Laboratory Preparedness for Emerging Pathogens 2015

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DISCLAIMER

- Protocols and processes described are specific to Texas Health Presbyterian Dallas, laboratory equipment, laboratory design, scope of service, and engineering controls.
- Each hospital and each laboratory is different. What we have put into place may not be appropriate for your hospital.
- Each Laboratory Medical Director in conjunction with Laboratory and Hospital Leadership should determine what needs to be done for their Laboratory based on their own scope of service and completion of a risk assessment.
LEARNING OBJECTIVES

• Outline the responsibility of the clinician in recognizing patients with suspected highly infectious agents.
• Consider the response to health alerts disseminated by the local health department and internal infection prevention team.
• Discuss the 2014 presentation of the first USA Ebola patient presenting to a tertiary care hospital unannounced.
• List and categorize emerging pathogens that are of current interest and concern to the clinical laboratory.
• Discuss appropriate handling and testing of specimens that are suspected of or known to contain an emerging pathogen (including how laboratory handling may differ per specimen, type of transmission and mode of testing performed).
• Identify potential challenges and necessary work process revisions for the clinical laboratory from the onset of and during an actual event.
• Discuss real world examples of laboratory testing and handling of highly infectious specimens from receipt to disposition.
• Make a distinction between lines of communication necessary for:
  • Laboratory Medical Director and Laboratory Management Team with the laboratory employees
  • Laboratory team with the rest of medical staff
LEARNING OBJECTIVES

• Communicate the necessity for laboratory preparedness before an actual sentinel event (including but not limited to):
  – Risk Assessment
  – Training
  – Supplies
  – Test Menu
  – Disposition of Samples

• Outline the opportunities for the lab medical director as a member of the medical staff and the medical disaster team.

• Summarize coordination of effort between Sentinel and LRN Laboratories and the provision of timely test results.

• Define the LRN laboratory and CDC roles during an emerging pathogen disaster event.
  • As a reference and support for the clinical laboratory
  • In regards to investigating and tracking highly infectious agents such as the Ebola virus

• Delineate the major social, economic, political, and security implications in light of a potential emerging pathogen disaster event for the hospital and the laboratory, the hospital employees, and the medical staff.

• Describe donning and doffing of high level PPE.
Pathogens of Consideration

- MERS (Middle East Respiratory Syndrome)
- Novel and Avian Influenza
- Vector-borne viruses: Chikungunya/Dengue
- Reservoir: Hantavirus
- *Brucella/Anthrax/Yersinia pestis/Burkholderia pseudomallei*
- Creutzfeldt-Jakob disease (CJD) Prion disease
- Hemorrhagic Fever
  - (Ebola, Lassa, Marburg, Crimean-Congo, Guanarito, etc)
Middle East Respiratory Syndrome
MERS

1) Countries in or near the Arabian Peninsula with MERS cases: Iran, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, United Arab Emirates (UAE), and Yemen (camel reservoir?)

2) Countries with travel-associated MERS cases: Algeria, Austria, China, Egypt, France, Germany, Greece, Italy, Malaysia, Netherlands, Philippines, Republic of Korea, Thailand, Tunisia, Turkey, United Kingdom (UK), and United States of America (USA).

Common signs/symptoms: fever, cough and SOB
Others: pneumonia, GI
36% mortality rate

MERS

- Little known about MERS to date with regards to pathogenicity and transmission
  - Close Contact and Health Care Providers

- Care should be taken to limit aerosols
  - Class II Biological Safety Cabinet (BSC)
  - Containment (closed tubes, buckets, rotors, etc)

- PPE
  - disposable gloves
  - disposable impervious laboratory coat/gown
  - NIOSH-approved filtering respirator (i.e.N-95 with fit test)
  - eye protection

- Three specimens types collected for optimal recovery via rRT-PCR (CDC approved assy)
  - lower respiratory
  - upper respiratory
  - serum specimens
  - Stool no longer recommended as routine collection

- Simultaneous testing for common respiratory pathogens
  - molecular
  - antigen detection
Biosafety Level (BSL)-2 Lab
- All activities involving infectious materials are conducted in biological safety cabinets or other physical containment devices within the laboratory.
- No work in open vessels is conducted on the open bench.
  - Processing of samples
  - Non-culture based diagnostic testing

Special Microbiological Practices:
- Disposable, wrap-around gown
- Shoe covers
- N95 respirator
- Eye protection, face shield, or PAPR
- Double glove inside the room before beginning work.

Evaluation and Capacity Review Tools:
http://www.cdc.gov/flu/international/tools.htm
Aedes aegypti

http://entomologytoday.org/tag/aedes-aegypti/
Chikungunya and Dengue Virus

- Dengue and Chikungunya viruses are transmitted by the same mosquitoes and have similar clinical features.
  - The two viruses can circulate in the same area and can cause occasional co-infections in the same patient.
- Dengue Hemorrhagic Fever (DHF) is also known as 'break bone fever'.
  - Severe pain in the eyes, head, and extremities
  - Nasal congestion/mucous buildup
- Chikungunya virus infection
  - High fever
  - Severe joint pain
  - Rash
  - Lymphopenia
- Note: Dengue virus infection is more likely to cause neutropenia, thrombocytopenia, hemorrhage, shock, and death.

http://www.cdc.gov/chikungunya/hc/clinicalevaluation.html
Prior to 2013, Chikungunya virus outbreaks had been identified in countries in Africa, Asia, Europe, and the Indian and Pacific Oceans.

In late 2013, the first local transmission of Chikungunya virus in the Americas was identified in the Caribbean (see map on next slide for distribution).

Dengue has emerged as a worldwide problem only since the 1950s.

Although dengue rarely occurs in the continental United States, it is endemic in Puerto Rico and in many popular tourist destinations in Latin America, Southeast Asia and the Pacific islands.

http://www.cdc.gov/chikungunya/hc/clinicalevaluation.html
Countries and territories where Chikungunya cases have been reported (as of March 10, 2015)

http://www.cdc.gov/chikungunya/geo/index.html
Chikungunya and Dengue Virus

- Laboratory diagnosis via serum or plasma to detect:
  - viral antigen
  - viral nucleic acid
  - IgM (ELISA or neutralizing antibody)
- Viral culture may detect virus within the first 3 days of illness
  - Requires BSL-3 conditions

- Chikungunya viral RNA can often be identified in serum within first week.
- Chikungunya antibodies may be found after first week.
- Convalescent-phase samples should be obtained from patients whose acute-phase samples test negative

- Diagnosis of acute Dengue can be established by testing serum samples during the first 5 days of symptoms and/or early convalescent phase (more than 5 days of symptoms).

http://www.cdc.gov/mmwr/preview/mmwrhtml/00031653.htm#00000568.htm
Dengue Diagnostic Process

Days Post-onset

0 1 2 3 4 5 6 7 8 9 10

Acute Serum
RT-PCR

- Undetermined cause of illness
+ Identification of DENV-1, -2, -3 or -4

Convalescent Serum

IgM ELISA

- No evidence of recent infection
+ Recent infection

IgM -

IgG -/+ 4 x (IgG +)

IgM +
Hantavirus

- May 1993 – first recognized HPS
- BSL-2 is recommended for laboratory handling of sera from persons potentially infected with the agents of HPS
- Several types of hantaviruses can cause hantavirus pulmonary syndrome
  - Sin Nombre strain first recognized
- Hantaviruses are carried by several types of rodents, particularly the deer mouse.
- Infected primarily occurs by breathing air infected with hantaviruses that are shed in rodent urine and droppings.

http://www.mayoclinic.org/diseases-conditions/hantavirus-pulmonary-syndrome/basics/definition/con-20030129
Hantavirus

- Flu-like symptoms 1-6 weeks post exposure
  - Fever >101
  - Chest X-ray that resembles ARDS
  - No cure – respiratory therapy may be necessary

- Laboratory Testing
  - IgM or increasing IgG
  - Nucleic Acid
  - Antigen
  - Left shift in the white blood cell count, neutrophilic leukocytosis, thrombocytopenia, and circulating immunoblasts.

Brucella/Anthrax/Francisella/Y. pestis/B. pseudomallei (and other agents of bioterrorism)


Prion diseases or *transmissible spongiform encephalopathies (TSEs)* are a family of rare progressive neurodegenerative disorders that affect both humans and animals.

They are distinguished by long incubation periods, characteristic spongiform changes associated with neuronal loss, and a failure to induce inflammatory response.

The term "prions" refers to abnormal, pathogenic agents that are transmissible and are able to induce abnormal folding of specific normal cellular proteins called prion proteins that are found most abundantly in the brain.

- The abnormal folding of the prion proteins leads to brain damage associated signs/symptoms of the disease.
- Prion diseases are usually rapidly progressive and always fatal.

- Tau 14-3-4 protein
- Scrapie prion protein (PrPSc)

[http://case.edu/med/pathology/centers/npdpsc/](http://case.edu/med/pathology/centers/npdpsc/)
Creutzfeldt-Jakob disease (CJD)
Prion disease


http://case.edu/med/pathology/centers/npdpsc/
**Viral Hemorrhagic Fevers (Ebola, Lassa, Marburg, Crimean-Congo, Guanarito, etc)**

VHF's are caused by viruses of four distinct families: arenaviruses, filoviruses, bunyaviruses, and flaviviruses.

- They are all RNA viruses, and all are covered, or enveloped, in a fatty (lipid) coating.
- Their survival is dependent on an animal or insect host, called the natural reservoir.
- The viruses are geographically restricted to the areas where their host species live.
- Humans are not the natural reservoir for any of these viruses. Humans are infected when they come into contact with infected hosts. However, with some viruses, after the accidental transmission from the host, humans can transmit the virus to one another.
- Human cases or outbreaks of hemorrhagic fevers caused by these viruses occur sporadically and irregularly. The occurrence of outbreaks cannot be easily predicted.
- With a few noteworthy exceptions, there is no cure or established drug treatment for VHF's.

[http://www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/vhf.htm](http://www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/vhf.htm)
Viral Hemorrhagic Fevers (Ebola, Lassa, Marburg, Crimean-Congo, Guanarito, etc)

WHO Laboratory assessment tool: Ebola virus disease/viral hemorrhagic fever diagnosis capacity - January 2015


Current CDC EVD Risk Assessment

Updated as of May 1, 2015


- Low Risk (but not zero) category now includes:
  - In any country
    - Laboratory processing of blood or body fluids from a person showing symptoms of Ebola while wearing appropriate PPE and using standard biosafety precautions
## Classification of Emerging Pathogens in the Laboratory

<table>
<thead>
<tr>
<th>Respiratory/Aerosol/Droplet</th>
<th>Reservoir/Vector-borne</th>
</tr>
</thead>
<tbody>
<tr>
<td>MERS</td>
<td>Chikungunya</td>
</tr>
<tr>
<td>Novel and Avial Flu</td>
<td>Dengue</td>
</tr>
<tr>
<td>Smallpox</td>
<td>Hantavirus</td>
</tr>
<tr>
<td>Blood-borne</td>
<td>Propagated in Culture</td>
</tr>
<tr>
<td>Enterovirus D68</td>
<td>Bacterial BTA agents</td>
</tr>
<tr>
<td>Hemorrhagic Fevers</td>
<td>Other</td>
</tr>
<tr>
<td>Smallpox</td>
<td>Prions</td>
</tr>
</tbody>
</table>

Classify agents as to form of transmission to help determine what appropriate PPE and testing.
The Role of the Sentinel Lab within the National Laboratory Network

The Role of the Sentinel Lab within the National Laboratory Network

- LRN
  - Established by the CDC, FBI, APHL, and USAMRIID
  - Goal is to decentralize testing capabilities and to link state and local labs with advanced-capacity clinical, food/water, vet, agricultural labs
  - Designated hospital labs as “sentinel labs”

Sentinel Labs
- Rule out critical biological agents
  - Follow protocols established by CDC and ASM
- Must have BSL-2 capability
- Refer to higher lab for confirmation
  - Chain of custody
  - Shipping and handling requirements
- Clues to a biological attack
  - Increased incidence of disease observed by doctors, EMS, pharmacists and laboratory techs
The Role of the Sentinel Lab within the National Laboratory Network

- Build a relationship with local LRN personnel
- Make sure all notifications from both CDC and LRN are received by the lab
  - Simplify this information into usable format for laboratory technologists on the bench
- Keep updated menu of LRN capabilities
- All numbers for LRN contacts accessible and posted in microbiology laboratory
- Attend any/all training offered by LRN (bioterrorism agent training, packaging/shipping, etc)
Sentinel and LRN Coordination

- Direct lines of communication will assist to expedite results
  - How will LRN obtain sample? (courier/other?)
    - What forms must accompany sample?
    - Tracking?
  - How will LRN submit results to clinical lab?
    - Is ordering physician able to obtain results as soon as LRN has completed testing or will the laboratory be responsible for communicating results to DR?
- The health department associated with the LRN may also be responsible for epidemiological investigation and follow-up with employees for exposure monitors.
Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th Edition


WHO Laboratory Biosafety Manual - Third Edition


http://www.cdc.gov/flu/avianflu/h7n9/risk-assessment.htm
Risk Assessment

• Prior to working with a pathogen in the laboratory, health and environmental related risks associated with its manipulation must be assessed.
• Biological risk assessment should focus on the prevention of laboratory-acquired infections as well as unintended release of the pathogen into the environment.
• Some of the agent specific factors used to determine risk included the:
  – pathogenicity of the agent,
  – agent’s route of transmission,
  – stability of the agent,
  – infectious dose or concentration of the agent,
  – origin of the agent,
  – availability of effective prophylaxis and use of antiviral agents for treatment against the agent

http://www.cdc.gov/flu/avianflu/h7n9/risk-assessment.htm
Risk Assessment – What to evaluate

- **Site-specific** risk assessments should consider the following:
  - Path of the sample from location of collection, path of transport and progression throughout the laboratory
    - Work processes
    - Storage
    - Disposal
  - Laboratory design
    - Open room designs should consider the risk of exposure to workers present in the area but that are not directly involved with testing of a particular sample
      - Negative pressure?
      - The laboratory should have special engineering and design features to ensure directional airflow from clean to potentially contaminated areas.
    - CLSI Document M29-A4 “Protection of Laboratory Workers from Occupationally Acquired Infections; Approved Guideline-Fourth Edition”

Risk Assessment – What to evaluate

- Equipment hazards
  - (e.g., the potential for: aerosols, sprays, splashes of the specimen when performing testing and using equipment)
  - Biological Safety Cabinet certification
- Safe work practices
- Decontamination procedures, including spill response and methods for decontamination of equipment
  - Analyzers: will service be able to be performed by manufacturer?
- Infectious waste management
- Potential mitigation of testing risks by implementation of engineering controls and administrative controls and task/exposure level appropriate PPE
- Laboratory communication protocols
- PPE selection and use
- Facility ventilation and filtration
- Employee medical surveillance and exposure response
- Safe sharps handling
- Personnel safety training and competencies
- Storage of PPE and Testing Supplies/Kits (rotating stock, spacial design)
CDC Equipment Considerations

1. Is the specimen contained within a closed chamber and does it remain contained within a closed chamber throughout testing?

2. Even if the specimen remains contained within a closed chamber, has an evaluation been performed to determine if the manufacturer’s safety features are effective in protecting instrument operators from exposure to aerosols or sprays from patient specimens?

3. If the specimen container is opened during testing, have the potential routes of exposure to the operator during sample preparation and testing been identified, and have engineering controls and/or PPE been implemented?

4. Does the instrument employ wash and decontamination solutions in its test system to adequately inactivate bloodborne pathogens, including Ebola virus?

5. Does the manufacturer provide hazard warnings and PPE guidance with their troubleshooting instructions?

6. Have the potential exposure routes associated with handling and transport of the instrument’s on-board waste collection been identified and PPE evaluated and implemented?

7. How close is the instrument to other operations in the laboratory?

8. Are there instructions for cleaning and decontaminating the instrument, including track systems?

9. Do recommended disinfectants meet the EPA requirements for inactivating non-enveloped viruses?

Risk Assessment – What to evaluate

• Lab testing capabilities
  – What is reasonable and will provide supportive care during rule out period
• Plan for positive patient not being transferred from your facility
• Willing participants
  – Packers
  – Shippers
  – Testers
  – Buddies
• Training (from time of call receipt to packaging/testing of sample) – who and how often?
  – Practice phone calls (secret shoppers)
  – Don/Dof
  – Practice “testing” in full PPE
Compliance

- **Policies**
  - Safety Policy existed at THD prior to October 2014
    - Created around the time of SARS prevalence
    - Followed during initial call-to-action (and yes! the plan worked)
    - Since modified

- **Texas Health Resources**
  - Working on standardization across system
    - PPE Use
    - Training and Drills to Maintain Readiness for the next patient (across ALL departments)
    - Audits
    - Direct Observation forms
Compliance

• PPE Policies
  – Appropriate?
    • Do you have what is needed?
    • Can you get what is needed?
    • As you change the policy, outline proper use
      – Examples: Gloves (where they should not be used, how long to wear)
        N95 masks (when to discard, when to use)
  – Enforcement around PPE Policy (not just for CAP inspections)
    • This will save Laboratorians during an actual event
  – Situational (Task Assessment Logs)
  – Employee Familiarity and Comfort with use of PPE and referral to policy
  – Recommendation: when performing Task Assessment, don’t just talk through the procedure but instead walk through the procedure with a real sample
    • Use pudding with glove use practice; glow germ
Training

- Laboratory personnel have specific training in handling pathogenic and potentially lethal agents and are supervised by competent scientists who are experienced in working with these agents
  - Online
  - Practical with “Fake” Samples and performing each role
  - LPX survey
  - More than once per year
- Supervisors are responsible for ensuring that laboratorians are properly trained to work safely in the laboratory
  - Document each training event
    - Date
    - Task specific
    - Signatures
- N95 Respirators
  - Individuals must be appropriately trained on proper use and testing of mask
  - Must be fit-tested in accordance with 29 CFR 1910.134

http://www.cdc.gov/flu/avianflu/h7n9/risk-assessment.htm
Local, State, National Health Alerts

- Who should receive the alerts and are they signed up for proper timely notification?
- Who is responsible for dissemination of information?
  - How is the information communicated and to whom
    - Email
    - Notification Boards
    - Daily Huddles or Dept Meeting
- Who are the stakeholders that need the information in order to take action/put plan into place?
  - Microbiology Lab (all team members)
  - Lab Medical Director and Administrative Director
  - Core Laboratory
  - Infection Prevention
  - Emergency Department

- How often is the information reviewed and updated?
- Is the information accessible and in a form that is usable?
  - Notification Boards?
  - Binder
    - Sendout forms
    - LRN contact information
    - Quick Reference Guide
    - Phone script
    - Section for each pathogen
      - Alert
      - Reference lab information
    - Hospital Tip Sheets
Plan and Prepare

- Who are the stakeholders that need to participate in cohesive plan?
  - Microbiology Lab (all team members)
  - Lab Medical Director and Administrative Director
  - Core Laboratory
  - Infection Prevention
  - Emergency Department

- Who in the laboratory will directly participate in the plan and what are the assigned roles?
  - Single point of contact for event or PUI
  - Pickup of Sample
  - Tester and Buddies
  - Other

- Who will be the point of contact for laboratory communication?
  - Preparation for Event or PUI
  - Suspicion of PUI (Patient Under Investigation)
  - During an event

- **Consistent, Clear, Concise, & Available Guidelines are key**
Notification of the Laboratory

Sequence of events at THD

1. ED physician identifies PUI
2. ED physician contacts Dallas County Health Dept
3. Simultaneously, ED RN contacts Laboratory
   - If the Core Lab or Client Services receives the call, it is transferred directly to microbiology
   - If call is taken on third shift, the microbiology supervisor or manager are contacted
4. Microbiology phone script and emerging pathogen spreadsheet are used (see next slides) to guide the phone call in order to obtain all pertinent information
   - Micro representative is sole contact at this point for the lab
   - Responsible for arranging transport of sample, contacting micro leadership and county health dept as well as potential in-house laboratory testing and shipping
EMERGING PATHOGEN PHONE SCRIPT

Please use this as a guide and check-sheet for questions to ask and things to do when taking a phone call regarding potential specimen collection and testing for emerging pathogens. This includes but is not limited to the following: Ebola, MERS, Measles, Mumps, Avian Influenza, Anthrax

Phone Call:

☐ Has the physician contacted the Dallas County Epidemiologist? (If the answer is no, please provide that contact info)

☐ Has infection prevention been informed? (Page via Ext 8480)

☐ May I have the patient information please? (MRN and First/Last Name)

☐ Let me assist you with specimen collection. The appropriate specimens are: Consult the Infectious Disease Referral Testing Guide (purple chart on front of binder) for specimen collection details for each particular emerging pathogen.

☐ What is your tube station – I will send you a collection kit (Remind the caller NOT to tube the sample back to the lab)
  • Tube Station ______________
  • What time should the lab arrive to pick up the specimen? __________

To Do List:

☐ Collection material has been sent and specimen pick-up has been arranged

☐ SPL Manager/Supervisor/Dr. Dickson Notified

☐ Core Lab Supervisor Notified

☐ Dallas County Laboratory Contacted – PHD Lab must call in addition to the physician call to DCH Epi

☐ THD Infection Prevention Contacted – PHD Lab must call in addition to the physician/RN

☐ Specimens have been received and/or picked up via red container

☐ Necessary forms completed and orders placed in LIS

☐ Jaguar (or DCH or FedEx) called for specimen pickup

☐ Specimens packaged and sent out

PLACE PATIENT LABEL HERE:

☐ Physician Name and Number ________________________________

☐ RN Name and Number ________________________________

Tech initials and Date: ________________________________

Keep this form with a copy of Specimen Submission Documents and give to SPL Manager or Supervisor.
<table>
<thead>
<tr>
<th>Infectious Disease</th>
<th>Specimen Type</th>
<th>Orderable</th>
<th>Send to?</th>
<th>Department To Perform Send Out</th>
<th>Physician to Notify Epidemiologist On-Call?</th>
<th>Notify Infection Prevention?</th>
<th>Transport Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measles (Acute)</td>
<td>Throat Swab in UTM media (3 ml) (pink liquid media) <em>recommended test</em></td>
<td>MiscRef Presby Complete TDH Form G2-V for Measles PCR</td>
<td>Dallas County Health OR Texas Dept Health</td>
<td>SPL</td>
<td>Yes</td>
<td>Yes</td>
<td>Category B Frozen</td>
</tr>
<tr>
<td></td>
<td>Serum (red or gold top)</td>
<td>Rubeola IgM ARUP</td>
<td>ARUP</td>
<td>CPA or SPL</td>
<td>Yes</td>
<td>Yes</td>
<td>Category B Refrigerated</td>
</tr>
<tr>
<td>Mumps (Acute)</td>
<td>Buccal Swab in UTM media (3 ml) (pink liquid media)</td>
<td>MiscRef Presby Mumps PCR 2009387 (ARUP connect)</td>
<td>ARUP</td>
<td>CPA or SPL</td>
<td>Yes</td>
<td>Yes</td>
<td>Category B Frozen</td>
</tr>
<tr>
<td></td>
<td>Serum (red or gold top)</td>
<td>Mumps IgM ARUP (Note: Should not be performed in absence of Mumps PCR request)</td>
<td>ARUP</td>
<td>CPA or SPL</td>
<td>Yes</td>
<td>Yes</td>
<td>Category B Refrigerated</td>
</tr>
<tr>
<td>Enterovirus D68</td>
<td>Nasopharyngeal Swab in UTM media (1 ml) (pink liquid media) and/or CSF</td>
<td>MiscRef Presby Complete TDH Form G2-V check “Other” and specify EV-D68 PCR</td>
<td>Texas Dept Health</td>
<td>SPL</td>
<td>Yes</td>
<td>Yes</td>
<td>Category B Frozen (contact Pam for assistance)</td>
</tr>
<tr>
<td>Influenza H5 (avian flu)</td>
<td>Multiple samples MUST be collected and placed in UTM: Nasopharyngeal Swab (1 ml) Nasal Swab (3 ml) Throat Swab (3 ml)</td>
<td>MiscRef Presby Complete DCH submission</td>
<td>Dallas County Health</td>
<td>SPL</td>
<td>Yes</td>
<td>Yes</td>
<td>Category B Refrigerated or frozen</td>
</tr>
<tr>
<td>MERS Co-V</td>
<td>Multiple samples MUST be collected and placed in UTM: Upper Resp: NP swab(1 ml UTM) Lower Resp: Sputum Tracheal or asp/wash (place in 3 ml UTM) Serum (gold/red)</td>
<td>MiscRef Presby Complete DCH submission and chain of custody forms</td>
<td>Dallas County Health</td>
<td>SPL</td>
<td>Yes</td>
<td>Yes</td>
<td>Category B Refrigerated (respiratory can be frozen)</td>
</tr>
<tr>
<td>Ebola</td>
<td>Whole Blood (Lavender)</td>
<td>MiscRef Presby Complete DCH submission and chain of custody forms</td>
<td>Dallas County Health</td>
<td>SPL</td>
<td>Yes</td>
<td>Yes</td>
<td>Category A Refrigerated</td>
</tr>
<tr>
<td>Chikungunya</td>
<td>Serum x 2 (red or gold top)</td>
<td>MiscRef Presby Complete DCH submission and chain of custody forms</td>
<td>Dallas County Health</td>
<td>SPL</td>
<td>No</td>
<td>Yes</td>
<td>Category B Refrigerated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Serology: MiscRef Presby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dengue</td>
<td>Serum x 2 (red or gold top)</td>
<td>MiscRef Presby Complete DCH submission and chain of custody forms</td>
<td>Dallas County Health</td>
<td>SPL</td>
<td>No</td>
<td>Yes</td>
<td>Category B Refrigerated</td>
</tr>
</tbody>
</table>

Table Subject to Changes: Consult Websites below for most recent information and additional infectious agent testing

[https://www.dallascounty.org/department/health/releases/2015/10/2015-221.htm](https://www.dallascounty.org/department/health/releases/2015/10/2015-221.htm) Dallas County Health Dept

[https://www.dphs.state.tx.us/default.shtm](https://www.dphs.state.tx.us/default.shtm) Texas Dept of Health

DALLAS COUNTY HEALTH EPIDEMIOLOGIST ON-CALL

During business hours: (214) 519-2004 After hours: (214) 677-7859
Laboratory Communication During an Actual Event

• Medical Director should be aware of all communication and decisions are made at his/her discretion
  – Will need to insert themselves into the discussions taking place with hospital administration and direct patient care teams

• **Limit** laboratory points of contact to one or two personnel within lab administration
  – Will communicate with ED etc to handle all questions and testing requests
  – Arrange transport of samples if needed
  – Field questions for outside laboratories
  – Coordinate with LRN

• Lab admin and Medical Director daily rounding with staff
  – Answer questions
  – Ease concerns
  – Address problems

• Laminated Charts or Cards for posting in patient care areas with all contact info and approved test menus
High Level PPE
LAB PERSONAL PROTECTIVE EQUIPMENT

- Standard precautions for routine laboratory testing includes: Gloves, Laboratory Coat, and a Face Shield
- Our Task Assessment List includes all of our current testing and required PPE for those tasks
  - It is now updated to include testing for highly infectious agents, including Ebola (high-level PPE)
- For laboratory personnel working with VHS specimens, full PPE coverage is recommended to reduce the risk of self-contamination
PERSONAL PROTECTIVE EQUIPMENT

Initial High Level PPE
October 2014

• Lab Coat
• Booties
• Isolation Gown
• N 95 Respirator
• Face Shield
• Two Sets of Gloves

The extent of PPE is not due to the virus being airborne but to protect the mucous membranes

The N95 mask and the face shield prevent hands from touching the mouth, nose, and eyes
HIGH LEVEL PPE
DONNING AND DOFFING SCRIPT

- CDC representatives observed how PPE was being used in the laboratory at THD and wrote out the steps into a “script” to be read aloud by a buddy at the time of both donning and doffing.
- The use of a “script” has improved consistency across all users and departments as well as provide an extra layer of security for safe practice.
Updates to previous versions of CDC PPE guidance: August 27, 2015

- Expanded rationale for respiratory protection
- Clarify that the trained observer should not serve as an assistant for donning PPE
- Suggest that a designated donning assistant or “buddy” might be helpful, especially in donning with the powered air purifying respirator (PAPR) option
- Modify the PAPR donning procedure to make the steps clearer
- Change the order of boot cover removal. Boot covers should now be removed after the gown or coverall
- Clarify the types of gowns and coveralls that are recommended and provide a link to considerations for gown and coverall selection
- Emphasize the importance of frequent cleaning of the floor and work surfaces in the donning area.
- See Sections 9B and 9D of CDC PPE Ebola site for updated CDC PPE sequences

1. Remove any jewelry. If you have long hair, tie back in a bun. Perform hand hygiene with gel
2. Put on knee-high booties
3. Put on extended cuff inner gloves
4. Put on disposable white coat
5. Put on surgical gown, fasten Velcro at the neck and time waist strings at the side
6. Allow coach to cut a thumb hole at the end of each sleeve of the gown. Check to make sure thumbs fit. This will anchor the sleeve down and prevent the sleeve from riding up the arm
7. Put on extended cuff outer gloves. Make sure the glove covers the end of the sleeve
8. Put on a N95 respirator
9. Put on bouffant
10. Put on a face shield. Band should sit above brow
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Enter doffing area</td>
</tr>
<tr>
<td>2.</td>
<td>Sanitize gloves with bleach wipe</td>
</tr>
<tr>
<td>3.</td>
<td>Remove extended cuff outer gloves</td>
</tr>
<tr>
<td>4.</td>
<td>Sanitize gloves</td>
</tr>
<tr>
<td>5.</td>
<td>Untie gown at the waist</td>
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<tr>
<td>6.</td>
<td>Remove gown. Place gown and outer gloves in red bag</td>
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<tr>
<td>7.</td>
<td>Sanitize gloves</td>
</tr>
<tr>
<td>8.</td>
<td>Stabilize yourself on a firm surface. Remove one outer bootie and place in the bag – Do not touch the bottom</td>
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<tr>
<td>9.</td>
<td>Sanitize gloves</td>
</tr>
<tr>
<td>10.</td>
<td>Remove the second outer bootie and place it in the red bag</td>
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<tr>
<td>11.</td>
<td>Sanitize gloves</td>
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<tr>
<td>12.</td>
<td>Remove a face shield</td>
</tr>
<tr>
<td>13.</td>
<td>Sanitize gloves</td>
</tr>
<tr>
<td>14.</td>
<td>Remove hair bouffant and place it in the red bag</td>
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<tr>
<td>15.</td>
<td>Sanitize gloves</td>
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<tr>
<td>16.</td>
<td>Remove extended cuff inner gloves</td>
</tr>
<tr>
<td>17.</td>
<td>Perform hand hygiene with gel</td>
</tr>
<tr>
<td>18.</td>
<td>Remove N95 respirator</td>
</tr>
<tr>
<td>19.</td>
<td>Remove white disposable lab coat</td>
</tr>
<tr>
<td>20.</td>
<td>Perform hand hygiene with soap water</td>
</tr>
</tbody>
</table>
PPE Video

Featuring Texas Health Presbyterian Dallas Laboratory
1. Choose a small or medium-sized face-piece that fits the face. Pull the head bands loose. The metallic strip should be uppermost. Pass the hand through the head bands.

2. Put on the mask. The head bands should be around the head and neck.

3. Press the metallic strip on both sides with the forefingers and middle fingers of both hands.

4. Seal Check:
   - Positive pressure checking — cover the mask lightly with both hands. Breathe with deliberation. Air should not leak out from the side of the mask.
   - Negative pressure checking — cover the mask lightly with both hands. Suck in air with deliberation. The mask should depress slightly inward.

http://www.cdc.gov/vhf/ebola/hcp/index.html

Specimen Transport, Storage and Tracking
CDC has developed interim guidance for U.S. laboratory workers and other healthcare personnel who collect or handle specimens.

This guidance includes information about the appropriate steps for collecting, transporting, and testing specimens from patients who are suspected to be infected with Ebola.

“U.S. clinical laboratories can safely handle specimens from potential Ebola patients by taking all required precautions and practices in the laboratory, specifically designed for pathogens spread in the blood.”

SPECIMEN TRANSPORT AT THD

• Collected specimens must be transported by a trained laboratory designee and transport buddy – PPE required lab coat and gloves

• Laminated protocols are provided to each nursing unit with detailed instructions on how to prepare and package samples for transport

• Samples are triple bagged, bleached, and placed in an approved container

• The container is placed in a pressure tested bio-containment jar as well as an absorbent pad to restrict movement and protect the sample

• The jar is placed in a transport box with an absorbent pad and the lid securely latched

• Highly infectious specimens must not be transported through the tube station
Manual Specimen Transport

- Container placed into case by RN and latched by technologist
- Samples carried by hand via technologist accompanied by a buddy along a pre-designated route
- Buddy pushes elevator buttons and made sure hallways, etc., were clear of disruption for transport
• Under the biological safety hood in the Special Procedures Lab or the Core Laboratory, samples are removed from the transport container, labeled with barcode labels, bleached and placed in new, clean transport bags
1. Wipe external container with bleach

2. Remove triple-bagged samples
3. Disinfect all bags with bleach wipes

4. Disinfect samples with bleach wipes and place in a new, clean bag for transport
The Buddy System

• Beginning Day 1 of Ebloa event
  – Put in place by tech with previous “Decon Team” experience
  – Two techs in high-level PPE
    • One tech to perform testing
    • One tech to record results, prevent others from entering testing area, observe technique and prompt performing tech for adjustments or to slow pace, provide bleach wipes or other supplies, to use computer keyboards and touchscreens
    • An additional tech used as a “runner” in anteroom for extra supplies and a go-between for placing secondary shipping containers into the final shipping box
• The Buddy System was used throughout the lab during all stages/types of testing and shipping at THD Laboratory
SPECIMEN TRACKING

• Chain of Custody
  – Forms should accompany samples throughout all stages of collection, transport, testing, storage, and destruction
    • Buddies will complete forms for the specimen handler and/or tester
  – After testing is complete; samples are triple bagged in clear bags so that the tube types are clearly visible through the bag.
    • Sample labels for each accession number contained in the bag is placed on the outside of the final bag with tech initials and notation of the bag contents

• Tracking numbers for shipping
  – Copies are kept of all shipping documents and/or emails regarding shipment and receipt of samples

• Patient logbook
  – Binder kept with section for each positive or suspect patient with chain of custody forms, shipping documents, and printout of laboratory orders from the LIS
  – Spreadsheet created for each patient to summarize all samples (with and without accessions) and their final destination
  – **MUST ACCOUNT FOR EACH SAMPLE TYPE AND TUBE RECEIVED BY THE LABORATORY**
Samples placed in clear bags (x 3) with patient accession label on outside; technologist handwritten indication of tube types and tech initials
# Specimen Tracking

**Section 1: Chain of Custody**

<table>
<thead>
<tr>
<th>Relinquished By (Submitter): Employee Name and ID</th>
<th>Relinquishing Department</th>
<th>Date/Time</th>
<th>Received By (Lab Specimen Transporters): Employee Names and IDs</th>
<th>Receiving Department</th>
<th>Date/Time</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Opened Specimen Transport Box, Pressure Jar, and Cataloged Specimens By: Employee Names and IDs</th>
<th>Department</th>
<th>Date/Time</th>
<th>Received And/OR Stored By: Employee Names and IDs</th>
<th>Receiving Department</th>
<th>Date/Time</th>
</tr>
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<tbody>
<tr>
<td>4.</td>
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<td>6.</td>
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</table>

<table>
<thead>
<tr>
<th>Received By: Names and IDs</th>
<th>Department</th>
<th>Date/Time</th>
<th>Received By: Names and IDs</th>
<th>Receiving Department</th>
<th>Date/Time</th>
</tr>
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<tbody>
<tr>
<td>8.</td>
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<td>9.</td>
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<td>11.</td>
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</tbody>
</table>

**Section 2: Lab Description**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Volume</th>
<th>Color of Tube</th>
<th>Test Requested</th>
<th>Accession Number</th>
<th>Collection Date/Time</th>
<th>Disposition: Autoclave/Shipped to</th>
<th>Date/Time</th>
<th>By/Witness Initial and ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example:1</td>
<td>5ml</td>
<td>Green</td>
<td>BMP, Mg++, Phos</td>
<td>14-269-00001</td>
<td>0800 on 10/26/2014</td>
<td>CDC by World Courier</td>
<td>1200 on 10/26/2014</td>
<td>CC 57621 LK 181644</td>
</tr>
</tbody>
</table>
SPECIMEN STORAGE

Lock-Down

- ALL samples are kept in the Special Procedures Lab “containment” room specimen refrigerator
  - If a specimen requires frozen storage, it will be stored in the -70 C freezer in Special Procedures Lab
  - The specimens are stored in compliance to Category A shipping requirements in an appropriate Bio-Jar container and clearly labeled with content and biohazard labels
  - The freezer is locked at all times. All access is supervised by the Laboratory Manager or designee
- Requires badge access
- ALL personnel (regardless of testing status) MUST badge in
- No specimen is autoclaved or shipped without proper documentation of such activity
  - Use chain of custody log and notate each tube type and accession destroyed or shipped
Exterior Containment Room Door

Interior Containment Room Door from inside containment room
Lock-Down Keypad

Negative Pressure Gauge

Entrance/Exit Log Sheet
Anteroom sink to left of interior door

Interior Containment Room door prior to entering room with sign-in sheet
Containment Room Specimen Fridge
THD Testing Protocols
Highly Infectious Protocol
(i.e. VHF)
First do no harm
VHF PATIENT EVALUATION for LABORATORY TESTS at THD

• Patients who enter the THD facility through the ED with suspected Ebola (or other VHF) follow a strict protocol for laboratory testing

• ED personnel must contact a Laboratory Supervisor who in turn must contact the Medical Director to verify history and symptoms and authorize testing.
  – Laboratory will contact Infection Prevention as a safeguard to making sure that IP is aware of the impending patient status

• All suspected cases are treated as potentially infective. Full PPE must be utilized until the patient is cleared of VHS

• Initial screening lab orders are CMP and CBC
• If the patient is a Non-US resident or has recent travel history to Africa, Blood parasites are ordered: Rapid Malaria and thin smears
• Two EDTA vials are collected for viral testing at Dallas County Health
• Positive samples may be confirmed at the CDC
Laboratory Testing

• Instructions are provided to each patient care area concerning lab tests available, key phone numbers and how to collect samples

• During Ebola, we tried to process samples only twice a day for routine testing
  – Scheduled following morning run
  – Limited number of staff involved and limited times in and out of PPE
  – Maintains ability to continue routine testing

• All daily testing is limited to an abbreviated test menu and requests for deviations from the menu require consultation and approval from the medical director
  – CMP and CBC

• When a patient is in the ICU, additional assays to the CMP are important for treatment. To prevent add-ons, with permission from our medical director and the treating physician, we automatically add a Mg, Phos, and CK to the morning orders
## Ebola Assessment and Treatment Centers

### U.S. Hospital Readiness as of December 2014

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of hospitals ready to treat a patient with Ebola</td>
<td>35</td>
</tr>
<tr>
<td>Number of hospitals assessed by CDC Rapid Ebola Preparedness teams</td>
<td>50+</td>
</tr>
<tr>
<td>Percentage of travelers returning from countries affected by Ebola who reside within 200 miles of a U.S. Ebola treatment center</td>
<td>83%</td>
</tr>
<tr>
<td>Number of healthcare workers who have received Ebola training</td>
<td>150,000+</td>
</tr>
<tr>
<td>Number of state and local laboratories able to diagnose Ebola</td>
<td>42</td>
</tr>
</tbody>
</table>

### Additional Resources

- **Ebola Treatment Centers**
  - [Visit CDC website](http://www.cdc.gov/vhf/ebola/hcp/preparing-ebola-assessment-hospitals.html)

- **Guidance for Ebola Assessment Hospitals**
  - [Visit CDC website](http://www.cdc.gov/vhf/ebola/hcp/preparing-ebola-assessment-hospitals.html)
Microbiology Testing and Shipping Procedures
High-Level PPE Go-Kit

Contents:

- Disposable lab coats (long)
- Knee-high booties
- Extended cuff gloves
- Surgical gowns
- Scissors
- N95 masks (small and regular)
- Bouffants
- Face shields
SPECIAL PROCEDURES LAB

- Donning performed outside of room with a buddy

- Runner stays in anteroom wearing minimum gown and gloves

- Containment Room Setup
  - Sign-in sheet
  - Biosafety Cabinet BSL-2
  - Storage Refrigerator designated for Ebola samples only
  - Autoclave
  - Category A waste containers
  - Swiffer®

Bring in what is needed for immediate testing or shipping only; use disposable supplies

Standard Supplies
- 2 containers of bleach wipes
- 1 container of alcohol wipes
- 1 bottle of bleach
- Small plastic bags
- Large plastic bags
- Sealable shipping bags
- Autoclave bags
- Autoclave tape
- Autoclave Prospore ampules
- Moisture absorbing bench pads
- Paper towels
- Small, medium, large gloves
- Precut strips of parafilm
- Suction canister and lid with bleach (as needed)
- Pink basin filled with 50% bleach (as needed)
- Sharps container
- Pre-Printed specimen labels
SPECIAL PROCEDURES LAB
Specimen testing

- Blood parasite
  - Limited to rapid antigen and thin prep slides only
    - Preparation of Blood Parasite “go-kit” prior to entrance into containment room
    - No sharps (other than slides) and no non-disposables used
    - Prepared under BSL-2 safety cabinet
    - Fix 15 min in methanol once air dried
    - Stain in 50 mL conical tubes
    - Slides may be used for CBC Differentials

- Other testing may include Giardia/Crypto Antigen, C diff toxin, Blood cultures, Respiratory PCR
  - Not to be performed without medical director approval
  - Consultation with manager or lead tech is required prior to performing testing in order to make sure processes are in place and understand
SPECIAL PROCEDURES LAB

Malaria Go-Kit

Contents:

- 30 ml each in a 50 mL conical tube
  - Hemacolor stains 1, 2, & 3
  - Milli-Q water
  - Methanol
- Plastic slide box containing 4 slides
- 2-3 plastic pipettes
- Pencil
- Capped polystyrene tube containing 4-5 drops Rapid Malaria reagent
- Rapid Malaria Card
- Timer (in separate plastic bag for buddy)
**SHIPPING**

- Follow DOT guidelines for packaging and shipping Category A samples
  - http://www.ecfr.gov/cgi-bin/text-idx?SID=2a97f2935677211e1785ac643163d2a9&node=49:2.1.1.3.10.5.25.33&rgn=div8

- IATA DGR
  - http://www.iata.org/whatwedo/cargo/dgr/Pages/index.aspx

- Only certified shipper may perform this process
  - “Specimens for shipment should be packaged following the basic triple packaging system which consists of a primary container (a sealable specimen bag) wrapped with absorbent material, secondary container (watertight, leak-proof), and an outer shipping package”

- Specimens should NOT be shipped to CDC without consultation with CDC and local/state health departments
  - NO specimens will be accepted without prior consultation. CDC highly recommends contacting your state and/or local health department before contacting CDC
  - For consultation call the EOC at 770-488-7100
  - Do not ship for weekend delivery unless instructed by CDC
Handling/Packaging Video

Featuring Texas Health Presbyterian Dallas Special Procedures Laboratory
EBOLA PCR TESTING

• PCR testing may now be performed by Dallas County Health department

• Contact of the BT coordinator or General Lab Supervisor at DCH is required
  – DCH Laboratory Response Submission form as well as DCH Chain of Custody forms are to be completed
  – DCH will provide guidance with regards to transfer of sample to DCH
  – Results available within approx. 4 hours after receipt at DCH

• Special Thanks to Dallas County Health BT lab. They assisted with transport/shipping and coordination last October (including driving samples to Austin themselves!!!
Blood Banking
BLOOD BANK

- No Screen performed

- Blood type only
  - Slide method
  - Tubes
    - Let sit as opposed to spinning
    - Validated method on back-end

- Products given followed emergency release procedures (no cross-match, etc)
• Blood types were performed on all three Ebola positive patients by Blood Bank Staff
• Blood Bank staff, Mary, Dr. Jensen and Dr. Dickson worked in conjunction with Carter Blood Care to arrange for the convalescent serum donations from Dr. Brantly
• Thank you to the Blood Bank staff!!!
Core Lab and Point of Care Testing

Equipment Decontamination

Texas Health Resources®
POINT OF CARE TESTING

In an effort to minimize laboratory testing, a wireless I-STAT and an Accucheck are provided by the laboratory for beside testing in each patient’s room.

For easy distribution, the POC department has compiled ‘starter kits’ which contain instruments and cartridges so testing can begin quickly. These are located in the Core Laboratory.

The POC instruments should be left in each patient’s room and not removed until the patient is discharged. Equipment is cleaned when the room is cleaned by the Decontamination Team. Afterwards, instruments can be thoroughly disinfected with standard disinfection procedures or a 1:10 bleach/water solution.
Available I-STAT cartridges and tests

<table>
<thead>
<tr>
<th>CG8+ Light blue</th>
<th>EG7+ Orange</th>
<th>CG4+ Medium blue</th>
<th>6+ Navy blue</th>
<th>Crea Pink</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>iCa</td>
<td>pH(Venous)</td>
<td>Na</td>
<td>Creatinine</td>
</tr>
<tr>
<td>PCO2</td>
<td></td>
<td>Lactate</td>
<td>K</td>
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<tr>
<td>PO2</td>
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<td></td>
<td>Cl</td>
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<tr>
<td>HCO3</td>
<td></td>
<td></td>
<td>BUN</td>
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<td>TCO2</td>
<td></td>
<td>Glu</td>
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<td>BE</td>
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<td>Hct</td>
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<td>sO2</td>
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<td>Hgb</td>
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<td>Hgb</td>
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</tbody>
</table>
Place “Do Not Enter Testing Area” signs at designated areas

Ensure biohazard trash receptacle is prepared and has adequate space

Prepare hematology analyzer: bleach tubes, previously run CBC samples and biohazard bag

Prepare chemistry analyzer: place bag in decapper area

Notify CPA to spin all samples off-line

Ensure there are adequate supplies for testing (baggies, tape, markers, bleach wipes, etc...)
Specimen Handling

- Chemistry samples are spun in a designated centrifuge using bio-containment lids
- Buckets are removed from the centrifuge and opened under the biological safety hood
- Specimens are placed in clean clear bags for transport to the instrumentation
CHEMISTRY TESTING

- Samples are placed on the APS in the designated lane for tubes with caps.
- The APS will then decap the tube and transport the tube to the analyzer.
- After testing the tube will be sealed with a foil seal and returned to the APS for specimen retrieval.
- Once testing is completed, specimen cap and any cuvettes used are retrieved for disposal.
HEMATOLOGY TESTING PROTOCOL

- All samples are assayed on a designated analyzer.
- Samples are performed using the instruments track system. No caps are removed for testing. The instrument pierces the cap and aspirates the sample for analysis
- If any platelet suspect flags are present, the instrument has the capability of performing platelet counts by two different measurements. These results were compared to obtain a reportable platelet count
- No peripheral smears are made. All instrument flags and low counts will be reported without manual confirmation
CORE LAB SPECIMEN HANDLING

POST TESTING

- Once testing is completed, ALL specimens are ‘packaged’ for storage. Specimens are bleached, parafilmed, then triple-bagged in clear specimen bags. Bleach between each step.

- The bags are sealed and labeled. Place a patient label on the packet which has all the tests ordered and the LIS accession numbers. Write on the label the tubes included in the packet (ex. 1 purple, 1 green..). Extra tubes as HOLD tubes in the LIS for tracking purposes.

- Any additional waste (example: specimen cap) is triple-bagged and labeled with a patient label. Write on this label “WASTE”

- Specimens are transported in a transport container to Special Procedures bio-containment room for proper disposal.
Core Laboratory Supply Cabinet

- All required PPE
- Instrument Protocols and laminated sheets
- Centrifuge containment lids
- Transport supplies
Decontamination/Destruction and Waste Management
KILLING EBOLA

- Use an EPA-registered disinfectant suitable for non-enveloped viruses (e.g., adenovirus, norovirus, poliovirus) to treat contamination/spills and to disinfect surfaces after bulk spill material has been removed.

  See [www.epa.gov/oppad001/chemreigndex.htm](http://www.epa.gov/oppad001/chemreigndex.htm)

  Follow manufacturer instructions for the specific disinfectant.


Surface Disinfection

- All samples and bags/containers are to be wiped thoroughly with a bleach wipe prior to and after testing.

- Wipe down (with a bleach wipe) all reachable surfaces of safety cabinet prior to and after testing as well as any other surfaces in the room that may have been touched (i.e. refrigerator doors, chairs, door handles).

- Safety cabinet – follow bleach wipe with an alcohol wipe on the outside Plexiglas surface to minimize bleach residue and allow for visibility.
DECON - DESTRUCTION OF SAMPLES & DISPOSABLES

- Pipettes, slides, test cartridges and other disposables are to be disposed of in the safety cabinet in a suction canister containing bleach.

- Non-disposables (i.e. specimen racks) are to be soaked in bleach within the safety cabinet allowing all parts of the non-disposable to have minimum contact time of 15 minutes.
All samples, slides, test cartridges, suction containers, etc. are to be autoclaved immediately following testing

- Note: DCH or CDC may request samples prior to their destruction
- All sample accession numbers and sample/tube types are documented by a buddy prior to the autoclave process
  - Documentation of destruction is required for Chain of Custody completion
- Two forms of autoclave QC are used; tape and Pro-Spore ampules
  - QC is documented for each autoclave run
WASTE MANAGEMENT

- Environmental Services provided special, designated biohazard containers for all materials from Ebola testing.
- All PPE, autoclaved blood products and any disposable waste were discarded in these special containers.
- All contents were triple-bagged with added bleach. Once the box was full, these bags were enclosed in a thick outer plastic bag that was sealed with zip-ties. After the lid was placed on the bin, it was shut with a metal strip.
- Environmental services picked up these containers (while wearing full PPE). These were then given to a designated waste management company who took all the waste to be incinerated.
Discussion . . .

- Physical exhaustion
- Mental/Emotional Stresses
- Prejudicial Perceptions
  - Family, Friends, Public
  - Vendors
  - Media
- Security measures