

38th WEDC International Conference, Loughborough University, UK, 2015

**WATER, SANITATION AND HYGIENE SERVICES BEYOND 2015:
IMPROVING ACCESS AND SUSTAINABILITY**

**The role of WASH and infection prevention control
in an Ebola treatment centre**

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BRIEFING PAPER 2197

Since February 2014, an EVD (Ebola Virus Disease) epidemic has been affecting West Africa. Since the beginning of the outbreak, and during the first phase of the response, the emphasis has been placed on the containment of the epidemic through the case management and isolation of patients. Following MSF and WHO guidelines for EVD response, SOLIDARITES INTERNATIONAL launched a WASH program in November 2014 to support the management on an Ebola Treatment Centre (ETC) in the district of Moyamba in Sierra Leone. This paper presents the specific roles and responsibilities that WASH actors can undertake in the management of an ETC during an EVD outbreak. The main objectives of WASH response are to ensure staff safety and to limit the risk of contamination inside and outside the ETC through water supply and chlorination, operation and maintenance of sanitation facilities, Infection Prevention Control (IPC) activities, dead body management and safe burial.

Background

Since February 2014, an EVD (Ebola Virus Disease) epidemic has been affecting West Africa. First appearing in Guinea, the epidemic subsequently spread to Sierra Leone and Liberia. Since the beginning of the outbreak, and for the first phase of the response, the emphasis has been put by most national and international actors, on the containment of the epidemic by enhancing the case management and isolation of patients. This strategy was in line with the priorities identified by the UNMEER (UN Mission for Ebola Emergency Response). In the first two pillars, (1. Stop the outbreak and 2. Treat the infected) the role of Infection Prevention Control (IPC) activities is decisive.

In EVD outbreak contexts, WHO advises to establish a “case management” committee in each health centre and to name a professional in this committee in charge of supervising adherence to IPC measures. In the current EVD outbreak, the role of supervising IPC measures has been assigned to the WASH components of the ETC management.

Medical and WASH coordination

Strong coordination between medical and WASH staff is essential to ensure optimal functioning of the ETC. The organization of the staff organogram in the ETC facilitates the decision making process by giving the same level of responsibility to the Medical Director and to the WASH Team Leader, each one on their field of expertise.

The WASH team is responsible for the implementation of IPC measures inside the ETC and as such, they have the legitimacy to advise or impose limitations to the medical activities if a risk of contamination or infection is identified.

In this context, SOLIDARITES INTERNATIONAL (SI) started an intervention in the Ebola Treatment Centre of Moyamba, in Sierra Leone, focusing on the WASH and IPC management of the centre. This intervention is implemented in partnership with the medical NGO Medicos del Mundo, which is in charge of the overall management of the programme and the clinical management of the ETC.

The specificity of this partnership and the coordination system adopted between Medical and WASH actors in this project highlights the role of a WASH actor in the management of an ETC and more generally, in the fight against Ebola.

Objectives of WASH response

The isolation of patients in safe facilities being the primary mean to interrupt the transmission of the disease, three main objectives for the WASH response in an ETC have been identified:

- to ensure that all staff members remain safe whilst carrying out their duties at the site;
- to limit the risk of contamination from the ETC to the outside;
- to limit the risk of cross-contamination among patients inside the ETC.

To achieve these goals, the WASH actor has to ensure:

- an adequate quantity and quality of water supply and adapted sanitation systems;
- adequate and safe burial practices for deceased patients;
- clear and effective Infection Prevention and Control activities.

Water supply and sanitation

Water supply is essential for the functioning of the centre, and in particular for disinfection, cleaning and washing activities. According to UNICEF, the estimated daily need is in a range of 100/400 l of water per person, and a 2 days buffer is needed.

Three types of water are used in the ETC:

- Raw Water (green line): for personal hygiene of patients, laundry, kitchen and washing / rinsing floors;
- 0.05% chlorinated water (yellow line): for bare skin disinfection, laundry and cleaning toilets in Low Risk and Very Low Risk areas;
- 0.5% chlorinated water (red line): for disinfection of the High Risk area, disinfection of objects coming from the High Risk Area (e.g. Personal Protective Equipment - PPE items), disinfection of ambulances, footbaths and sprayers.

Moyamba ETC is equipped with 2 dedicated boreholes, 3 storage tanks of 70m³ (Oxfam Tank), 2 tanks of 10m³ for 0.05% chlorine solution, 2 tanks of 10m³ for 0.5% chlorine solution, 3 main pipelines (one for each water type) with demand pumps, and 1 emergency pipeline for 0.5% water supply in the High Risk area.



Photograph 1. Water tanks area



Photograph 2. The three lines of the water network

Emergency water network

Any intervention for the maintenance/repair of the water network inside the High Risk zone can be very complex and time consuming because technicians have to be dressed with full Personal Protective Equipment (PPE) and cannot work for more than 45 minutes at a time (each entry in the High Risk zone is limited to 45 min).

To avoid interruptions in the supply of 0.5% solution in the High Risk zone, an independent network has been connected to the tanks for 0.5% water. This network runs in between the double fence that divides the different zones of the ETC, to allow technicians to make rapid intervention wearing only a light PPE. In case of a breakdown of the main supply line, this can be closed for the time of the maintenance and the emergency network can be quickly opened.

The chlorine used in the ETC is NaDCC as it is easier to dissolve than HTH at high range of strength and it leaves less residual.

As the concentration of chlorine in the solutions is crucial for disinfection purposes, the strength of chlorine is tested several times per day. To analyze the water of the ETC in the two chlorinated lines, two systems are used:

- Antenna Wata System is used for a preliminary identification of the strength of chlorine solution. It gives an indication about the concentration, but not the exact value.
- HI 96771C Chlorine Ultra High Range ISM is used for verification and for data recording. It gives an exact value of concentration, but the results are limited at 500PPM.

Due to the high concentration of chlorine in the used solutions, exact results can only be obtained by dilution, as showed in the following table.

Table 1. Dilution needed for chlorine concentration analysis				
Water	Antenna Wata Test	HI 96771C Chlorine Ultra Range ISM		
	No dilution (1/1)	No dilution (1/1)	Dilution 1/10	Dilution 1/100
0.05%	X	X	X	
0.5%	X		X	X

Sanitation is also a key factor to control the epidemic. Although survival and transmission of the virus in the environment is unlikely, safe disposal of body fluids, wastewater and solid waste is essential to limit the risk of infection for staff, non-EVD patients and community members. The solutions adopted in Moyamba are the use of flush latrines with septic tanks for wastewaters and incineration for solid waste (both 'regular' and contaminated waste). Special attention has to be paid for the disposal of contaminated sharps: sharps are collected in safe boxes and burned in incinerators.

Safe burial

Dead bodies of EVD patients are highly infectious. Safe burial practises prevent the risk of contamination for the communities.

For patients who die inside the ETC, once the medical team confirms the death, the IPC team performs the Dead Body Management (DBM) and the safe burial.

In Moyamba centre, the two activities are done by two different teams. One team prepares the body inside the ETC, i.e. they disinfect the body with 0.5% solution, put it in the body bags and transfer the bags to the mortuary. Another team manages the burial outside the ETC in collaboration with the psychosocial team of the ETC. Their role is to liaise with the civil and religious authorities and with the families. Then, they have to bury the body within 24h (according to the Moyamba District regulation). A special ambulance collects



In the ETC, IPC role is divided into four main responsibilities: establishing physical barriers, establishing rules, establishing Standard Operating Procedures (SOP) and critical support to medical activities.

Inside the High Risk zone, another division is made, based on the level of contamination:

- Zone 1: Ambulance bay, triage and Suspect cases' ward
- Zone 2: 'Probable' (or high suspect) ward
- Zone 3: Confirmed ward, Recovery ward, waste area, morgue and ambulance bay for the morgue.

This separation is essential to limit the risk that a non-EVD suspect case is infected by contact with a confirmed patient's body fluids.

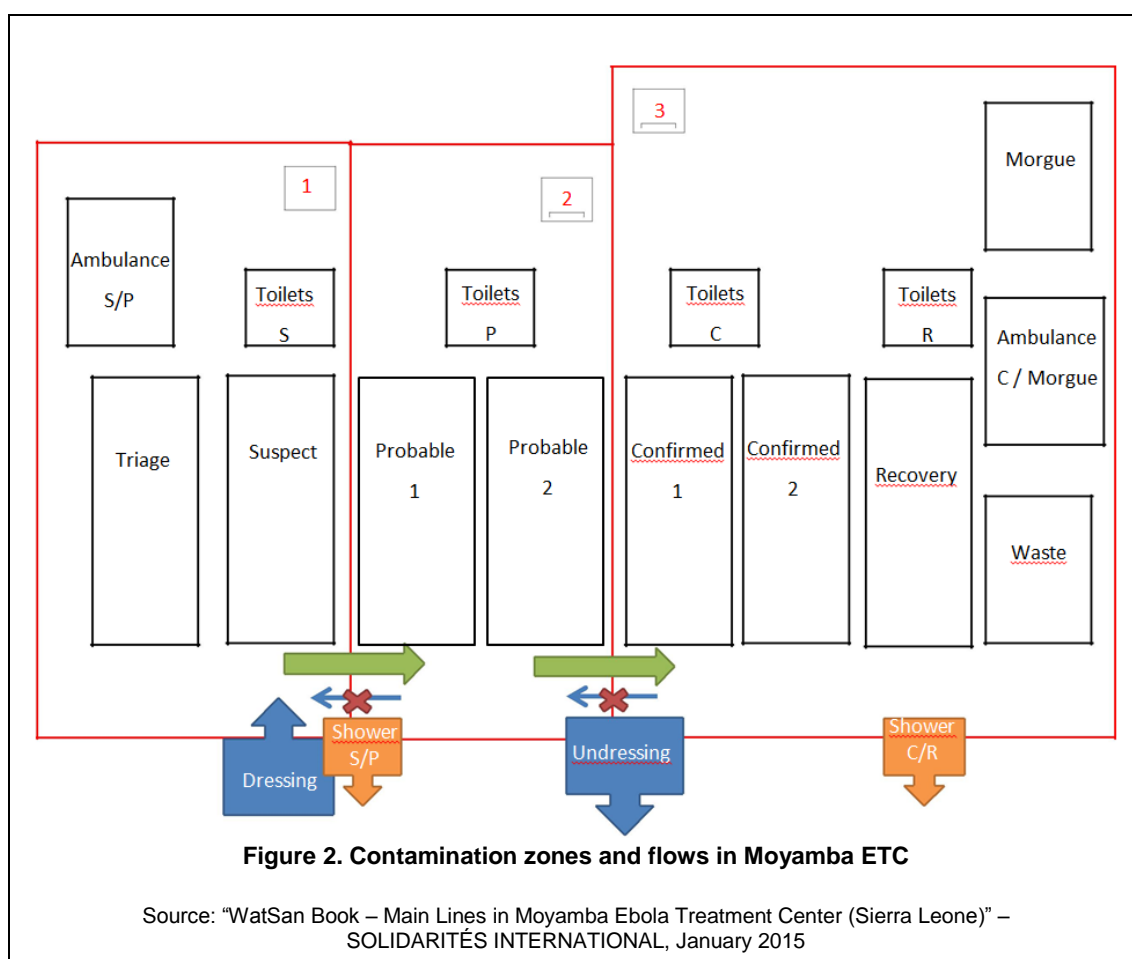
To reinforce the separation between the three zones, double gates with footbaths (0.5% chlorine solution) for boots disinfection are installed on the walkthrough between each zone and at the entrance of each tent.

The IPC team is also responsible for the management and monitoring of Personal Protective Equipment (PPE) which constitute a primary barrier for personal protection of the ETC staff. Every person entering the High Risk zone to perform any activity (medical activities, disinfection and cleaning, technical maintenance, support activities, etc.) has to dress with full PPE beforehand.

Establishing rules

Physical barriers are not protection by themselves if they are not used properly. The IPC team is in charge of defining and ensuring the respect of general and specific IPC rules inside the ETC.

The ETC is organized so that staff, patients and materials follow a flow from the less to the most contaminated area. Entrance in the High Risk is from the less contaminated area and exit is from the most contaminated. No person (patient or staff) or material should inverse the flow to avoid bringing contamination from confirmed to suspected area.



Any modification of the wards' organization (disposition of beds, shelves, other pieces of furniture) and the entry of new items/devices must be discussed with the IPC team beforehand. The IPC managers will check if the modifications are possible and in line with IPC rules.

Establishing SOP

SOP are essential to avoid cross-contamination and infections inside the ETC.

Every activity carried out in the ETC has to follow protocols. All protocols have been established prior to the opening of the centre and have to be followed by all teams:

- General protocols: established by IPC team, have to be followed by every person entering the High Risk Zone (i.e. dressing and undressing PPE)
- IPC protocols: established by IPC team, have to be followed by IPC team while carrying out all activities (i.e. cleaning and disinfection of wards and materials, waste management, laundry, dead body management)
- IPC/medical protocols: established together by medical and IPC team, for common activities (i.e. ambulance receiving, patients transfer and discharge)
- Medical protocols: established by medical team with inputs from IPC team about IPC issues (i.e. blood samples, installation of IV, cleaning of patients)

Critical support to medical activities

For most of the activities conducted in the High Risk zone, the medical team needs the support of the IPC team which will guarantee the safety of the staff and the disinfection of materials, facilities and equipment.

Among these activities are: ambulance receiving, patients transfer (from triage to the wards and from a ward to another), patients discharge and some special activities such as the installation of child-friendly spaces in the patients' wards to avoid them moving around inside the High Risk zone and putting themselves and others in danger.



Photograph 3. A play pen to keep children safe



Photograph 4. Ambulance receiving a disinfection

The IPC team is also the first responsible for critical accident management. Every problem that occurs to the team inside the High Risk zone (accidental exposure, problems with PPE, mistakes in undressing, mistakes in staff, patients or material flows, etc.) have to be reported to the IPC manager for immediate action if needed and for recording. In case of accidental exposure to infected body fluids or sharp accident, the IPC manager has to report to the medical director for medical follow-up.

Conclusions and perspectives

Although Ebola is not a water related disease, in this paper we highlight how important the WASH response can be during an EVD outbreak to contain and stop the spread of the disease. We recognize that the extent of the current outbreak in West Africa forced the international community to develop a new approach to the response. In this approach, responsibilities that were managed directly by medical organizations in the past have been assumed by different stakeholders.

In this context and until the discovery of effective vaccines and/or treatment for Ebola changes the framework of intervention, the medical response cannot be separated from a strong WASH intervention.

Acknowledgements

The authors would like to extend thanks to Médecins Sans Frontières for the incredible support given during the current EVD outbreak to all the agencies and NGOs that launched an Ebola response program for the first time. Authors are equally thankful to all the team members of SOLIDARITES INTERNATIONAL, Medicos del Mundo and the Norwegian Health Team who accompanied us in this project. Special thanks go to Julio Martinez, who led the IPC team during the opening of the ETC.

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