2014 West Africa Ebola Outbreak

- Majority of cases in Liberia, Guinea and Sierra Leone
- Transported to Nigeria and Senegal

Since 22 March 2014

- Over 3,000 deaths
- Over 6,500 cases
- ~50% mortality rate

Source: HealthMap
Decontamination of Electronic Devices with Chlorine Dioxide Gas

- Tested to be non-destructive to electronics by use of 15 decon cycles on a simulated device and 5 decons on an iStat device without measurable damage to electronics.

- Process creates heat 80-120°F temp

- 30 minute spore kill demonstrated
Protocol

- Perform a surface decon of the equipment. Remove any soil or fluids using appropriate PPE and disinfectants.
- Open kit and tape chlorine dioxide (CD) indicator with purple check marks facing in the up direction within the sealable bag. Place one in the center and one in the corner. Decon should occur in shaded, well ventilated area (outside is ideal in case of bag leak).
- Open the mylar bags containing Part A and Part B and place into some type of cup container (ideally disposable plastic) that can hold at least 50 mls of material and fluid.
- Add ~15 mls of water to the Part A and Part B container. Quickly, mix gently, and place into the center of the sealable bag.
- Place your item to be deconned in the bag and ideally lifted off of the surface of the CD mixture and bag.
- Seal bag, record time, and observe the CD indicator. Open after a minimum of 30 minutes (60 minutes ideal) and when the CD indicator changes from lighter purple to pink. The bag will generate heat and pressure during the gas phase of the process.
- After 30 minutes and CD indicator change, remove the device, wipe down equipment with a water solution and dry. Use gloves and open bag in a well ventilated area and shaded area. CAUTION: Gas generated in bag is strong and there will be chlorine residue on the equipment that will irritate skin and mucous membranes.
- Seal bag and properly dispose of the bag and components. At this point the bag is not considered medical waste.
Old School...

New School?

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Equipment Decontamination

Current system
2 gallon and 10 gallon bags
Two powder packets combined
Water added to powder and bags rapidly sealed

Ideal system
1 m$^3$ and 0.5$^3$ m fixed containers
Ports for addition of dry and liquid components
Personnel Decontamination

Current system
Personnel spray one another with bleach mist prior to removing PPE. Difficult to insure topical coverage.

Ideal system(s)
Bleach foam spray
Cubicle
Current system
Single agent assays (Ebola virus)

Ideal multiplex system(s)
Ebola virus
*Plasmodia sp*
*S. typhii*
Lassa fever virus
Improved Patient and Body Transport

**Current system**
Standard clothing
Public or private vehicles
Assemble absorbent material and plastic body bag the field
( Sometimes just plastic used, causes bodies to explode dispersing infectious material)

**Ideal system(s)**
Ventilated patient clothing that protects other personnel
Modified vehicle
Body bags that include fail-safe absorbent material within plastic
Data Collection and Management

**Current system**
Ad hoc

**Ideal system(s)**
Real time monitoring of patient census, outcomes, personnel, supplies
Fieldable devices