AFHSB

ARMED FORCES HEALTH SURVEILLANCE BRANCH

2016 REPORT

HEALTH SURVEILLANCE, ANALYSIS, AND INSIGHT FOR ACTION

Friends and Colleagues

In fiscal year 2016, the Armed Forces Health Surveillance Branch (AFHSB) took major strides to advance the Defense Health Agency's (DHA) vision to serve as a joint, integrated Combat Support Agency that enables the Army, Navy, and Air Force medical services to provide a medically ready force to Combatant Commands (CCMDs) in both peacetime and wartime.

In its first full year operating under the DHA, AFHSB enhanced our public health surveillance data collection and analysis capabilities to support the CCMDs and military services. As part of its transition into the Public Health Division (PHD) under the J3-Operations Directorate, AFHSB improved the integration of its public health surveillance efforts with other PHD branches to help the Defense Department develop and implement prevention and treatment policies for injuries and illnesses that our men and women in uniform and other beneficiaries might face.

Through its partnerships across the federal government, and within the Military Health System (MHS), AFHSB continued to make progress in being at the forefront of militarily relevant public health surveillance for many reasons—including in the interest of U.S. national security, and the global security of its allies. That work begins with the Data Management and Technical Support section, which is responsible for maintaining the Defense Medical Surveillance System (DMSS), a vast database that contains billions of current and historical data on diseases and medical events (e.g., hospitalizations, ambulatory visits, reportable medical events, laboratory tests, immunizations, and casualty data affecting service members and other beneficiaries in the MHS throughout their military careers). The DMSS, which contains demographic, occupational, and medical information in longitudinal surveillance records, is linked to the Department of Defense Serum Repository (DoDSR)—another one of AFHSB's key surveillance tools. The DoDSR is one of the world's largest serial blood-derived serum repositories, containing more than 62 million specimens collected from more than 11 million active duty and reserve careers service members throughout their careers, and is a powerful resource to support military medical surveillance, clinical care, and seroepidemiologic investigations.

The staff of Epidemiology and Analysis (E&A) section strengthened its collaboration with the military services by expanding its epidemiologic support through AFHSB satellites that provide an on-site team of epidemiologists and public health experts to meet the needs of the Army, Navy and Air Force. E&A and satellite staff use both tools—the DMSS and DoDSR—to provide data analysis and serum for public health surveillance investigations to a cross-section of individuals throughout the Defense Department and military services. In 2016, the section distributed 359 ad hoc reports and 550 periodic reports throughout the MHS community. These reports look for trends over time of diseases and injuries such as communicable diseases, training-related injuries, mental health illnesses, traumatic brain injury, and deployment health. The staff also supported 20 health-related investigations that requested the use of 30,470 serum specimens from the DoDSR in 2016. Two studies by the Global Emerging Infections Surveillance and Response (GEIS) section and the Walter Reed Army Institute of Research (WRAIR) investigated Zika virus seroprevalence among recruits who were born in endemic areas and Zika virus seroconversion among service members living in Puerto Rico during the emergence on the virus in that country. The E&A section also continues to serve as a key Defense Department source for health surveillance and epidemiologic training for preventive medicine residents from Walter Reed Army Institute of Research (WRAIR) and the Uniformed Services University of the Health Sciences (USU) during a five- to six-week practicum rotation under the supervision and mentorship of senior staff.

In 2016, the GEIS section completed an ambitious and complex overhaul of its operations to improve the alignment of its infectious disease surveillance activities to CCMD regional and force health protection priorities. This action required greater coordination with the CCMD surgeon's offices as well as with the Office of the Joint Staff Surgeon and Army, Navy, and Air Force Service laboratory leadership. GEIS developed strategic guidance documents that detailed specific lines of effort where GEIS-funded projects could provide focused support to CCMD theater campaign plan objectives and infectious disease priorities. To improve efficiency of its proposal and report review and funding cycle, GEIS piloted a business cycle that resulted in the ability of GEIS to inform service laboratories of their funding profiles four months earlier than in previous years. As a result, the business cycle was developed into an enduring timeline outlining programmatic activities over three fiscal years. Finally, to stabilize GEIS funding at the service laboratories into the future, GEIS implemented a new process to track ongoing sustainment activities through work plans that describe three years of activities. As a result, the GEIS network is now better globally postured and transregionally integrated to provide early detection and outbreak response in support of Joint Force Health Protection and Operational Readiness against infectious diseases wherever they may arise.

The Integrated Biosurveillance (IB) section continued its evolution as a key player in supporting, promoting, improving, and coordinating biosurveillance activities within the Defense Department and across the interagency. The section produced and distributed 216 disease-specific surveillance summaries on topics, including Zika virus, avian influenza A(H7N9), Middle East respiratory syndrome coronavirus, chikungunya in the Western Hemisphere, yellow fever in Africa, and the Ebola outbreak in West Africa in 2016. It now shares fully unclassified versions of surveillance summaries on the AFHSB website for non-governmental organizations and foreign nations.

The IB section moved AFHSB liaison activities for CCMDs directly under its supervision so that they have direct access to individuals monitoring health events and disease outbreak and provide increased interactions with CCMD surgeon staff. IB's CCMD liaisons provided public health subject matter expertise to exercises such as Eager Lion in Jordan and Eagle Resolve in Kuwait, creating exercise background

information feeders and scenarios (injects) and serving as a moderator for these scenario discussions to provide epidemiologic expertise in detection and prevention.

IB staff also improved its use of existing and potential new biosurveillance systems to enable Defense Department senior leaders and public health professionals to predict and/or forecast emerging infectious diseases and develop corresponding force health protection measures.

To facilitate CCMD interactions, IB section staff implemented a browser-based tool into the daily workflow of AFHSB analysts to visualize RME data and outpatient data from the DMSS. They developed a tool to utilize Defense Department outpatient data from the Centers for Disease Control and Prevention (CDC) National Syndromic Surveillance Program environment and automatically display disease and syndrome trends. This collaboration with the CDC will allow surveillance partnerships between military treatment facilities and local public health jurisdictions, both working on the same platform. The staff also advocated and received approval for enhancing the Defense Department's Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE). DHA approved a technical refresh of ESSENCE that brings an advanced visualization capability on par with the civilian sector and aligns our system with the same code base used by both CDC and more than one-half of the state public health departments. IB can use these tools to conduct timely surveillance of the force and convey findings to CCMD and military service public health decision makers without delay.

Moving forward, AFHSB is undertaking several major initiatives in 2017. Through its satellites, the E&A staff will conduct monthly professional exchanges and create a Health Surveillance Steering Group to interact more closely with the service public health hubs. Other initiatives include: development of a global infectious disease surveillance strategy with other Defense Department and interagency partners; development of a real-time predictive surveillance capacity in coordination with the DHA's Research and Development Directorate; transition of all information management and technology platform capabilities under its Health Information Technology Directorate for more effective maintenance and support of our surveillance systems; and eventual transformation of our present separate health surveillance components into a comprehensive "system of systems."

I strongly believe these initiatives will place AFHSB at the forefront of health surveillance in the 21st century allowing us to have near real-time situational awareness with more accurate estimation of disease and injury threats for use by the Joint Force to decrease morbidity and mortality. I am also looking forward to the continuing and new challenges that face us in ensuring support of the readiness and health of our fighting force and their beneficiaries as the DHA continues to assume its role as a Combat Support Agency.

DOUGLAS A. BADZIK, MD, MPH COL, MC, USA
Chief, Armed Forces Health Surveillance Branch

VISION

To be the central epidemiologic resource and a global health surveillance proponent for the U.S. Armed Forces.

MISSION

Provide *timely, relevant, actionable,* and *comprehensive* health surveillance information to promote, maintain, and enhance the health of military and military-associated populations.

AFHSB CRITICAL FUNCTIONS ARE:

- Acquire, analyze/interpret, disseminate information, and recommend evidence-based policy.
- Develop, refine, and improve standardized surveillance methods.
- Serve as a focal point for sharing health surveillance products, expertise and information.
- Coordinate a global program of militarily relevant infectious disease surveillance.

CONTENTS

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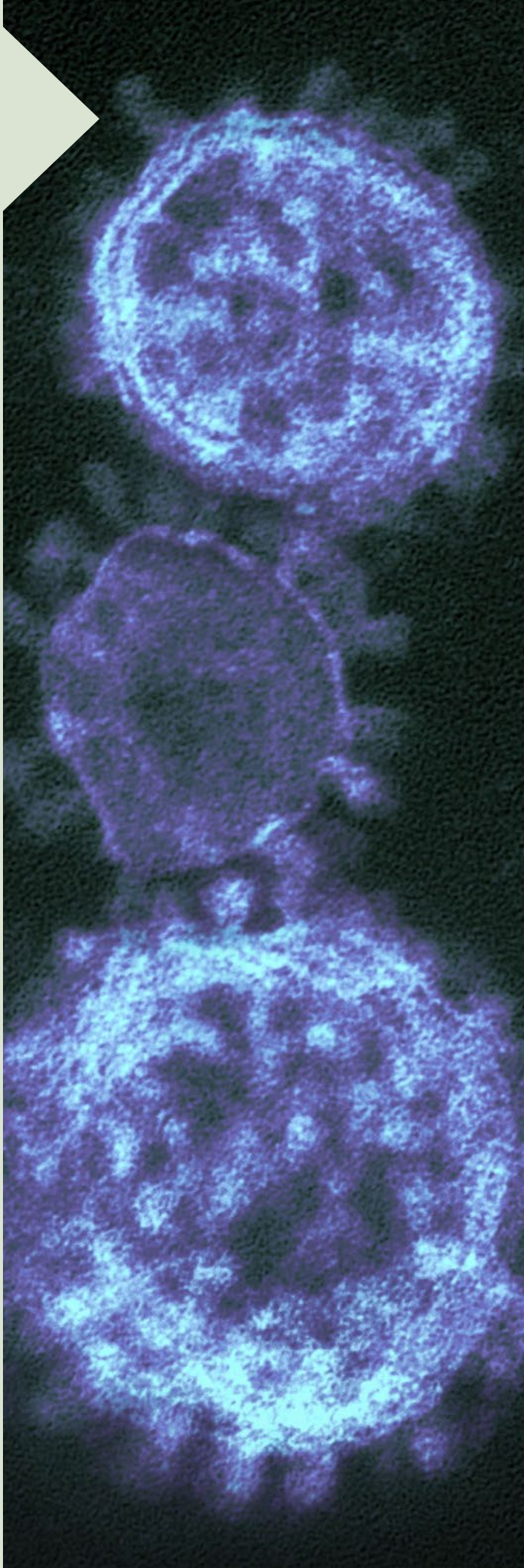


THE HISTORY OF AFHSB

THE ORIGINS OF AFHSB

The Armed Forces Health Surveillance Branch (AFHSB) is the central epidemiologic health resource for the U.S. military. AFHSB operates under DHA's Public health Division in its J3-Operations Directorate.

AFHSB was created in February 2008 as the Armed Forces Health Surveillance Center following the merger of the capabilities and resources of the Army Medical Surveillance Activity's Defense Medical Surveillance System (DMSS) and the Department of Defense Serum Repository (DoDSR), the Department of Defense Global Emerging Infections Surveillance and Response System, and the Global Health Surveillance Activity from the Office of the Deputy Assistant Secretary of Defense for Force Health Protection and Readiness.

AFHSB manages the DMSS and the DoDSR. As the central repository of medical surveillance data for the U.S. Armed Forces, DMSS contains current and historical data on diseases and medical events (e.g., hospitalizations, ambulatory visits, reportable medical events [RMEs], laboratory tests, immunizations, and casualty data) affecting service members throughout their military careers. DMSS contains billions of data records on service members and other beneficiaries of the Military Health System (MHS).

The DoDSR was established in 1989 to store blood sera collected during Defense Department testing program for HIV infections. Later, the DoDSR was designated to receive serum specimens collected before and after operational deployments. With more than 62 million serial serum specimens from more than 11 million individuals, the DoDSR is the world's largest storage facility of its kind.

The Defense Department mission was expanded through a Presidential Decision Directive NSTC-7 to include support of global surveillance, training, research, and response to emerging infectious disease (EID) threats, resulting in the establishment of DoD-GEIS in 1997. GEIS coordinates AFHSB's global EID surveillance and response initiatives among a network of partner organizations and executes a militarily relevant surveillance program involving respiratory infections, enteric infections, febrile and vector-borne infections (FVBIs), and antimicrobial-resistant organisms. The AFHSB also plays a key role in integrating biosurveillance information to understand the threats from endemic and EIDs relevant to the military worldwide.

DEFENSE HEALTH AGENCY

DHA is a joint, integrated Combat Support Agency that enables the Army, Navy, and Air Force medical services to provide a medically ready force and ready medical force to Combatant Commands in both peacetime and wartime. The DHA supports the delivery of integrated, affordable, and high-quality health services to MHS beneficiaries and is responsible for driving greater integration of clinical and business processes across the MHS.

DHA DIRECTOR VICE ADMIRAL RAQUEL C. BONO'S PRIORITIES:

- Enhance our relationship with the Services
- Evolve and mature our understanding of what it means to be a Combat Support Agency
- Optimize DHA operations

AFHSB ORGANIZATIONAL STRUCTURE

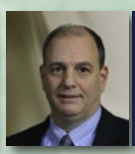
Chief
COL Douglas Badzik

Chief, Operations and Administration
Mr. Robert Welch

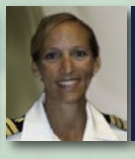
Deputy Chief
Dr. Jose Sanchez

Chief, Epidemiology & Analysis
Col Dana Dane

Chief, Integrated Biosurveillance
Mr. Juan Ubiera

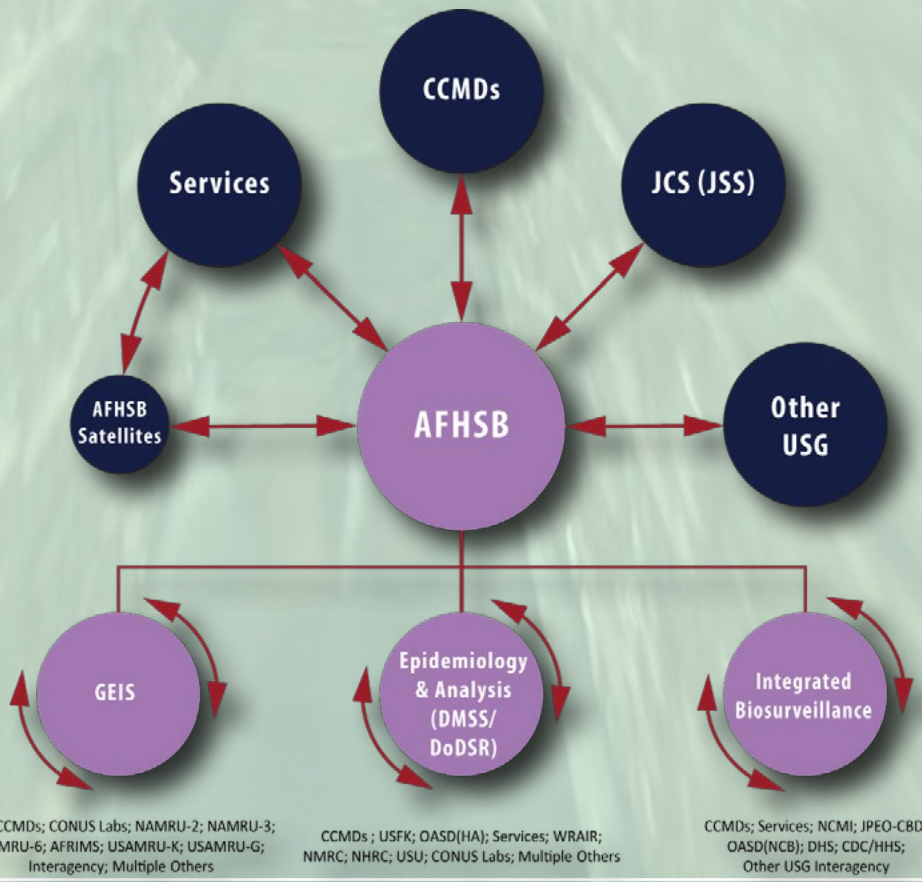


Chief, Data Management & Technical Support
Dr. Mark Rubertone



Chief, Global Emerging Infections Surveillance & Response
CDR Franca Jones

CUSTOMERS AND STAKEHOLDERS



AFHSB publishes summaries of notifiable diseases, trends of illnesses of special interest, and field reports describing outbreaks and case occurrences in its peer-reviewed journal, *Medical Surveillance Monthly Report (MSMR)*, which disseminates Defense Department medical surveillance information. AFHSB also provides up-to-date information on diseases that could affect force health protection.

As part of its merger with DHA, AFHSB assumed responsibility from some of the health surveillance capabilities of the Service Public Health Hubs, which include personnel from the U.S. Army Public Health Center U.S. Air Force School of Aerospace Medicine (USAFSAM), and the Navy and Marine Corps Public Health Center (NMCPHC). The Service Public Health Hubs' select surveillance personnel and assets are satellites of AFHSB.

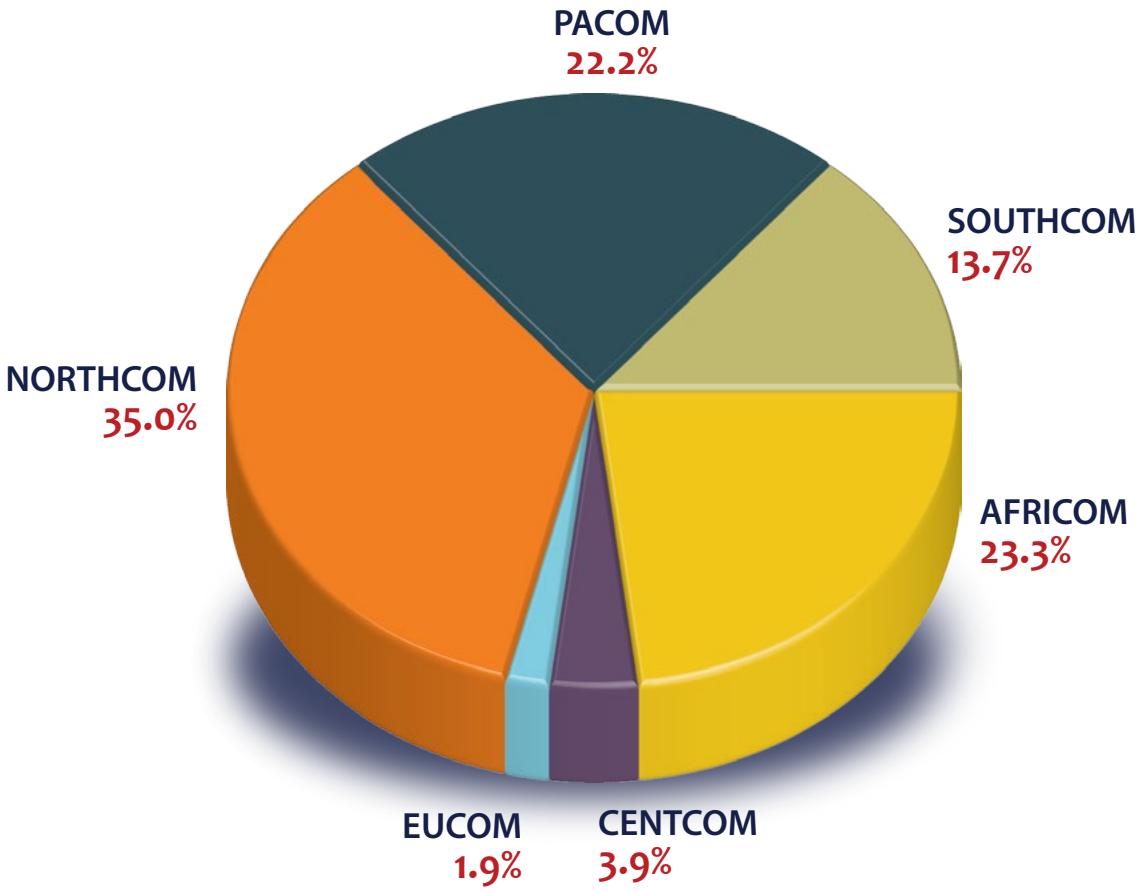
AFHSB is currently organized into four sections: DMTS, E&A, GEIS, and IB.

AFHSB FINANCES

The AFHSB budget was $81.9 million for 2016. AFHSB distributed nearly 69 percent of its funds directly to laboratory partners through the GEIS program following an extensive internal and external proposal review process.

Funding recipients include the Army and Navy overseas laboratories such as the Armed Forces Research Institute of Medical Sciences (AFRIMS), U.S. Army Medical Research Detachment-Georgia (USAMRD-G), U.S. Army Medical Research Unit–Kenya (USAMRD-K), U.S. Naval Medical Research Unit–Asia (NAMRU-A), NAMRU-3, and NAMRU-6. Several CONUS-based military and university partners include the Naval Medical Research Center (NMRC), Naval Health Research Center (NHRC), WRAIR, USAFSAM, Uniformed Services University of the Health Sciences (USU), and others that receive funding in support of their robust programs that benefit the Defense Department and partners. The remaining funds support AFHSB sections and headquarters, including biosurveillance initiatives, contracts, *MSMR*, DoDSR, and other infrastructure costs.

FY16 FINANCIAL MANAGEMENT AND ACCOUNTABILITY



THE ELEMENTS OF MILITARY MEDICAL SURVEILLANCE

TOOLS OF SURVEILLANCE

The DMSS and DoDSR are longstanding and vital assets to U.S. Armed Forces medical surveillance. The DMSS and DoDSR have their historic roots in routine HIV screening and surveillance. However, their functions were expanded in the early 1990s to encompass all diseases and injuries relevant to the protection of U.S. forces and deployment health.

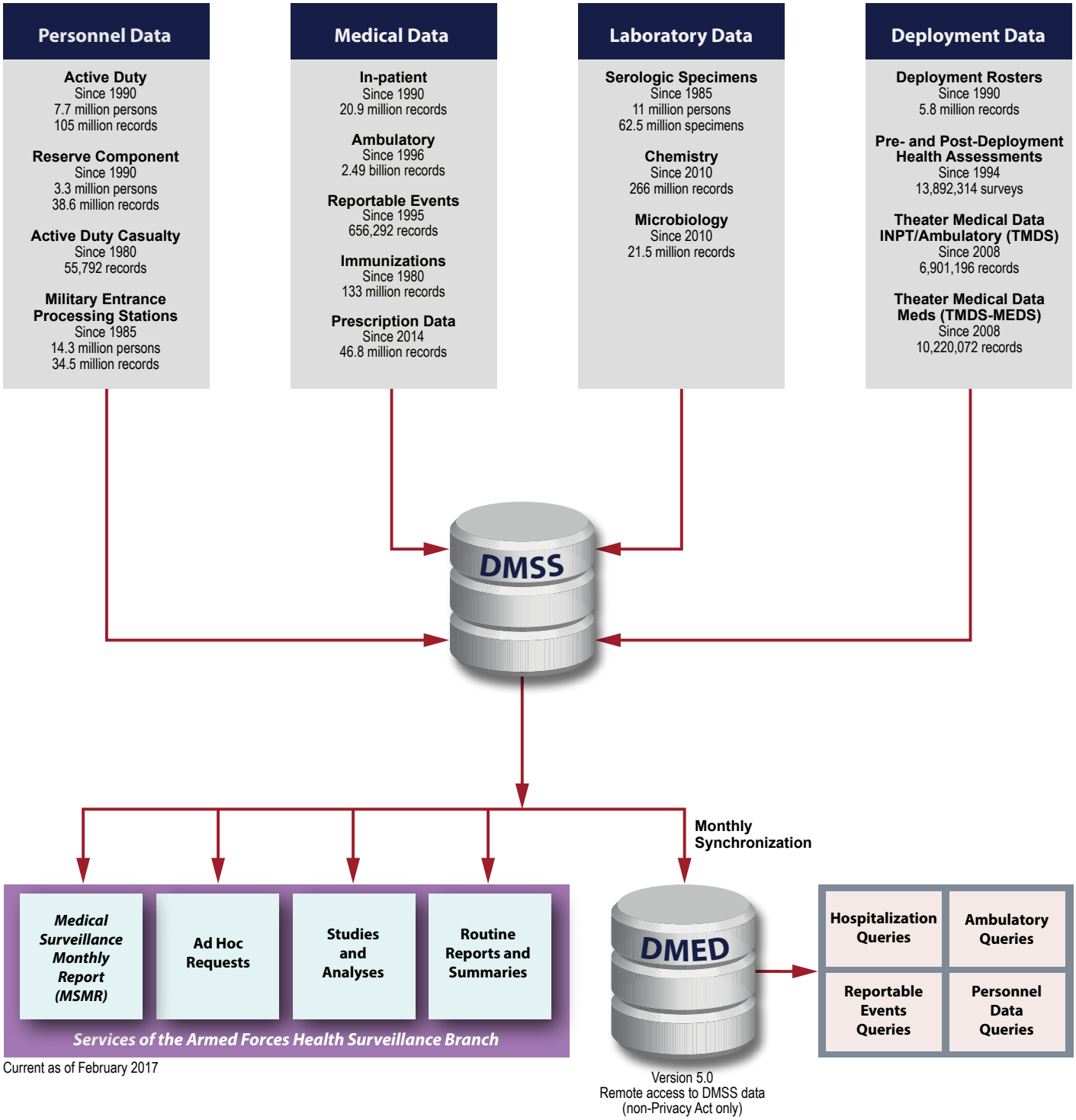
The DMSS receives data from multiple sources and integrates these data in a continuously expanding longitudinal surveillance database for all individuals who have served in the military since 1990. DMSS records are maintained in person, place, and time of reference. The organization of the data facilitates efficient and powerful analyses of morbidity among service members using traditional epidemiologic practices.

The Defense Medical Epidemiology Database (DMED) is derived from DMSS, providing select data that are de-identified and remotely accessible to individuals. The purpose of DMED is to provide standard epidemiologic methodology used to analyze active duty personnel and medical event data. Users benefit from unprecedented access to tri-service epidemiologic data and can query large amounts of data in a timely and efficient manner.

DMED is available to authorized users—including U.S. military medical providers, epidemiologists, medical researchers, safety officers, or medical operations/clinical support staff—who are responsible for surveying health conditions in the U.S. military and conveying this information to commanders for monitoring and enhancing the health of the active duty component. With appropriate documentation, civilian collaborators in military medical research and operations may also have access to DMED. During 2016, AFHSB processed and dispensed more than 30,470 aliquots of serum specimens for serologic studies and analyses, making it one of the busiest years in the history of the DoDSR. The specimens are housed in state-of-the-art freezers with advanced cooling equipment and technology. The DoDSR contains 62 million serial blood-derived serum specimens collected from more than 11 million active duty and reserve service members throughout their careers. The DMSS database containing demographic, occupational, and medical information in longitudinal surveillance records links to the DoDSR specimens, which establishes a unique and powerful resource to support the conduct of military medical surveillance, clinical care, and seroepidemiologic investigations.

DMTS Chief Dr. Mark Rubertone (back) demonstrates the DoDSR laboratory where blood serum is processed to DHA Director Vice Adm. Bono (front) during a visit to AFHSB. (Courtesy: AFHSB)

DMSS STRUCTURE AND FUNCTIONAL RELATIONSHIP



Current as of February 2017

Version 5.0
Remote access to DMSS data
(non-Privacy Act only)

EPIDEMIOLOGY ANALYSES AND REPORTS

The E&A section integrates the expertise of epidemiologists, preventive medicine physicians, and data analysts to provide timely analyses and reports of actionable health information. The section uses AFHSB health surveillance tools—DMSS and DoDSR—and provides surveillance products to Defense Department policymakers, military commanders, healthcare providers, public health officers, and researchers. In addition, E&A staff analyze and interpret large datasets, publish the *MSMR*, develop and disseminate standards for case definitions, and train preventive medicine residents.

The section receives and responds to hundreds of health-related inquiries and investigations on the U.S. military with the intent of preserving the health of the U.S. Armed Forces. Many inquiries are initiated by key leaders throughout the Defense Department and relate to military operations. Each analysis and report distributed by the section entails numerous hours of epidemiologic expertise and programming by analysts to extract relevant data from the billions of health records stored in the DMSS and blood sera in the DoDSR.

E&A staff prepare analyses under two general categories: periodic reports and ad hoc reports. In FY16, the section distributed 359 reports on ad hoc analyses and more than 550 periodic reports throughout the Defense Department community. These routine and periodic reports look for trends over time of diseases and injuries such as communicable diseases, training-related injuries, mental health illnesses, traumatic brain injury (TBI), and deployment health. Routine and periodic reports have helped Defense Department policymakers to shape their force health protection programs, and healthcare professionals to develop preventive measures against diseases or injuries affecting U.S. service members and their beneficiaries.

For example, E&A staff provide analyses and subject matter expertise for AFHSB's "DoD Seasonal Influenza Surveillance Summary" during the influenza season. This report contains weekly summaries of influenza activity among MHS beneficiaries by CCMD. The influenza report tabulates data about outpatient medical encounters for influenza-like illness (ILI), mandatory reports about cases of influenza hospitalizations, and ancillary services data on laboratory test results, provided by the NMCPHC to assess weekly influenza activity in the Defense Department. The Reportable Medical Events Monthly Report provides summaries of RMEs among Defense Department beneficiaries. The report summarizes counts of each RME for the most recent month and provides comparisons to average counts for the same month and 12-month periods from data for the past five years. E&A staff continue to produce the Installation Injury Reports, which provide detailed counts and rates of injuries to service members that occur at nearly 200 military installations each month. These reports detail injuries by anatomical region, external cause of injury, and impact on service members' duty status.

Analyst Liliya Meyerson (left) shows Major General Jeffrey B. Clark (right), chief of DHA's J3 Operations Directorate, examples of medical health surveillance analysis produced by the E&A section. (Courtesy: AFHSB)

The ad hoc analyses originate from health-related requests from operational taskers, congressional inquiries, military public health centers, military clinicians, military researchers, and the *MSMR* staff. These tailored analyses consist of requests for health surveillance on topics such as mental and behavioral health, TBI, infectious diseases, vaccines, and deployment and training-related illnesses and injuries. Ad hoc analyses on trends in diseases and injuries that are considered to be of special interest by military leaders may become routine and recurrent reports.

In 2016, the section supported several ad hoc requests and recurring reports for the CCMDs. Examples of routine reports are weekly influenza surveillance reports for each CCMD and reportable medical events to U.S. European Command (EUCOM). Ad hoc requests included several from U.S. Central Command (CENTCOM) on counts of ILI, animal bites, and diarrheal diseases, and a request from U.S. Northern Command to provide influenza case counts. Additionally, a CENTCOM deployment health report

FY16 AFHSB Periodic Reports in One Year

Deployment Reports

- U.S. Army D&I Report
- Civilian Deployment Health Compliance Report
- Civilian Post-Deployment Health Assessment (DD2796) Summary Report
- Civilian Post-Deployment Health Reassessment (DD2900) Summary Report
- Civilian Pre-Deployment Health Assessment (DD2795) Summary Report
- Deployment Health Compliance Report
- Deployment Health Report
- Post-Deployment Health Assessment (DD2796) Summary Report
- Post-Deployment Health Reassessment (DD2900) Summary Report
- Pre-Deployment Health Assessment (DD2795) Summary Report
- U.S. Coast Guard (USCG) Deployment Health Assessment Report
- *MSMR* Deployment Health Assessment Summary
- Special Surveillance (*MSMR*): Amputations, TBI, DVT, Leishmaniasis, Severe acute pneumonia, and heterotrophic ossification

Disease Reports

- Armed Forces Pest Management Board (AFPMB) Arthropod-Borne Hemorrhagic Fever Report
- AFPMB Dengue/Hemorrhagic Fever Report
- AFPMB Leishmaniasis Report
- AFPMB Lyme Disease Report
- AFPMB Mosquito Borne Encephalitis Report
- AFPMB West Nile Fever Report
- Armed Forces Communicable Disease Report
- Influenza Modeling Report
- Influenza Surveillance Report
- Influenza-Like Illness Army Report
- Malaria Case-Finding Report
- Malaria YTD Korea
- Meningococcal Report
- National Capital Region Medical Directorate Communicable Disease Report
- Reportable Events Monthly Report (REMR)
- Respiratory Illnesses Report
- USFK Biosurveillance Report
- VA Influenza Surveillance Report

Injury Reports

- Army Annual Injury Report
- Army Injury & Overuse Report
- Army PH360 Report
- DoD Eye Injury Annual Report
- DoD Eye Injury Quarterly Report
- DoD Hearing Injury Annual Report
- DoD Hearing Injury Quarterly Report
- Injury Installation Reports
- Installation Injury Fort Leonard Wood
- Reserve Lost Duty Metrics
- U.S. Army Training And Doctrine Command (TRADOC) Cold Injury Report
- TRADOC Heat Injury Report
- TRADOC Training-Related Injuries Report
- U.S. Army Special Operations Command Special Reportable Events (Semi-Annual)

Mental Health Reports

- Air Force Special Operations Command (AFSOC) Mental Health and TBI Annual Report
- AFSOC Mental Health and TBI Quarterly Report
- Defense and Veterans Brain Injury Center TBI Screen
- Force Health Protection and Readiness (FHP&R) Harm and Violence Report
- FHP&R Mental Health Screen Report
- FHP&R PTSD Depression Screen Report
- Health Affairs Mental Health Report
- Health Affairs TBI Report
- MHS Dashboard Measures
- USASOC Mental Health and TBI Monthly Report
- USASOC Mental Health and TBI Quarterly Report
- Health Affairs PTSD Report
- Automated Neuropsychological Assessment Metrics Report

Special Reports

- DIB RME Weekly Report
- EUCOM RMES Monthly Summary
- FHP QA Compliance Audits: ANAM
- Special Surveillance (*MSMR*): Motor Vehicle Accidents
- USCG Burden of Disease Report
- USCG RepEvent Report
- Smallpox Cardiac AE Report

Total Number of Reports: 550

was redesigned to meet the needs of its leadership. Specialized requests and reports for the U.S. Southern Command were also provided during the fiscal year.

In 2016, E&A completed multiple analyses in response to congressional inquiries and Government Accountability Office (GAO) requests. Examples of congressional inquiries have included providing the number of current military personnel diagnosed with acute and chronic hepatitis B and how many progressed to chronic liver disease, incidence of kidney cancer in the military, and counts and severity of burns occurring during deployments. One GAO request was to support a study investigating military separations for misconduct and their association with mental health diagnoses.

In 2016, the section continued to collaborate with other federal partners such as the CDC and the U.S. Food and Drug Administration (FDA). E&A's work with the CDC included evaluation of influenza vaccine effectiveness for service members and dependent children in the Air Force and assisting with malaria case reporting. E&A, in collaboration with the GEIS section, provided the FDA with evaluation of influenza vaccine dosing strategies and effectiveness analyses.

In 2016, the section supported 20 health-related investigations that requested the use of 30,470 serum specimens from the DoDSR. Two studies by the GEIS section and WRAIR investigated Zika virus seroprevalence among recruits who were born in endemic areas and Zika virus seroconversion among service members living in Puerto Rico during the emergence on the virus in that country. Another investigation utilized specimens from the DoDSR to investigate latent visceral leishmaniasis infections among service members deployed during Operation Iraqi Freedom. In another instance, the section continued to support a project investigating exposure to melioidosis, an infectious skin disease, among Marines deployed to Darwin, Australia.

AFHSB SATELLITES

Staff from the AFHSB satellites contribute unique expertise in areas such as influenza surveillance, laboratory data analysis, behavioral and social health, and RME surveillance, to the overall AFHSB mission. Satellite staff are located at the APHC in Aberdeen Proving Ground, Maryland, the NMCPHC in Portsmouth, Virginia, and at Wright-Patterson Air Force Base in Dayton, Ohio. Satellite staff support their respective service epidemiology centers, coordinating their data requests through the E&A Request Approval Process (RAP) meeting, and are vital members of the RAP and other E&A and AFHSB working groups.

Epidemiologists in AFHSB's Navy Satellite serve produce products on a range of issues such as reportable and emerging infections. A Navy Hospital Corpsman prepares to administer a hepatitis B vaccination at Naval Air Station North Island Branch Clinic (Courtesy: U.S. Navy)

THE NAVY SATELLITE, co-located with the NMCPHC's EpiData Center (EDC), supports several of its products, including behavioral and operational health, reportable and emerging infections, and application development and data systems support. Staff includes four epidemiologists who serve as subject matter experts for their respective teams; prepare analytic reports; and provide data support to Navy Department customers in areas such as influenza, infectious disease surveillance, behavioral health, suicide epidemiology, and data management and quality control.

In 2016, key satellite accomplishments included completing a congressional request for U.S. Navy Bureau of Medicine on sickle cell traits among recruits; transitioning TBI case definitions from ICD-9 to ICD-10 codes; participating in the 21st Century Sailor Office's meeting for case reviews of 2014 Navy suicide deaths; and developing an EDC ambulatory medical encounter database process for removing duplicate records. The satellite team completed 80 routine reports, 38 ad hoc reports, and 604 data support requests.

THE ARMY SATELLITE staff, in conjunction with APHC, conduct population-based health surveillance through the systematic collection, analysis, interpretation, and reporting of behavioral health, disease and injury, social

health outcomes, occupational and environmental medicine, and mortality of its soldiers. The satellite's staff maintain the Department of Defense Suicide Event report program, the Army Behavioral Health Integrated Data Environment, and the Army Disease Reporting System internet (DRSi).

The Behavioral and Social Health Outcomes support cell completed 80 ad hoc and routine requests on suicidal behavior, alcohol use, and behavioral health outcomes in 2016. Those products included the Surveillance of Suicidal Behavior, Behavioral Health Risk Assessment Data Report, and U.S. Army Mortality Report.

The cell supporting the APHC Injury Prevention Division conducts analysis on injury surveillance for initial entry training and the greater Army population, which are distributed to key Army leaders from the installation level to Defense Department policymakers.

The cell supporting the Disease Epidemiology Division manages the DRSi and the publication of the Armed Forces Reportable Medical Events Guidelines and Case Definitions that includes coordinating tri-service input. In addition, staff conducts surveillance of emerging infections such as Zika virus in Army service members and at Army medical treatment facilities.

The Occupational Environmental Medicine (OEM) cell updates the Active Duty Army Noise-Induced Hearing Injury (NIHI) Surveillance Data Profile for 2007–2016 based on further analysis received from E&A. The OEM cell collaborates with interdisciplinary subject matter experts from DHA's Department of Defense Hearing Center of Excellence to produce this latest Army NIHI data profile, which is used as a template for entire department and all NIHI surveillance reporting by all the services.

THE AIR FORCE SATELLITE comprises three cells: Field Epidemiology; Air Force Mortality Registry (AFMR); and the DoD Global, Laboratory-based Influenza Surveillance Program.

The Field Epidemiology cell supports the USAFSAM epidemiology consult service. It monitors ESSENCE and the Air Force DRSi health surveillance databases; contacts base-level public health offices; provides education; and has the opportunity to conduct epidemiologic research and evaluation studies. Field epidemiologists are responsible for responding to consults, outbreak response, and data requests from Air Force bases, major commands, and other agencies. In 2016, the satellite contributed to 50 reports, completed more than 30 consults, trained 25 officers and physicians and 50 technicians, conducted monthly Zika surveillance, and submitted two articles for publication.

The AFMR is a comprehensive database created in 1998 to obtain and code standard death certificates for all Air Force service members and retirees occurring from 1970 to the present. More than 452,000 deaths have been recorded in the registry. The AFMR team works with field epidemiologists to identify mortality trends and patterns and support targeted studies. In 2016, the AFMR team coded and entered into the database more than 6,000 deaths and requested more than 13,000 records from prior decades for confirmation and entry.

The DoD Global, Laboratory-based, Influenza Surveillance Program is a sentinel program with 95 sites globally. The program's priorities include identification and tracking of circulating influenza and influenza vaccine effectiveness analyses. These priorities are accomplished through weekly influenza reports, monthly EUCOM influenza reports, quarterly GEIS reports, sequencing analyses, and both mid- and end-of-season vaccine effective analyses. In 2016, the surveillance team completed testing on more than 5,500 specimens and provided vaccine effectiveness (VE) and sequencing information for the FDA's Vaccines and Related Biological Products Advisory Committee meeting. These data accounted for about 24 percent of the total U.S. data for VE and sequencing in 2016.

STANDARD AND SURVEILLANCE PRACTICES

AFHSB's Surveillance Methods and Standards (SMS) Working Group develops, documents, and publishes standard surveillance case definitions and methodologies. The working group includes representatives from all services and consults, when needed, with experts from the Defense Department during the case definition development process. These case definitions allow Defense Department public health practitioners to measure disease trends and related biological phenomena in different environments and situations over time.

The ongoing documentation of AFHSB's case definitions and methodologies promotes internal consistency and credibility of its surveillance efforts and promotes consistency and comparability of public health information and data across multiple agencies. The AFHSB case definitions also serve as guidelines for other Defense Department health surveillance and research organizations. The AFHSB case definitions are designed for use with administrative healthcare data derived from the U.S. military electronic health

record and contained in the DMSS and other available datasets. The definitions primarily use *International Classification of Diseases, 9th and 10th Revisions, Clinical Modification* (ICD-9 and ICD-10) codes to identify conditions of interest diagnosed in the MHS.

In 2016, the working group continued its efforts to develop ICD-10 code sets for its existing case definitions in response to the October 1, 2015, transition from ICD-9. Efforts were also made to ensure that all new case definition developed at the AFHSB included ICD-10 code sets. Case definition documentation primarily focuses on creating code sets for conditions frequently used in AFHSB reports. To date, there are more than 100 condition-specific case definitions in 18 categories available on the AFHSB website. Of these, approximately 95 include proposed ICD-10 code sets. In 2016, the working group updated the case definition and ICD-10 code set, to include severity categories, for the Defense Department TBI surveillance case definition. The updated TBI case definition was developed jointly with the Defense and Veterans Brain Injury Center and the CDC. In addition, in collaboration with the APHC, the DoD Hearing Conservation Working Group, and the Tri-Service Vision Conservation and Readiness Program, updated the case definitions for both Noise-Induced Hearing Injuries and Eye Injuries. The SMS working group developed and documented, among others, new case definitions for priority mental health conditions, gastroenteritis, meningitis, gallbladder disease, and hernias.

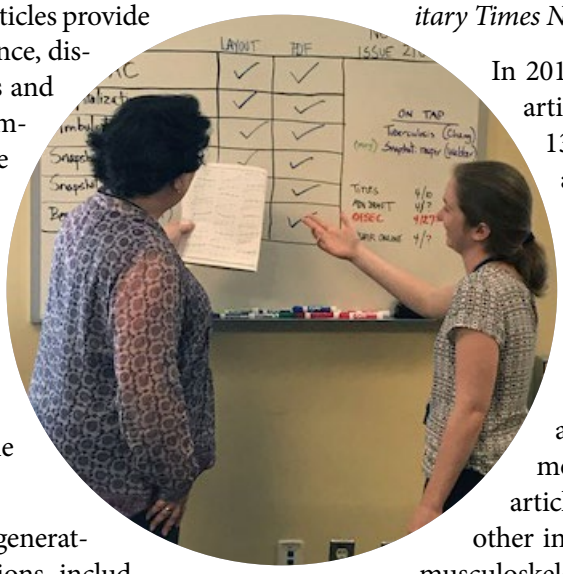
AFHSB also maintains and publishes the Armed Forces Reportable Medical Events Guidelines and Case Definitions. The 2012 guidelines were revised and updated in 2016 and will be published online in 2017. The Defense Department uses these guidelines to help military public health officers, healthcare providers, and laboratories to identify and report specific diseases and conditions of public health importance to both military and civilian authorities.

E&A analyst Lin Li combines epidemiologic and programming expertise to extract relevant data from billions of healthcare records stored in the DMSS and DoDSR. (Courtesy: AFHSB)

Whether in training or deployed, service members can sustain injuries that might jeopardize their operational readiness. E&A staff produce timely analyses and reports to help Department of Defense policymakers shape their force health protection programs.

MEDICAL SURVEILLANCE MONTHLY REPORT

Launched in 1995, the *MSMR* is the flagship publication for AFHSB. The peer-reviewed journal's articles provide evidence-based estimates of the incidence, distribution, impact, and trends of illness and injuries among U.S. military service members and associated populations. The *MSMR's* readership includes professionals throughout the MHS, including public health officials, clinicians, researchers, academicians, healthcare planners, policymakers, and analysts. The publication has more than 1,500 subscribers. The *MSMR* is indexed on MEDLINE®, averaging about 800 online hits per month on PubMed.



MSMR Technical Writer/Editor Valerie Williams (left) and Senior Managing Epidemiologist Shauna Stahlman (right), discuss content to be published in the peer-reviewed journal. (Courtesy: AFHSB)

Articles published in the *MSMR* have generated media coverage in diverse publications, including *The New York Times, Nature Magazine, USA Today, The Standard, The Daily Record, Infection Control Today, Medical Express, the Examiner, the Fayetteville Observer, International Business Times, LidTime, The Los Angeles Times, The Washington Post, The Times News, Stars and Stripes* and *Military Times Newsweekly Group*.

In 2016, the *MSMR* published a total of 44 articles, including 20 original full reports, 13 updates of previously published data analyses, four brief reports, six surveillance snapshots, and one editorial. Eighteen of the articles were submitted by authors not affiliated with the *MSMR* editorial staff. Three issues had special themes: sexually transmitted infections (STIs), heat injuries, and burden of disease and injury. The most frequent subjects of the original articles and updates in FY16 were STIs, other infectious diseases and immunizations, musculoskeletal conditions and injuries, and the healthcare burden of disease and injury. The *MSMR* continues to welcome manuscript submissions for relevant articles on topics in military public health, epidemiology, surveillance, and disease and injury prevention.

RESIDENCY TRAINING

As a key Defense Department source for health surveillance and epidemiologic training, AFHSB hosts preventive medicine residents from WRAIR and USU for a five- to six-week practicum rotation under the supervision and mentorship of senior staff. Residents enhance their understanding of the complexities of health surveillance systems, knowledge and application of epidemiology, and critical analytical skills. They also are exposed to AFHSB daily operations and initiatives. Central to their rotation, residents design and execute a data analysis project using the DMSS. Residents begin with a hypothesis and design an epidemiologic study in which they analyze and interpret data and generate a publishable manuscript and oral presentation.

Lieutenant Colonel (Promotable) P. Ann Loveless (right) and Lieutenant Colonel Jan Maby (center), a preventive medicine resident at WRAIR, delivered an oral presentation as part of an epidemiology rotation at AFHSB. (Courtesy: AFHSB)

Since 2008, AFHSB has trained 63 residents from the three services (29 with Army, 19 with Navy, and 15 with Air Force) and one DrPH student. Resident and student projects have resulted in published articles such as "Post-Refractive Surgery Complications and Eye Disease, Active Component, U.S. Armed Forces, 2005–2014"; "A Decade of Functional Gastrointestinal Disorders in Active Component U.S. Military Service Members, 2005–2014"; and "Increasing Severity of Traumatic Brain Injury Is Associated with an Increased Risk of Subsequent Headache or Migraine: A Retrospective Cohort Study of U.S. Active Duty Service Members, 2006–2015." Nearly half of the completed resident projects are published in the *MSMR* or other peer-reviewed journals and/or presented at the American College of Preventive Medicine or the American Public Health Association meetings. Additionally, the E&A section offers additional rotation and practicum opportunities for occupational and environmental medicine residents and master of public health and master of science in public health degrees at USU.

GLOBAL EMERGING INFECTIONS SURVEILLANCE NETWORK

GEIS VISION

Enhanced force health protection and national security through support to the Geographic Combatant Commands (GCCs) and a global laboratory network poised to prevent, detect, and respond to infectious disease threats.

GEIS MISSION

Inform force health protection decision-making and enhance global health security by preventing, detecting, and responding to infectious disease threats through supporting GCC priorities and strengthening surveillance, outbreak response, collaboration, and coordination of the global DoD laboratory network.

Following are the core GEIS partners who conduct ongoing sustainment activities on behalf of GEIS and are identified in the Strategy:

- NMRC in Silver Spring, Md., including the following subordinate laboratories: Naval Medical Research Unit (NAMRU)-3 in Cairo, Egypt; NAMRU-6 in Lima, Peru; NAMRU-2 in Phnom Penh, Cambodia; Naval Medical Research Center-Asia (NMRC-A) in Singapore; and NHRC in San Diego, Calif.
- WRAIR in Silver Spring, Md., including the following subordinate laboratories: U.S. Army Medical Research Directorate (USAMRD)-Kenya in Nairobi, and USAMRD-Georgia in Tbilisi, and AFRIMS in Bangkok, Thailand
- USAFSAM in Dayton, Ohio
- USU in Bethesda, Md.

MILITARY TREATMENT FACILITY LABORATORIES: Brooke Army Medical Center (BAMC), Tripler Army Medical Center (TAMC), Landstuhl Regional Medical Center (LRMC), and Brian Allgood Army Community Hospital (BAACH).

PUBLIC HEALTH COMMANDS: Public Health Command Region-Pacific (PHCR-P), Public Health Command Region-Europe (PHCR-E), Navy and Marine Corps Public Health Center-Epi Data Center (NMCPHC-EDC), and Navy Environmental Preventive Medicine-Unit 2 (NEPMU-2).

ADDITIONAL FY16 PARTNERS: 18th Aerospace Medicine Squadron, Theater Preventive Medicine Flight (18 AMDS/SGPL); United States Army Medical Research Institute for Infectious Diseases (USAMRIID); and Georgetown University.

GLOBAL EMERGING INFECTIONS SURVEILLANCE (GEIS)

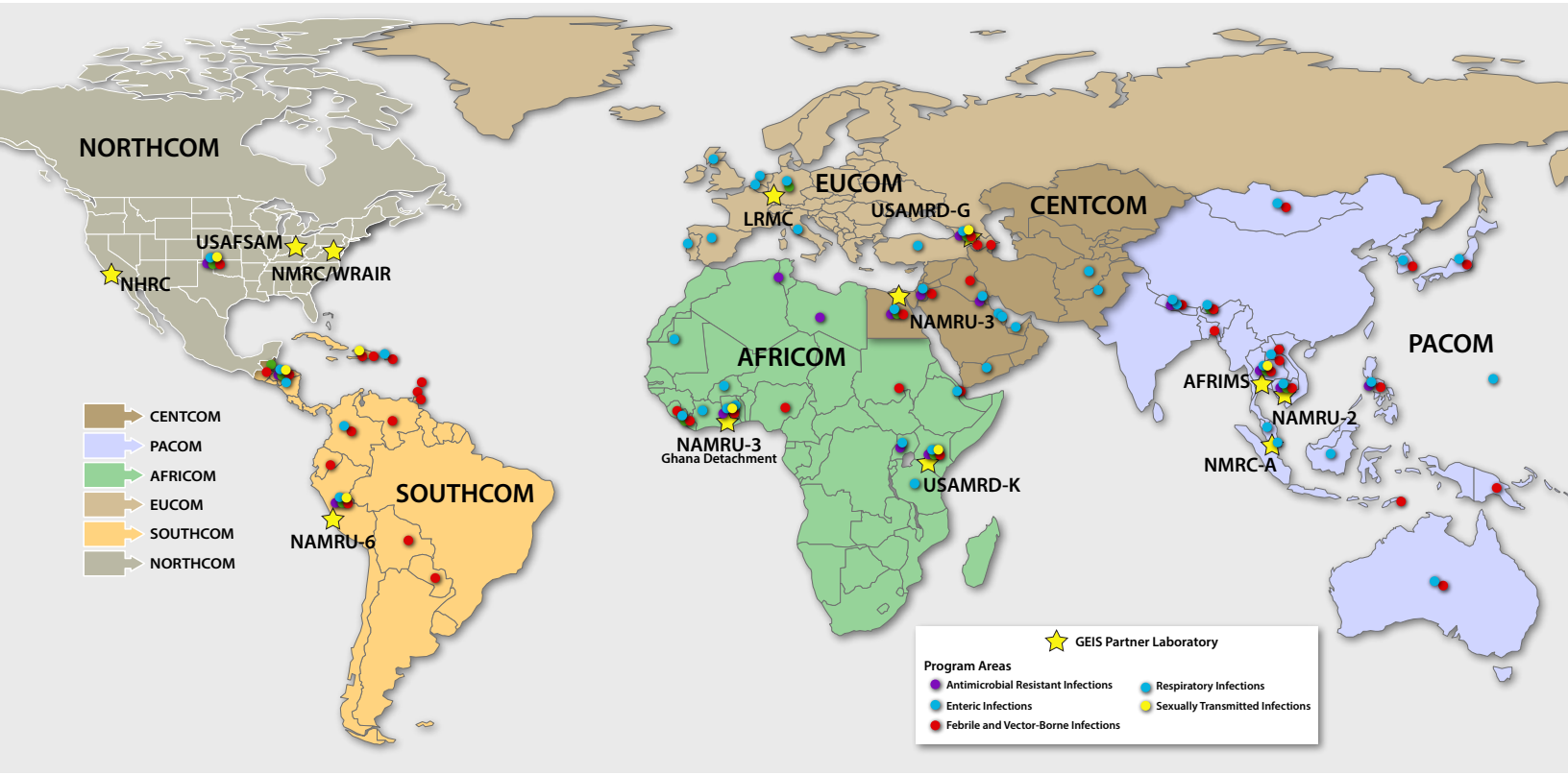
The GEIS section's role is to coordinate a global program of militarily relevant infectious disease surveillance to inform force health protection (FHP) decision-making and improve national security.

As part of AFHSB's reorganization under DHA, GEIS strives to meet the DHA Director's three Strategic Priorities. In FY16, GEIS focused on shaping the DHA's role as a Combat Support Agency. GEIS improved its supporting relationship with the GCC by revamping GEIS management for the 2016 funding cycle and beyond. Specifically, GEIS developed a "trifecta" of strategic guidance documents, including a Strategy, Focus Area Roadmaps, and GEIS-GCC Regional Alignments that detail specific lines of effort where GEIS-funded projects can provide focused support to GCC theater campaign plan objectives and infectious disease priorities, The new GEIS Strategy was published with four key lines of effort (LOEs) that, when fully implemented in fiscal year 2017, will enable improvements in the collection of relevant infectious disease surveillance data to inform FHP decision-making. The LOEs are:

- Conduct surveillance of militarily relevant infectious disease threats to inform FHP decision-making across the GCCs
- Provide support to outbreak response to better understand infectious disease threats to the U.S. Armed Forces
- Enhance coordination and collaboration efforts between the GCCs, GEIS partners, the U.S. interagency, and international partners to improve efficiency and effectiveness
- Optimize return on investment through improved program administration and management.

GEIS restructured its former infectious disease "pillars" in 2016 into "focus areas" that include respiratory infections (RI), enteric infections (EI), febrile and vector-borne infections (FVBI), and antimicrobial resistance (AMR). The former sexually transmitted infections (STI) pillar was discontinued and moved, in part, under the AMR focus area. Mainly, this was done to focus STI surveillance efforts on the global emergence of antimicrobial-resistant *Neisseria gonorrhoeae* (GC) and de-emphasize broad STI surveillance. GEIS focus area leads also developed Roadmaps for each focus area in FY16 as guidance for Defense Department service laboratory preparation and submission of proposals for 2017 funding. These Roadmaps detail the types of activities within each focus area that GEIS is interested in funding and organizes these activities under the LOEs in the Strategy. GEIS developed GCC-specific regional alignment documents to provide information for the Defense Department service laboratories on specific GCC theater priorities to guide their efforts in meeting these priorities.

Additionally, to improve efficiency of its proposal and report review and funding cycle, GEIS piloted a Business Cycle crossing in 2016. At the start of the fiscal year, Defense Department service laboratories were informed of their funding at the start of the fiscal year following a thorough review of their proposals internally by GEIS staff, DHA's PHD and Immunization Healthcare Branch, J9-Research and Development, J1/8-Resource Management, Office of General Council. The proposals also were reviewed externally, by steering committees consisting of Defense Department and interagency subject matter experts, and the Office of the Joint Staff Surgeon and GCC Surgeons' Offices. In 2016, GEIS strengthened its external focus area steering committees by including subject matter experts from other Defense Department agencies and the CDC to ensure that GEIS continues to fund projects that describe the best science with the most value for FHP. The Business Cycle pilot resulted in the ability of GEIS to inform Defense Department service laboratories of their funding four months earlier



than in previous years. GEIS used lessons learned from this pilot to develop an enduring annual Business Cycle for next three fiscal years.

Finally, to stabilize GEIS funding at the Defense Department service laboratories into the future, GEIS implemented a new process to track ongoing sustainment activities through workplans that describe three years of activities. GEIS continues to provide approximately 10 percent of its budget for new and novel approaches for infectious disease surveillance.

In 2016, GEIS provided $56.9 million in funding to 21 Defense Department service laboratories who operate in the U.S. and overseas to implement infectious disease surveillance in support of FHP.

In partnership with their host nations, the Defense Department service laboratories conduct disease surveillance and outbreak response with the primary purpose of obtaining data for U.S. FHP. Their work also indirectly improves host nation surveillance and outbreak response capabilities in the process of collaboration.

The GEIS network is globally postured and transregionally integrated to provide early detection and outbreak response in support of Joint Force Health Protection and Operational Readiness against infectious diseases wherever they may arise.

ANTIMICROBIAL RESISTANCE (AMR)

FOCUS: AMR surveillance projects fill an existing knowledge or clinical treatment gap, focusing on resistant infections that include wound and healthcare-associated bacterial infections and GC and mechanisms of resistance transmission.

WHAT'S NEW IN FY16: The AMR Focus Area supported 35 projects totaling approximately $7.3 million, including funding from GEIS and the President's Combating Antimicrobial Resistant Bacteria budget. The scope of the AMR portfolio was expanded to include One Health concepts to identify resistant organisms passed between animals and humans. Multiple projects aimed at increasing whole genome sequencing were initiated, allowing for more in-depth evaluation of genetic mechanisms responsible for antimicrobial resistance. Finally, the program expanded surveillance efforts to eight countries. The actionable FHP information developed in the AMR focus area directly affect stewardship programs and effective combat treatment regimens for each GCC area of responsibility.

WHERE WE'RE GOING: AMR will work to initiate surveillance efforts in multiple new countries; enhance the focus on secondary verification of presumptive resistant organisms; expand global comparison of resistance patterns; and improve the cost-effective evaluation of the spread, scope, and severity of antimicrobial resistance and its effect on the diminishing choices for effective therapy. This work will allow the GCC surgeons to develop local exceptions to medical practice requirements to recommend effective treatment in their

area of responsibility for Defense Department populations exposed to environmental conditions not found in the United States.

SERVICE LABORATORIES SUPPORTED IN FY16: AFRIMS, NAMRU-3, NAMRU-6, NMCPHC-EDC, NMRC-A, TAMC, USAMRD-G, USAMRD-K, USU, and WRAIR.

ACCOMPLISHMENTS:

- Provided timely and actionable FHP-relevant information on drug-resistant *Escherichia coli* directly impacting Defense Department medical countermeasures: the Multidrug Resistant Organism Repository and Surveillance Network reported the first U.S. human *E. coli* isolate carrying the plasmid-mediated colistin resistance mechanism (*mcr-1* gene) on a novel plasmid and an additional four new *E. coli* isolates with the gene from a second MHS patient
- Increased knowledge of global GC resistance patterns to assist in informing FHP treatment regimen decisions and, potentially, policy: the USU GC Repository received, confirmed, and archived isolates from Haiti (18), Ghana (74), Peru (90), and Thailand (264; 132 unique), providing quality control and secondary verification of GC isolates across the GEIS network
- Advanced Defense Department awareness of potential failures in traditional treatment regimens for militarily relevant Gram-negative organisms, specifically in the CENTCOM area of responsibility. High rates of resistance (78 percent; 400/516) in militarily relevant Gram-negative organisms were detected in Egypt: multidrug-resistant *Acinetobacter* (87 percent; 97/111), methicillin-resistant *Staphylococcus aureus* (71 percent; 31/44), extended-spectrum beta-lactamase-producing *Klebsiella pneumoniae* (62 percent), and *E. coli* (59 percent).

TOP ACCOMPLISHMENTS FOR FY16

- Strengthened its role as a Combat Support Agency by ensuring that 100 percent of its funding for infectious disease surveillance and outbreak response projects met GCC theater campaign plan objectives and infectious disease and strategic regional priorities
- Fortified its relationship with the services by drafting and releasing a "trifecta" of guiding documents known as the Strategy, GEIS Focus Area Roadmaps, and GEIS–GCC Alignment to facilitate the ability of Defense Department service laboratories to develop proposals for funding to meet GCC infectious disease and strategic regional priorities
- Optimized internal operations to improve its relationship with the services and GCC support for GEIS-funded projects
- Overhauled its business process by creating a structured multi-year business cycle that allows ongoing sustainment activities to be projected in a three-year rolling work plan
- Streamlined its proposal review, approval, and funding process, utilizing defined metrics and seeking review at multiple levels within the DHA, external steering committees, and the GCCs
- Tightened its financial evaluation and tracking of funded projects to enable improved program management and fiscal stewardship
- Improved its relationship with the services by hosting the first annual GEIS partner laboratory Commander's Call to discuss and gain "buy-in" of strategic shifts in the GEIS program and by visiting the majority of the OCONUS GEIS Core laboratory partners to engage more directly with the laboratories, discuss issues to identify workable solutions, expand the dialogue between the various partners, and witness firsthand the efforts of the laboratories to provide critical information for FHP decision-making
- Demonstrated GEIS network ability to rapidly pivot to address emerging infectious diseases. With additional funding, the service laboratories enhanced Zika virus surveillance during the height of the outbreak, and gained valuable information on MERS-CoV transmission. The laboratories also identified new areas and types of antimicrobial resistance in bacteria, the lack of artemisinin resistance for malarial organisms outside of Southeast Asia, and provided input to vaccine, vector control, and antimicrobial stewardship programs. Thousands of samples were collected, isolated, characterized, compared, and archived for later use. This vast network of global surveillance assets are poised to provide real-time actionable FHP decision-making data in the coming years.

ENTERIC INFECTIONS (EI)

FOCUS: EI surveillance projects address militarily relevant enteric pathogens that degrade readiness through:

- Surveillance in the U.S. military (including recruit, shipboard, and forward-deployed populations) and in foreign military and civilian populations
- Characterization of acute diarrhea in immune-naive travel populations
- Advanced characterization and antimicrobial susceptibility testing of endemic and novel pathogens
- Detection of emerging pathogens in previously tested "pathogen-negative" stool samples.

WHAT'S NEW IN FY16: The EI Focus Area supported 15 projects totaling $4.3 million. EI surveillance during military exercises was expanded to include Angkor Sentinel and Cooperation Afloat Readiness and Training in addition to Cobra Gold and Balakatan. The Global Travelers' Diarrhea (GTD) study expanded prospective surveillance efforts to Nepal, Thailand, the Republic of Georgia, and Honduras. EI surveillance activities were initiated at LRMC, and NHRC expanded its norovirus sequencing capabilities and began expanding recruit surveillance to two new sites at military bases at Camp Pendleton and Fort Jackson, increasing support to the services.

WHERE WE'RE GOING: The EI Focus Area will work to initiate surveillance at USAMRD-G and continue pre-initiation planning at multiple sites in Djibouti, Liberia and Uganda; implement standard operation procedures for multi-pathogen platform technologies, enhancing pathogen detection and identification of co-pathogens with the GTD study; expand focus on U.S. military populations, particularly in military treatment facilities that do not diagnose EI; and decrease focus on active cohort surveillance. These changes in focus improve the generation of actionable information for FHP in the most cost-effective manner across the broadest spectrum of militarily relevant geographic space for each GCC and the Defense Department.

SERVICE LABORATORIES SUPPORTED IN FY16: AFRIMS, LRMC, NAMRU-3, NAMRU-6, NHRC, NMRC-A/NAMRU-2, USAMRD-G, and USAMRD-K.

FY16 ACCOMPLISHMENTS:

- Improved Defense Department diarrhea treatment regimens, specifically across the PACOM area of responsibility, known for its high level of *Campylobacter* antimicrobial resistance, by expanding testing algorithms: incorporating testing of *Campylobacter concisus* into the workflow for prospective diarrheal stool samples based on study examining prevalence and diversity of *C. ureolyticus* and *C. concisus* among travelers and children with diarrhea in Thailand and Cambodia
- Expanded information for FHP treatment regimen decisions and contributed data to the research community to focus and prioritize enteric vaccine production to prevent mission degradation caused by diarrhea: identified trimethoprim-sulfamethoxazole (TMP/SMX)-resistant *Shigella* sp (n=8) phenotypes in circulation across Kenya, in 525 stool samples from seven collection sites.

GEIS laboratory partners conduct surveillance of enteric infections that are transmitted by food or other routes. An Army food service specialist prepares meal for cooking competition. (Courtesy: U.S. Army)

FEBRILE AND VECTOR-BORNE INFECTIONS (FVBI)

FOCUS: FVBI Focus Area surveillance projects address vector-borne and zoonotic pathogens associated with acute febrile illness (AFI) in humans in three general areas:

- Human infections and disease
- Vector distribution and pathogen presence in vectors and reservoirs
- Environmental drivers of exposure and infection.

WHAT'S NEW IN FY16: The FVBI Focus Area supported 67 projects totaling approximately $17.4 million. GEIS provided $1.7 million to Army and Navy laboratories in response to Zika emergence in the Western Hemisphere to address global knowledge gaps and better assess the threat to U.S. military personnel. As part of that initiative, GEIS partners initiated new AFI surveillance activities along the U.S.-Mexico border and among Defense Department personnel in Puerto Rico, allowing direct evaluation of disease burden and effectiveness of current FHP methodologies.

WHERE WE'RE GOING: The FVBI Focus Area will work to increase coordination and collaboration on vector-borne diseases with Defense Department and interagency partners; incorporate advanced diagnostic platforms for multi-pathogen identification into surveillance activities; leverage next-generation sequencing capabilities for pathogen detection, identification, and characterization; and improve risk

mapping for pathogens, vectors, and reservoirs. These activities will enhance the capability to identify known and/or emerging FVBI vectors and pathogens for expanded FHP decision-making capabilities globally.

SERVICE LABORATORIES SUPPORTED IN FY16: 18 AMDS/SGPL, AFRIMS, BAMC, NAMRU-3, NAMRU-6, NEPMU-2, NHRC, NMRC, NMRC-A, PHCR-P, USAMRD-G, USAMRD-K, USAMRIID, USU, WRAIR

FY16 ACCOMPLISHMENTS:

- Enhanced the GCC Surgeons' ability to accurately describe Zika exposure risk to U.S. forces in 12 countries: demonstrated low prevalence in Cambodia, Thailand, and Laos before 2016; linked Zika infection and Guillain-Barré Syndrome in Bangladesh; suggested the absence of Zika virus circulation in Kenya; identified acute cases in Colombia, Honduras, Peru, Venezuela, and Grenada, and travel cases in Arizona; and mapped vector presence in Haiti
- Supported current Defense Department guidance for treatment of *Plasmodium falciparum* malaria. Continued surveillance for emerging resistance to antimalarial drugs further characterized artemisinin-resistant *P. falciparum* in Southeast Asia. Molecular markers of artemisinin resistance in samples from Peru, Kenya, South Pacific, Somalia, or Sudan were not detected; continued surveillance is warranted to rapidly detect spread of resistant organisms
- Improved the GCC Surgeons' ability to assess exposure risk/preventive posture and enhance vector control measures to protect Defense Department personnel from a variety of AFI pathogens: documented the geographic distribution and prevalence of the causative agent of scrub typhus (*Orientia tsutsugamushi*); a potentially elevated rate of asymptomatic latent visceral leishmaniasis among U.S. Operation Iraqi Freedom deployers; and emerging and novel alphavirus, flavivirus, and rhabdovirus isolates in field-collected mosquitoes from Turkey, The Republic of Korea, and Kenya.

RESPIRATORY INFECTIONS (RI)

FOCUS: RI Focus Area surveillance projects address rapid detection and response to respiratory pathogens, especially those with pandemic potential in humans through:

- Human and animal surveillance to develop knowledge about RI distribution
- Advanced characterization to understand determinants of infection
- Vaccine effectiveness studies.

WHAT'S NEW IN FY16: The RI Focus Area supported 38 projects totaling approximately $22.4 million RI surveillance at the animal–human interface was initiated in the African nation of Mauritania. This country has little infectious disease surveillance and a substantial number of people living and working in pastoral communities with close contact with livestock and poultry. Because of its proximity to Mali, Niger, and Algeria, Mauritania is viewed as an operationally important country within the AFRICOM Area of Responsibility, as well as one from which emerging zoonotic pathogens could emerge and threaten U.S. Armed Forces in the future.

WHERE WE'RE GOING: The RI Focus Area will work to expand surveillance at the human-animal interface, especially in locations where spillover is likely; augment existing influenza sites with ability to conduct surveillance for additional respiratory pathogens; establish a standardized testing algorithm for severe respiratory illness; and expand use of the DoD Serum Repository for analyses that might increase FHP. These efforts will maximize an existing robust geographical surveillance effort encompassing more than 300 sites to improve harmonization and generation of actionable FHP information across the spectrum of RI.

SERVICE LABORATORIES SUPPORTED IN FY16: AFRIMS, BAACH, BAMC, NAMRU-3, NAMRU-6, NHRC, NMRC-A, PHCR-E, USAFSAM, USAMRD-G, USAMRD-K, USU, and WRAIR.

FY16 ACCOMPLISHMENTS:

Provided direct, measurable influence on FHP for all service members by supporting World Health Organization and Centers for Disease Control and Prevention (CDC) influenza vaccine selection for 2016–2017: funded the collection, testing, and analysis of more than 25,000 samples for influenza and other respiratory viruses, and published 2,000 sequences to GenBank that were used to determine influenza strains appropriate for vaccine inclusion.

Directly impacted DoD influenza vaccine policy through the development of DoD influenza vaccine effectiveness estimates to be used in conjunction with CDC estimates to support a change in vaccination recommendations by the Advisory Committee on Immunization Practices. Based on this work, the live attenuated influenza vaccine was not recommended for use in the 2016–2017 influenza season.

BIOSURVEILLANCE IN THE DEPARTMENT OF DEFENSE

INTEGRATED BIOSURVEILLANCE

AFHSB plays a key role in supporting, promoting, improving, and coordinating biosurveillance activities within the Defense Department and across the interagency. AFHSB leadership, in coordination with Office of the Assistant Secretary of Defense for Health Affairs, created the IB section in April 2012.

IB staff members have a wide variety of skills in the fields of infectious disease epidemiology, preventive medicine, family medicine, veterinary epidemiology, and occupational and environmental health. The staff lends its expertise by collaborating with many other offices in the Defense Department, as well as external U.S. government agencies. Those agencies include the White House National Security Staff and Office of Science and Technology Policy, the Department of Homeland Security's Science and Technology Directorate and Office of Health Affairs, Office of the Under Secretary of Defense Policy, and the Office of the Joint Staff.

IB is organized into two offices: Office of Alert and Response Operations (ARO) and Office of Innovation and Evaluation (IE).

ARO monitors biosurveillance data sources and communicates routinely with Defense Department, U.S. government interagency, and non-governmental and international partners to detect and report all-hazard events (e.g., emerging and re-emerging infectious diseases, environmental incidents) relevant to the health of all Defense Department personnel, including dependents and beneficiaries. ARO develops timely and relevant products based on the data and information; provides expertise on issues relevant to the health of Defense Department populations; and coordinates information gathering and resource leveraging, as available. ARO disseminates information through various communication channels depending on urgency.

ARO'S FY16 ACCOMPLISHMENTS INCLUDE:

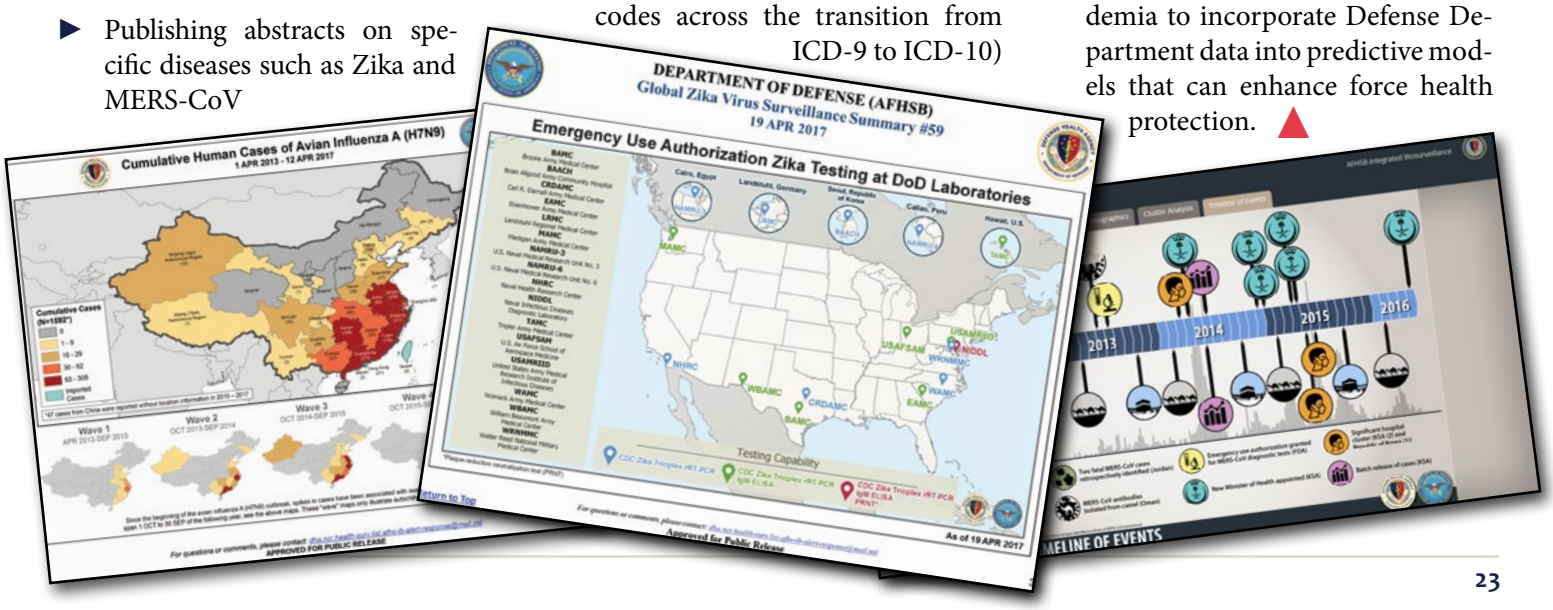
- Producing and distributing 216 disease-specific surveillance summaries on topics, including Zika virus, avian influenza A (H7N9), Middle East respiratory syndrome coronavirus (MERS-CoV), chikungunya in the Western Hemisphere, yellow fever in Africa, and the Ebola outbreak in West Africa
- Sharing fully unclassified versions of surveillance summaries on the AFHSB website to share with non-governmental organizations and foreign nations
- Producing and distributing nine executive summaries and 21 spot reports for relaying quick information on topics including the World Health Organization Emergency Committees, MERS-CoV, Ebola, several types of influenza, chikungunya, Zika virus, yellow fever, and other events
- Producing a weekly AFHSB Health Surveillance Update with health events and disease outbreaks listed by combatant command and an associated interactive map
- Participating on the steering committee of the Biosurveillance Indications and Warnings Analytic Community (BIWAC) with U.S. interagency partners. The ARO chief is currently the elected Chairman of the Steering Committee. BIWAC manages the WILDFIRE web-based discussion portal for relaying and requesting information from U.S. government sources among analysts. In 2016, ARO posted 12 queries and made two responses on disease-specific topics
- Moving CCMD liaison activities to ARO ensuring that CCMDs have direct access to individuals monitoring health events and disease outbreaks for better information flow and awareness
- Developing up-to-date guidance for the detecting and reporting of Zika, chikungunya, Ebola, H7N9, and MERS-CoV in MHS beneficiaries. ARO distributed this guidance to our partners and it is available at www.health.mil/AFHSB

- Answering numerous requests for information on specific diseases as well as laboratory testing information and processes for detecting and reporting specific diseases from the CCMDs, services, military treatment facilities, the U.S. interagency, and others
- Providing CENTCOM material and subject matter expertise for their exercise in Jordan - Eager Lion. Acted as a virtual Emergency Operations Center to provide live subject matter expertise during exercise play via web portal
- Participating in interagency policy committees, including the Biosurveillance Sub-Interagency Policy Committee, the Biological Defense Research and Development Subcommittee, the Emerging Infectious Disease Working Group, and the Foreign Animal Disease Threats Working Group
- Collaborating daily with the Department of Homeland Security's National Biosurveillance Integration Center on health events. Those interactions included participating in their daily and weekly working calls and quarterly meetings, and helping to create and distribute a global Ebola Persons under Investigation Report issued daily to the White House during the height of the outbreak
- Publishing abstracts on specific diseases such as Zika and MERS-CoV

The Office of IE assesses biosurveillance needs through evaluation and consultation on the use of existing and potential new biosurveillance systems, data, and data sources. IE staff develop visualization tools to enable analysts at AFHSB to perform indicator-based surveillance and partner with other agencies to ensure that the latest technology is available to our analysts. IE evaluates emerging technologies that will enable Defense Department senior leaders and public health professionals to predict and/or forecast emerging infectious diseases and develop corresponding force health protection measures.

IE'S FY16 ACCOMPLISHMENTS INCLUDE:

- Implementing a browser-based tool into the daily workflow of AFHSB analysts to visualize Reportable Medical Events data and outpatient data from the DMSS
- Developing a tool to extract Defense Department outpatient data from the CDC National Syndromic Surveillance Platform environment and automatically display disease and syndrome trends. This collaboration with the CDC will allow surveillance partnerships between military treatment facilities and local public health jurisdictions, both working on the same platform
- Evaluating AFHSB data quality and usefulness (e.g., investigation of coding errors and mapping of codes across the transition from ICD-9 to ICD-10)
- Advocating for enhancing the ESSENCE. DHA approved a technical refresh of ESSENCE which brings advanced visualization capability on par with the civilian sector and brings our system onto the same code base as the CDC and over half of the state public health departments
- Serving as the primary Defense Department source of public health expertise in the Department of Defense–Defense Threat Reduction Agency Biosurveillance Ecosystem development effort by coordinating technical-functional collaboration discussions and providing feedback on the practical utility of analytic apps, data visualization apps, and possible improvements to analyst workflow
- Providing public health expertise through collaboration with the Joint Program Executive Office for Chemical and Biological Defense toward the development of the Biosurveillance Portal
- Advancing the operational use of epidemiologic modeling and forecasting by serving as co-chair on the interagency Pandemic Prediction and Forecasting Science and Technology Working Group of the White House's National Science and Technology Council; and working with industry and academia to incorporate Defense Department data into predictive models that can enhance force health protection.



SPREADING THE NEWS ON MEDICAL SURVEILLANCE

AFHSB PUBLICATIONS

Publications and presentations are used to communicate important findings and occurrences to peers and policymakers, to archive data and information for future reference, and to teach resident physicians and developing scientists. AFHSB staff and partners are strongly encouraged to submit the results of their work to professional meetings and journals, particularly those that are peer reviewed, and to use the development of abstracts, oral presentations, posters, and manuscripts as teaching vehicles. Each year, AFHSB partners submit proposals for collaboration and these usually provide the background and the basis for the development of internal reports, abstracts, and manuscripts.

In 2016, AFHSB staff and GEIS partners prepared and published manuscripts in peer-reviewed journals and posters for international and national conferences. These papers and presentations helped further our understanding of the risk regarding disease transmission and severity, as well as disease prevention. A large number of AFHSB projects and protocol studies are initiated in response to specific questions or needs for data. Many of these projects are done by junior staff members with supervision by senior managers.

Because some of the work done by the AFHSB staff is of great interest to the Defense Department and other government agencies, AFHSB staff are encouraged to consider submission of selected reports to the Defense Technical Information Center, which serves the Department of Defense community as a central resource for scientific and technical information.

AFHSB STAFF PUBLICATIONS & REPORTS, 2014-2016

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ACRONYMS

AFHSB	Armed Forces Health Surveillance Branch
AFMR	Air Force Mortality Registry
AFRICOM	U.S. Africa Command
AFRIMS	U.S. Army Armed Forces Research Institute of Medical Sciences
AFI	acute febrile illness
AMR	antimicrobial resistance
ARO	Alert and Response Operations
BIWAC	Biosurveillance Indications and Warnings Analytic Community
CENTCOM	U.S. Central Command
CCMD	Combatant Command
CDC	Centers for Disease Control and Prevention
DHA	Defense Health Agency
DMED	Defense Medical Epidemiology Database
DMSS	Defense Medical Surveillance System
DMTS	Data Management and Technical Support
DoD-GEIS	Department of Defense Global Emerging Infections Surveillance and Response System
DoDSR	Department of Defense Serum Repository
DRSi	Disease Reporting System Internet
E&A	Epidemiology and Analysis
EDC	EpiData Center
EI	enteric infection
EID	emerging infectious disease
ESSENCE	Electronic Surveillance System for the Early Notification of Community-based Epidemics
EUCOM	U.S. European Command
FVBI	febrile and vector-borne illness
FDA	U.S. Food and Drug Administration
FHP	force health protection
GAO	Government Accountability Office
GCC	Geographic Combatant Command
GEIS	Global Emerging Infections Surveillance
GTD	Global Traveler's Diarrhea
H7N9	avian influenza A subtype H7N9
HIV	human immunodeficiency virus
HPV	human papilloma virus
IB	Integrated Biosurveillance
ICD-9-CM	*International Classification of Diseases, Ninth Revision, Clinical Modification*
ICD-10-CM	*International Classification of Diseases, Tenth Revision, Clinical Modification*
IE	Office of Innovation and Evaluation
IHR	International Health Regulations
ILI	influenza-like-illness
LOE	line of effort
IPL	Institut Pasteur du Laos
MDR-TB	multidrug-resistant tuberculosis
MERS-CoV	Middle East Respiratory Syndrome–Coronavirus
MHS	Military Health System
MSMR	*Medical Surveillance Monthly Report*
NAMRU-3	Naval Medical Research Unit 3
NAMRU-6	Naval Medical Research Unit 6
NAMRU-A	Naval Medical Research Unit–Asia
NHRC	Naval Health Research Center
NMCPHC	Navy and Marine Corps Public Health Center
NMRC	Naval Medical Research Center
NORTHCOM	U.S. Northern Command
OCONUS	outside the contiguous United States
OEM	Occupational Environmental Medicine
PACOM	U.S. Pacific Command
PHD	Public Health Division
RAP	Request Approval Process
RME	Reportable Medical Event
SMS	Surveillance Methods and Standards
SOUTHCOM	U.S. Southern Command
STI	sexually transmitted infection
TBI	traumatic brain injury
USAFSAM	U.S. Air Force School of Aerospace Medicine
USAMRIID	U.S. Army Medical Research Institute for Infectious Diseases
USAMRD-G	U.S. Army Medical Research Directorate-Georgia
USAMRD-K	U.S. Army Medical Research Directorate-Kenya
USU	Uniformed Services University of the Health Sciences
VE	vaccine effectiveness
WRAIR	Walter Reed Army Institute of Research

AFHSB Chief Colonel Douglas Badzik (left) escorts DHA J3 Operations Director Major General Jeffrey Clark (right) to a meeting with Branch staff during a recent visit. (Courtesy: AFHSB)

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