

Section 8

Public Health Laboratory Status Report

The Florida Department of Health (DOH) Bureau of Public Health Laboratories (BPHL) is a network of four laboratories located in Jacksonville, Miami, Pensacola, and Tampa that provides population-based diagnostic, screening, monitoring, reference, emergency, and research laboratory services. BPHL collects epidemiologic and demographic information to support the core public health functions of DOH. Technical services, based upon evolving community requirements, include screening and confirmatory testing for biological and chemical threats, disease outbreak investigations, sexually transmitted diseases, tuberculosis, HIV, mosquito-borne viruses, animal rabies, and parasitology. Accurate and timely laboratory data are critical to support informed public health decisions. BPHL also provides training for healthcare providers and laboratory scientists; tests samples from potable, environmental, and recreational water sources, pollution spills, and suspect contaminated foods; and certifies environmental and water testing laboratories. BPHL provides laboratory screening of all newborns in Florida for 34 genetic disorders, which can lead to death or severe physical and mental disabilities without detection and early treatment.

BPHL supports all 67 county health departments, other DOH programs, physicians, hospitals, and numerous state and federal agencies by providing public health diagnostic, screening, and reference laboratory services.

History

The Florida Legislature established the State Board of Health in Jacksonville in 1889. In 1903, the Legislature established the State Public Health Laboratory, also located in Jacksonville. Seven years later, in 1910, the Tampa and the Pensacola Laboratories were established. Like the Jacksonville Laboratory, the Pensacola and Tampa Laboratories were responsible for providing diagnostic testing to the State Board of Health and to private physicians. With three laboratories up and running, BPHL was able to provide vital services to what were then the most populous areas of Florida. The Miami Laboratory was established in 1914 and the Tallahassee Laboratory in 1915. The Tallahassee Laboratory closed in 1917, was re-opened in 1921, and closed permanently in 1992. The Orlando Laboratory was opened in 1948 and operated until 1992. The West Palm Beach/Lantana Laboratory was opened in 1953 in the basement at the A.G. Holley State Tuberculosis Hospital; since 1982, it had its own separate building on the campus. The West Palm Beach/Lantana Laboratory ceased accepting specimens on September 5, 2011 and closed entirely on September 29, 2011.

Preparedness

Phil Lee, of the BPHL Jacksonville Laboratory, was invited by the Trust for America's Health (TFAH) and the Robert Wood Johnson Foundation to write an article concerning his experience in confirming the identification of *Bacillus anthracis* in the index patient during the anthrax incident of 2001 entitled *Anthrax Events in 2001-10 Years After: Firsthand Story from Phil Lee, BPHL-Jacksonville*. The article, published in September 2011 in *Remembering 9/11 and Anthrax: Public Health's Vital Role in National Defense* (<http://healthyamericans.org/assets/files/TFAH911Anthrax10YrAnnvFINAL.pdf>), also includes the activities of BPHL at that time and will be used to recognize the efforts of public health professionals and demonstrate the ongoing importance and the continued need to support public health preparedness. TFAH shared these stories with members of Congress, governors, other state and local officials, and members of the media during commemoration activities for the ten year anniversaries of the September 11 and anthrax tragedies. The lessons learned from the anthrax incident of 2001 and the subsequent injection of additional state and federal funding has greatly increased Florida's capability and capacity to respond to public health emergencies, whether due to terrorism, natural disasters, outbreaks, or emerging infectious diseases such as SARS and 2009 H1N1 pandemic influenza.

Public Health Laboratory Interoperability Project (PHLIP) Initiative

The Informatics Program Manager for the Association of Public Health Laboratories (APHL), speaking on behalf of APHL and their contractors working on the Public Health Laboratory Interoperability Project (PHLIP)

initiative, recognized the work that BPHL staff continues to provide at the national level. BPHL staff and their electronic messaging team from the DOH Division of Information Technology provided PHLIP and the Laboratory Technical Implementation Assistance for Public Health (LTIAPH) with important expertise and assistance contributing to the ongoing success of these projects.

Out of all of the project participants across the nation, Florida is the only state that has successfully participated in all project activities:

- PHLIP influenza result reporting to the Centers for Disease Control and Prevention (CDC), known as the Electronic Laboratory Surveillance Message (ELSM),
- H1N1 pandemic influenza electronic test order and result (ETOR) messaging with the Texas Public Health Laboratory to ensure surge capacity and mutual assistance,
- Electronic order and result messaging to CDC for the *Salmonella* phase 1 implementation (first to send an order message for validation), and
- HITECH Cooperative Agreement to help create Electronic Laboratory Reporting (ELR) HL7 v2.5.1 message to Public Health (LTIAPH).

In addition, the DOH electronic messaging team is one of only two teams in the country supporting a technical route-not-read hub to support national laboratory data sharing. In conclusion, the contributions, expertise, technical prowess, and collaborative approach of DOH teams have been invaluable to the ongoing success of APHL's informatics projects.

Tuberculosis

In August 2011, BPHL staff surveyed all licensed clinical laboratories in Florida to identify the laboratories that provide testing for *Mycobacterium tuberculosis* (TB) and determine the scope of testing that is performed. Florida laboratories that perform TB testing were sent a copy of the most recent CDC guidelines for Nucleic Acid Amplification Testing (NAAT) for TB. These laboratories were also sent information about the Hain Genotype® MTBDRPlus (Hain test), a NAAT for the detection of common mutations resulting in resistance to rifampin and/or isoniazid. BPHL performed this test on all clinical specimens that are both acid-fast bacilli (AFB) smear-positive and positive for TB with the *Mycobacterium tuberculosis* Direct (MTD) NAAT test. The communication of current guidelines, coupled with information obtained during the survey process and data on the number and types of TB samples submitted to the BPHL from Florida laboratories, were part of a systems approach to ensure that the appropriate tests are ordered on patients suspected of infection with TB. This will enable BPHL to continue to offer the highest quality testing services to the citizens of Florida, while avoiding costs associated with redundant or unnecessary testing. In 2010, the BPHL performed 23,074 TB cultures, 10,746 MTD tests, and 288 Hain tests. In 2011, BPHL performed 21,736 TB cultures, 9,618 MTD tests, and 255 Hain tests.

Since July 2009, the BPHL Jacksonville Laboratory has performed a molecular rapid test (Hain) automatically on all initial sputum AFB smear and nucleic acid amplification test positive specimens (i.e., highly infectious patients). By conventional methods, drug susceptibility results are available within four to eight weeks. The early detection of multidrug-resistant tuberculosis (MDR TB) cases allows for patients to be placed on appropriate anti-TB therapy much sooner and results in cost savings for the public health system in Florida. DOH has been recognized by the Association of State and Territorial Health Officials (ASTHO) with the 2012 Vision Award for the Florida Multidrug-Resistant (MDR) Tuberculosis (TB) Screening Program. ASTHO's annual award program recognizes best practices at state health departments that demonstrate creative and innovative approaches to addressing public health needs and challenges. Applications are judged and scored by experts and leaders in state public health through a peer-reviewed process, and are evaluated on background information, innovation, effectiveness, and potential for replication.

Sentinel Chicken Viral Surveillance

Throughout Florida, sentinel chickens are used to identify mosquito-transmitted encephalitis viruses currently circulating in the environment. For 26 years, BPHL has assayed weekly serum samples from sentinel chickens located throughout the state for antibody development to St. Louis encephalitis virus (SLEV), eastern equine encephalitis virus (EEEV), Highlands J virus (HJV), and, since 2000, West Nile virus (WNV). Over time, improvement of the assays and the information distribution system allow for more effective use of test results by our partners in environmental health, epidemiology, county health departments and mosquito control in order to better control the risk of disease from these viruses.

Florida uses sentinel chickens to help assess the risk of large-scale transmission of these viruses. Flocks of four to six chickens were maintained in 27 counties in 2011, either by the county mosquito control agency or the county health department. The number and distribution of these flocks is determined by the county; it is important to have enough flocks to provide good geographic coverage. Chickens are used because they do not become ill from these viruses and, if infected with the virus, are not able to infect another mosquito to perpetuate the transmission cycle. Since blood samples from the sentinel chickens are tested weekly, the detection of antibody in a chicken that had no antibody previously (seroconversion from antibody negative to antibody positive) indicates recent transmission of virus at the bird's location.

During 2011, 44,356 sera from 2,898 chickens were assayed; 234 seroconverted to WNV (8.1%), 65 to SLEV (2.2%), 44 to EEEV (1.5%), and 12 to Highlands J virus (HJV) (0.4%). In 2011, more sentinels seroconverted to SLEV antibody than in any year since WNV first appeared in Florida (2001), indicating the continued potential risk for SLEV activity and outbreaks.

Because of Florida's climate, there is mosquito activity and virus transmission year round. The historical county sentinel seroconversion data is used to determine when significant levels of seroconversion are detected. At that time, our partners take action, adjusting mosquito control activities to meet the situation and announcing the need for personal protection activities. Although we cannot prevent every case of infection, these activities do serve to reduce the risk of widespread outbreaks with large numbers of cases.

Chromium-6 (Hexavalent Chromium) in Drinking Water

In 1974, Congress passed the Safe Drinking Water Act. The maximum contaminant level goal (MCLG) in water for chromium (total) is 0.1 milligrams per liter (mg/L) or 100 parts per billion (ppb). The most common forms of chromium in the environment are trivalent (chromium-3), hexavalent (chromium-6), and the metal form, chromium-0. Chromium-3 occurs naturally in many vegetables, fruits, meats, grains, and yeast. Chromium-6 and 0 are generally produced by industrial processes. In a September 2010 draft human health assessment for chromium-6, the U.S. Environmental Protection Agency proposed to classify chromium-6 via ingestion as likely to be carcinogenic to humans. According to the BPHL Environmental Laboratory Certification Program, many laboratories in Florida and out of state are certified to test for chromium (total) in non-potable (168) and potable water (90), and are certified to test for chromium-6 in non-potable (88) and potable water (1). The BPHL Jacksonville Laboratory implemented the assay for chromium-6 in potable water in September 2011.

Severe Combined Immunodeficiency (SCID)

Severe Combined Immunodeficiency (SCID), also known as bubble boy disease, is a treatable illness in which an infant fails to develop a normal immune system. After successful treatment, infants with SCID can lead a normal life. The U.S. Department of Health and Human Services (HHS) includes SCID in the national core panel of disorders for newborn screening to protect infants with this disorder. In January 2011, the Florida Genetic Testing and Newborn Screening Advisory Council endorsed the addition of the screening test for SCID to the Florida Newborn Screening test panel, which was implemented October 1, 2012.

Genetic Screening Processor for Newborn Screening Laboratory

The transfer of testing from the old instrument (AutoDelfia) to Genetic Screening Processor (GSP) for congenital hypothyroidism (T4 - thyroxine and TSH - thyroid stimulating hormone), congenital adrenal hyperplasia (17OHP – 17-alpha hydroxyprogesterone) and cystic fibrosis (IRT – immunoreactive trypsinogen) was completed on September 1, 2011. GSP provides automation and ensures higher quality results. All reagents and consumables are barcoded and scanned by the instruments, which can significantly reduce potential errors.

2010 Newborn Screening Morbidity Data

The DOH Children’s Medical Services Newborn Screening Follow-up Program, in collaboration with BPHL, manages the Newborn Screening (NBS) program for Florida. BPHL performs screening tests for the core disorders as recommended by the HHS Secretary’s Advisory Committee on Heritable Disorders in Newborns and Children (SACHDNC). BPHL performs screening tests for additional disorders for a total of 35 diseases and conditions (including a hearing screen). Table 1 shows the newborn screening morbidity counts for 2009 and 2010, the most recent years for which data are available.

Table 1. Newborn Screening Morbidity Counts, Florida 2009 and 2010

Conditions	Morbidity Counts	
	2009	2010
Live births	221,632	214,934
Confirmed diagnosis by Florida referral centers		
Biotinidase deficiency	0	1
Partial	6	3
Congenital adrenal hyperplasia	5	11
Congenital hypothyroidism	68	68
Cystic fibrosis		
2 mutations	25	43
1 mutation	10	20
Ultra-high IRT/No mutations	1	1
Galactosemia (G/G)	1	4
Variant	NA	21
Sickle cell		
Sickle cell anemia (SS)	140	135
Hemoglobin SC disease (SC)	82	91
Sickle beta thalassemia (SA)	9	9
Disorders detected by tandem mass spectrometry	32	29
Hearing loss recognized through NBS follow-up program	249	238