

Ebola Virus Disease: Personal Protective Equipment and Other Ebola-Related Supplies

UNICEF Supply Division

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Ebola Virus Disease (EVD): Personal Protective Equipment and Other Ebola-Related Supplies

1. Summary

- The current EVD outbreak has reached five countries in West Africa, with 4,269 documented cases and 2,288 deaths (as of 6 September). A separate, un-related Ebola outbreak has also been reported in the Democratic Republic of the Congo.
- No licensed treatment currently exists for EVD. Only supportive care, containment and transmission prevention are the currently available interventions. UNICEF procures and stocks essential medical supplies, hygiene supplies and personal protective equipment (PPE) for caregivers and patients. UNICEF is currently sourcing and procuring the necessary high quality PPE and essential medical supplies in support of EVD outbreak response. UNICEF also has performed an initial survey of the market for prophylaxis and therapeutic interventions in the pipeline.
- UNICEF has not historically supplied the full suite of PPE items required in the “high risk” Ebola setting (direct contact with cases and bodies) and is currently consulting with WHO, Médecins Sans Frontières (MSF) and other stakeholders to review and fully map PPE options appropriate for an EVD context. Specifications for these items have been developed and sourcing is underway. Due to the global surge in demand for PPE supplies, demand has outpaced current production levels, and therefore a shortage exists. UNICEF is working with WHO to establish a delivery prioritisation mechanism until sufficient production is available, which is anticipated by the December 2014 / January 2015 timeframe.
- While some PPE can be used in both high and low risk settings, protective suits (coveralls) “EN14126 category 3 type 3”, certified against infectious agent transmissions, are currently being sourced by UNICEF, in addition to other PPE supplies. These coveralls provide the ultimate protection against viral infection for medical and non-medical staff in EVD outbreak settings.
- UNICEF is developing product specifications of essential supplies to assist UNICEF Country Offices (COs) in EVD planning, preparedness and response. UNICEF has also developed the first draft of a PPE kit for use in high risk settings (see Table 1 below). It will be refined based on feedback from the field and consultation with stakeholders. UNICEF is also supplying a ‘household protection kit’, developed by MSF, to reduce transmission within families by providing basic protection and disinfection tools for families with the possibility of an infected member.
- UNICEF encourages partners to harmonise EVD response and supply content to ensure cost-effective and efficient outbreak response management.

2. Background

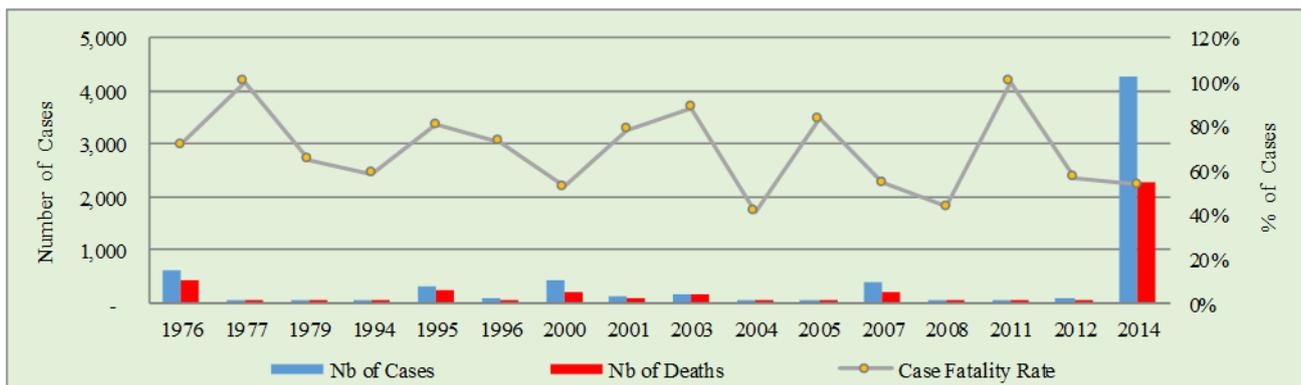
EVD (previously known as Ebola haemorrhagic fever) is one of the world’s most virulent diseases with a case fatality rate (CFR) that can reach up to 90%. The virus is transmitted through direct contact with infected human or animal bodily fluids, internal organs and skin tissue.¹ It is not transmitted through air, water or food.² EVD occurs primarily in remote areas of Central and West Africa, however the current outbreak includes urban centres. There have been 24 documented outbreaks since 1976, each averaging ~100 cases and a CFR of 66%. The current outbreak has reached 4,269 cases and 2,288 deaths (6 September),³ with a CFR of 54% (Figure 1). But this figure could be materially higher after all cases have been confirmed. 26 million people, including 10.3 million children live in the areas affected by Ebola.

¹ World Health Organization, [Ebola Virus Disease](#), WHO, Geneva, April 2014.

² Centers for Disease Control and Prevention, [Ebola](#), CDC, Atlanta, August 2014.

³ World Health Organization, [WHO: Ebola Response Roadmap Situation Report](#), WHO, Geneva, 8 September 2014.

Figure 1 EVD Outbreaks, Cases, Deaths and CFR



Source: WHO.

The incubation period from time of infection to onset of symptoms is between 2-21 days, and patients are only infectious when symptomatic. There is currently no licensed treatment or vaccine for EVD. Only supportive care and intensive prevention through isolation and containment can be broadly provided.⁴

UNICEF is working closely with WHO, MSF and the International Federation of Red Cross and Red Crescent Societies (IFRC), as well as other partners and communities on outbreak response, as well as to share information on how to prevent the further spread of EVD and care for those already affected. The latest updated information and materials critical to assist countries dealing with EVD and outbreak response management is available [here](#).

UNICEF has prepared a [field guide for UNICEF staff](#) to explain EVD epidemiology, describe UNICEF’s roles and responsibilities, and what can be done to prevent and prepare for an EVD outbreak. The information and resources are in different languages and put on the UNICEF Ebola SharePoint for easy access.

UNICEF has also prepared a practical guidance tool to help COs assess and mitigate the risks to health supply chains in a time of Ebola outbreak and is available [here](#). UNICEF is working on a list of supplies to be used in planning, preparedness and response.⁵

3. EVD Personal Protective Equipment and Body Bags

Currently there is no harmonized international set of standards for selection of supplies, especially of EVD PPE or burial cadaver bags (body bags) for response to countries affected by Ebola. The selection of PPE depends on the risk hazard assessment identified by each treatment centre and the infectious agent transmission in each facility during medical intervention and care. “High-risk” areas include treatment or isolation facilities accommodating patients (suspected or confirmed), laboratories and morgues. “Low-risk” areas include facilities used for service preparation, stores, laundry and disinfection. While universal precautions include protection for head, eyes, respiration, body, hands and feet, mucosal membranes in both high or low risk areas: i) in high-risk areas, precautions should include patient isolation and full protective clothing; ii) in low-risk areas, partial protective clothing is required.

UNICEF is working with WHO and MSF to identify appropriate EVD PPE technical specifications, standards and guidance to determine and define appropriate context and end-use function of the

⁴ World Health Organization, [Frequently Asked Questions on the Ebola Disease](#), WHO, Geneva, August 2014.

⁵ The list is a working document and subject to review.

equipment. A harmonised set of standards for supply selection is encouraged, including a defined EVD PPE kit/set.

UNICEF has prepared a draft PPE kit suitable for high-risk settings (see Table 1). The quantities of components in the draft kit will be determined with input from the field and refined through consultation with stakeholders. The kit includes substitute, or alternate, products for some of the PPE items that are currently difficult to source in adequate quantities to meet the needs, without compromising the safety level of the biological barrier against EVD.

Table 1 Draft PPE Kit Items Suitable For High-Risk Settings

Body Barrier Area	PPE Product	Reusable or Disposable	Substitute PPE Product(s) and Notes	Reusable or Disposable
Body (core) - inner layer	Tunic, surgical, woven, sizes M, L and XL.	Reusable	Alternative sizes of same item	-
Body (core) - inner layer	Trousers, surgical, woven, sizes M, L and XL.	Reusable	Alternative sizes of same item	-
Head - inner layer	Cap, surgical, non-woven, disposable.	Disposable	Cap, surgical, woven (reusable)	Reusable
Body (core) and head - outer layer	Coverall, Cat. III, Type 3 with hood, sizes M, L, XL and XXL.	Disposable	Coverall, Cat. III, Type 4/5 with hood, sizes M, L, XL and XXL worn with Type 3 apron or heavy duty apron over the coverall.	Disposable
Body (core) - outer layer	Apron, rubber, heavy duty.	Reusable	Aprons, surgical, disposable.	Disposable
Nose and mouth	Mask, high filtration/Respirator, (grade FFP2 or N-95), regular size, without valve, single use.	Disposable	Mask, high filtration/Respirator (grade FFP3), regular size, single use.	Disposable
Hands	Gloves, examination nitrile, non-sterile, single use, sizes S, M and L.	Disposable	Alternative sizes of same item.	-
Hands	Gloves, utility, rubber or nitrile, heavy duty.	Reusable	None.	-
Face and eyes	Face shield, clear with foam head band, fog resistant, full face length.	Disposable	Either face shield or goggles depending on procedure.	-
Face and eyes	Goggles, protective, wrap around, plastic, fog resistant, with open vent.	Reusable	Either face shield or goggles depending on procedure.	-
Feet and legs	Boots, lightweight PVC or rubber, heavy duty (impermeable and puncture proof), anti-slip, closed, sizes 41, 43 and 45.	Reusable	Alternative sizes of same item.	-
Feet and legs	Overboots, with PVC sole and elasticized top.	Disposable	Can be Type 3 or Type 5/6 if worn over rubber boot.	-

Source: UNICEF Supply Division.

In response to the acute outbreak, UNICEF identified, sourced and supplied EVD PPE that at least met low-risk settings' needs based on specification agreed to by Ministries of Health. Recently, UNICEF secured access to EVD PPE for high-risk setting and is supporting the scaling up of availability. EVD PPE for low-risk settings (a subset of the above list) are generally more readily available, but given the surge in demand, supplier inventories have been depleted and ongoing demand is not able to be met. As a result, suppliers are increasing their production.

Securing availability of EVD PPE for high-risk settings is even more difficult. Suppliers have not experienced such a high demand previously, and production time is longer. Because there is not a harmonised set of standards for supply selection for EVD PPE, industry is not able to produce to demand, thereby adding to lead-time. When EVD PPE for use in high risk settings is available, it typically comes as individual components because items are sourced from different suppliers. Notably, impermeable protective coveralls for use in high risk settings and leak-proof body bags were especially

difficult to secure, but have recently been sourced. Protective body bags must meet the minimum specifications to ensure safe disposal of cadavers, which include:

- Impermeable, vinyl, minimum thickness 400 microns,
- Should be able to hold 100-125 kilos (200-250 lbs),
- Size 250 x 120 cm for adults and 150 x 100cm for children,
- Should contain no chlorides or carbons: chlorides or carbon pollute the environment and can cause damage to retort chambers. Body bags should be non-carcinogenic to health of funeral workers when used for cremations,
- At least 6 handles included in the body bag to allow burial team to hand-carry it safely,
- Heat-sealed: to insure superior strength and safety,
- Provide full containment of bloodborne pathogens,
- Cracking point of -25 to -32°C.

UNICEF has also been in close communication with manufacturers and wholesalers (Kimberly-Clark, DuPont, 3M and others) to source additional PPE, in particular to fill the gaps for proper available garments for high-risk settings. Based on the high volume of demand and lack of manufacturer inventory and capacity, UNICEF is working with suppliers to identify lead times for delivery, and as a result, countries may also be asked to split deliveries over time.

Table 2 EVD PPE Supplies Currently Available through UNICEF

Products	Description	Image
<p>Personal Protective Equipment</p>	<ul style="list-style-type: none"> - Gloves – surgical, gynaecological and examination. - Aprons – plastic. - Safety Glasses. - Masks – High filtration. - Masks – Surgical disp. - PPE Kit – “Influenza risk 1”. Only for supportive use / no direct contact (i.e., can be used in “low risk). - PPE Kit – “Influenza risk 2”. Only for supportive use / no direct contact (i.e., can be used in “low risk). - Caps – surgical. - Clogs – plastic. - Coats – medical. - Coveralls- adult, High-risk and Low-risk settings. - Gowns – surgical and patient. - Drapes – surgical. - Trousers – surgical. - Tunic – surgical. - Stretcher – Foldable and with side rails. - Body bags – Adult and child. 	 <p>Source: UNICEF SD.</p>

Source: UNICEF Supply Division.

A supply list of available standard and new non-standard medical equipment, consumables and clinical diagnostics to plan EVD management response (in case of 3 different scenarios; preparedness, outbreak and health system strengthening) is provided in the annex to the previously mentioned [UNICEF’s guidance note for UNICEF COs](#). The note identifies a non-exhaustive list of items that can be used for initial assessment designed to guide supply planning, budgeting and response in relation to current country EVD situation. The material codes and specification references for the catalogued items are also available. The emergency medical and principally PPE supplies used in low risk settings that UNICEF has procured and delivered to Guinea, Liberia Nigeria and Sierra Leone to date are summarised in Table 3.

Table 3 EVD Response Supplies Delivered/Shipped to Guinea, Liberia, Nigeria and Sierra Leone since July 2014 to date (September).

Medical Equipment			
Items	Units	Items	Units
15 KVA 3-phase voltage regulator	2	Hand sanitizer refill 1200ml	576
Back pack sprayer (16l)	450	Hand sanitizer ster	70
Bag urine collecting 2000ml	24,400	Infusion g.set w/burette ster su	3,000
Bandage adhesive 3.0cm/BOX-100	1,000	LLIN 100d blue 190 x 180 x 150cm LxWxH	250,000
Bandage elastic 7.5cm x 5m roll	4,834	Medical cot surge bed w/ IV pole	200
Bandage gauze 5cm x 5m roll	1,808	Midwifery kit 3-renewable	156
Bandage gauze 8cm x 4m roll	13,637	Needle disp 19G ster/BOX-100	5
Basin kidney stainless steel 825ml	500	Needle disp 21G ster/BOX-100	10,180
Bed hospital	15	Needle disp 22G ster/BOX-100	8,000
Bed mattress hospital	115	Needle disp 23G ster/BOX-100	180
Bed sheets hospital	225	Needle disp 25G ster/BOX-100	2,000
Brush hand scrubbing plastic	1,250	Obstetric surgical kit suppl.1-drugs	10
Cannula IV short 18G ster disp	23,030	Obstetric surgical kit suppl.2-equipment	10
Cannula IV short 20G ster disp	25,000	Obstetric surgical kit suppl.3-renewable	10
Cannula IV short 22G ster disp	24,000	Oral Polio Vaccine vial of 20 doses	217,000
Cannula IV short 24G ster disp	20,000	Poly tank and water container 5000l	20
Cold Chain chest freezer 250-300	1	Resuscitation kit basic	12
Cold Chain refrigerator 2 door	1	Sachet tablet plastic 10 x 16cm/PAC-100	1,682
Cold Chain room walk-in type 40m ³	2	Scalpel blade ster disp no.10	3,275
Compress gauze 10 x 10cm n/ster/BOX-100	2,058	Scalpel blade ster disp no.22	11,398
Compress gauze 10 x 10cm ster/PAC-5	5,000	Scissors bandage 200mm ster	436
Compress gauze anti-septic 6 x 3cm/BOX-100	2,000	Scissors Deaver 140mm ster s/b	1,250
Cotton wool 500g roll n/ster	7,184	Sphygmomanometer adult aneroid	500
Diarrhoeal disease set pac	15	Stethoscope foetal Pinard	500
Digital thermometer	500	Syringe disp 10ml w/ndl 21G/BOX-100	1,433
Drum sterilizing 260mm diam	500	Syringe disp 20ml ster/BOX-100	1,247
Ebola flyers prevention message	50,000	Syringe disp 2ml ster/BOX-100	2,000
Ebola posters Do's and Don'ts	35,000	Syringe disp 5ml ster/BOX-100	10,000
Forceps artery Kocher 140mm ster	1,250	Syringe disp 5ml w/ndl 21G/BOX-100	5
Gauze roll 90cm x 100m n/ster	1,000	Tape adhesive ZO 2.5 cm x 5m	3,500
Gloves exam latex pwd-free L/BOX-100	19,030	Tape adhesive ZO perforated 10 cm x 5m	2,065
Gloves exam latex pwd-free M/BOX-100	20,630	Tape measure tailor's fibreglass1.5m	1,250
Gloves exam latex pwd-free S/BOX-100	15,010	Tape umbilical 3mm x 50m n/ster	3,000
Gloves gyn pwd-free ster M su pair	15,000	Test strips urinan gluc prot/PAC-100	1,856
Gloves surg pwd-free 6.5 ster su pair	38,254	Thermometer clinical digital 32-43°C	5,000
Gloves surg pwd-free 7 ster su pair	39,735	Tourniquet latex rubber 50cm	2,500
Hand sanitizer + touch-free dispenser	24	Tube suction CH08 L 50cm ster disp	7,600

Medicines			
Items	Units	Items	Units
Acetylsalicylic acid 500mg tabs/PAC-100	199	Metronidazol pwd/os 200mg/5ml/BOT-100ml	3,110
Albendazole 400mg chewable tabs/PAC-100	128	Metronidazole 250mg tabs/PAC-1000	5,000
Amoxicl pwd oral sus 125mg/5ml/BOT-100ml	335,850	Metronidazole inj 500mg/100ml vI/BOX-50	3,107
Amoxicillin 250mg disp tab/PAC-100	3,498	Nystatin oral sus 100,000IU/ml/BOT-30ml	217
Amoxicillin 500mg tabs/PAC-100	1,171	ORS low osm 10.2g/0.5L CAR/1000	840
Ampicillin pwd inj 500mg vial/BOX-50	15,500	ORS low osm 20.5g/1L CAR/100	1,125
Artesunate 50mg+SP 525mg tabs/6+2/PAC-25	2,000	ORS low osm flavour 20.5g/1l CAR/1000	319

Artesunate pwd inj 60mg vial/BOX-1	80,000	Oxytocin inj 10 IU 1ml amp/BOX-10	1,101
Azithromycin 250mg tablets/PAC-6	74,056	Paracetamol 250mg disp tabs/PAC-100	47,500
Benzyl benzoate 25% lotion /BOT-1000ml	200	Paracetamol 500mg tabs/PAC-100	34,000
Ceftriaxone pwd inj 1g vial/BOX-10	4,784	ReSoMal 42g sachet 1l/CAR-100	150
Clotrimazole 500mg vag tabs/applicator	48	Sod lactat comp inj 500ml w/g.set/BOX-20	700
Dexamethasone inj 4mg/ml 1ml amp/BOX-50	2,047	Sodium chl inj 0.9% 500ml w/g.set/BOX-20	700
Epinephrine inj 1mg/ml 1ml amp/BOX-10	2,120	Sul 100mg+Trimet 20mg disp tab/PAC-100	37,429
Fe(as fum.)+folic 60+0.4mg tab/PAC-1000	17,731	Sul 200mg+Trim 40mg/5ml os/BOT-100ml	400
Gentamicin inj 40mg/ml 2ml amp/BOX-50	10,892	Tetracycline eye ointment 1%/TBE-5g	20,000
Glucose hyperton.inj 50% 50ml v1/BOX-20	30	Zinc 20mg tablets/PAC-100	50,813
Glucose inj 5% 500ml w/g.set/BOX-20	700		

PPE			
Items	Units	Items	Units
Apron, plastic re-usable and disposable	4,223	Masks	231,130
Body bags, adult	11,622	Nose masks	450
Boot adult pair	100	Plastic helmets	450
Gloves heavy duty	700	Rain boots assorted sizes	582
Gloves w/o pwd nitr L disp/BOX-100	990	Rain suits long type	575
Gloves w/o pwd nitr M disp/BOX-100	1,370	Raincoat	107
Gloves w/o pwd nitr S disp/BOX-100	970	Safety clothing and headgear - bibs	80
Hooded overall assorted sizes	537	Safety goggles	6,600

Water and Sanitation			
Items	Units	Items	Units
Bucket HDPE with lid 14l	500	Plastic buckets with faucets	15
Calcium Hypochlorite 10kg drum	16,800	Liquid Chlorine Solution 0.7% 3.7l	107,895
Calcium hypochlorite 2.5kg drum	273	Plastic buckets with faucets	15
Calcium hypochlorite 45kg drum	13,680	Pumps compressors & accessories	16,000
Calcium Hypochlorite 50kg drum	30	Soap 110g bar carton	170,030
Calcium Hypochlorite 5kg drum	3,920	Soap antibacterial	70
Calcium hypochlorite 65-70% kg	124,716	Sprayers 16l	15
Dispositifs de lavage des mains	500	Water Dispenser with double faucet	2
Filtering & purifying equip disp	4	Water floc & disinfectant pwd/BOX-240	879,120

Nutrition		Temporary Structures	
Items	Units	Items	Units
F-100 therap diet sachet 114g/CAR-90	874	Camping goods - disp large trays	200
F-75 therap diet sachet 102.5g/CAR-120	700	Camping goods - disp paper plates	200
MUAC child 11.5 red/PAC-50	3,020	Camping goods - disp plastic forks	200
Multiple micronutrient pwd sach /PAC-30	10,000	Camping goods - disp plastic spoons	200
Portable Photometer Iodine in Salt	3	Plastic mat big size	200
Reagents for S0000228/PAC-100	25	Tarpaulin plastic roll 4 x 50m	65
Scale electronic mother/child 150kg x 100g	100	Tent light weight rectangular 72m ²	62
Scale infant spring type 25kg x 100g	800		
Therapeutic spread sachet 92g/CAR-150	1,500		
Therapeutic spread sachet 92g/CAR-150	65,697		

Source: UNICEF Supply Division.

Table 4 describes the tentative country demand over the next 6 months for PPE components for both high and low-risk settings to form the next series of shipments to countries engaged in EVD preparedness, planning and response for Guinea, Liberia and Sierra Leone.

Table 4 Current EVD Pipeline Response Supplies for Guinea, Liberia and Sierra Leone for the next 6 months

Medical equipment			
Items	Units	Items	Units
Bed hospital standard w/mattress	100	Gloves surgical disp S	30,000
Cannula IV short 16G ster disp	4,500	Glucose hyperton inj 50% 50ml v1/BOX-20	30
Cannula IV short 18G ster disp	9,030	Glucose inj 5% 500ml w/g.set/BOX-20	700
Cannula IV short 22G ster disp	9,030	Gown surgical su	100,000
Cannula IV short 24G ster disp	9,000	Hand wash disinfectant	6,000
Diarrhoeal disease set PAC	20	Infusion g.set w/burette ster su	3,000
Ebola flyer	50,000	Mask surgical IIR type su	25
Gentam inj 40mg/ml 2ml amp/BOX-50	134	Mask surgical/PAC-50	7,500
Gloves exam latex pwd-free L/BOX-100	76,100	Medical cot surge bed w/IV pole for ETU	600
Gloves exam latex pwd-free M/BOX-100	82,000	Needle disp 19G ster/BOX-100	5
Gloves exam latex pwd-free S/BOX-100	76,000	Needle disp 21G ster/BOX-100	180
Gloves exam nitr n/ster L	60,000	Needle disp 23G ster/BOX-100	180
Gloves exam nitr n/ster M	60,000	Sod lactat comp inj 500ml w/g.set/BOX-20	800
Gloves exam nitr n/sterile S	60,000	Sodium chl inj 0.9% 500ml w/g.set/BOX-20	700
Gloves surgical disp L	30,000	Syringe disp 10ml w/ndl 21G/BOX-100	5
Gloves surgical disp M	30,000	Syringe disp 5ml w/ndl 21G/BOX-100	5

Medicines		PPE	
Items	Units	Items	Units
Albendazole 400mg chew tabs/PAC-100	508	Anti-Fog spray for glasses	14,000
Amoxicillin 250mg disp tab/PAC-10	1,500	Aprons heavy duty non-woven	150,000
Amoxicillin 500mg disp tab/PAC-10	1,000	Cadaver bag adult	7,000
Ceftriaxone pwd inj 1g vial/BOX-10	20,000	Cadaver bag child	3,000
Ceftriaxone pwd inj 250mg vial/BOX-50	200	Coveralls L	130,000
Ciprofloxacin 250mg tabs/PAC-10	5,000	Coveralls M	130,000
Ciprofloxacin 500mg tabs/PAC-10	10,000	Coveralls XL	130,000
Diazepam inj 5mg/ml 2ml amp/BOX-10	1,091	Face shield guardall disp	6,000
Metochlorpramide inj 5mg/ml	1,500	Gloves heavy duty	325,500
ORS low osm 20.5g/1l CAR/1000	100	Gum boots with anti-slip profile knee high - 42	500
ORS low osm 20.5g/1l/CAR-100	1,125	Gum boots with anti-slip profile knee high - 43	500
Promethazine 25mg tabs/PAC-100	250	Gum boots with anti-slip profile knee high - 44	500
ReSoMal 42g sachet for 1l/CAR-100	46	Hand sprayer compression	14,000
Sodium lactat inj 1l	3,000	Helmet plastic	500
Sodium lactat inj 500ml	2,500	Mask/PAC-40	7,500
Zinc 20mg tablets/PAC-100	10,059	Nose mask	200,500
Temporary structures		Overalls	500
Items	Units	Rain boots	500
Tarpaulin plastic roll 4 x 50m	70	Rain suit	500
Tent light weight rectangular 42m ²	110	Safety goggles	28,500
Tent light weight rectangular 72m ²	190	Shoe covers protective	300,000

Water and Sanitation			
Items	Units	Items	Units
Back pack sprayer 16l	5,150	Refuse bag 100l black 70 microns	20
Bucket w/lid plastic 20l	100,000	Refuse bags bio-hazard plastic/PAC-100	30,000
Calcium Hypochlorite 60-70% kg	252,000	Sanigel alcohol 62% hand cleanser w dispenser	500
Chlorax 1l	150,000	Soap 100g bar	250,000
Chlorine (NaDCC 67mg tabs/BOX-100)	40,000	Soap 200g bar	3

Chlorine HTH 25kg/BOX	800	Soap 90gm x 60 bars/CAR-60	10,000
Chlorine solution x 250ml	1,700,000	Squat plate plastic 80 x 60cm	200
Hand washing demonstration flier	50,000	Water guard	150,000
Jerry cans 20l	100,000	Water tank collapsible 10000l w/dist kit	50
Measuring cup	50,000	Water tank rigid 5000l w/fittings	44

Nutrition			
Items	Units	Items	Units
F-100 therap diet sach 114g/CAR-90	652	Ready to use infant formula 235ml/PAC-6 Bottles	336,000
F-75 therap diet sach 102.5g/CAR-120	302	Scale electronic mother/child 150kg x 100g	50
MUAC adult without colour code/PAC-50	15	Scale infant clinic beam type 16kg x 10g	10
MUAC child 11.5 red/PAC-50	10,015	Scale infant spring type 25kg x 100g	800
Portable baby/child L-hgt mea syst/SET-2	200	Therapeutic spread sachet 92g/CAR-150	53,300
Portable baby/chlid.adult mea syst/SET-2	33		

Source: UNICEF Supply Division.

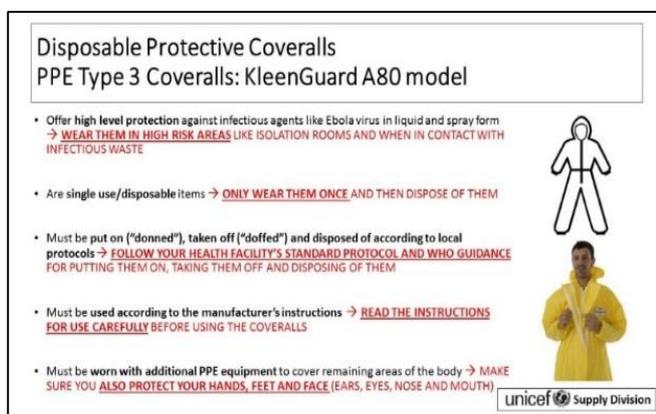
Table 5 provides an overview of available PPE coveralls based on an indicative production of 30,000 units per month for use in high-risk setting. The gap in supply is substantial based on an estimated need of 3,300 units per day. UNICEF is working with WHO to establish a delivery prioritisation mechanism until sufficient production is available, which is anticipated by the December 2014 / January 2015 timeframe.

Table 5 PPE Supplies Availability and Indicative Production Capacity

Products	Available Quantity	Lead Time	Indicative Production Capacity / Month
Coveralls	14,300	In stock	30,000
Rubber boots-reusable PPE	1,441	In stock	2,800
Heavy duty apron, plastic or rubber	1,250	Lead time 5 weeks	65,000
Face mask – disposable PPE pack 20	64,000	In stock	100,000
Heavy duty gloves-disposable	13,300	In stock	20,000
Exam gloves Nitrile non-sterile	10,650,000	In stock	n/a
Goggles - disposable PPE	6,000	In stock	50,000
Anti-fog spray for goggles - consumables	930	In stock	900
Face shield – consumables	2,300	In stock	40,000
Bio-hazard plastic bags	4,500	Lead time 6 weeks	3,000

Source: UNICEF Supply Division.

Figure 2 Example of Product Information Sheet for Type 3 Coveralls



The need to reinforce compliance with protocol measures and procedures is important for single use items. A letter noting appropriate use needs to accompany each item, especially for Single Use items. UNICEF is preparing additional product information sheets for some of the PPE products used in high risk settings that are meant to complement training on the use of the PPE. Figure 2 provides an illustrative example one such product information sheet for end users of a particular brand of Type 3 coveralls.

The ‘household protection kit’ developed by MSF contains component products (listed in Table 6) to reduce transmission within families by providing basic protection and disinfection tools for families with the possibility of an infected member. UNICEF is currently sourcing these components for urgent kit packing and supply.

Table 6 Household Protection Kit Contents

Product	Quantity
Sprayer, 1l	1
Bucket + lid, 20 l, food grade plastic, stackable	1
Refuse bag, 100 litres, red, 70 microns	20
Gloves, cleaning, rubber, reusable, pair, L	4
Gown, surgical, non-woven, single use, XL	4
Mask, surgical IIR type, single use	25
Soap, 100 g, bar	6
Gloves, examination, latex, single use, non-powdered, L	100
Chlorine NaDCC 500g pack + 20 ml measuring scoop*	1

Note*: Chlorine NaDCC is not included in the kit box. It is provided separately with each kit.

Source: UNICEF Supply Division.

Similar to the high risk PPE kit, functionally equivalent products are being sourced where they are more rapidly available. UNICEF advises 600g bars of soap, which is twice the standard product amount.

4. Pipeline Therapeutic and Medical Interventions

UNICEF has conducted an initial survey of the market to assess pipeline products which could eventually be used for EVD prophylaxis and therapeutics (Annex 1). Most of the products are currently in pre-clinical or Phase I studies, with limited immediate availability (even if appropriate regulatory and ethical clearances were given). These products are usually generously financially supported, including substantial grants (sometimes greater than \$100 million) from various agencies of the U.S. Government, including the National Institute of Health (NIH).

UNICEF has been contacting individual manufacturers to assess capacity and timing for potential compassionate use. Initial information has been included from both those communications and other sources, including manufacturers attending WHO’s recent consultation on potential therapies and vaccines. UNICEF will update the available information as it materialises. UNICEF’s actions are intended to be supportive and informed by the normative decisions of WHO and other national regulatory bodies. UNICEF looks forward to partners’ and governments’ own assessments and ongoing interactions with many of the identified manufacturers as it relates to product efficacy and bioethical and regulatory standards.

5. Next Steps

- UNICEF is continuing to place emergency purchase orders (POs) for key essential items requested to meet PPE item requests, including high filtration and surgical masks, infusion giving sets, disposable aprons and body bags.
- UNICEF is working with WHO, MSF and suppliers to establish a harmonised set of standards for EVD PPE supply selection in low- and high-risk settings.
- UNICEF will continue to work with the main PPE manufacturers (DuPont, 3M, Kimberly Clark and others) and seek to ensure increased supply and reduced lead times for delivery. UNICEF will

use updated standards to establish supplier arrangements for EVD PPE to meet demand for low- and high-risk settings.

- UNICEF may need to set-pack EVD PPE kits for high risk setting in our warehouse until containment of EVD or availability of treatment.
- As UNICEF makes further progress in identifying additional manufacturers and supply sources, particularly for PPE designed for the high risk setting, this note will be updated accordingly.
- UNICEF will continue to survey the EVD prophylaxis and therapeutics markets to assess any potential for any emerging intervention to be opportunistically used on a compassionate basis, including manufacturers' capacity and timing for scale-up. As regulatory authority and other related normative functions rest with WHO, UNICEF will look to be supportive in our work, subject to the direction and policies set by WHO.
- UNICEF Supply Division staff have been deployed to Liberia and Sierra Leone to meet with partners and work on strengthening in-country coordination and the different roles and responsibilities.

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Other UNICEF information notes can be found at http://www.unicef.org/supply/index_54214.html.

Annex 1a Pipeline Prophylaxis & Prevention

Product / Company	Description	Current Status
GSK (UK)	<ul style="list-style-type: none"> - Attenuated strain of recombinant chimpanzee adenovirus virus, (cAd3). - CimpAdenoVirus 3 that is used as a carrier, or vector, to deliver benign genetic material derived from the Ebola virus Zaire. 	<ul style="list-style-type: none"> - Up to 10,000 additional doses are planned for production. No timing is confirmed, but end December 2014, January 2015, 1Q 2015 or later in the year remains possible. - Primary health workers would likely be primary group. - Cost unknown. - Human trials to be conducted in University of Oxford (60 people), Gambia (40 people), Mali (40 people) and US (unknown). - Phase 1 trial start: USA 2nd Sep 2014 / UK mid-Sep 2014 / The Gambia early-Oct 2014 / Mali early-Oct 2014 / Uganda to be determined. - Phase 1 trial preliminary results: USA end-Oct 2014 / UK end-Oct 2014 / The Gambia end-Nov 2014 / Mali end-Nov 2014.
Crucell (J&J)	<ul style="list-style-type: none"> - Vaccine based on PER.C6® cells. - Initially using Adenovirus Serotype 5 (Ad5), additional vectors are expected to be included in further developments. 	<ul style="list-style-type: none"> - Small phase I completed (16 individuals). - Extended Phase I anticipated next. - Awaiting potential capacity and timing from manufacturer. - Have entered into partnership with Bavarian Nordic.
Bavarian Nordic	<ul style="list-style-type: none"> - 3 vaccines under development based on Smallpox and Marburg model. - 1 vaccine of 1 ds sch. + 2 vaccines 2 ds sch. under development. 	<ul style="list-style-type: none"> - Have just past pre-clinical trials, will enter clinical trials. - Capacity to produce vaccine batches of 100,000 vials and a 28 million production capacity. - Have entered into partnership with Crucell.
NewLink Genetics	<ul style="list-style-type: none"> - Vaccine based on replication-competent vesicular stomatitis virus (and advanced vaccine technology developed for Ebola and Marburg). 	<ul style="list-style-type: none"> - Currently advancing this vaccine into a human Phase I safety study is a major priority for NewLink and their partners. - August 2014, Public Health Agency of Canada donated 800-1,000 doses to WHO (remaining doses after conclusion of phase 1 trials. Details of the donation are under discussion. - Further availability will depend on investment into manufacturing. - Phase 1 trial start: USA 1st-2nd week Oct 2014 / EU unknown / Africa site Oct 2014. - Phase 1 trial preliminary results: USA ~end-Nov 2014 / Africa site end-Nov 2014.
Profectus Biosciences	<ul style="list-style-type: none"> - Vaccine targeting pre- and post-exposure protection against the haemorrhagic disease caused by Ebola and Marburg viruses. 	<ul style="list-style-type: none"> - Animal trials still ongoing.
Thomas Jefferson University (PA)	<ul style="list-style-type: none"> - Vaccine based upon chemically inactivated rabies virus (RABV) containing EBOV glycoprotein in their envelope. 	<ul style="list-style-type: none"> - Plans to start Phase I by September 2014 and finishing by March 2015, which also includes production of 1,000 doses of vaccine for clinical trials. (Expected 40 individuals in Phase I). - Phase II expected to start in January 2015 and end February 2016, treatment of 1,000 patients. - IDT Biologika GmbH to perform manufacturing, with potential to ramp-up production during Phase II for commercial (if product is indicating effectiveness). Vaccine production component of clinical trial is estimated at ~\$2m.

Annex 1b Pipeline Treatments

Product / Company	Description	Current Status
<p>Convalescent plasma / <i>Blood Transfusion Services</i></p>	<ul style="list-style-type: none"> - Blood transfusions derived from EVD survivors. - Considered safe if well-managed. - Risks are those associated with any blood, blood products and blood borne pathogens. - Theoretical concern about antibody dependent enhancement of EVD infection, which may increase infectivity in cells. 	<ul style="list-style-type: none"> - Results from studies are difficult to interpret. - Not known if antibodies from survivors' plasma is sufficient to treat or prevent disease. - More research is ongoing and options to conduct studies are being explored. - Logistics and blood management, transport and shipping from source to point of use may be a challenge. - First batches of convalescent plasma might be available by end-2014.
<p>Polyclonal Immunoglobulins / <i>Fab'Entech -France</i></p>	<ul style="list-style-type: none"> - Hyper immune globulin of purified concentrated plasma of immunised animals and previous infected humans with high titres of neutralising antibodies to be used. - Antibodies that can neutralize the different EVD strains shown offer protection in monkeys 48 hours after EVD exposure. 	<ul style="list-style-type: none"> - Generally considered safe. Extensive experience with the use of hyper immune globulin against other infectious diseases. Inactivation and purification procedures eliminate blood-borne pathogens. - Not currently available. - Several months needed to immunize animals, collect plasma and purify product. Work has started on producing immune globulin in horses, and human immune globulin in cattle. - Studies in horses could take place in 6 months, but large scale batches for human use not expected before mid-2015.
<p>ZMapp / <i>Mapp Biopharmaceutical; LeafBio</i></p>	<ul style="list-style-type: none"> - Combination of 3 monoclonal antibodies. - Plant-system based production. 	<ul style="list-style-type: none"> - Planning Phase I clinical trials for which it needs to still produce sufficient quantities. - Current supply has been exhausted (originally intended for just animal safety and efficacy testing); working with U.S. Gov't to "accelerate scale-up" of production which might yield a few hundred doses by end-2014 / 6 months. - Active pharmaceutical ingredient appears to be able to be produced on the order of several weeks. Subsequently, distillation and purification processes are required to isolate the API (time unknown).

<p>TKM-Ebola / <i>Tekmira</i> <i>Pharmaceuticals</i></p>	<ul style="list-style-type: none"> - Small interfering RNA molecular (encapsulated in lipid nanoparticles) against Ebola virus RNA polymerase L protein. 	<ul style="list-style-type: none"> - 83% effective in primates if administered 48 hours after infection and 67% survival 72 hours after infection. - Single dose study found adverse effects of headaches, dizziness, and chest tightness and raised heart rate at high doses. Lower dosage thought to be better tolerated and inform proposed treatment. - US FDA has authorised emergency use in EVD infected patients. A limited number of treatment courses are potentially available. - A potential 900 courses could be produced by early 2015. - Phase I clinical trials begun in January 2014. Previous hold on clinical trials was removed allowing for treatment with currently Ebola-infected patients (subject to all other clearances). - Company has inventory to cover Phase I trials. Requires “months” to produce new quantities.
<p>BCX4430 / <i>BioCryst</i> <i>Pharmaceuticals</i></p>	<ul style="list-style-type: none"> - Broad-spectrum RNA dependent-RNA polymerase inhibitor. 	<ul style="list-style-type: none"> - 83-100% survival in rodents with EVD and effective in animals 48 hours after infection with Marburg virus (same family as Ebola). Study is still in preclinical trials with safety studies planned. - Awaiting clarification of potential capacity and timing. Need animal treatment and protection data for EVD prior to consideration for availability and feasibility. - No material is currently available for field use.
<p>AVI-7537 / <i>Sarepta Therapeutics</i></p>	<ul style="list-style-type: none"> - Phosphorordiamidate oligonucleotide. - RNA-based therapeutics. 	<ul style="list-style-type: none"> - 60-80% survival in primates when given at time of infection. - Human tolerability has been demonstrated in early studies. - Active ingredient is available for 20-25 courses by mid-October. Potential production of approx. 100 treatment courses could available by early 2015. - Previous clinical trials has been cancelled (supposedly due to U.S. Federal government budget) - Company has publicly stated that it has active pharmaceutical ingredient which can, given appropriate waivers, be available in a week. Quantities prospectively available is currently unknown, however.
<p>Favipivavir / T-705 / <i>Toyama Chemical/Fuji</i> <i>Film</i></p>	<ul style="list-style-type: none"> - IV infusion of lyophilised siRNA prevents replication within cell (0.3mg/kg infusion once for 7 days). 	<ul style="list-style-type: none"> - Effective in mice, but limited in NHP (1 in 6 survived). - A study using a different dose regimens underway. - Approved in Japan for flu treatment and under study in other countries. - Tested in 1,000 people with no adverse effects. - EVD doses are to be 2-5 times higher than currently tested, and treatment duration to be longer than for flu. - Use for field post-exposure prophylaxis under discussion. - 10,000 treatment courses may be available, pending dosage volume to be used for EVD.

<p>Interferons (IFN) many non-exhaustive list: Alpharona / Pharmaclon; IntronA (Intron-A) / Schering-Plough; IFN-β / Realderon / Teva; Reaferon EC / GNC Vector; Reaferon EC-Lipint / Vector-Medica; Infagel / Recolin / Vector-Medica; Altevir / Bioprocess; Viferon / Feron; Kipferon / Alfarm; Giaferon / A/S Vitafarma; Genferon / Biocad; Grippferon / Ophthalamoferon / Gerpferon / Firn-M</p>	<ul style="list-style-type: none"> - IFNs demonstrate clinically to have a role in treating viral diseases, as they enhance innate and adaptive immune and antibody responses. - They have widespread potential (generally for HepB and C infections). It is not yet known if this product could be efficacious in EVD, and no tests have yet been done. - IFNs could be used where clinicians have experience in IFN use for other conditions. 	<ul style="list-style-type: none"> - Use of IFN-β in NHP prolonged time to death from Ebola (Zaire) at 18 hours post infection. 1/3 of NHP survived infection from Marburg infection. - IFN-α2b daily therapy starting 18 hours after infection reduced viremia without significant delay time to death. - Availability of US-FDA and other approved stocks unlimited, though cost, and absence of an approved product for use with EVD will be a barrier.
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Source: UNICEF Supply Division / WHO.