Infection prevention and control (IPC) and personal protective equipment (PPE) recommendations for care of patients affected by Ebola

B. Allegranzi, SDS, HIS
WHO Interim IPC guidance for EVD

Interim
Infection Prevention and Control Guidance for Care of Patients with Suspected or Confirmed Filovirus Haemorrhagic Fever in Health-Care Settings, with Focus on Ebola

September 2014


How to safely collect blood samples from persons suspected to be infected with highly infectious blood-borne pathogens (e.g. Ebola)

Field Situation - How to safely collect blood samples from persons suspected to be infected with highly infectious blood-borne pathogens (e.g. Ebola)

Safe Burials

Ebola Guidance Package

Key considerations for the implementation of an Ebola Care Unit at community level
New WHO Guidelines on Personal Protective Equipment (PPE)

Guideline development process
- Development of key research questions
- Systematic literature reviews
- Literature review and an online survey on values and preferences of health workers
- Evidence-to-recommendations exercise using the GRADE framework
- Expert consultation
- WHO Guideline Review Committee

Issued on 31 October 2014

What are the benefits and harms of double gloves, full face protection, head cover, impermeable coveralls, particulate respirators, and rubber boots as PPE when compared with alternative less robust PPE for HCWs caring for patients with filovirus disease?

Ebola Virus Disease

Ebola virus spreads through:

- **direct** contact with body fluids (stool, vomit, blood, urine, saliva, semen, breast milk) of a sick person with EVD
- by contact with surfaces or equipment contaminated by body fluids of an infected person

➢ Through mucous membranes or non-intact skin (e.g. cuts or abrasions)

• Transmission through intact skin has not been documented
Standard Precautions

- Routine precautions to be applied in **ALL** situations for **ALL** patients
  - whether or not they appear infectious or symptomatic
  - especially important for EVD because the initial manifestations are non-specific


**KEY ELEMENTS AT A GLANCE**

1. **Hand hygiene**
   - How to perform hand hygiene:
     - Clean your hands by rubbing them with an alcohol-based formulation, as the preferred method for routine hygiene; handwashing if hands are not visibly soiled.

2. **Standard Precautions**
   - Handwashing (40–60 sec.): wet hands and apply soap; rub all surfaces; rinse hands and dry thoroughly, with a single use towel, or towel to turn-off faucet.
   - Hand rubbing (20–30 sec.): apply enough product to cover all areas of the hands, rub all surfaces until dry.

3. **Environmental cleaning**
   - Clean the hands as soon as the task involving an exposure risk to body fluids has ended (and after glove removal).

4. **Hearing protection (ears, nose, and mouth)**
   - Wear (i) a surgical protection mask and eye protection (goggles or (ii) a face shield to protect mucous membranes of the eyes, nose, and mouth during activities that are likely to generate splashes or sprays from body fluids, secretions, and excretions.

5. **Personal protective equipment**
   - Wear (i) gloves, sleeve, mask, and eye protection suit to prevent contamination of clothing, and transfer of pathogens to other patients or the environment.

6. **Respiratory hygiene and cough etiquette**
   - Persons with respiratory symptoms should apply source control measures, in particular when coughing or sneezing with tissue or mask, disposal of used tissues and masks, and perform hand hygiene after contact with respiratory secretions.

7. **Waste disposal**
   - Ensure safe waste management.

8. **Patient care equipment**
   - Wear protective suits with gloves, cover all body fluids, secretions, and excretions.

9. **Cleaning day-to-day items**
   - Disposing of used needles and other sharp instruments.

Standard Precautions

- Reduce the risk of transmission of microorganisms from both recognized and non-recognized sources of infection.

- Apply to blood, all body fluids, secretions and excretions (except sweat) whether or not they contain visible blood; non-intact skin; and mucous membranes.
Standard Precautions: key elements

- hand hygiene
- gloves ➔ BASED ON RISK ASSESSMENT
- gown ➔ BASED ON RISK ASSESSMENT
- facial protection ➔ BASED ON RISK ASSESSMENT (eyes, nose, mouth)
- respiratory hygiene and cough etiquette
- environmental cleaning and disinfection
- cleaning and disinfection of patient care equipment
- waste disposal
- injection safety and prevention of sharps injuries
Personal protective equipment
Experts agreed that it was most important to have **PPE which protects the mucosae** – mouth, nose and eyes – from contaminated droplets and fluids.

**Hands** are known to transmit pathogens to other parts of the body or face and to other individuals. Therefore, **hand hygiene and gloves** are essential, both to protect the health worker and to prevent transmission to others.

Face cover, protective foot wear, gowns or coveralls, and head cover were also considered essential to prevent transmission to health workers.

**Balance** between the best possible protection against filovirus infection while allowing HCWs to provide the best possible care to patients with maximum ease, dexterity, comfort and minimal heat-associated stress.
PPE to protect eyes

- **WHO strongly recommends** either a face shield or goggles that closely fits with the contours of the face and does not allow fluids to see through.

- Currently no scientific evidence comparing the effectiveness of face shields and goggles. Therefore, considered equal; choice based on other factors (e.g., preference, availability)

- Aspects to be considered: fogging, visibility and prescription glasses
WHO strongly recommends: a fluid-resistant medical/surgical mask with a structured design (e.g. duckbill, cup shape) that does not collapse against the mouth.

While doing procedures that generate aerosols of body fluids a fluid-resistant particulate respirator (NIOSH N95, EN149 FFP2, or equivalent) should be used.

- It is important to note that not all respirators are fluid resistant.
- Fluid resistance is not essential if the mask or respirator is used together with a face shield.
- Devices used to protect eyes, nose and mouth should be taken off as late as possible during the PPE removal process, preferably at the end, in order to prevent inadvertent exposure of the mucous membranes.
WHO strongly recommends: double gloves while providing clinical care. As for the type, nitrile gloves are preferred over latex gloves.

- Nitrile gloves are recommended because they resist chemicals, including certain disinfectants such as chlorine, and nitrile is more environmentally friendly.
- High rate of allergies to latex and contact allergic dermatitis among health workers.
- If nitrile gloves are not available latex gloves can be used.
- Preferably, the outer glove should have a long cuff, reaching well above the wrist, ideally to the mid forearm.
- Use of tape to attach gloves to gowns or coveralls should be avoided.
Hand hygiene and glove use

GLOVES PLUS
HAND HYGIENE
= CLEAN HANDS

GLOVES WITHOUT
HAND HYGIENE
= GERM
TRANSMISSION

The use of gloves does not replace the need for cleaning your hands!
Change gloves during patient care

- If heavily soiled with blood or any body fluids while providing care to the same patient
- When moving from one patient to another while caring for patients in the same room.

- Perform careful hand hygiene immediately after removal
- **2-step procedure to facilitate changing gloves safely:**
  1) disinfect the outer gloves before removing them safely
  2) keep the inner gloves on and disinfect them before putting on a fresh outer pair. Alcohol-based hand rubs are preferred when disinfecting hands and gloved hands.
How to don gloves

I. HOW TO DON GLOVES:

1. Take out a glove from its original box

2. Touch only a restricted surface of the glove corresponding to the wrist (at the top edge of the cuff)

3. Don the first glove

4. Take the second glove with the bare hand and touch only a restricted surface of glove corresponding to the wrist

5. To avoid touching the skin of the forearm with the gloved hand, turn the external surface of the glove to be donned on the folded fingers of the gloved hand, thus permitting to glove the second hand

6. Once gloved, hands should not touch anything else that is not defined by indications and conditions for glove use

1. Pinch one glove at the wrist level to remove it, without touching the skin of the forearm, and peel away from the hand, thus allowing the glove to turn inside out.

2. Hold the removed glove in the gloved hand and slide the fingers of the ungloved hand inside between the glove and the wrist. Remove the second glove by rolling it down the hand and fold into the first glove.

3. Discard the removed gloves.

WHO strongly recommends: a protective body wear in addition to regular on-duty clothing (i.e. surgical scrubs).

The protective body wear could either be **a disposable gown and apron, OR a disposable coverall and apron**

The gown and the coverall should be made of fabric that is tested for resistance to penetration by blood or body fluids OR to blood-borne pathogens

- **Gown**: EN 13795 high performance level, or AAMI level 3 performance, or equivalent; AAMI PB70 level 4 performance, or equivalent

- **Coverall**: meets or exceeds ISO 16603 class 3 exposure pressure, or equivalent; OR meets or exceeds ISO 16604 class 2 exposure pressure, or equivalent.
PPE to cover the body
PPE to cover the body (2)

- Coveralls and gowns are equally acceptable (lack of comparative evidence to show whether one is more effective than the other)

- **Gowns:**
  - considerably easier to put on and, in particular, to take off (safer when removing PPE)
  - generally more familiar to HCWs and hence more likely to be used and removed correctly. These factors also facilitate training in their correct use
  - heat stress is significantly less for gowns and they are
  - more likely to be available in areas commonly affected by filovirus disease
  - in some cultures, gowns may be more acceptable than coveralls when used by women
PPE to cover the body (3)

- The choice of **apron** should be, in order of preference:
  1. Disposable, waterproof
  2. If disposable aprons are not available, **heavy duty, reusable waterproof** aprons can be used if appropriate cleaning and disinfection between patients is performed.

- Easier to remove a soiled apron compared to gowns and coveralls.
- Generally worn for the entire time the HCW is in the treatment area.
- If the apron is visibly soiled, a disposable apron should be removed and changed.
- HCWs wearing a reusable apron should leave the ward to clean, disinfect and remove the apron.
• **WHO strongly recommends:** waterproof boots (e.g. rubber/gum boots) that extends above the bottom edge of the gown.

- If boots are not available, closed shoes (slip-ons without shoelaces and fully covering the dorsum of the foot and ankles) can be used. Shoe covers, nonslip and preferably impermeable, used over closed shoes facilitate decontamination.

- Boots need not be removed on leaving the PPE removal area *provided* they have been cleaned and disinfected; the same pair of boots can be worn until the end of that day’s work or shift.
WHO recommends that all health workers should wear a head cover that covers the head and neck while providing clinical care for patients with filovirus disease.

The head cover is suggested to be separate from the gown or coverall, so that these may be removed separately.

Conditional recommendations since there is no evidence to support use of a head cover over a hood (covering the shoulders) or hair cap for preventing transmission of infection; no comparative evidence of effectiveness in preventing transmission between a separate head cover and a head cover that is integrated in the coverall.

When a separate head cover is not available, a coverall with hood can be worn provided that the hood is put on after eye, nose and mouth protection.
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<td>X</td>
<td>Double gloving</td>
<td>Double gloving</td>
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<td>Face masks</td>
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<td>Disposable gown (G) Or Coverall (C)</td>
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<td>Disposable waterproof apron***</td>
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<td>Respirator (e.g. N95/FFP2) if aerosol-generating procedures</td>
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* For cleaning/waste management activities goggles are preferable.
**Use hood if preferable, but cap acceptable.
***If unavailable, heavy duty, reusable waterproof aprons can be used if appropriate cleaning and disinfection between patients is performed.
**** If unavailable, closed, puncture resistant shoes + overshoes can be used
HOW YOU USE PPE is crucial:

- Avoid touching or adjusting PPE
- Perform hand hygiene before donning new gloves
- Avoid touching your eyes, mouth, or face with gloved or ungloved hands
- For putting on and removing PPE, supervision by a trained member of the team

**For removal:**
- Remove the most contaminated PPE items first
- Be careful to avoid any contact between the soiled items (e.g. gloves, gowns) and any area of the face (i.e. eyes, nose or mouth) or non-intact skin
- Discard disposable items in a waste container

**Instructions** should be displayed on the wall in the dressing room
Protection depends on:

- adequate and regular supplies
- adequate staff training
- proper hand hygiene
- appropriate human behavior
- close supervision and support
Hand hygiene

The 5 Moments apply to any setting where health care involving direct contact with patients takes place.

1. BEFORE TOUCHING A PATIENT
2. BEFORE CLEAN / ASEPTIC PROCEDURE
3. AFTER BODY FLUID EXPOSURE RISK
4. AFTER TOUCHING A PATIENT
5. AFTER TOUCHING PATIENT SURROUNDINGS
Adaptation for EVD patient care

Hand hygiene indications

- before donning gloves and wearing PPE on entry to the isolation room/area,
- before any clean/aseptic procedures being performed on a patient,
- after any exposure risk or actual exposure with the patient’s blood and body fluids,
- after touching (even potentially) contaminated surfaces/items/equipment in the patient’s surroundings,
- and after removal of PPE, upon leaving the care area.
Hand hygiene

- Hand hygiene should be performed within the isolation rooms/areas every time it is needed according to these indications during care to a patient, along with change of gloves.

- When caring for patients in the same room, it is essential to organize the complete care to each patient before moving to the next and to perform hand hygiene between touching the patients.

- Neglecting to perform hand hygiene after removing PPE will reduce or nullify any benefits of the protective equipment.
Handrubbing must be performed by following all of the illustrated steps.

This takes only 20–30 seconds!
How to handwash

- Handwashing must last 40–60 secs and should be performed by following all of the illustrated steps.
- Always perform hand hygiene with soap and running water when hands are visibly soiled.

1. Wet hands with water;
2. Apply enough soap to cover all hand surfaces;
3. Rub hands palm to palm;
4. Palm to palm with fingers interlaced;
5. Backs of fingers to opposing palms with fingers interlocked;
6. Right palm over left dorsum with interlaced fingers and vice versa;
7. Rotational rubbing of left thumb clasped in right palm and vice versa;
8. Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;
9. Dry hands thoroughly with a single use towel;
10. Use towel to turn off faucet;
11. Your hands are now safe.
Guide for the local production of the WHO alcohol-based handrub formulations

From sugar can, at low cost (0.30 $US) = 0.006% of the total annual hospital budget

Mali, Africa, 2007
System change made possible
WHO alcohol-based formulation local production

Global Survey 2012

39 sites in 28 countries

Other key elements for IPC

- Patient isolation
- Environmental cleaning and disinfection
- Cleaning and disinfection of patient care equipment
- Waste disposal
- Injection safety and prevention of sharps injuries
- Laboratory safety
- Safe post-mortem examination
- Safe management of dead bodies
- Management of exposure risk and accidents
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Field Situation - How to safely collect blood samples

Safe Burials

Ebola Guidance Package

Key considerations for the implementation of an Ebola Care Unit at community level
Patient placement

Put suspected or confirmed cases in single isolation rooms with

- adjoining dedicated toilet or latrine
- showers
- sink equipped with running water, soap and single-use towels, alcohol-based hand rub dispensers
- stocks of personal protective equipment (PPE)
- stocks of medicines
- good ventilation
- screened windows, doors closed
- restricted access
Patient placement and work flow

- If isolation rooms are unavailable, cohort these patients in specific confined areas:
  - Rigorously keep suspected and confirmed cases separate
  - Ensure the items listed for isolation rooms are readily available
  - Make sure that there is at least 1 meter (3 feet) distance between patient beds

- Rigorously use dedicated equipment (e.g. stethoscopes) for each patient. If not possible, appropriately decontaminate the items between each patient contact.

- Ensure safe patient flow from ‘clean’ to ‘dirty’, and care possibly from dry to wet patients.
Injection safety

- Exclusively dedicated injection and parenteral medication equipment for each patient
- Syringes, needles or similar equipment should never be reused.
- Limit the use of needles, other sharp objects and sample collection for laboratory testing as much as possible.
Cleaning process

- Environmental surfaces or objects contaminated with blood, other body fluids, secretions or excretions should be cleaned first and then disinfected ASAP using standard hospital detergents/disinfectants (e.g. 0.5% chlorine solution)
- From “clean” to “dirty” areas
- If locally prepared, prepare cleaning and disinfectant solutions every day
- Clean floors and horizontal work surfaces at least once a day with clean water and detergent with a moistened cloth
- Do not spray (i.e. fog) occupied or unoccupied clinical areas with disinfectant – not evidence-based, potentially dangerous, false sense of safety
Management of linen

- Place soiled linen in clearly-labelled, leak-proof bags or buckets at the site of use, and transport directly to the laundry area in a separate container.
- Container surfaces should be disinfected before removal from the isolation room/area.
- If there is any solid excrement such as faeces or vomit, scrape off carefully using a flat firm object and flush it down the toilet or in the sluice before linen is placed in its container.
- For low-temperature laundering, wash linen with detergent and water, rinse and then soak in 0.05% chlorine for 30 min.
- If safe cleaning and disinfection of heavily soiled linen is not possible or reliable, burn the linen immediately.
Waste collection and disposal

- Waste segregation at point of generation
- Use of leak-proof waste bags and covered bins for all solid, non-sharp, infectious waste
- Place in a designated pit of appropriate depth (e.g. 2 m or about 7 feet), cover with a layer of soil 10–15 cm deep after each waste load, and filled to a depth of 1–1.5 m (or about 3–5 feet).
- An incinerator may be used for short periods during an outbreak to destroy solid waste
- The area designated for the final waste treatment and disposal should have controlled access to prevent entry by animals, untrained personnel or children
- Waste such as faeces, urine and vomit, and liquid waste from washing, can be disposed of in the sanitary sewer or pit latrine.
 IPC training and reinforcement after training

- Importance of standard precautions in all outpatient and inpatient care
  - Many HCW infections from failure to apply standard precautions, rather than PPE in treatment centre

- PPE - putting on and taking off is a skill
  - not just knowledge that can be conveyed by demonstration
  - needs practice
  - needs ongoing supervision by dedicated supervisor

- Importance of safe work set-up and consistent practices