

Annex 7. Disinfection

Disinfectants

Chlorine is the best disinfectant for use against A(H5N1) contamination. There are two main reasons for this:

1. In many countries it is the only cheap and easily available disinfectant effective against influenza viruses.
2. It is one of the few disinfectants that can safely be used in laboratories where PCR work is undertaken because it fragments nucleic acids. Other disinfectants such as quaternary ammonium compounds and alcohols precipitate nucleic acids and can give false results in PCR tests (see below).

The best compound for the preparation of chlorine solutions for disinfection is household bleach (also known by other names such as Chlorox®, Eau-de-Javel). Household bleach is a solution of sodium hypochlorite which generally contains 5% (50 g/litre or 50 000 ppm) available chlorine.

Note that:

- different products may contain different concentrations of available chlorine and the concentration should be checked before use;
- household bleach preparations can lose some of their chlorine over time. Use newly manufactured bleach if possible. If the bleach does not smell strongly of chlorine it may not be satisfactory for the purpose and should not be used;
- thick bleach solutions should **never** be used for disinfection purposes (other than in toilet bowls) as they contain potentially poisonous additives.

When preparing chlorine solutions for use note that:

- chlorine solutions gradually lose strength, and freshly diluted solutions must therefore be prepared daily;
- clear water should be used because organic matter destroys chlorine;
- 1:10 bleach solution is caustic. Avoid direct contact with skin and eyes;
- bleach solutions give off chlorine. Prepare them in a well ventilated area;
- use plastic containers for mixing and storing bleach solutions as metal containers are corroded rapidly and also affect the bleach.

Two different dilutions of bleach are used for disinfection.

- **1:10 bleach solution** (which contains 0.5% chlorine concentration), a strong disinfectant that is used to disinfect:
 - Excreta
 - Bodies
 - Spills of blood/body fluids
 - Vehicles and tires
 - It is also used to prepare 1:100 bleach solution
- **1:100 bleach solution** (which contains 0.05% chlorine concentration) which is used to disinfect:
 - Surfaces
 - Medical equipment
 - Bedding
 - Reusable protective clothing before it is laundered

Also recommended for:

- Rinsing gloves between contact with different patients (if new gloves are not available)
- Rinsing gloves, aprons, boots before leaving a patient's room
- Disinfecting contaminated waste before disposal

To prepare 1:10 bleach solution add one volume of household bleach (e.g. 1 litre) to nine volumes of clean water (e.g. 9 litres).

To prepare 1:100 bleach solution add one volume of 1:10 bleach solution (e.g. 1 litre) to nine volumes of clean water (e.g. 9 litres).

Note: 1:100 bleach solution can also be prepared directly from household bleach by adding 1 volume of household bleach to 99 volumes of clean water (e.g. 100 ml of bleach to 9.9 litres of clean water) but making it up from 1:10 bleach solution is much easier!).

There are some other products containing chlorine that can be used to make up disinfectant solutions. **These are not as suitable as household bleach for this purpose.** A table for the preparation of chlorine solutions from some of these compounds is given below.

Preparing chlorine solutions using products other than household bleach

Chlorine product	1:10 solution	1:100 solution
Calcium hypochlorite powder or granules (70%) (High Test Hypochlorite -HTH)	7 g (0.5 tablespoonful) per 1 litre of water	7 g (0.5 tablespoonful) per 10 litres of water
Bleaching powder (Chlorine of Lime) with 30% active chlorine	16 g (1 tablespoonful) per 1 litre of water	16 g (1 tablespoonful) per 10 litres of water

Disinfection

All objects that have come in contact with potentially infectious materials should be decontaminated.

Decontamination of surfaces

Wear an apron, heavy-duty gloves and other barrier protection if needed. Disinfect surfaces by wiping clean with 1:100 chlorine solution, then incinerate all absorbent material in heavy-duty garbage bags. The surfaces must be rinsed with clean water after disinfection.

Disinfecting surfaces in laboratories where PCR work is undertaken

Disinfect surfaces with 1:100 chlorine solution (more dilute solutions are not effective). The chlorine must subsequently be removed as it is caustic and may damage equipment. This may be done either by wiping the surfaces with clean water or with 70% alcohol (which also has a useful additional effect against most bacteria [not against bacterial spores] and vegetative fungi).

Decontamination of blood or body fluid spills

For spills, use 1:10 chlorine solution to inactivate pathogens before soaking up the fluid with absorbent materials. These absorbent materials must then be incinerated.

Disinfection of hands

The principal means for disinfecting hands is by washing with soap and water. If available, a commercial hand disinfectant containing alcohol, chlorhexidine or polyvidone iodine could be used. The use of strong chlorine solutions (such as 1:100 chlorine solution) should be avoided as it is dangerous).

Sterilization and reuse of instruments and materials

In field outbreak situations, sterilization and reuse of any instruments or materials is not generally advisable. However, it may be necessary to reuse instruments etc. and these should first be disinfected with chlorine, cleaned and then sterilized.

Items such as instruments used for autopsy should be disinfected with 1:10 chlorine solution or 70% ethanol.

Vehicles

Vehicles driven onto potentially infected poultry farms should be rigorously disinfected because influenza viruses may survive for weeks in cool, moist, dark conditions and can easily be spread via mud or faecal contamination on vehicle tires or sub frames. All gross contamination must be removed from vehicles with a power washer and then all surfaces that may have been splashed by mud or faeces on the farm must be sprayed down with 1:10 chlorine solution. Use of a tire bath with 1:10 chlorine for disinfection of tires is ideal (the chlorine solution should be replaced after every two or three vehicles as it will rapidly become exhausted). Operators of power washers must be very well protected due to the high risk of their being sprayed with contaminated material.