

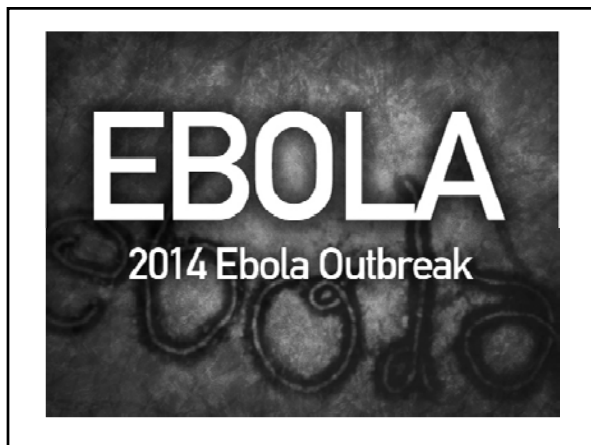
**Nurses Matter:
Ebola 101 and Personal
Protective Equipment**

**Satellite Conference and Live Webcast
Wednesday, November 5, 2014
10:00 a.m.– 12:00 p.m. Central Time**

Produced by the Alabama Department of Public Health
Video Communications and Distance Learning Division

Faculty

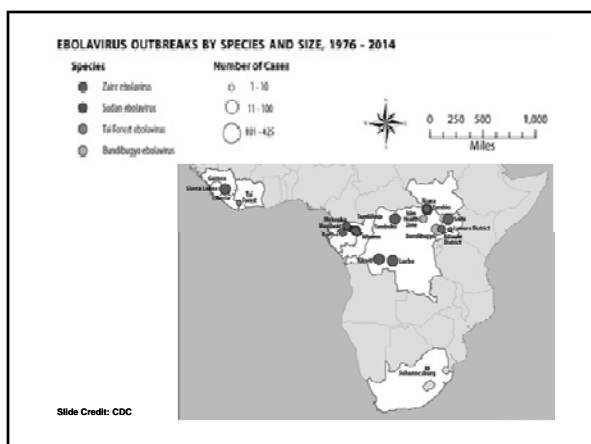
**Albert White, Jr., MD, FACP
Infectious Disease Physician
Area 3 Health Officer
Alabama Department of Public Health**



**Ebola is a Rare and
Deadly Disease**

- First discovered in 1976 near the Ebola River in the Democratic Republic of the Congo
- Outbreaks occur sporadically in Africa
- Family of zoonotic RNA viruses
 - Filoviridae

Slide Credit: CDC



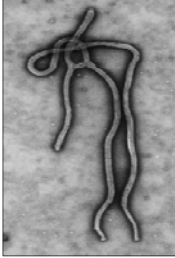
Ebola Virus Disease

- Previously called Ebola hemorrhagic fever
- 5 species of Ebolavirus
 - Zaire ebolavirus
 - Bundibugyo ebolavirus
 - Reston ebolavirus
 - Sudan ebolavirus
 - Tai Forest ebolavirus

Slide Credit: CDC

Ebola Virus Disease

- All but Reston ebolavirus known to cause disease in humans
- Historically, death rates for Ebola range from 50% - 90%



Slide Credit: CDC

Ebola Virus

- Zoonotic virus - Bats the most likely reservoir, although species unknown
- Spillover event from infected wild animals (e.g., fruit bats, monkey, duiker) to humans, followed by human - human transmission

Slide Credit: CDC

Ebolavirus Ecology

Epizootic Cycle

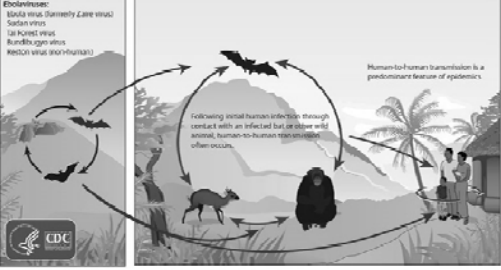
New evidence strongly implicates bats as the reservoir hosts for ebolaviruses. Through the means of local epizootic, maintenance and transmission of the virus within bat populations remain unknown.

Ebolaviruses:
 Ebola virus, Zaire ebolavirus, Sudan virus, Gabon ebolavirus, Bundibugyo virus, Reston virus, and Taï Forest virus.

Epizootic Cycle

Epizootics caused by ebolaviruses appear sporadically, producing high mortality among non-human primates and duikers, and may precede human epidemics. Ebola is caused by ebolaviruses produce acute disease among humans, with the exception of Reston virus which does not produce detectable disease in humans. Ebola is known about how the virus first passes to humans, triggering waves of human-to-human transmission, and an epidemic.

Human-to-human transmission is a predominant feature of epidemics.



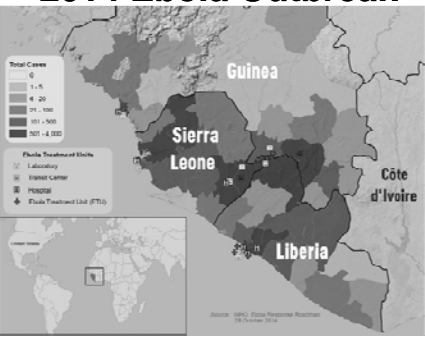
CDC

2014 Ebola Outbreak

- This is the largest Ebola epidemic in history
- CDC's response to Ebola is the largest international outbreak response in CDC's history

Slide Credit: CDC

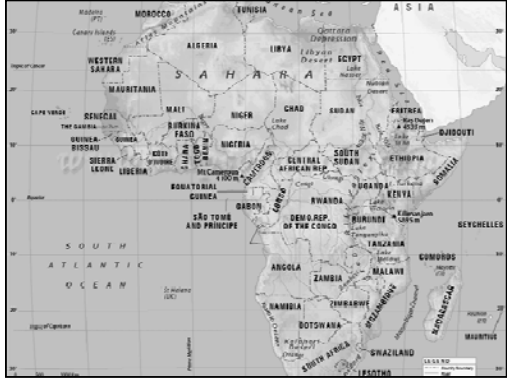
2014 Ebola Outbreak



Total Cases:
 0
 1 - 5
 6 - 20
 21 - 100
 101 - 500
 501 - 1,000
 1,001 - 4,000

Ebola Treatment Units:
 Hospital Center
 PHC/OTU
 Ebola Treatment Unit (ETU)

Source: WHO, Ebola Response Network, 10 November 2014.
<http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/distribution-map.html>, Accessed 10/31/2014
 Slide Credit: CDC



Ebola Cases and Deaths

- As of October 29, 2014, a total of 13,540 cases of Ebola (7,702 laboratory - confirmed) and 4,941 deaths have been reported

Ebola Cases and Deaths

Countries with Wide - Spread Transmission

Country	Total Cases	Laboratory-Confirmed Cases	Total Deaths
Guinea	1,667	1,409	1,018
Liberia	6,535	2,515	2,413
Sierra Leone	5,338	3,778	1,510
Total	13,540	7,702	4,941

Countries with Travel - Associated Cases

Country	Total Cases	Laboratory-Confirmed Cases	Total Deaths
Mali	1	1	1
Senegal	1	1	0
Total	2	2	1

Countries with Localized Transmission

Country	Total Cases	Laboratory-Confirmed Cases	Total Deaths
Nigeria	20	19	8
Spain	1	1	0
United States	4	4	1
Total	25	24	9

Slide Credit: CDC Source: <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/united-states-imported-case.html>

EVD Cases (United States)

- As of October 24, 2014, EVD has been diagnosed in the United States in four people, one (the index patient) who traveled to Dallas, TX from Liberia, two healthcare workers who cared for the index patient, and one medical aid worker who traveled to New York City from Guinea

Slide Credit: CDC Source: <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/united-states-imported-case.html>

EVD Cases (United States)

- Index Patient
 - Symptoms developed on September 24, 2014, approximately 4 days after arrival
 - Sought medical care at Texas Health Presbyterian Hospital of Dallas on September 26
 - Admitted to hospital on September 28
 - Testing confirmed EVD on September 30
 - Patient died October 8

Slide Credit: CDC Source: <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/united-states-imported-case.html>

EVD Cases (United States)

- TX Healthcare Worker, Case 2
 - Cared for index patient
 - Was self - monitoring and presented to hospital reporting low - grade fever
 - Diagnosed with EVD on October 10
 - Recovered and released from NIH Clinical Center October 24

Slide Credit: CDC Source: <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/united-states-imported-case.html>

EVD Cases (United States)

- TX Healthcare Worker, Case 3
 - Cared for index patient
 - Was self - monitoring and reported low - grade fever
 - Diagnosed with EVD on October 15
 - Currently receiving treatment at Emory University Hospital in Atlanta

Slide Credit: CDC Source: <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/united-states-imported-case.html>

EVD Cases (United States)

- NY Medical Aid Worker, Case 4
 - Worked with Ebola patients in Guinea
 - Was self - monitoring and reported fever
 - Diagnosed with EVD on October 24
 - Currently in isolation at Bellevue Hospital in New York City

Slide Credit: CDC Source: <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/united-states-imported-case.html>

Ebola Virus Transmission

- Virus present in high quantity in blood, body fluids and excreta of symptomatic EVD - infected patients
- Opportunities for human - to - human transmission
 - Direct contact (through broken skin or unprotected mucous membranes) with an EVD - infected patient's blood or body fluids

Slide Credit: CDC

Ebola Virus Transmission

- Sharps injury (with EVD - contaminated needle or other sharp)
- Direct contact with the corpse of a person who died of EVD
- Indirect contact with an EVD - infected patient's blood or body fluids via a contaminated object (soiled linens or used utensils)

Slide Credit: CDC

Ebola Virus Transmission

- Ebola can also be transmitted via contact with blood, fluids or meat of an infected animal
 - Limited evidence that dogs become infected with Ebola virus
 - No reports of dogs or cats becoming sick with or transmitting Ebola

Slide Credit: CDC

Human - to - Human Transmission

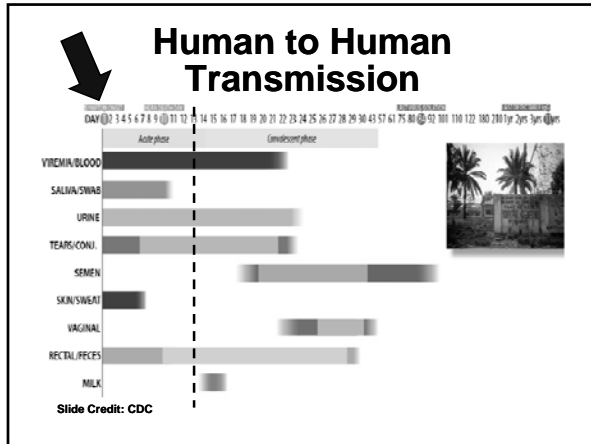
- Infected persons are not contagious until onset of symptoms
- Infectiousness of body fluids (e.g., viral load) increases as patient becomes more ill
 - Remains from deceased infected persons are highly infectious
- Human - to - human transmission of Ebola virus via inhalation (aerosols) has not been demonstrated

Slide Credit: CDC, Source: <http://www.cdc.gov/vhf/ebola/pdf/infections-spread-by-air-or-droplets.pdf> Accessed 11/03/14

Human - to - Human Transmission

The infographic 'HOW EBOLA IS SPREAD' provides detailed information on transmission routes. It states that Ebola is not a respiratory disease and does not spread through the airborne route. It explains that Ebola is spread by direct contact with the blood or body fluids of an infected person, or through contact with contaminated objects like needles. It also notes that while Ebola can be spread through droplets, this is not the primary mode of transmission. Finally, it offers protection advice: avoid contact with infected individuals, use protective gear, and practice good hygiene.

Slide Credit: CDC, Source: <http://www.cdc.gov/vhf/ebola/pdf/infections-spread-by-air-or-droplets.pdf> Accessed 11/03/14



EVD Risk Assessment

- The following epidemiological risk factors should be considered when evaluating a person for Ebola virus disease (Ebola), classifying contacts, or considering public health actions based on exposure

Source: <http://www.cdc.gov/vhf/ebola/exposure/risk-factors-when-evaluating-person-for-exposure.html>, Accessed 11/3/14

EVD Risk Assessment

High Risk	Some Risk
<ul style="list-style-type: none"> - Direct contact with body fluids, from a person sick with Ebola who is showing symptoms,* through: a needle stick, splashes to eyes, nose, or mouth, getting body fluids directly on skin - Touching a dead body while in a country with a large Ebola outbreak without wearing recommended personal protective equipment (PPE) or not wearing PPE correctly - Both living with and taking care of a person sick with Ebola 	<ul style="list-style-type: none"> - Close contact with a person sick with Ebola such as in a household, healthcare facility, or the community (with no PPE worn). - Close contact means being within 3 feet of the person sick with Ebola for a long time - Direct contact with a person sick with Ebola in a country with a large Ebola outbreak while wearing PPE correctly

Source: <http://www.cdc.gov/vhf/ebola/exposure/risk-factors-when-evaluating-person-for-exposure.html>, Accessed 11/3/14

EVD Risk Assessment

Low (but not zero) Risk	No Identifiable Risk
<ul style="list-style-type: none"> - Having been in a country with a large Ebola outbreak within the past 21 days, with no known exposure (such as NO direct contact with body fluids from a person sick with Ebola) - Being in the same room for a brief period of time with a person sick with Ebola - Brief direct contact, like shaking hands, with someone sick with Ebola - Direct contact with a person sick with Ebola in the United States while wearing PPE correctly - Travel on an airplane with a person sick with Ebola 	<ul style="list-style-type: none"> - Contact with an asymptomatic person who had contact with a person with Ebola - Contact with a person with Ebola before the person developed symptoms - Having been more than 21 days previously in a country with widespread Ebola virus transmission - Having been in a country without widespread Ebola virus transmission and not having any other exposures as defined above

Source: <http://www.cdc.gov/vhf/ebola/exposure/risk-factors-when-evaluating-person-for-exposure.html>, Accessed 11/3/14

Early Clinical Presentation

- Acute onset; typically 8 - 10 days after exposure (range 2 - 21 days)
- Signs and symptoms
 - Initial: Fever, chills, myalgias, malaise, anorexia
 - After 5 days: GI symptoms, such as nausea, vomiting, watery diarrhea, abdominal pain

Slide Credit: CDC

Early Clinical Presentation

- Other: Headache, conjunctivitis, hiccups, rash, chest pain, shortness of breath, confusion, seizures
- Hemorrhagic symptoms in 18% of cases

Slide Credit: CDC

Early Clinical Presentation

- Other possible infectious causes of symptoms:
 - Malaria, typhoid fever, meningococemia, Lassa fever and other bacterial infections (e.g., pneumonia) – all very common in Africa

Slide Credit: CDC

Clinical Features

- Nonspecific early symptoms progress to:
 - Hypovolemic shock and multi - organ failure
 - Hemorrhagic disease
 - Death
- Non - fatal cases typically improve 6 - 11 days after symptoms onset

Slide Credit: CDC

Clinical Features

- Fatal disease associated with more severe early symptoms
 - Fatality rates of 70% have been reported in rural Africa
 - Intensive care, especially early intravenous and electrolyte management, may increase the survival rate

Slide Credit: CDC

Clinical Management of EVD: Supportive, but Aggressive

- Hypovolemia and sepsis physiology
 - Aggressive intravenous fluid resuscitation
 - Hemodynamic support and critical care management if necessary
- Electrolyte and acid-base abnormalities

Slide Credit: CDC. Reference: Fowler RA et al. Am J Respir Crit Care Med. 2014

Clinical Management of EVD: Supportive, but Aggressive

- Aggressive electrolyte repletion
- Correction of acid-base derangements
- Symptomatic management of fever and gastrointestinal symptoms
 - Avoid NSAIDS

Slide Credit: CDC. Reference: Fowler RA et al. Am J Respir Crit Care Med. 2014

Clinical Management of EVD: Supportive, but Aggressive

- Multisystem organ failure can develop and may require
 - Oxygenation and mechanical ventilation
 - Correction of severe coagulopathy
 - Renal replacement therapy

Slide Credit: CDC. Reference: Fowler RA et al. Am J Respir Crit Care Med. 2014

Healthcare Providers in the United States

- U.S. healthcare workers should follow CDC's "Infection Prevention and Control Recommendations for Hospitalized Patients with Known or Suspected Ebola Hemorrhagic Fever in U.S. Hospitals"

Slide Credit: CDC

Healthcare Providers in the United States

- CDC recommends standard, contact, and droplet precautions for management of hospitalized patients with known or suspected Ebola
 - These precautions can be found in "2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Setting" at: www.cdc.gov/hicpac/2007IP/2007ip_part3.html

Slide Credit: CDC

Healthcare Providers in the United States

- Any U.S. hospital that is following CDC's infection control recommendations and can isolate a patient in a private room (with a private bathroom and door closed) is capable of safely managing a patient with Ebola

Slide Credit: CDC

Infection Control

- Early recognition
 - Early recognition is critical for infection control
- Patient Placement
 - Patients should be placed in a single patient room containing a private bathroom with the door closed

Slide Credit: CDC, ADPH
Source: www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html , Accessed 10/22/2014

Infection Control

- Avoid contamination of reusable porous surfaces that cannot be made single use
 - Non - carpeted rooms, remove all upholstery (furniture, curtains)
 - Use only a mattress and pillow with plastic or other covering that fluids cannot get through

Slide Credit: CDC, ADPH
Source: www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html , Accessed 10/22/2014

Infection Control

- Reduce potential for exposure
 - Limit number of personnel caring for patient
 - Limit use of sharps, needles and aerosol - generating procedures
 - Prohibit visitors without proper PPE training and supervision
 - Make telephone communication available as an alternative

Slide Credit: CDC, ADPH
Source: www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html , Accessed 10/22/2014

Personal Protective Equipment

- New guidance issued October 20
 - Recent experience from Nebraska and Emory incorporated into guidance
- Check CDC website for current information:
 - www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html

Slide Credit: CDC, ADPH
Source: www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html , Accessed 10/22/2014

Personal Protective Equipment

- CDC Web - based training based on equipment:
 - <http://www.cdc.gov/vhf/ebola/hcp/pe-training/index.html>

Slide Credit: CDC, ADPH
Source: www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html , Accessed 10/22/2014

Three Principles of Guidance for PPE

- Rigorous training to be practiced and demonstrated competence including donning and doffing PPE in systematic manner
- No skin exposure when PPE is worn
- Supervised by trained monitor observing donning and doffing of PPE according to standard procedure

Slide Credit: CDC, ADPH
Source: www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html , Accessed 10/22/2014

Recommended PPE Components (1 of 2)

- Double gloves
- Single - use boot covers that are waterproof and extend to at least mid calf or shoe covers
- Single - use fluid resistant or impermeable gown OR
- Single - use fluid resistant or one piece suit with incorporated socks

Source: www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html , Accessed 10/22/14

Recommended PPE Components (2 of 2)

- Respirators including either N 95 or PAPR (if PAPR is used, single use cover compatible with PAPR per manufacturer's instructions
- Single use full face shield that is disposable

Source: www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html , Accessed 10/22/14

Recommended PPE Components (2 of 2)

- Surgical hoods to ensure complete coverage of head and neck
- Apron that is waterproof and covers torso to level of mid calf if patient has vomiting and diarrhea

Source: , Accessed 10/22/2014
www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html

Personal Protective Equipment (PPE)



DONNING

PPE Practices

- Select standard equipment, train and demonstrate competence
- Designate areas for donning / doffing; designate space for clean and potentially contaminated areas
- Trained observer monitors use and safe removal of PPE
- Step by step removal / disinfecting visibly contaminated PPE with EPA registered disinfectant wipe prior to taking off equipment

Source: www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html, Accessed 10/22/2014

Glove and Hand Hygiene

- Disinfection of gloved hands using either an EPA registered disinfectant wipe or alcohol based hand rub between steps of taking off PPE
- Hand hygiene after removal of all PPE
- All hand hygiene in accordance with standard protocols
 - Review CDC Guidance regularly for updates

Source: www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html, Accessed 10/22/2014

Patient Care

- Dedicated medical equipment (preferably disposable) should be used for patient care
- All non - dedicated, non - disposable medical equipment used for patient care should be cleaned and disinfected according to the manufacturer's instructions and hospital policies

Slide Credit: CDC

Patient Care

- Limit the use of needles and other sharps as much as possible
 - All needles and sharps should be handled with extreme care and disposed in puncture - proof, sealed containers

Slide Credit: CDC

Medical Waste Management

- Medical waste generated in the care of patients with known or suspected EVD is subject to procedures set forth by local, state and federal regulations
 - <https://www.osha.gov/SLTC/bloodborne-pathogens/index.html>
- Medical waste contaminated with Ebola virus is a Category A infectious substance regulated as a hazardous material under the U.S. Department of Transportation's (DOTs) Hazardous Materials Regulations

<http://www.cdc.gov/vhf/ebola/hcp/medical-waste-management.html>, Accessed 10/20/14

Medical Waste Management

- <http://phmsa.dot.gov/hazmat/transporting-infectious-substances>
- Alabama Department of Environmental Management Medical Waste Program
 - <http://www.adem.state.al.us/alEnviroRegLaws/files/Division17.pdf>
- CDC Medical Waste Management Guidance
 - <http://www.cdc.gov/vhf/ebola/hcp/medical-waste-management.html>

<http://www.cdc.gov/vhf/ebola/hcp/medical-waste-management.html>, Accessed 10/20/14

Medical Waste Management

- Ebola - associated medical waste inactivated (e.g., autoclaved) or incinerated may be transported as regulated medical waste
- Ebola - associated medical waste inactivated or incinerated is no longer considered a Category A infectious substance

<http://www.cdc.gov/vhf/ebola/hcp/medical-waste-management.html>, Accessed 10/20/14

Medical Waste Management

- Ebola - associated waste that has been properly inactivated or incinerated is no longer infectious
 - <http://www.epa.gov/waste/nonhaz/industrial/medical/programs.htm>
- ADEM maintains a list of permitted medical waste disposal companies: (334) 271 - 7700

<http://www.cdc.gov/vhf/ebola/hcp/medical-waste-management.html>, Accessed 10/20/14

Environmental Infection Control

- Daily cleaning and disinfection of hard, non - porous surfaces should be done using a United States Environmental Protection Agency (EPA) - registered hospital disinfectant with a label claim for a non - enveloped virus

Slide Credit: CDC

Environmental Infection Control

- Staff performing environmental cleaning and disinfection should wear recommended PPE and consider the use of additional barriers (e.g. , shoe and leg coverings)
 - Eye protection (face shield or goggles) and face mask should be worn when performing tasks such as liquid waste disposal that can generate splashes

Slide Credit: CDC

Interim Guidance for Monitoring and Movement of Persons with EVD Exposure

- CDC has created guidance for monitoring people exposed to Ebola virus
 - Available at: www.cdc.gov/vhf/ebola/hcp/monitoring-and-movement-of-persons-with-exposure.html

Slide Credit: CDC

Interim Guidance for Monitoring and Movement of Persons with EVD Exposure

- **Conditional release**
 - People are monitored by a public health authority for 21 days after the last known Ebola virus exposure
 - Self - monitor for fever twice daily and notify the public health authority if they develop fever or other symptoms

Slide Credit: CDC

Interim Guidance for Monitoring and Movement of Persons with EVD Exposure

- **Controlled movement**
 - Notify the public health authority about their intended travel for 21 days after their last known potential Ebola virus exposure
 - No travel on flights, ships, long - distance buses or trains

Slide Credit: CDC

What is ADPH Doing?

- **Established an Ebola Planning and Response Team**
 - Epidemiology
 - Emergency Preparedness and Response
 - Healthcare: Medical, Nursing, Emergency Medical Services, Pharmacy, Laboratory and Dental
 - Communications
 - Legal

What is ADPH Doing?

- **Actively monitoring individuals that have arrived from West Africa**
- **Developing, updating and disseminating guidance and information**
- **Working with partners**
- **Responding to inquiries from healthcare providers, the public and media**
- **Toolkits: Hospitals, EMS, Nursing, Urgent Care, Pharmacies and other facilities**

ADPH Ebola Website Public

www.adph.org/ebola

ADPH Ebola Website Healthcare Providers

www.adph.org/ebola

Screening of Suspected Cases



http://www.adph.org/ebola/assets/ADPH_EVD_Hospital_Screening.pdf, Accessed 11/03/2014

Reporting of Suspected Cases

- All suspected viral hemorrhagic fever cases are required to be reported to ADPH immediately
- If a patient with a travel history to an affected country presents:
 - Complete the ADPH Ebola Viral Disease Investigation Form
 - Contact the Epidemiology Division immediately at 1 - 800 - 338 - 8374

Reporting of Suspected Cases

- ADPH will use the CDC algorithm to determine if a patient should be tested for Ebola
- All Ebola testing requests must be submitted to the CDC by ADPH
 - If a patient is determined to require testing, instructions on sample collection, packaging and shipping will be communicated to the provider

Remember Other Emerging Infectious Diseases

- Travel history is critical
 - Consult CDC Yellow Book: <http://wwwnc.cdc.gov/travel/page/yellowbook-home-2014>
- Chikungunya
- Dengue
- MERS - CoV
- Enterovirus (EV) D 68

For More Information



www.adph.org/ebola