


Key Measures for the Prevention and Control of Ebola Virus
Dr. Sergey Eremin, WHO Department of Pandemic and Epidemic Diseases
Sponsored by the World Health Organization Patient Safety Agency



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Key Measures for Prevention and Control of Ebola Virus Disease


Dr. Sergey Eremin
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Hosted by
Dr. Benedetta Allegranzi

www.webbertraining.com September 16, 2014

INTRODUCTION TO EBOLA VIRUS DISEASE (EVD)


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Ebola Virus Disease

- EVD spread through
 - **direct** contact with body fluids (stool, vomit, blood, urine, saliva, semen, breast milk) of a sick person with EVD
 - direct contact with the deceased person's body or discharge (funeral or burial preparation or ceremonies) plays a role in the transmission of Ebola
 - by contact with surfaces or equipment contaminated by body fluids of an infected person
- R_0 for this outbreak ranges between 1.4 and 1.6 in Guinea, Sierra Leone and Liberia
 - Similar to what was observed in previous outbreaks in DRC in 1995 and lower than the R_0 2.7 in Uganda in 2000
 - It is lower than most of the cholera outbreaks seen in the west African region in the past decade (R_0 2.4)


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Ebola Virus Disease

- Incubation 2-21 days
 - In the current outbreak, in 90% of patients for whom information is available, <15 days
- Case fatality ratio 24-89%
 - 54.9% for current outbreak
- Average time between symptom onset and death is 7 days
 - approximately 50% of patients
- Average time from symptom onset to recovery is 15 days
 - the other 50% of patients


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Ebola Virus Disease

- Often sudden onset of fever, intense weakness, muscle pain, headache and sore throat
- Followed by vomiting, diarrhea, and in some cases, both internal and external bleeding
- The symptoms of EVD are not specific and are difficult to differentiate from other endemic or epidemic tropical diseases such as malaria, typhoid fever, leptospirosis etc
- Laboratory confirmation is key to monitor the diseases in the population and guide the triage of patient in health care facilities to prevent health-care associated infection in hospitalized patients


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Ebola Virus Disease

- Treatment is supportive but effective in reducing mortality
 - Rehydration, intensive care
- Some potential specific treatment
 - Monoclonal antibodies
 - Very limited availability
 - Limited information on safety & efficacy
 - Other candidate drugs also in early stages of testing
- Vaccines in development
- In the environment the virus can be eliminated relatively easily with heat, alcohol-based products, and many commonly used disinfectants (e.g. sodium hypochlorite)

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Key features of the outbreak in West Africa

- Localized outbreaks (hotspots or hubs of transmission)
- The initial epicenter is in the forest region along the border areas of Guinea, Liberia, and Sierra Leone
- It is amplified by intensive commercial and social activities. Other hotspots are in the densely populated urban areas with intense transmission in Monrovia (Liberia) and Freetown in Sierra Leone, and various rural areas in the affected countries.
 - There is also limited transmission in Lagos and port Harcourt in Nigeria initiated through an imported case from Liberia as well as in Senegal (1 imported case from Guinea by land crossing)

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Key interventions to stop EVD transmission

1. Early isolation of patients to prevent transmission at home and in the community
 - In addition to isolation, Ebola treatment centres provide safe care and psychosocial support and contribute to surveillance through identification of contacts
2. Early detection of new Ebola cases through close monitoring of contacts and isolation of contacts when they show symptoms
3. Safe burials: to reduce transmission through contact with dead bodies, whether during preparation of the body for burial or during the funeral ceremony

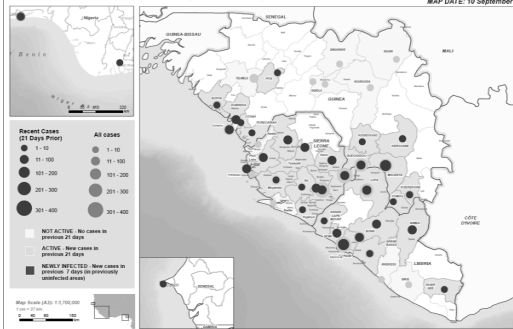
Laboratory diagnostic and social mobilization are critical to support the above mentioned interventions

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Geographical distribution of new and total cases in Guinea, Liberia, and Sierra Leone

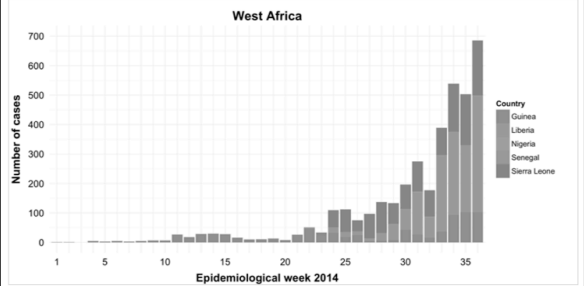
MAP DATE: 19 September



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Distribution of EVD cases by affected countries



4366 EVD cases and 2218 deaths in West Africa, as of September 7

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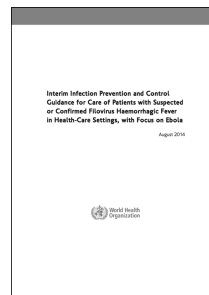
EVD cases in HCW

Country	Case definition	Cases			Deaths	
		Total	Last 21 days	Last 21 days/total cases (%)	Total	Deaths/total cases (%)
Guinea	Confirmed	45	12	27	19	42
	Probable	8	0	0	8	100
	Suspected	1	1	100	0	0
	All	54	13	24	27	50
Liberia	Confirmed	63	3	5	54	86
	Probable	80	42	52	25	31
	Suspected	19	1	5	2	10
	All	162	46	28	81	50
Sierra Leone	Confirmed	71	3	4	30	42
	Probable	1	0	0	1	100
	Suspected	2	2	100	0	0
	All	74	5	7	31	42
Total		301	66	22	144	48

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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

August 2014

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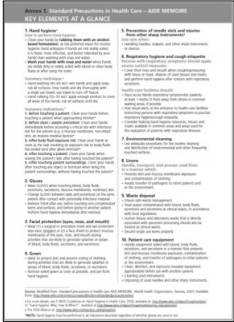
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Infection prevention and control for
GENERAL PATIENT CARE

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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





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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


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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
- Main foundations
 - Hand hygiene
 - Use of PPE based on risk assessment
 - Clean/safe environment

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Hand hygiene

How to perform hand hygiene:

- Clean your hands by rubbing them with an alcohol based formulation, as the preferred mean for routine hygienic hand antisepsis if hands are not visibly soiled
 - It is faster, more effective, and better tolerated by your hands than washing with soap and water.
- Wash your hands with soap and water when hands are visibly dirty or visibly soiled with blood or other body fluids or after using the toilet

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

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How to handrub

Handrubbing must be performed by following all of the illustrated steps. This takes only 20–30 seconds!

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How to handwash

Handwashing must last 40–60 secs and should be performed by following all of the illustrated steps.

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Use of PPE based on risk assessment

SCENARIO	HAND HYGIENE	GLOVES	GOWN	MEDICAL MASK	EYEWEAR
Always before and after patient contact, and after contaminated environment	✓				
If direct contact with blood and body fluids, secretions, excretions, mucous membranes, non-intact skin	✓	✓			
If there is risk of splashes onto the health care worker's body	✓	✓	✓		
If there is a risk of splashes onto the body and face	✓	✓	✓	✓	✓

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Infection prevention and control for

DIRECT PATIENT CARE FOR SUSPECTED OR CONFIRMED PATIENTS WITH EVD

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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

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Patient placement

- 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

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Staff allocation

- Ensure that clinical and non-clinical personnel are assigned exclusively to EVD patient care areas
- Ensure that members of staff do not move freely between the EVD isolation areas and other clinical areas during the outbreak
- Restrict all non-essential staff from EVD patient care areas

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Visitors

- Stopping visitors access to the patient is preferred
- If this is not possible, limit their number to include only those necessary for the patient's well-being and care, such as a child's parent
- Do not allow other visitors to enter the isolation rooms/areas and ensure that any visitors wishing to observe the patient do so from an adequate distance (approximately 15 m or 50 feet)
- Before allowing visitors to EVD patients to enter the HCF, screen them for signs and symptoms of EVD

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Hand hygiene, PPE, and other precautions

- Ensure that all visitors use PPE and perform hand hygiene and are provided with related instructions prior to entry into the isolation room/area
- Ensure that all HCWs (including aides and cleaners) wear PPE according to the expected level of risk before entering the isolation rooms/areas and having contacts with the patients and/or the environment
- Personal clothing should not be worn for working in the patient areas. Scrub or medical suits should be worn

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Hand hygiene, PPE, and other precautions

- Carefully apply IPC precautions to avoid any possible unprotected direct contact with blood and body fluids when providing care to any patient with EVD, including suspected cases

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Perform hand hygiene:

- 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
- After removal of PPE, upon leaving the care area.

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Hand hygiene

- Hand hygiene should be performed within the isolation rooms/areas every time it is needed according to the above 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 negate any benefits of the protective equipment.

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To perform hand hygiene

- Use an alcohol-based hand rub or soap and running water applying the correct technique recommended by WHO
 - Always perform hand hygiene with soap and running water when hands are visibly soiled
 - Alcohol-based hand rubs should be made available at every point of care (at the entrance and within the isolation rooms/ areas) and are the standard of care
 - Alcohol-based hand rubs can be produced locally at the HCF level by following WHO recommendations and instructions

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Personal protective equipment



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PPE...

- Correctly sized gloves (non-sterile examination gloves) when entering the patient care area
 - Consider changing gloves if heavily soiled with blood or any body fluids while providing care to the same patient
 - perform careful hand hygiene immediately after removal
 - Always change gloves and perform hand hygiene immediately after removal, when moving from one patient to another while caring for patients in the same room.
 - Consider double gloving when the quality of gloves appears to be poor (e.g., if holes and tears form rapidly during use)

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...PPE

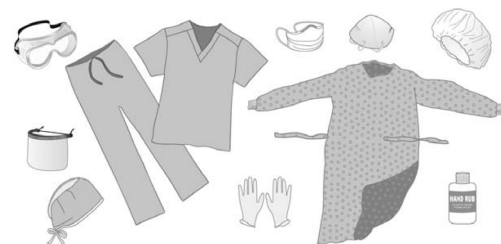
- A disposable, impermeable gown to cover clothing and exposed skin
- A medical mask and eye protection (eye visor, goggles or face shield) to prevent splashes to the nose, mouth and eyes
- Closed, puncture and fluid resistant shoes (e.g. rubber boots) to avoid contamination with blood or other body fluids or accidents with misplaced, contaminated sharp objects.
 - If boots are not available, overshoes should be used but these must be removed while still wearing gloves and with caution to avoid hand contamination

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PPE

when handling a case of EVD



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PPE when handling a case of EVD

Both dressing and undressing should be supervised by a trained member of the team. These instructions should be displayed on the wall in the dressing and undressing room:

http://who.int/entity/csr/disease/ebola_put_on_ppequipment.pdf?ua=1 http://who.int/entity/csr/disease/ebola_remove_ppeequipment.pdf?ua=1

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Different standards

- 40 min vs 2.5-3 hours
- Human interaction and facial expressions
- Concerns about “neck area exposure”
- Resource implications
- Other HC settings

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When using PPE

- Avoid touching or adjusting PPE
- Remove gloves if they become torn or damaged
- Change gloves between patients
- Perform hand hygiene before donning new gloves
- Avoid touching your eyes, mouth, or face with gloved or ungloved hands

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Taking off PPE

- Remove the most contaminated PPE items first.
- Hand hygiene must be performed immediately after glove removal
 - Perform hand hygiene whenever ungloved hands touch contaminated PPE items
- 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

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Protection depends on:

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

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Aerosol-generating procedures

- Avoid aerosol-generating procedures if possible
- Wear a respirator (FFP2 or EN certified equivalent or US NIOSH-certified N95) if any procedures that stimulate coughing or promote the generation of aerosols is planned to be performed
 - e.g., aerosolized or nebulized medication administration, diagnostic sputum induction, bronchoscopy, airway suctioning, endotracheal intubation, positive pressure ventilation via face mask


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Reusable equipment

- Carefully clean and decontaminate reusable equipment
- Rigorously use dedicated equipment (e.g. stethoscopes) for each patient
 - If this is not possible, decontaminate the items between each patient contact
 - For instance, if the stethoscope has to be used on different patients, it is essential that the full stethoscope (i.e. staff hand contact as well as patient contact surfaces) be thoroughly cleaned first with water and soap using appropriate PPE to remove organic matter and then wiped with alcohol.
 - All waste generated during the decontamination process should be treated as infectious waste


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Equipment in isolation areas

- Items and equipment should not be moved between isolation rooms/areas and other areas of the HCF, unless they are appropriately discarded and disposed.
 - For instance, the patient charts and records should be kept outside the isolation rooms/areas to avoid their contamination


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INJECTION SAFETY AND MANAGEMENT OF SHARPS

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Use of injection equipment

- Each patient should have exclusively dedicated injection and parenteral medication equipment which should be disposed of at the point of care.
- Syringes, needles or similar equipment should never be reused.
- Limit the use of needles and other sharp objects as much as possible.
- Limit the use of phlebotomy and laboratory testing to the minimum necessary for essential diagnostic evaluation and patient care


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If the use of sharp objects cannot be avoided:



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ENVIRONMENTAL CLEANING & MANAGEMENT OF LINEN

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PPE to use when cleaning

- Wear heavy duty/rubber gloves, impermeable gown and closed shoes (e.g. boots) when cleaning the environment and handling infectious waste.
- Add facial protection (mask and goggle or face shield) and overshoes if boots are unavailable when undertaking cleaning activities with increased risk of splashes or in which contact with blood and body fluids is anticipated
 - e.g., cleaning surfaces heavily soiled with vomit or blood or cleaning areas closer than 1 meter (3 feet) from a patient with symptoms like diarrhoea, bleeding or vomiting, etc.)

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Cleaning process...

- Environmental surfaces or objects contaminated with blood, other body fluids, secretions or excretions should be cleaned and disinfected as soon as possible using standard hospital detergents/disinfectants (e.g. 0.5% chlorine solution)
 - Application of disinfectants should be preceded by cleaning to prevent inactivation of disinfectants by organic matter
- Cleaning should always be carried out from “clean” areas to “dirty” areas, in order to avoid contaminant transfer

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...cleaning process...

- If locally prepared, prepare cleaning and disinfectant solutions every day
- Change cleaning solutions and refresh equipment frequently while being used during the day, as they will get contaminated quickly
- Follow your hospital protocols if available

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... cleaning process...

- Clean floors and horizontal work surfaces at least once a day with clean water and detergent.
 - Cleaning with a moistened cloth helps to avoid contaminating the air and other surfaces with air-borne particles.
 - Allow surfaces to dry naturally before using them again.
-  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.

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... cleaning process

- Do not spray (i.e. fog) occupied or unoccupied clinical areas with disinfectant
 - This is a potentially dangerous practice that has no proven disease control benefit

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Management of linen...

- Linen that has been used on patients can be heavily contaminated with body fluids (e.g. blood, vomit) and splashes may result during handling
- When handling soiled linen from patients, use gloves, impermeable gown, closed shoes (e.g., boots) and facial protection (mask and goggle or face shield).

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...management of linen...

- Place soiled linen in clearly-labelled, leak-proof bags or buckets at the site of use
- 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
 - If the linen is transported out of the patient room/area, it should be put in a separate container – it should never be carried against the body
- Linen should be transported directly to the laundry area and laundered promptly with water and detergent

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...management of linen

- For low-temperature laundering, wash linen with detergent and water, rinse and then soak in 0.05% chlorine for 30 minutes. Linen should then be dried according to routine standards and procedures.
- Washing contaminated linen by hand should be discouraged
 - If washing machines are not available or power is not ensured, take the soiled linen out of the container and empty it into a large drum container of hot water and soap. Soak the linen in this drum and make sure it is totally covered with water
 - Use a stick to stir; then throw out the water and refill the drum with clean water and add bleach and allow to soak for 10–15 minutes. Remove the linen and then rinse in clean water. Remove excess water and spread out to dry. Avoid as much splashing as possible.
- If safe cleaning and disinfection of heavily soiled linen is not possible or reliable, burn the linen to avoid any unnecessary risks to individuals handling these items.

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WASTE MANAGEMENT

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PPE for waste management

- Wear heavy duty/rubber gloves, impermeable gown, closed shoes (e.g. boots) and facial protection (mask and goggle or face shield), when handling infectious waste (e.g. solid waste or any secretion or excretion with visible blood even if it originated from a normally sterile body cavity)
 - Goggles provide greater protection than visors from splashes that may come from below when pouring liquid waste from a bucket
- Avoid splashing when disposing of liquid infectious waste.

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Waste collection



- Waste should be segregated at point of generation to enable appropriate and safe handling.
- Collect all solid, non-sharp, infectious waste using leak-proof waste bags and covered bins. Bins should never be carried against the body (e.g. on the shoulder)

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Waste disposal...

- Waste should be placed in a designated pit of appropriate depth (e.g. 2 m or about 7 feet) and filled to a depth of 1–1.5 m (or about 3–5 feet). After each waste load, the waste should be covered with a layer of soil 10–15 cm deep
- An incinerator may be used for short periods during an outbreak to destroy solid waste
 - It is essential to ensure that total incineration has taken place
 - Caution is required when handling flammable material and when wearing gloves due to the risk of burn injuries if gloves are ignited

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...waste disposal

- Placenta and anatomical samples should be buried in a separate pit
- The area designated for the final treatment and disposal of waste 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. No further treatment is necessary.

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POST-MORTEM EXAMINATIONS

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Post-mortem examinations...

- The coordinator and/or the IPC staff should be consulted for any decision making on post-mortem examinations.
- Post-mortem examination of HF patient remains should be limited to essential evaluations only and should be performed by trained personnel.

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...post-mortem examinations

- Personnel examining remains should wear eye protection, mask, double gloves, disposable impermeable gowns, and closed shoes or boots.
 - In addition, personnel performing autopsies of known or suspected HF patients should wear a particulate respirator (e.g., FFP2, or EN certified equivalent, or US NIOSH-certified N95) or a PAPR.
 - When removing PPE, avoid any contact between soiled gloves or equipment and the face (i.e. eyes, nose or mouth)
 - Hand hygiene should be performed immediately following the removal of PPE

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MANAGING EXPOSURE TO THE VIRUS

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Percutaneous or muco-cutaneous exposure: what to do?

- Persons including HCWs with percutaneous or muco-cutaneous exposure to blood, body fluids, secretions, or excretions from a patient with suspected or confirmed HF should:
 - immediately and safely stop any current tasks,
 - leave the patient care area,
 - safely remove PPE
 - exposure during PPE removal can be just as dangerous
 - immediately after leaving the patient care area, wash the affected skin surfaces or the percutaneous injury site with soap and water
 - accordingly, irrigate mucous membranes (e.g. conjunctiva) with copious amounts of water or an eyewash solution, and not with chlorine solutions or other disinfectants

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Managing exposure

- Immediately report the incident to the local coordinator
 - This is a time-sensitive task and should be performed as soon as the HCW leaves the patient care unit
- Exposed persons should be medically evaluated including for other potential exposures (e.g., HIV, HCV) and receive follow-up care, including fever monitoring, twice daily for 21 days after the incident
- Immediate consultation with an expert in infectious diseases is recommended for any exposed person who develops fever within 21 days of exposure
- HCWs suspected of being infected should be cared for/isolated, and the IPC precautions must be applied until a negative diagnosis is confirmed
- Contact tracing and follow-up of family, friends, co-workers and other patients, who may have been exposed to Ebola virus through close contact with the infected HCW is essential

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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

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2014 WHO Teleclass Schedule

Clean Care is Safer Care

January 29

Innovation and implementation strategic approaches to reduce catheter-related bacteraemia: The results of a European multicentre study (PROHIBIT)
Dr. Walter Zingg, Switzerland

March 7

How to prevent the spread of multiresistant bacteria
Dr. Stephan Harbarth, Switzerland

April 9

Highlights on SSI prevention: The new CDC guidelines and more
Dr. Joseph Solomkin, USA

May 5

Special lecture for International Hand Hygiene Day
Prof. Didier Pittet, Switzerland

September 3

New WHO global campaign to eliminate unsafe therapeutic injections
Dr. Benedetta Allegranzi, Switzerland

October 8

Public reporting and disclosure of HAI rates: Positive impact or confusion?
Dr. Maryanne McGuckin & Mr. John Govednik, USA

November 5

Global application of behaviour change models and infection control strategies
Dr. Michael Borg, Malta

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