TN Department of Health

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PUBLIC HEALTH LABORATORY NEWSLETTER

Ebola Sudan Virus Disease

Submitted by: Stephanie Poindexter, MAT, MLS(ASCP)CM | PH Lab Consultant 2, Training Coordinator

On September 20, 2022, an outbreak of Ebola Sudan Virus Disease in western Uganda was confirmed by the Ugandan Ministry of Health. According to the World Health Organization, 164 total cases, resulting in 77 deaths had been reported through December 13.[1] The outbreak had led to nineteen infections, seven of which proved to be fatal, among healthcare workers.[2] As of December 11, 2022, no additional confirmed cases had been reported within the past 14 days and only six contacts remained under follow-up.[3] On January 11, 2023, Uganda declared the Ebola Sudan Virus outbreak over, following two incubation periods, or 42 days, without additional cases .[4]

other countries, including the United States. The outbreak resulted in over 28,000 total cases and 11,325 deaths.[6]

Ebola Virus Disease symptoms include aches and pains, severe headaches and fatigue early in the disease, but later progress to include gastrointestinal symptoms. Patients also may experience hemorrhaging, and in severe cases, multiple organs may be impacted, leading to organ failure, shock and death. Symptoms may take up to 21 days to appear, but usually appear within 10 days of exposure. The disease is not transmissible until symptoms develop.[7]

While the origin of the virus is unknown, it is believed to have

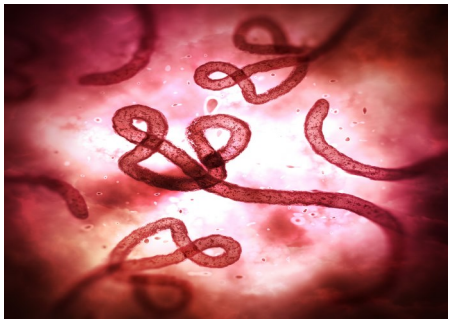


Image: IStock.com/bortonia

practices must be used.[6]

Because early recognition is essential to prevent the spread of the virus, CDC recommends that Ebola Virus Disease be considered when evaluating patients with a history of travel to an Ebola-affected area or contact with a known or suspected

Viral Hemorrhagic Fevers must be immediately reported to TN Department of Health.

Ebolavirus can cause fatal disease in humans and non-human primates. Since the first recognized outbreak in 1976, ebolaviruses have led to occasional outbreaks in several African Countries. There are six known Ebolavirus species, however only four (*Zaire, Sudan, Taï Forest*, and *Bundibugyo*) have been shown to cause disease in humans.[5] Between 2014 - 2016, Ebola Virus Disease caused by *Zaire ebolavirus* spread rapidly outside of Africa to seven

originated with bats or non-human primates. Ebolaviruses are spread by direct contact with infected blood and/or body fluids, including those of the deceased.[5] The virus can survive for several hours on contaminated surfaces and several days in body fluids.[8] As seen in the 2014-2016 outbreak, healthcare workers are at high risk when caring for infected patients, therefore proper PPE and infection control

case. Ebola Virus Disease symptoms overlap with many common illnesses, such as influenza, malaria and typhoid fever. CDC also recommends that these patients should also be evaluated for malaria infection.[9]

While this outbreak has been declared over, it serves as a reminder that situations involving high-consequence pathogens may arise at any time. Each situation allows us to be more prepared for the next one.

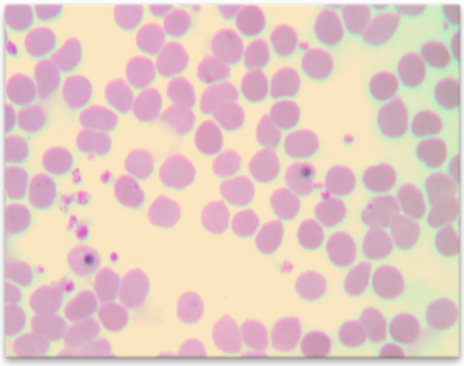
Category A Shipping boxes have been distributed to key locations for use if testing is deemed necessary by TDH CEDEP and CDC

Samples for Viral Hemorrhagic Fevers, including Ebolavirus, are classified as Category A Infectious Substances. Suspected or confirmed Category A substances require shippers to be certified to ship infectious substances. Information related to infectious substance packaging and shipping, including training requirements and opportunities, has been added to the TDH Training and Workshop page: https://www.tn.gov/health/health-program-areas/lab/lab-education.html

Malaria and Blood Parasite Specimen Submission

Submitted by: Dorothy Baynham, MT(ASCP)| PH Lab Manager 3, Special Microbiology

Blood parasite infections, including malaria, can rapidly progress when left untreated and can become fatal. Early symptoms of malaria are often non-specific and can mimic various other infections, including ebolavirus. Depending on the travel history and epidemiology, patients under investigation for ebolavirus infection should also be evaluated for malaria infection.



Plasmodium falciparium blood smear made from 10 day old blood

Accurate clinical diagnosis of blood parasite infections requires laboratory confirmation. Microscopic examination of thick and thin blood smears is considered to be the gold standard for laboratory confirmation of blood parasite infections, including malaria. Giemsa or Wright-Giemsa-stained slides should be prepared and reviewed by a trained laboratorian, as soon as possible after collection, as delays may make identification increasingly difficult. Anticoagulants inside the collection tube specimen can interfere with parasite morphology and staining characteristics. Batching or sending out samples for suspected blood parasite infection is not recommended, as it can delay diagnosis.

Resources are available from CDC to assist laboratorians and pathologists in the diagnosis of parasitic diseases, including bench aids and safety guidance: https://www.cdc.gov/malaria/diagnosis_treatment/diagnostic_tools.html and through the for CDC's DPDx website: https://www.cdc.gov/dpdx/index.html.

Webinar: Is It Malaria?

The TDH webinar "Is it Malaria?" is available to assist laboratory personnel with identifying the different species of *Plasmodia* and *Babesia*. The webinar discusses the proper way to make a thick and thin blood smear, as well as available rapid malaria tests. The link to the webinar, slide deck and job aid can be found on the TDH Laboratory Services Training and Workshops webpage:

https://www.tn.gov/health/health-program-areas/lab/lab-education.html

How does this impact laboratories in Tennessee?

Laboratories are required to submit samples confirmed or suspected *Plasmodium* species to the Tennessee Public Health Laboratory for confirmation and surveillance under the Tennessee Reportable Disease Guidelines. A vial of EDTA whole blood with Giemsa-stained or Wright-Giemsa stained thick and thin film slides are required for submission. Patient geographic and travel information should be included with sample submission.

Specimens suspected or confirmed for *Plasmodium* species must be submitted to the TN Public Health Laboratory for confirmation and surveillance.

A full review of the stained blood smears should be performed prior to sending the specimen to the TN Public Health Laboratory for confirmation testing. The TN Public Health Lab will examine blood slides for the presence of blood parasites, and if present, identify and speciate the parasites. *Plasmodium* PCR may also be performed based on the morphological examination. Specimens may also be sent to the CDC for more in-depth confirmation testing upon approval by CDC.

Overview of the TN Public Health AR Lab Network *N. gonorrhoeae* Program

Submitted by: Galen Montgomery, MLS, MSPS | PH Lab Manager 1, ARLN

Neisseria gonorrhoeae is a commonly reported sexually transmitted infection that has become one of the top three public health threats due to its propensity to develop drug resistance. The CDC estimates that approximately 820,000 infections occur annually, and of those infections, fifty percent of new gonorrhea infections each year are resistant to at least one drug. The Gonococcal Isolate Surveillance Project, or GISP, established in 1986, has functioned as the national surveillance system of antibiotic resistant gonorrhea in the U.S. It was established not only to monitor susceptibility trends in *N. gonorrhoeae* strains, but also to function as a rational basis for the selection of gonococcal therapies.

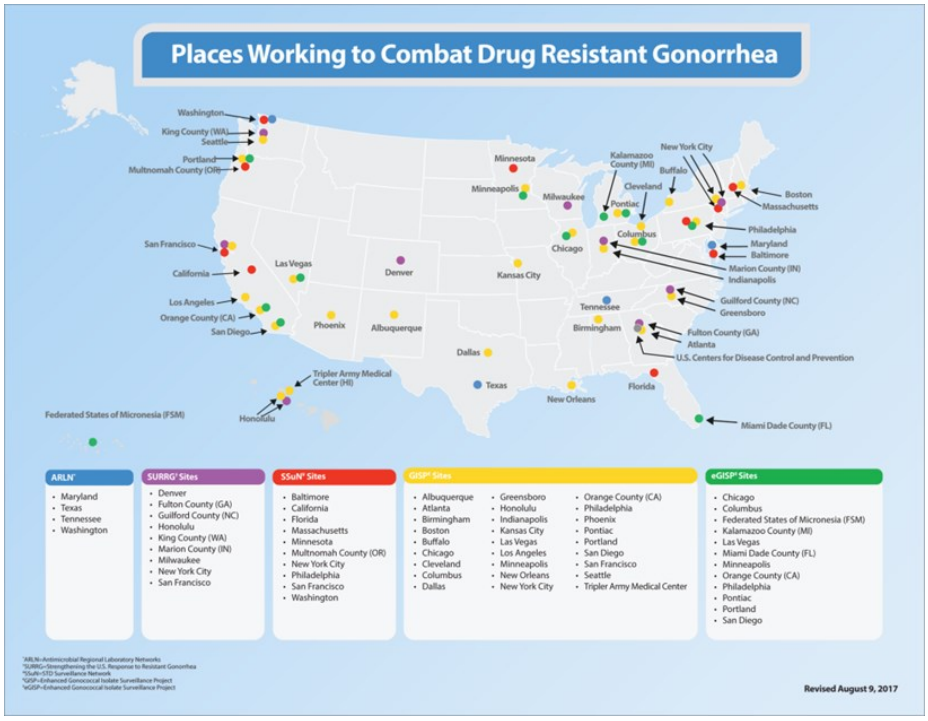


Image: CDC

In 2014 an executive order from the President created the National Action Plan for Combating Antibiotic Resistant Bacteria, a 5-year strategy to control, prevent and detect antibiotic resistance in bacteria. CARB funds the Antimicrobial Resistance Laboratory Network, a network of public health labs funded to have enhanced capacity for culture susceptibility testing and genomic sequencing capabilities. Additionally, through CARB, funding was created for two more projects: the enhanced Gonococcal Isolate Surveillance Project, also known as eGISP, and Strengthening the U.S. Response to Resistance Gonorrhea, or SURRG. These projects expanded the testing platform and collection types of isolates to curb the growing threat from this organism. Tennessee is one of the four GC AR Lab Network Labs in the country, illustrated in the map above.

By the end of fiscal year 2021, the TN Public Health Laboratory took on additional GC testing to support the transition of GC regional lab responsibilities from the Texas Public Health Lab to Utah's State Public Health Lab. This created a scenario where the TN Public Health Laboratory's AR section became the number one testing site for *N. gonorrhoeae* within the network with over 2500 isolates tested!

Antimicrobial Resistance Lab Network Regional Laboratory Training

APHL and CDC hosted an in-person *Candida auris* training at the TN Public Health Laboratory from December 6 – 9, 2022. The training focused on expansion of *C. auris* screening to non-regional state public health labs and jurisdictions. Representatives from Regional AR Laboratories in New York, Maryland, Wisconsin, Minnesota, Utah, Washington and Tennessee attended the training.

Two concurrent sessions were held during the training. A "Train-the-Trainer" session was held in preparation for future trainings that will be held for public health laboratories within their regions. The training session included topics on *Candida* identification and colonization screening. A wet-lab was also held focusing on Antifungal Susceptibility Testing.

NBS Beta-Ketothiolase Deficiency in Tennessee

Submitted by: Jazmyne Jackson, MHS | PH Lab Scientist 1, NBS

Beta-Ketothiolase deficiency, also known as Mitochondrial Acetoacetyl-CoA Thiolase Deficiency, is a rare organic acid disorder caused by impaired protein and fat breakdown. With this deficiency, the body cannot produce ketone bodies, which store energy produced during the breakdown of fat, used in babies when stressed or in between feedings.

Beta-Ketothiolase is an autosomal-recessive condition, meaning both parents must pass down a non-working Acetyl-CoA Acetyltransferase 1 gene.[1] This gene produces the Mitochondrial Acetoacyl-CoA Thiolase enzyme necessary for fat and protein breakdown. When MAT does not function properly, it causes a buildup of organic acids and other toxins in the blood, specifically the amino acid isoleucine. An indicator of this disease is the buildup of Tiglycarnitine (C5:1 acylcarnitine) in the blood[2], which is tested by the TDH Public Health Laboratory's Newborn Screening section using tandem mass spectrometry.

Symptoms of BKT deficiency are seen as early as six months, but on average, signs occur around one year of age. Signs include lethargy, vomiting, diarrhea, fever, poor appetite and breathing problems. Many of these symptoms occur when the baby's diet includes foods that cannot be broken down. The most common and essential treatment includes dietary restrictions to prevent the buildup of harmful proteins in the body, but a low-protein diet that is still nutritious is necessary. Additional treatments may include supplements and medications; for example, L-carnitine supplements are used to remove toxic substances from the body. Bicitra, a prescription containing sodium citrate, can be used to help neutralize acid in the blood and urine. When sodium citrate is ingested, it is broken down to sodium bicarbonate, neutralizes the acids in the body.[3]

Although there is no cure, if the condition is caught early, treatment can be implemented to help the infant to grow and develop. If not diagnosed, the disorder can lead to intellectual disabilities and seizures. There are less than 5,000 people in the world with this disease.[4] One in every 1,000,000 babies born are diagnosed with this disease.[5] Even if the sample shows elevated amounts of C5:1 acylcarnitine, it does not mean the baby has the disease. High levels of acylcarnitine's in the mother's blood could lead to false positive results in the baby.[6] Babies who are born premature may also have results that are out of range.

TN began screening for this disorder in 2004. Since that time, it has only rarely been detected

Proper specimen collection is important when testing for this disorder to get accurate results. Unsatisfactory specimens due to clotting or contamination may give erroneous results, which could lead to delayed diagnosis and treatment, as results cannot be confirmed until a new specimen has been analyzed. If an abnormal sample is detected, further testing to confirm MAT deficiency will be required. Follow-up for abnormal results includes the testing of blood and urine for harmful levels of acids and toxins.[7] Genetic counseling after testing can help parents better understand the test results and treatment options, work through emotional concerns, and provide referrals to Geneticists or other healthcare providers and advocacy and support groups.

Importance of Molecular Surveillance Expansion in Public Health

Submitted by Robert R. Schell | PH Lab Scientist 1, Molecular Biology

Outbreaks have gained the attention of the public due to the recent global SARS-CoV-2 pandemic. Whether it be tomorrow or ten years from now, the next big outbreak could occur at any moment in time. Those working in public health are constantly working to help detect the next dangerous outbreak before it spreads rampantly throughout the population. With the evolution of advanced molecular detection, laboratories now have access to new technology and applications that were once purely experimental.

Molecular surveillance has become an essential part of the testing services offered by public health laboratories. With assistance from sentinel surveillance sites, a portion of specimens from the public are tested with AMD technology for molecular surveillance. This allows public health scientists and epidemiologists to detect and monitor how different microbes, including viruses, are currently changing at the genomic level. It then can determine what is currently circulating in the population and be monitored for potentially concerning changes as they occur in real time. This surveillance is vital to the health of our communities as we continue to grow.

The TN Public Health Laboratory is rapidly increasing its ability to provide more of these services to the citizens of Tennessee. Several new next generation sequencing instruments are being installed and new assays are being developed for the genomic characterization of Influenza, *Neisseria gonorrhoeae* and *Candida auris*. Older assays are being revitalized, such as those that allow for the sequencing of hepatitis and *Cryptosporidium*. New bioinformatics pipelines are being developed to help streamline the analysis process. This will allow findings to be communicated to public health authorities, including the CDC, and keep state officials informed and up to date on the newest developments in public health. The expansion of molecular surveillance capacity will ultimately help propel the Tennessee Department of Health to new heights while giving Tennesseans the best that public health has to offer. Although it is unknown when the next outbreak will occur, the timely expansion of molecular surveillance methods will allow the TN Public Health Lab to be well-prepared for it when it does occur.

TN Public Health Laboratory Consultative Services

The Tennessee Public Health Laboratory employs several Public Health Laboratory Consultants that are available as a resource to laboratories across the state. These services include, but are not limited to, biosafety consultation and risk assessment, continuing education seminars and workshops, and communication to Sentinel laboratories.

Meet Public Health Laboratory Consultant: Russell Bowden, Jr., MS HSA, MT

Outreach Coordinator

Years in Outreach: 7

Professional Memberships:

- APHL, Association of Public Health Laboratories, www.aphl.org
- CLSI, Clinical and Laboratory Standards Institute, Laboratory Quality Management System Certificate Program, www.clsi.org

Areas of Expertise:

- Sentinel Lab Outreach
- General Diagnostic Laboratory Testing
- Quality Assurance
- Infectious Substance Packing and Shipping

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Most noteworthy outreach-related accomplishment:

Training clinical laboratory staff to properly package and ship infectious substances; Assisting with hands-on Bio-Threat Preparedness Rule Out or Refer Workshops.

Teaching Activities:

Conducting virtual CDC Infectious Substance Packing and Shipping classes for laboratory staff. Assisting with training for HAZMAT, fire, and emergency personnel on proper collection and submission of suspicious substances to the TDH Public Health Laboratory.

Dr. Rumpler leads Newborn Screening CAP Survey in Saudi Arabia

In June, Dr. Marc Rumpler, a College of American Pathologists (CAP) laboratory inspector, led an international team of experts to conduct a CAP survey of the Newborn Screening Laboratory for the Public Health Authority in Riyadh, Saudi Arabia. The PHA Newborn Screening Lab is the sole provider of services for the entire Kingdom of Saudi Arabia.

WELCOME NEW EMPLOYEES!

Spencer Hall	Krista Rollin	Malcolm Finlay	Alexis Rowe
PH Laboratory Scientist 1	*PH Laboratory Scientist 1*	*PH Laboratory Scientist 1*	*PH Laboratory Technician 1*
Aquatic Biology	*Enteric Bacteriology*	*Newborn Screening*	*Newborn Screening*

PROMOTIONS

Bel Dalton
PH Administrator 1— Grant Manager

Kathe Legg
PH Administrator 1— Contract Manager

Interested in a Public Health Lab Career?

Visit https://www.tn.gov/health/health-program-areas/lab/lab-services-careers.html for current employment opportunities!

References

Ebola Sudan Virus Disease

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Importance of Molecular Surveillance Expansion in Public Health

https://www.cdc.gov/coronavirus/2019-ncov/variants/genomic-surveillance.html

https://www.cdc.gov/amd/what-we-do/surveillance.html

The Mission of Laboratory Services is to provide quality testing services through innovation, collaboration, and education that protects and improves the health of all.

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TN Department of Health

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