraviolet light and drying (Sagripanti et al 2011)

Background (3)

- On environmental surfaces, extensive spontaneous declines of infectivity are expected in hours, days or weeks, depending on the matrix, surface and environmental conditions.
- Filoviruses are highly susceptible to several disinfectants: 3% acetic acid, 2% peracetic acid, 1% glutaraldehyde, ethanol-based products, 1:10-1:100 dilutions of domestic bleach & organic solvent.
Background (4)

- Ebola is not a fecal-oral pathogen; no documented or reported transmission via water or feces
- Ebola will decline more quickly in excreta than many enteric viruses (e.g. polio, hepatitis)
- There are no studies on Ebola survival in sewage; must infer from what is known about other viruses
- Field and laboratory survival studies in excreta are being conducted (results in Q3 and Q4 2015)
Background (5)-Most urine and faeces from infected individuals does not contain Ebola

<table>
<thead>
<tr>
<th>Type of body fluid</th>
<th>Early Samples (&lt;=14 days after onset of illness)</th>
<th>Late Samples (&gt;14 days after onset of illness)</th>
<th>All samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectal/stool</td>
<td>8%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Urine</td>
<td>9%</td>
<td>0%</td>
<td>3%</td>
</tr>
</tbody>
</table>

For comparison, 100% of breast milk samples and 41% of semen samples contained Ebola Virus. None of the vomit and sweat samples contained the Ebola Virus.
Background (5)-Conditions to accelerate decline of Ebola in faeces

• **Time!!** (see details in next slide)
• **Heat** (20-25°C for days/weeks; > 50°C for minutes)
• **Low pH (<3.0) and High (>11.5) pH**
• **Disinfectants**
  – Quaternary compounds approved for enveloped viruses
  – Peracetic acid
  – Accelerated peroxide
  – Ammonia
### Background (7)-Virus survival in Sewage

<table>
<thead>
<tr>
<th>Virus</th>
<th>Enveloped</th>
<th>% removal in 7 days</th>
<th>% removal in 21 days</th>
<th>% removal in 1 month</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronavirus TGEV</td>
<td>Yes</td>
<td>99</td>
<td>~99.995</td>
<td>~99.9995</td>
<td>Casanova et al., 2009</td>
</tr>
<tr>
<td>Coronavirus MHV</td>
<td>Yes</td>
<td>~95%</td>
<td>~99.9999</td>
<td>&gt;99.999999</td>
<td>Casanova et al., 2009</td>
</tr>
<tr>
<td>Feline coronavirus FIPV</td>
<td>Yes</td>
<td>~99.9%</td>
<td>No Data (detection limit reached)</td>
<td>No Data (detection limit reached)</td>
<td>Gundy et al., 2008</td>
</tr>
<tr>
<td>Polio 1</td>
<td>No</td>
<td>~95</td>
<td>No data (only 7-day exp’t.)*</td>
<td>No data (only 7-day exp.)*</td>
<td>Sobsey and Cooper 1972</td>
</tr>
<tr>
<td>Polio 1</td>
<td>No</td>
<td>90</td>
<td>99</td>
<td>~99-99.9%</td>
<td>Gray et al, 1993</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>No</td>
<td>70</td>
<td>90</td>
<td>99%</td>
<td>Gray et al, 1993</td>
</tr>
</tbody>
</table>

All inactivation rates for 20-25 C.

Survival of enveloped virus is approximately 50% less in excreta compared to laboratory media or tap water. A one log (99%) reduction of Ebola is expected in excreta at room temperature in 3 days (or less).
Principles in terminal cleaning and decontamination of Ebola facilities (1)

- A trained **IPC officer** should be identified for the inspection of the facility **before** and **after** terminal cleaning and decontamination and for supervision of the process.
- Ideally, the facility should be also inspected during the procedures.
- A **checklist** including the necessary steps for the waste management, cleaning and decontamination processes should be developed and used.
- The employed cleaners should be given a thorough briefing before starting.
- Staff health and safety should be monitored and injuries/illness should be reported.
- Appropriate hand hygiene facilities and areas for PPE donning and doffing and for decontamination should be set up.
Principles in terminal cleaning and decontamination of Ebola facilities (2)

- The facility should NOT be re-opened until the safe completion of the process is documented by an IPC officer using the checklist.

- District authorities and social mobilisation officers should develop appropriate communications to assure health workers and the population about the safe conditions of the facilities.

- Consider visual improvements (repainting walls, landscaping, etc) to signal new purpose/use of facility.
Procedures for cleaning and decontamination of Ebola facilities (1)

- Visually inspect surfaces for sign of wear and tear, decay or overall disrepair (e.g. mattresses, furniture, equipment)
- Keep careful record all items that have been safely decontaminated and keep such documentation with items
- Safely dispose and incinerate all non intact objects/equipment
- Safely dispose and incinerate all objects/equipment made of porous/ absorbable material
- If tent surfaces show visible signs of wear or are soiled, they should be demolished, safely disposed and incinerated
- If burning pit is used, it should be closed with cement when all procedures are concluded
- Surfaces that are intact and can withstand rigorous cleaning may undergo cleaning and disinfection
Procedure for terminal cleaning and decontamination of Ebola facilities (2)

- **Cleaners** should wear adequate PPE (either a face shield or goggles, mask, heavy duty gloves and inner nitrile gloves, waterproof apron, coverall or gown acc. to WHO specifications, rubber boots)
- If locally prepared, cleaning and disinfectant solutions should be freshly prepared every day
- Cleaning/disinfectant solutions and equipment should be changed and refreshed frequently while being used during the day, as they will quickly become contaminated
- Cleaning should always be carried out from “clean” areas to “dirty” areas, in order to avoid contaminant transfer
- Dry sweeping with a broom should never be done. Rags holding dust should not be shaken out, and surfaces should not be cleaned with dry rags. Use moistened cloths to prevent spread of virus particles in the air and to other surfaces.
- Place all dirty cloths/towels and solid waste in leak-proof plastic bags, collected in covered bins and incinerate
- Sharp objects and equipment that has been in contact with blood or body fluids should be placed inside puncture resistant waste containers
Procedures for terminal cleaning and decontamination of Ebola facilities (3)

- Application of disinfectants should be preceded by cleaning to prevent inactivation of disinfectants by organic matter.
- All environmental surfaces (incl furniture, walls, doors, etc.) or objects should be cleaned with water and a detergent and then disinfected using a 0.5% chlorine solution (i.e. a solution containing 5 000 ppm available free chlorine) or another suitable disinfectant. Moistened cloths and wipes should be used.
- Allow surfaces to dry naturally.
- The procedure should be very meticulous and thorough and special attention should be paid to **high touch surfaces**.
- If available, solid waste and objects could be disinfected by autoclaving. Shredding or compaction post treatment is likely necessary.
Cleaning and decontamination process of spills of organic material

- **WARNING:** chlorine is inactivated when it gets in contact with organic material; therefore, directly pouring chlorine over spills or liquid waste containing blood or body fluids will NOT lead to appropriate decontamination of this waste and of the soiled surfaces.

- Spills or waste including blood, other body fluids, secretions or excretions should be removed, and the site of spill cleaned and decontaminated
  1. Remove the soiled with towels
  2. Clean with soap/detergent
  3. Disinfect with chlorine solution 0.5%


Procedures for terminal cleaning and decontamination of Ebola facilities (4)

- Spraying rooms with disinfectants is not recommended. It is a potentially dangerous practice for HCWs that has no proven disease control benefit while the disinfectant may not reach all desired surfaces.
- Spraying may be accepted outdoors and in some community settings (e.g. decontamination of EVD victims’ households by a burial team) when it is the only feasible option.
- It may be considered also when necessary to disinfect sand or gravel floors.
- When spraying is used, it should be preceded by cleaning with water and detergent to mechanically remove the contaminants and organic matter. After spraying of disinfectant, it may be needed also to ensure that it is properly distributed on the surfaces.
Considerations for sanitation facilities - Latrines

- If superstructure of latrine/toilet is temporary sheeting of little value, safely dispose and incinerate.
- If superstructure of latrine/toilet is material that can be reused and of value, clean and disinfect in same manner as treatment facility.
- Latrine pit may be either (1) filled and decontaminated superstructure moved to a new pit OR (2) waiting period of one week where entrance to latrine is locked and then opened for use by general population.
- Decision will depend on: type of facility, community concerns, available funds, etc.
Considerations for sanitation facilities—Septic Tanks and Holding Tanks

• Septic tanks followed by leachfield should be operated and maintained according to demand, hydrogeological conditions, etc.

• Faecal waste in holding tanks or septic tanks should be left at least one week after last user and emptied according to local protocols with workers wearing full PPE.

• Septic tanks which will not be reused can be destroyed after emptying. One week should be allowed the site is redeveloped.

• Temperature should be monitored and gas release allowed in septic and holding tanks to prevent explosions.
Considerations for sanitation facilities-Septic Tanks and Holding Tanks

- Once transferred; faecal sludge should undergo wastewater treatment under the operation of trained personnel before environmental disposal; community sensitization is critical!

- Adding lime or other disinfectants to large amounts of stored faecal waste requires careful consideration of dose, risk to handlers and procedure to achieve equal mixing
Additional information


http://www.who.int/water_sanitation_health/hygiene/om/wsh9241562153/en/

http://apps.who.int/iris/bitstream/10665/137181/1/WHO_EVD_WSH_14_eng.pdf?ua=1&ua=1

http://apps.who.int/iris/bitstream/10665/144730/1/WHO_EVD_WSH_14.2_eng.pdf
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