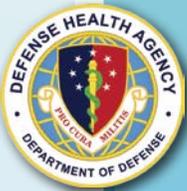


# 2017 ANNUAL REPORT



# AFHSB

ARMED FORCES HEALTH SURVEILLANCE BRANCH



HEALTH SURVEILLANCE, ANALYSIS, AND INSIGHT FOR ACTION



### Friends and Colleagues

As the Armed Forces Health Surveillance Branch (AFHSB) nears completion of its third year as part of the Defense Health Agency (DHA), I'm exceedingly proud of our team's accomplishments in solidifying DHA's role as a Combat Support Agency (CSA) and providing the military services and the Military Health System (MHS) with sound epidemiologic data to improve the health and readiness of all service members.

Our success is owed in large part to the collaboration with the Office of the Joint Staff and Combatant Commands (CCMDs), the military services and its public health centers, and U.S. government interagency partners. This letter comes at a time of key transition for the DHA and its Public Health Division as we continue to refine our role as a CSA and establish our ability to provide value to the MHS. Highlights from 2017 include the following:

- ▶ AFHSB's Integrated Biosurveillance (IB) section continued to make strides toward providing the CCMDs with custom actionable global health surveillance data through an electronic format accessible on-demand worldwide to improve force health protection. The centerpiece of this effort was the development of web-based interactive disease surveillance maps that enable IB's customers, particularly the CCMDs, to focus on what they need to know to provide a medically ready force to meet the needs of the nation's defense. With these maps, combatant commanders can zoom to an area of interest, click on points, and extract exactly what they need to know about a particular disease event. This product complements the 175 IB disease-specific surveillance summaries produced on a range of topics, including avian influenza A(H7N9), a CCMD-oriented assessment of outbreaks and medical events of interest, and the Zika virus in the Americas.
- ▶ Our Global Emerging Infections Surveillance (GEIS) section undertook a new effort to establish synergy in global infectious disease surveillance among the Defense Department and other interagency partners within the geographic regions of the CCMDs. The goal of the effort is for GEIS to work with its partners such as the Defense Threat Reduction Agency and the U.S. Centers for Disease Control and Prevention (CDC) to eliminate redundancy in their disease surveillance portfolios and address gaps in such efforts. Initial efforts began in the U.S. Pacific Command, U.S. Africa Command and U.S. Southern Command areas of responsibility during 2017, and will continue through 2018. GEIS also launched a new Data-to-Decision program to rapidly get infectious disease surveillance data from the field into the hands of decision-makers such as CCMDs to protect the health and improve the readiness of the force. The program requires the Defense Department laboratories worldwide that receive GEIS funding to submit monthly reports on projects (stratified by level of public health concern) to better inform CCMDs decision-making.
- ▶ The Epidemiology and Analysis (E&A) section further aligned its health surveillance analysis to the needs of the CCMDs. The E&A staff provided analyses and subject matter expertise for AFHSB's "DoD Seasonal Influenza Surveillance Summary," which contains weekly analysis of influenza activity among MHS beneficiaries by CCMDs. During 2017, E&A supported numerous requests for analysis on trends of diseases and injuries that are considered to be of special interest by military leaders at the CCMDs. For example, E&A produced an ad hoc request for U.S. European Command on potential tick-borne encephalitis cases in its area or responsibility. For the U.S. Special Operations Command (US-SOCOM), the staff provided analysis on two requests on the injury and mental health encounters for special operators and malaria rates among those forces deployed in Afghanistan.
- ▶ In addition, the Department of Defense Serum Repository (DoDSR) continued to support operational analysis and research to understand the threats from endemic and emerging infectious diseases relevant to the military worldwide. In 2017, AFHSB processed and dispensed 12,500 aliquots of serum specimens in support of 28 serologic studies and analyses. Ten of these serum studies were for clinical needs, one was a criminal investigation, five were operational, and the remaining 13 were for research studies. These studies included leptospirosis seroconversion among U.S. infantry forces in the Republic of Korea; vaccine responses to sequential annual influenza vaccinations; development of irritable bowel syndrome and the role of autoantibodies; and evaluation of neuropsychiatric, balance, and vestibular issues from acute mild TBI and concussion cases from Operation Enduring Freedom.

As you read AFHSB's annual report, we hope it will remind you of our recent successes and the future path that we will take to ensure our mission in 2018. We look forward to working tirelessly to make sure that our health surveillance products fulfill the ultimate goal of helping the Defense Department and the services make the best decisions in protecting the health and readiness of its military and beneficiaries.

Lastly, our accomplishments are achieved through the hard work and collaboration of the public health staff at the military services and the CCMDs as well as with the assistance and collaboration of a dedicated team of epidemiologists, analysts, and other public health experts who provide their valuable time and input to ensure that our goals are met. It is a privilege to serve with such a great team. ■

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:

- ▶ 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

[The History of AFHSB..... 5](#)  
    [The Origins of AFHSB..... 5](#)  
    [AFHSB Organizational Structure..... 6](#)  
    [Customers and Stakeholders..... 6](#)  
    [AFHSB Finances ..... 7](#)

[The Elements of Military Medical Surveillance..... 8](#)  
    [Tools of Surveillance..... 8](#)  
    [DMSS Structure and Functional Relationship ..... 9](#)  
    [Epidemiology Analyses and Reports ..... 10](#)  
    [AFHSB E&A Satellites ..... 13](#)  
    [Standard and Surveillance Practices ..... 16](#)  
    [Medical Surveillance Monthly Report ..... 17](#)  
    [Residency Training ..... 17](#)

[Global Emerging Infections Surveillance..... 18](#)  
    [Global Emerging Infections Surveillance \(GEIS\) ..... 19](#)

[Biosurveillance in the Defense Department ..... 24](#)  
    [Integrated Biosurveillance ..... 24](#)

[Spreading the News on Medical Surveillance..... 28](#)  
    [AFHSB Publications..... 28](#)

[AFHSB Staff Publications and Reports..... 29](#)

[Acronyms..... 33](#)



*With more than 64 million serial blood serum specimens from more than 11 million individuals, the Department of Defense Serum Repository is the world's largest storage facility of its kind. (Courtesy: AFHSB)*

# THE HISTORY OF AFHSB

## THE ORIGINS OF AFHSB

The [AFHSB](#) is the central epidemiologic health resource for the U.S. military. The branch 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 DoDSR, the Department of Defense Global Emerging Infections Surveillance and Response System (DoD-GEIS), 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 such as 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 MHS beneficiaries.

The DoDSR was established in 1989 to store blood sera collected during the Defense Department testing program for human immunodeficiency virus (HIV) infections. Later, the [DoDSR](#) was designated to receive serum specimens collected before and after operational deployments. With more than 64 million serial serum specimens from 11 million individuals, the DoDSR is the world's largest storage facility of its kind.

In 1997, the Defense Department established DoD-GEIS in response to a Presidential Decision Directive to expand its mission to include support of global surveillance, training, research, and response to emerging infectious disease (EID) threats. 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, and antimicrobial-resistant organisms. The AFHSB also plays a key role in integrating biosurveillance

where it collects data and information in near real-time of the threats from endemic and EIDs relevant to the military worldwide.

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)*. AFHSB also provides up-to-date information on diseases that could affect force health readiness and protection.

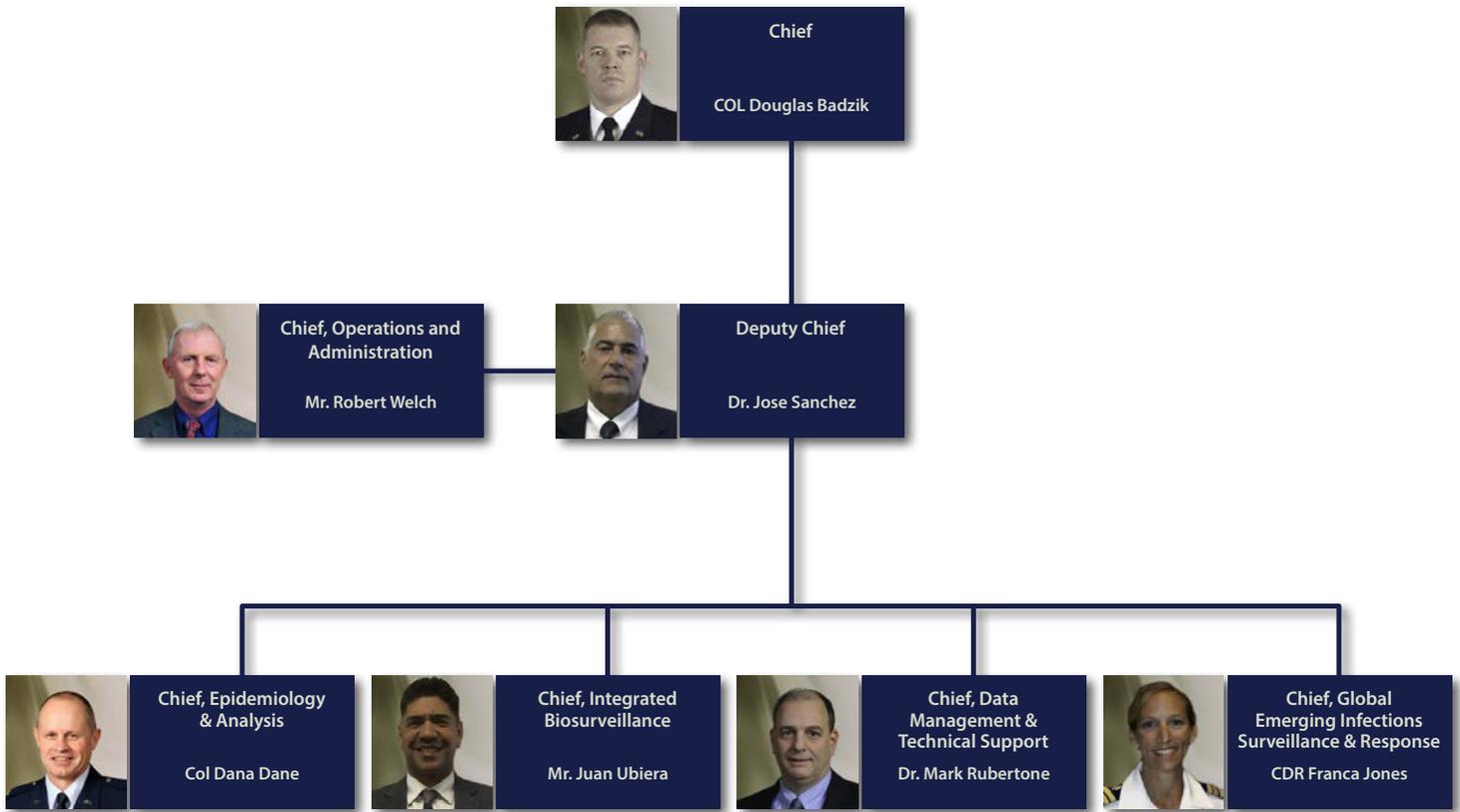
AFHSB also assumed responsibility from some of the health surveillance capabilities of the Service Public Health Hubs, which include personnel from the U.S. Army Public Health Center (USAPHC), U.S. Air Force School of Aerospace Medicine (USAFSAM), and the Navy and Marine Corps Public Health Center (NMCPHC).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

AFHSB is currently organized into four sections: Data Management and Technical Support (DMTS), E&A, GEIS, and IB. ■

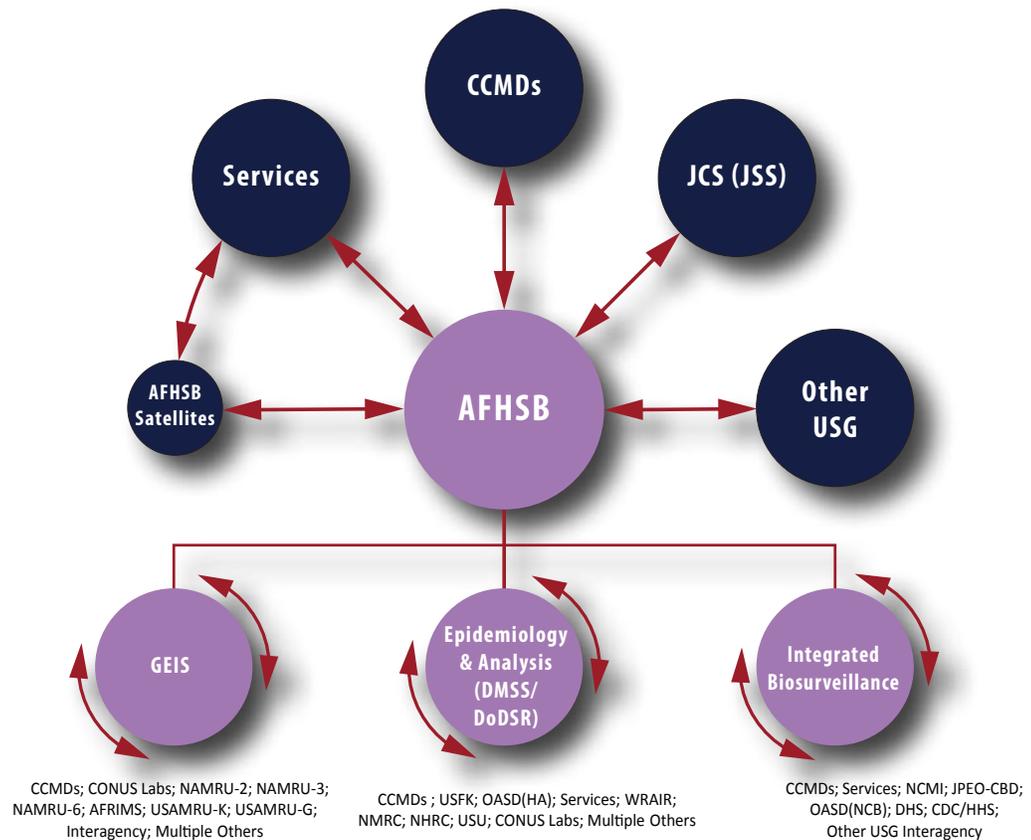


Angelia Cost, a senior managing epidemiologist, leads a tour of the DoDSR laboratory where blood serum is processed. The DoDSR supports military medical surveillance, clinical care, and seroepidemiologic investigations. (Courtesy: AFHSB)

# AFHSB ORGANIZATIONAL STRUCTURE



# CUSTOMERS AND STAKEHOLDERS



## AFHSB FINANCES

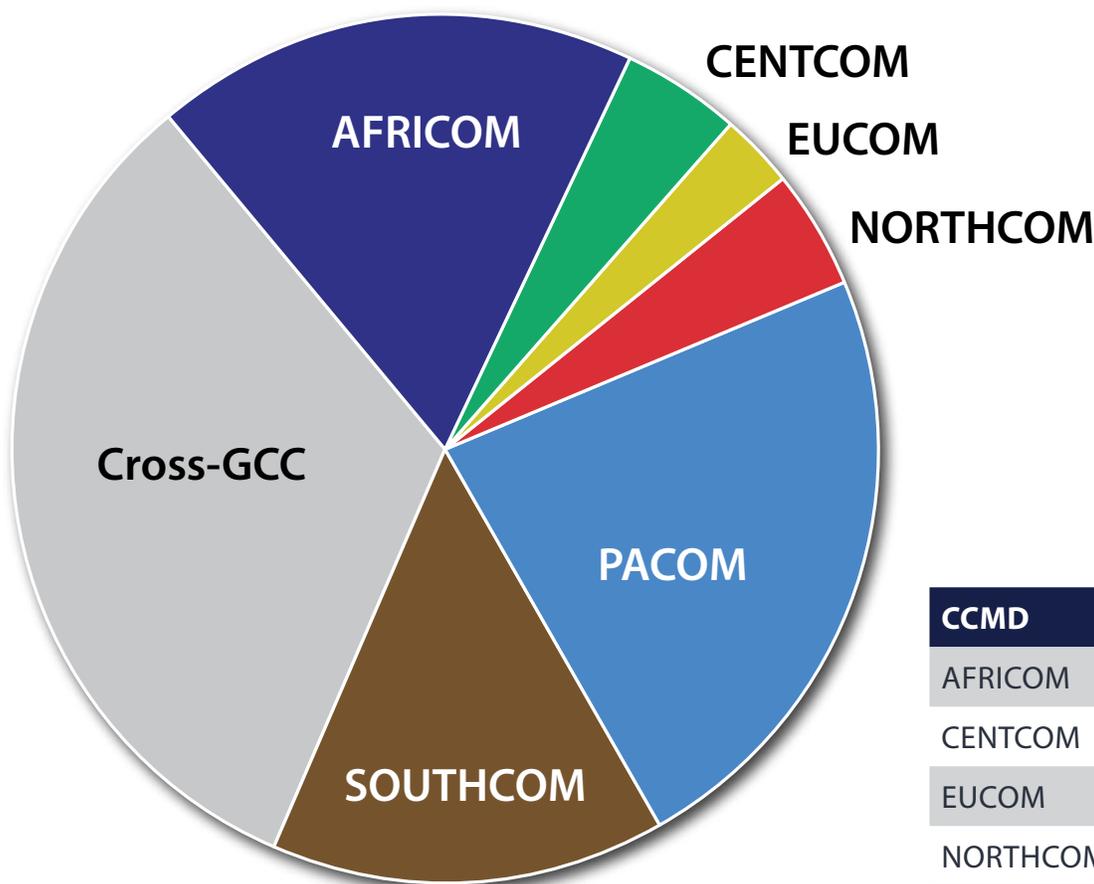
The AFHSB expenditures totaled \$74.6 million for fiscal year 2017. It distributed 78 percent of its funds directly to GEIS laboratory partners following an extensive internal and external proposal review process.

Funding recipients include the Army and Navy overseas laboratories such as the U.S. Army Medical Command, Armed Forces Research Institute of Medical

Sciences (AFRIMS); U.S. Army Medical Research Directorate–Georgia; U.S. Army Medical Research Directorate–Kenya; Naval Medical Research Center–Asia; Naval Medical Research Unit No. 3, and Naval Medical Research Unit No. 6. Several U.S.-based military and university partners include the Naval Medical Research Center (NMRC), Naval Health Research Center (NHRC), USAFSAM,

NMCPHC, Walter Reed Army Institute of Research (WRAIR), Uniformed Services University of the Health Sciences (USU), and other funding recipients whose robust programs benefit the Defense Department. The remaining funds support AFHSB sections and headquarters, including biosurveillance initiatives, contracts, *MSMR*, DoDSR, and other infrastructure costs. ■

## FY17 DISTRIBUTION OF GEIS FUNDING FOR SURVEILLANCE



CCMD	Amount	%
AFRICOM	\$ 10,651,757	18.3
CENTCOM	\$ 2,540,154	4.4
EUCOM	\$ 1,606,733	2.8
NORTHCOM	\$ 2,577,779	4.4
PACOM	\$ 13,380,413	23.0
SOUTHCOM	\$ 8,488,301	14.6
Cross-GCC	\$ 18,883,863	32.5
<b>Total</b>	<b>\$ 58,129,000</b>	<b>100.0</b>

# THE ELEMENTS OF MILITARY MEDICAL SURVEILLANCE

## TOOLS OF SURVEILLANCE

The DMSS and DoDSR are longstanding and vital assets to medical surveillance within the U.S. Armed Forces. 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 it 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. Through traditional epidemiologic practices, users can mine the data for efficient and powerful analyses of morbidity among service members. With more than three billion data records, including more than one billion records on U.S. service members alone, the DMSS remains the Defense Department's premier epidemiologic resource.

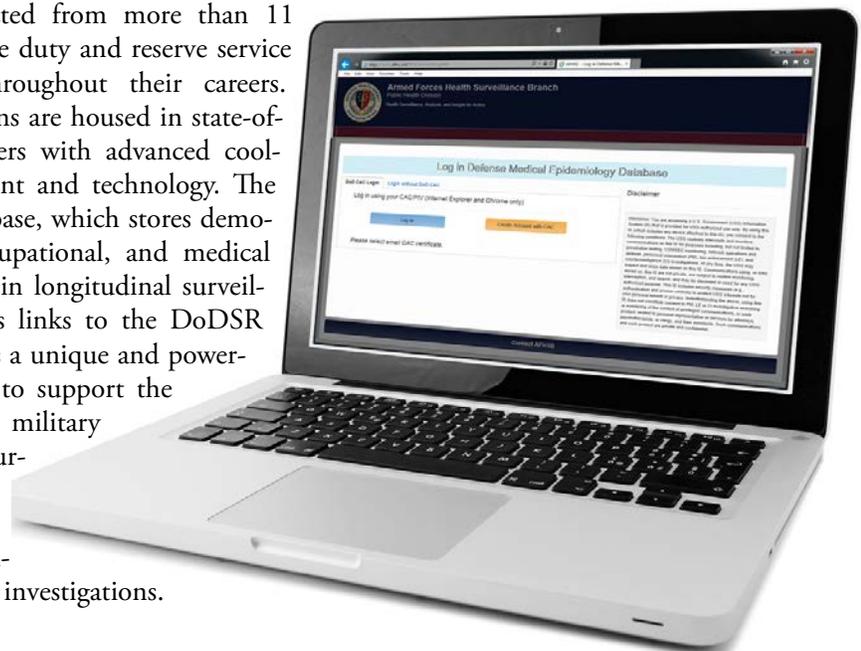
The Defense Medical Epidemiology Database (DMED) is derived from DMSS, providing select data that are de-identified and remotely accessible to online users. The purpose of [DMED](#) is to provide standard epidemiologic methodology used to analyze active duty personnel and medical event data. During 2017 a new, enhanced web-based version of DMED was released. Users now 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 and 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.

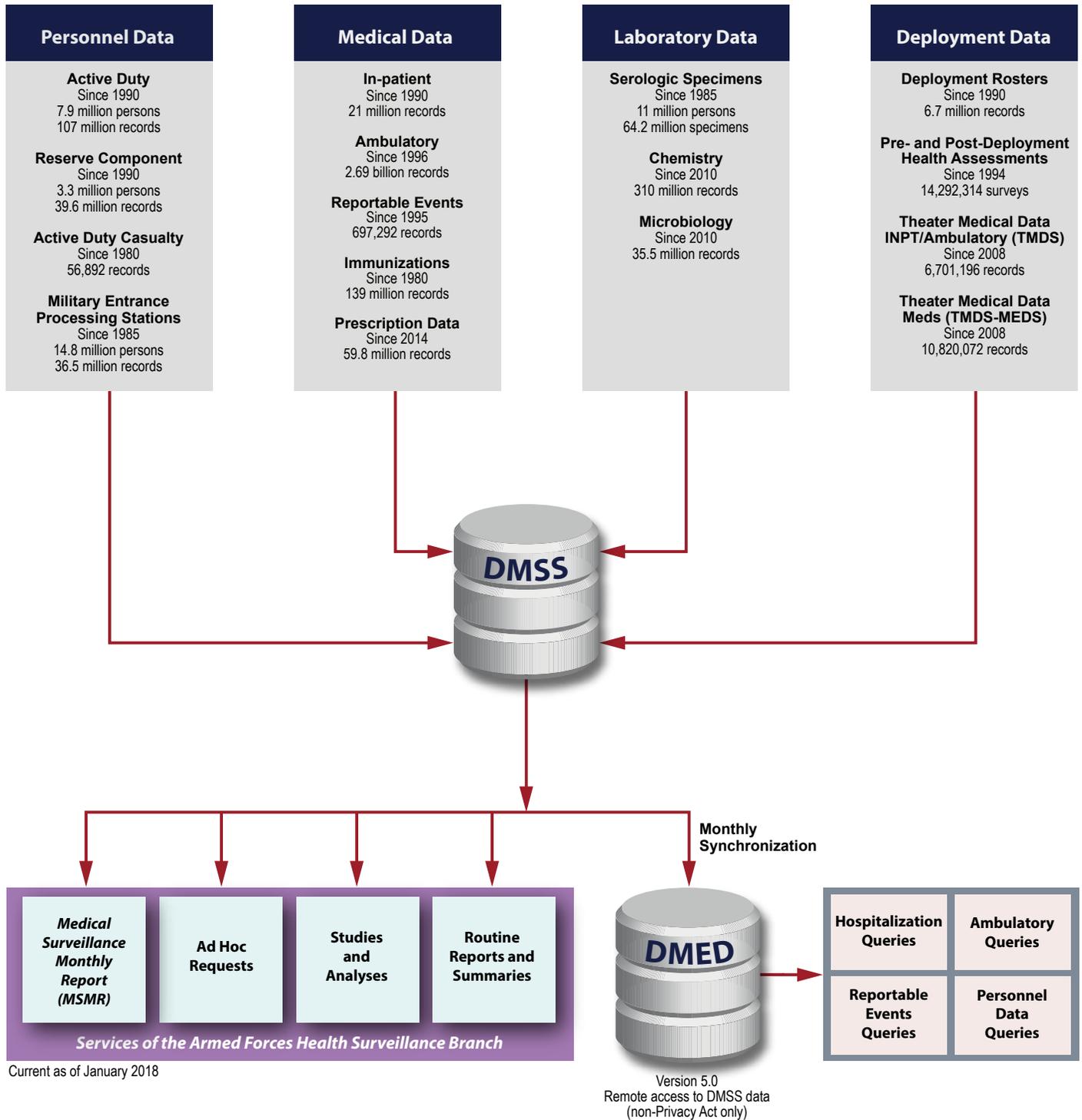
The DoDSR contains more than 64 million serial blood-derived serum specimens collected from more than 11 million active duty and reserve service members throughout their careers. The specimens are housed in state-of-the-art freezers with advanced cooling equipment and technology. The DMSS database, which stores demographic, occupational, and medical information in longitudinal surveillance records links to the DoDSR specimens, is a unique and powerful resource to support the conduct of military medical surveillance, clinical care, and seroepidemiologic investigations.

During 2017, AFHSB processed and dispensed more than 12,500 aliquots of serum specimens in support of 28 serologic studies and analyses.

Ten of these serum studies were for clinical needs, one was a criminal investigation, five were operational, and the remaining 13 were for research studies. The research studies included leptospirosis seroconversion among U.S. infantry forces in the Republic of Korea, vaccine responses to sequential annual influenza vaccinations, development of irritable bowel syndrome and the role of autoantibodies, evaluation of neuropsychiatric, balance, and vestibular issues from acute mild traumatic brain injury (TBI) and concussion cases from Operation Enduring Freedom. ■



# DMSS STRUCTURE AND FUNCTIONAL RELATIONSHIP



# 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 data sets, 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 members prepare analyses under two general categories: periodic reports and ad hoc requests. In 2017, the section supported 324 ad hoc requests for data analyses and distributed 421 periodic reports throughout the Defense Department. These ad hoc requests and periodic reports look for trends over time of diseases and injuries such as communicable diseases, training-related injuries, mental health illnesses, TBI, and deployment health. Ad hoc requests and periodic reports have helped Defense Department policymakers shape their force health protection programs, and healthcare professionals develop preventive measures against diseases or injuries

affecting U.S. service members and their beneficiaries.

For example, E&A staff provided analyses and subject matter expertise for AFHSB’s “DoD Seasonal Influenza Surveillance Summary” report during the influenza season. This report contains weekly summaries of influenza activity among MHS beneficiaries by CCMDs. The influenza report highlights data about outpatient medical encounters for influenza-like illness, 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.

Another report, the U.S. Central Command (CENTCOM) Deployment Health Report, is produced quarterly for its Surgeon’s Office. This report provides data on medical encounters occurring in CENTCOM grouped by disease and injury categories cumulatively since 2008 and during the 12 and three months prior to the report being run. Additionally, the report provides extensive data on medical air transports (MATs) out of CENTCOM monthly since October 2001. The MAT data are provided both by disease, battle, and non-battle injury categories and then for specific areas of interest, such as musculoskeletal issues and mental health disorders and other most common diseases. MAT data are provided on both service members and civilian/contractors who are deployed to CENTCOM.

During 2017, E&A supported requests for analyses on trends of diseases and injuries that are considered to be of special interest by military leaders at the CCMDs. E&A, for example, produced an ad hoc request for U.S. European Command (EUCOM) on potential tick-borne encephalitis cases in its area of responsibility and two requests for USSOCOM on the injury and mental

health encounters for special operators and malaria rates among special operators deployed to Afghanistan.

Last year, E&A completed two analyses in response to congressional inquiries. The staff provided the House Armed Services Committee for counts and incidence and prevalence rates of osteoarthritis, including post-traumatic arthritis and subsequent separation from service among active component service members. For the APHC, the staff provided it with injury rates among Army Rangers and special operators.

E&A also has supported the Defense Department efforts to address former Vice President Joe Biden’s Cancer Moonshot initiative. This initiative is to accelerate cancer research and make more therapies available to more patients while also improving the ability to prevent cancer and detect it at an early stage. E&A provided epidemiologic guidance, DoDSR specimens, and accompanying data from the DMSS to assist the Walter Reed National Medical Center’s Murtha Cancer Center in the design and implementation of studies in support of this effort. The first of these studies was to investigate head and neck squamous cell carcinomas, including oropharyngeal squamous cell carcinoma, for which there are currently no clinically accepted screening tests. The study was designed to apply cutting-edge proteomics research to identify serum biomarkers indicative of disease states to develop early diagnostic tools and prognostic indicators, which may be used to inform treatment decisions and improve survival.

E&A also conducted a follow-up study on the potential health effects of burn pit exposures at the request of DHA’s J-9 Research and Development Directorate and Deputy Assistant Secretary of Defense for Health Affairs. This study updates a previous one conducted in 2009, expanding the follow-up period

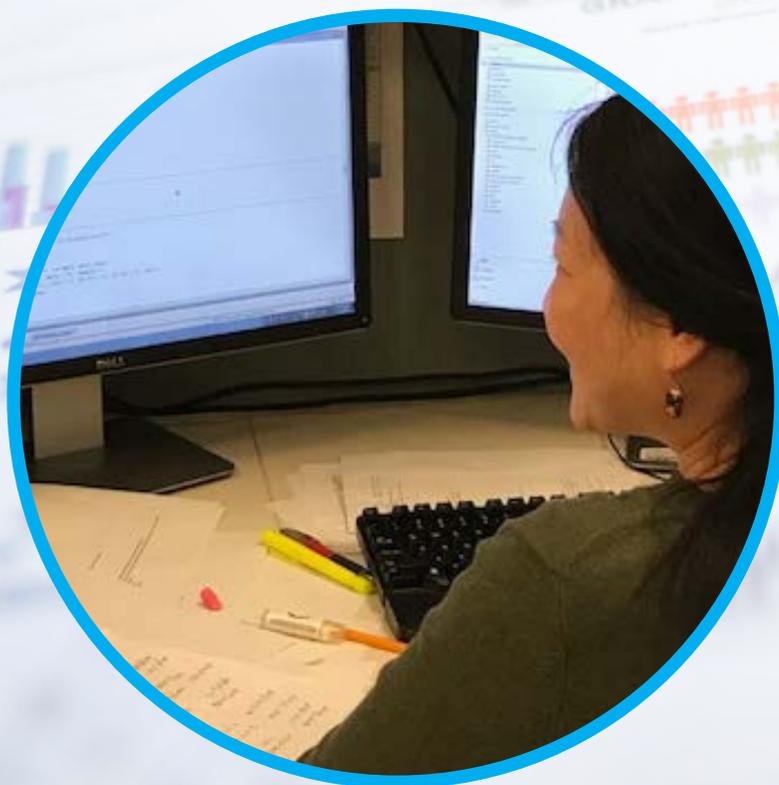
## The Elements of Military Medical Surveillance

to up to nine years. The study also investigated previous chronic respiratory conditions as well as incorporated new chronic conditions. The objective of this study was to determine whether rates of chronic health outcomes are higher among individuals who spent time in a CENTCOM location with a burn pit, compared to individuals deployed to non-burn pit locations in Korea, Germany, or a U.S.-based control cohort.

The results of this study will help inform Defense Department and Veteran Affairs medical providers and policymakers on burn pit locations of interest that may be associated with chronic conditions and the service members potentially at risk for these outcomes.

The E&A section also continued to collaborate with other federal partners such as the CDC and the U.S. Food and Drug

Administration (FDA) in 2017. E&A's work with the CDC included providing potential malaria cases among service members to be included in the CDC's National Malaria Surveillance System. E&A, in collaboration with the GEIS section, the AFHSB's Air Force satellite, and the NHRC provided the FDA with evaluation of influenza vaccine effectiveness (VE) analyses. ■



*Lin Li, an epidemiologist, is part of a staff that spends countless hours of their epidemiologic expertise and programming skills to extract relevant data from billions of health records to produce reports on illnesses and injuries that impact the U.S. Armed Forces. (Courtesy: AFHSB)*

# The Elements of Military Medical Surveillance

## FY17 AFHSB Periodic Reports in One Year

TYPE OF REPORT	REPORT NAME
Deployment	Army D&I Report
Deployment	Civilian Deployment Health Assessment Summary Report
Deployment	Deployment Health Compliance Report
Deployment	Deployment Health Report
Deployment	PostDeployment Health Assessment (DD2796) Summary Report
Deployment	PostDeployment Health Reassessment (DD2900) Summary Report
Deployment	PreDeployment Health Assessment (DD2795) Summary Report
Deployment	Post-deployment Health Assessment - MH Reserve Guard referrals
Deployment	Deploy Form Summary Report
Deployment	FHPQA TBI
Deployment	MSMR Deployment Health Assessment Summary
Deployment	Special Surveillance (MSMR): Amputations, TBI, DVT, Leishmaniasis, Severe acute pneumonia, and heterotrophic ossification
Disease	Armed Forces Communicable Disease Report
Disease	Influenza Surveillance Report
Disease	Malaria Case-Finding Report
Disease	Malaria YTD Korea
Disease	Meningococcal Report
Disease	NCRMD Communicable Disease Report
Disease	Reportable Events Monthly Report (REMR)
Disease	USFK Biosurveillance Report
Disease	VA Influenza Surveillance Report
Disease	PH360 Chronic Disease Report
Disease	PH360 Behavioral Health Report
Injury	Army Annual Injury Report
Injury	Army Injury&Overuse Report
Injury	Army PH360 Report
Injury	DoD Eye Injury Annual Report
Injury	DoD Eye Injury Quarterly Report
Injury	DoD Hearing Injury Annual Report
Injury	DoD Hearing Injury Quarterly Report
Injury	Injury Installation Reports
Injury	Installation Injury Ft Leonard Wood
Injury	Reserve Lost Duty Metrics
Injury	TRADOC Cold Injury Report
Injury	TRADOC Heat Injury Report
Injury	TRADOC Training-related Injuries Report
Injury	USASOC Special Reportable Events (Semi-Annual)
Mental Health	AFSOC Mental Health and TBI Annual Report
Mental Health	DVBIC TBI Screen
Mental Health	Health Affairs (HA) Mental Health Report
Mental Health	Health Affairs (HA) TBI Report
Mental Health	MHS Dashboard Measures
Mental Health	Health Affairs (HA) PTSD Report
Mental Health	ANAM Report
Special	IB RME Weekly Report
Special	EUCOM RMES Monthly Summary
Special	Special Surveillance (MSMR): Motor Vehicle Accidents
Special	Smallpox Cardiac AE Report
<b>Total Reports 444</b>	

## AFHSB E&A SATELLITES



The E&A satellites staff contribute unique expertise in areas such as influenza surveillance, laboratory data analysis, behavioral and social health, and RME surveillance, in support of the overall AFHSB mission. The satellite staff are located at APHC in Aberdeen Proving Ground, Md., NMCPHC in Portsmouth, Va., and USAFSAM 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 meeting, and serve on other E&A and AFHSB working groups.

**THE NAVY SATELLITE**, co-located with the NMCPHCs EpiData Center, supports several of its divisions, including behavioral and operational health, reportable and emerging infections, and application development and data systems support. Staff includes three epidemiologists and a statistician who serves as subject matter experts for their respective teams, prepare analytic reports, and provide data support to Navy customers in surveillance areas such as TBI, behavioral health, infectious disease, and suicide epidemiology, as well as management and quality control.

In 2017, key satellite accomplishments included completing a congressional request on substance abuse among marines in the aviation career field for Marine manpower and reserves, Marine and family programs, describing results from the 2017 report using data from the 2015 Survey of Health Related Behaviors, participating in the 21st Century Sailor Office's meeting for case reviews of 2015 Navy suicide deaths, and providing weekly influenza situation reports.

Satellite staff also delivered oral presentations at several conferences in 2017. Topics included methodology for analyzing air quality in a deployed setting at the Military Health Research Symposium and behavioral and life risk factors among calendar year 2014 U.S. Navy suicide attempts at the American Association of Suicidology annual conference.

**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

AFHSB satellite's staff maintain the DoD 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 85 ad hoc and routine requests on suicidal behavior, alcohol use, and behavioral health outcomes in 2017. Annual reports released during 2017 include the 2016 Active Component Surveillance of Suicidal Behavior Publication (SSBP) and the 2015 Behavioral Health Risk Assessment Data Report. New projects initiated during 2017 include the surveillance of alcohol and substance abuse among Army soldiers, 2016 National Guard and Army Reserve Component SSBP, and the economic analysis of suicidal behavior.

The cell supporting the APHC Injury Prevention Division conducts surveillance and analysis on injury prevention for initial entry training and the broader Army population. The data are then 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 RME Guidelines and

## The Elements of Military Medical Surveillance

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. Additionally, new reports have been created to support Army public health priorities including the heat injury and gastrointestinal illness reports.

**THE AIR FORCE SATELLITE** comprises three cells: Field Epidemiology; Air Force Mortality Registry (AFMR); and

the DoD Global, Respiratory Pathogen Surveillance Program.

The Field Epidemiology cell supports the USAFSAM epidemiology consult service. It monitors Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE) and the Air Force DRSi health surveillance databases. In addition, the staff 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 2017, the satellite contributed to 50 reports, completed more than 30 consults, trained 35 officers and physicians and 25 technicians, conducted monthly Zika surveillance, and submitted two articles for publication. The Field Epidemiology cell supported the epidemiology consult service's mission in creating two training guides critical for Air Force public health:

### Air Force Satellite Reports

TYPE OF REPORT	REPORT NAME	COUNT
Respiratory Surveillance	Weekly Influenza Report	38
Respiratory Surveillance	Midseason Vaccine Effectiveness Estimates 2016-2017	1
Respiratory Surveillance	2016-2017 Influenza Final Report	1
Epidemiology Consult	DRSi Weekly Report	52
Epidemiology Consult	DRSi Monthly Report	12
Epidemiology Consult	DRSi Annual Report	1
Epidemiology Consult	Air Force Public Health Report	2
Epidemiology Consult	Air Force Monthly Zika Report	12
<b>Total Reports</b>		<b>119</b>

### Army Satellite Reports

TYPE OF REPORT	REPORT NAME
Disease	DRSi Reportable Medical Events daily report
Disease	DRSi Reportable Medical Events weekly report
Disease	DRSi Reportable Medical Events monthly report
Disease	U.S. Army Weekly Influenza Surveillance Report
Disease	U.S. Army Monthly Vectorborne Disease Report
Disease	Tri-Service Epidemiology Technician monthly training
Disease	Medical Event Reporting Survey
Disease	DRSi Re-development Reports and Surveys for Reporters
Injury	Army Annual Injury Report
Injury	Army Installation Civilian Injury Data Reports
Injury	Army Installation Active Duty Medical Encounter Reports
Injury	Army Installation Safety RMIS Reports
Injury	Soldier 2020 IET Gender Integration Analysis
Injury	IET Injury Surveillance
Mental Health	Behavioral Health Risk Assessment Report
Mental Health	Surveillance of Suicidal Behavior Publication - Active Component

## Navy Satellite Reports

TYPE OF REPORT	REPORT NAME	COUNT
Disease	Influenza Situation Report (SITREP)	13
Disease	Monthly Malaria Report	1
Disease	Monthly TB Report	1
Disease	Monthly Syphilis	1
Disease	HPV Vaccine Compliance	1
Disease	MCRD PI Chromobacterium V (Tasker)	2
Disease	Case Finding: Pandemic Flu	1
Disease	Daily Case Findings	9
Disease	Pacific Theater STI Counts	1
Disease	Quantifying GI Illness	1
Disease	Hep A/Hep B Burden	1
Disease	Influenza Seasonal Summary	1
Disease	HL7 EUCOM encephalitis	1
Disease	Case Finding: Cocci	1
Disease	Case Finding: Zika	1
Injury	Djibouti Respiratory Surveillance Project	1
Injury	Concurrent Hyponatremia in Reported Heat Illness Cases among Army Personnel	1
Mental Health	Force Health Report	18
Mental Health	N171 "Deep Dive": 2015 USN Suicide Case Reviews	1
Mental Health	N171 "Deep Dive": 2016 USN Suicide Case Reviews	1
Mental Health	Suicide Case Review Analysis, CY 2014	1
Mental Health	USMC Suicide Case Reviews	3
Mental Health	Attempted Suicides and Deaths in the USN, CY 2014	1
Mental Health	Substance Abuse and Aviation MOS in the USMC	1
Mental Health	Suicide Case Review Analysis, CY 2015	1
Mental Health	Traumatic Brain Injury (TBI) Surveillance Annual Report	1
Mental Health	Traumatic Brain Injury (TBI) Surveillance Quarterly Report	4
Mental Health	Comorbid TBI and PTSD in AD Servicemembers: Phase I Report	1
Operational Health	2015 Health Related Behaviors Survey Analysis	1
<b>Total Reports</b>		<b>72</b>

*The U.S. Air Force Epidemiology User's Guide and the Outbreak Response Kit.*

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 461,000 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 2017, the AFMR team

coded and entered into the database more than 4,000 deaths and requested 14,000 records from prior decades for confirmation and entry.

The DoD Global, Respiratory Pathogen Surveillance Program is a sentinel program with 79 sites globally. The program's priorities include identification and tracking of circulating influenza and other respiratory pathogens as well as influenza VE analyses. These priorities are accomplished through weekly influenza

reports, monthly GEIS reports, sequencing analyses, and both mid- and end-of-season VE analyses. In 2017, the surveillance team completed testing on more than 5,500 specimens, sequenced more than 1,100 specimens, and provided VE and sequencing information for the FDA's Vaccines and Related Biological Products Advisory Committee meeting. These data were a significant contribution to the total U.S. data for VE and sequencing in 2017. ■

## STANDARD AND SURVEILLANCE PRACTICES

AFHSB's Surveillance Methods and Standards (SMS) Working Group develops, documents, and publishes standard surveillance case definitions and methodologies for studies that utilize DMSS data. 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 (ICD), 9th and 10th Revisions, Clinical Modification (ICD-9 and ICD-10) codes to identify conditions of interest diagnosed in the MHS.

In 2017, the SMS working group developed and documented 14 new case definitions, updated several others, and continued its efforts to develop ICD-10 code sets for its existing case definitions. All new case definitions developed at the AFHSB now include ICD-10 code sets. The AFHSB prioritizes its case definition documentation process on militarily relevant conditions and on those conditions frequently used in AFHSB reports. To date, there are more than 115 condition-specific case definitions in 18 categories available on the [AFHSB website](#). Of these, approximately 105 include proposed ICD-10 code sets. The SMS working group developed and documented, among others, new case definitions for nonmelanoma skin cancer, gallbladder disease, viral and bacterial meningitis, and eating disorders.

AFHSB also maintains and publishes the Armed Forces Reportable Medical Events Guidelines and Case Definitions with July 17, 2017 version available on the [AFHSB website](#). 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. ■

### Surveillance Case Definitions

Standard surveillance case definitions used by the Armed Forces Health Surveillance Branch (AFHSB) for routine surveillance and reporting. These case definitions have been designed for use with administrative healthcare data derived from the U.S. military electronic health record (EHR) and contained in the Defense Medical Surveillance System (DMSS) and other available datasets.

Note: On October 1, 2015, the International Classifications of Disease, 10th Revision, Clinical Modification (ICD-10-CM) replaced ICD-9-CM for coding of morbidity data. In response to this transition, AFHSB has developed ICD-10 code sets for many of the Branch's surveillance case definitions. If available\*, the proposed ICD-10 code set is included in the code table within the condition-specific case definition. The validity of these code sets will be evaluated when ICD-10 data is available.

#### 1.0 Allergy

Allergic Rhinitis\*

#### 2.0 Cardiovascular

Deep Vein Thrombophlebitis

#### 3.0 Dental

#### 4.0 Dermatology

Plant Dermatitis\*

Malignant Melanoma; Skin\*

Non-Melanoma Skin Cancer\* (New)

#### 5.0 Ear, Nose, Throat

Noise-Induced Hearing Loss; Occupational\*

Hearing Injuries; Noise-Induced\*

Obstructive Sleep Apnea\*

#### 6.0 Endocrinology

Diabetes Mellitus; Type I&II\*

Gestational Diabetes Mellitus

#### 7.0 Gastroenterology

Appendicitis\* (Updated)

Hernia, Hiatal\* (New)

Hernia, Abdominal\* (New)

Gallbladder Disease\* (New)

Gastroesophageal Reflux Disease\*

#### 8.0 Genitourinary

Urolithiasis (Urinary Stones)\*

Urinary Tract Infection\* (New)

#### 9.0 Gynecology

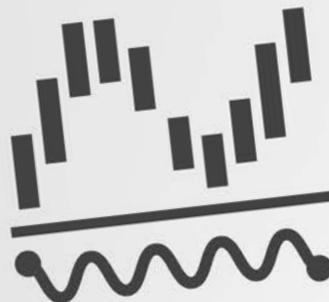
Menorrhagia\*

Pelvic Inflammatory Disease\*

Polycystic Ovarian Syndrome\*

Uterine Leiomyomas (Fibroids)\*

Vaginal Candidiasis\* (New)

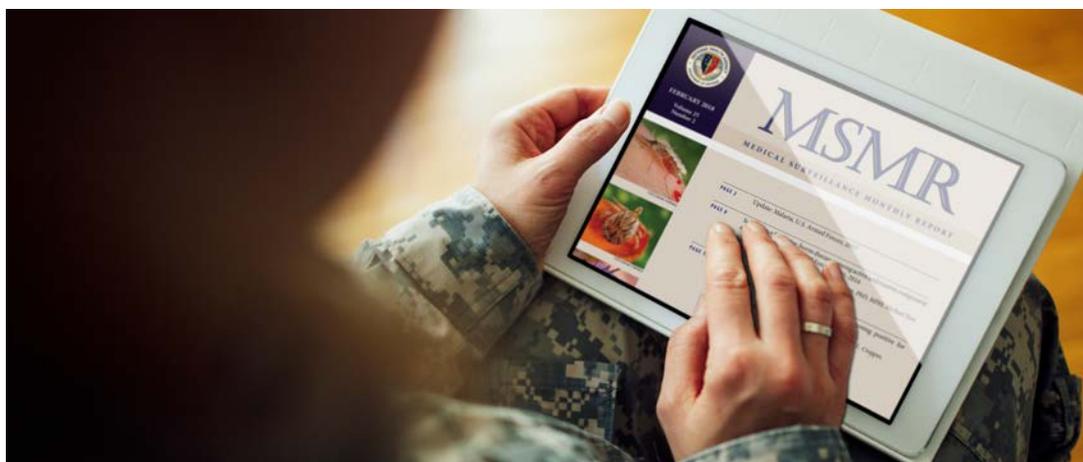


## MEDICAL SURVEILLANCE MONTHLY REPORT

Launched in 1995, the *MSMR* is the flagship publication for AFHSB. The monthly 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, policy-makers, and analysts.

The *MSMR* is indexed on MEDLINE and has more than 1,500 online subscribers. During 2017, the *MSMR* received 15,074 total page hits on the AFHSB website. The average number of page hits per month was 1,256. 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*, *The Los Angeles Times*, *The Washington Post*, *The Times News*, *Stars and Stripes*, and *Military Times Newsweekly Group*. In 2017, the *MSMR* published a

total of 49 articles, including 31 original full reports, six updates of previously published data analyses, five brief reports, and seven surveillance snapshots. Nine of the articles were submitted by authors not affiliated with the *MSMR* editorial staff. Six issues had special themes: burden of disease and injury, heat injuries, cold weather injuries, gastrointestinal/foodborne illness, hepatitis A/B/C, and HIV. The most frequent topics of original articles and updates in 2017 were gastrointestinal/foodborne illness, healthcare burden of disease and injury, influenza, norovirus, hepatitis A/B/C, heat injuries, and HIV. 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 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.

Since 2008, AFHSB has trained 50 residents from the three services and two DrPH students. In 2017, there were three Army residents, three Navy residents, and four Air Force residents. Resident and student projects have resulted in published articles such as “Obstructive Sleep Apnea and Associated Attrition, Active Component, U.S. Armed Forces, January 2004–May 2016,” “A Decade of Functional Gastrointestinal Disorders in Active Component U.S. Military Service Members, 2005–2014,” and “Increasing Severity of Traumatic Brain Injury Is As-

sociated with an Increased Risk of Subsequent Headache or Migraine: A Retrospective Cohort Study of U.S. Active Duty Service Members, 2006–2015.” More than one-third of the completed resident projects are published in the *MSMR* or other peer-reviewed journals 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

## **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.

### **GEIS CORE LABORATORY PARTNERS:**

The following are the core GEIS partners who conduct ongoing sustainment activities on behalf of GEIS.

- ▶ Naval Medical Research Center (NMRC) in Silver Spring, Md., including Naval Medical Research Unit No. 2 (NAMRU-2); Naval Medical Research Unit No. 3 (NAMRU-3) in Cairo, Egypt; NAMRU-3 Ghana Detachment in Accra, Ghana; Naval Medical Research Unit No. 6 (NAMRU-6) in Lima, Peru; and Naval Health Research Center (NHRC) in San Diego, Calif.
- ▶ Walter Reed Army Institute of Research (WRAIR) in Silver Spring, Md., including U.S. Army Medical Research Directorate-Kenya (USAMRD-K) in Nairobi, Kenya; U.S. Army Medical Research Directorate-Georgia (USAMRD-G) in Tbilisi, Georgia; Armed Forces Research Institute of Medical Sciences (AFRIMS) in Bangkok, Thailand
- ▶ U.S. Air Force School of Aerospace Medicine (USAFSAM) in Dayton, Ohio
- ▶ Uniformed Services University of the Health Sciences (USU) in Bethesda, Md.

**MILITARY TREATMENT FACILITY LABORATORIES:** Brian Allgood Army Community Hospital (BAACH), Landstuhl Regional Medical Center (LRMC), San Antonio Military Medical Center (SAMMC), and Tripler Army Medical Center (TAMC)

**PUBLIC HEALTH COMMANDS:** Navy and Marine Corps Public Health Center-EpiData Center (NMCPHC-EDC), Navy Environmental Preventive Medicine-Unit 2 (NEPMU-2), Navy Environmental Preventive Medicine-Unit 5 (NEPMU-5), and Public Health Command Europe (PHC-E)

**ADDITIONAL PARTNERS:** 18th Aerospace Medicine Squadron, Theater Preventive Medicine Flight (18 AMDS/SGPL), 65th Medical Brigade (65th MED BDE), Edgewood Chemical Biological Center (ECBC), Georgetown University, Navy Entomology Center of Excellence (NECE), Office of the Surgeon General Pharmacovigilance Center (OTSG-PVC), and U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID)

## GLOBAL EMERGING INFECTIONS SURVEILLANCE (GEIS)

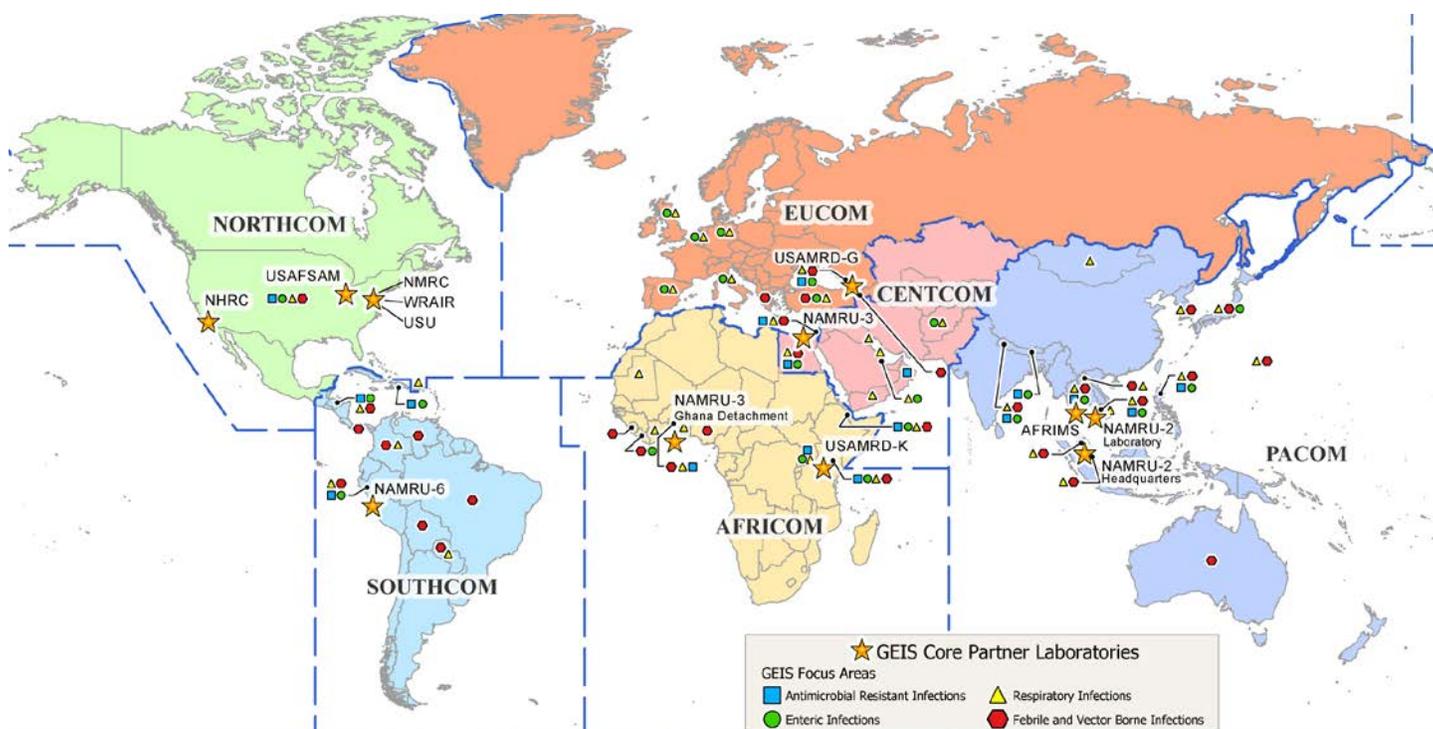
The GEIS section's role is to coordinate a global program of militarily relevant infectious disease surveillance to inform force health protection (FHP) decision-making and improve national security. The GEIS network comprises the Defense Department service medical research laboratories that are globally postured and transregionally integrated to provide early detection and outbreak response in support of joint FHP and operational readiness against infectious diseases wherever they may arise. In 2017, [GEIS](#) provided \$58.1 million in funding to 26 Defense Department service laboratories that implement infectious disease surveillance in support of FHP. In partnership with their host nations and regional partners, the Defense Department service laboratories conduct disease surveillance and outbreak response with the primary purpose of obtaining information for U.S. FHP. Their work also indirectly improves partner nation surveillance and outbreak response capabilities through active collaboration.

The reorganization of the AFHSB and GEIS section under DHA's Public Health Division in 2015 has invigorated the role of GEIS as a CSA. To strengthen its role as a CSA, GEIS hosted its first Business Optimization Meeting in April 2017 to bring together CCMD Surgeons and other key stakeholders to engage in substantive discussion regarding the role of GEIS in combat support. This meeting had representatives from all six GCC Surgeons' offices, the Office of the Joint Staff Surgeon, leaders from DHA's Public Health Division and other offices within its Healthcare Operations Directorate, and leaders from the Defense Department service medical research laboratories.

In addition, GEIS hosted a State of the Science meeting in November 2017 to bring together GEIS partners from around the globe to discuss how to translate data from GEIS-funded efforts into timely, actionable information products that aid the CCMD Surgeons in FHP decision-making. The meeting also pro-

vided the opportunity for the GEIS program office and its partners to review achievements, lessons learned, and surveillance technologies, and plan next steps for the GEIS network in efforts to detect and characterize emerging and novel infectious disease threats to U.S. military personnel.

GEIS launched a new Data-to-Decision initiative in August 2017. The immediate goal of this initiative is to improve the availability of timely, actionable information from GEIS-funded projects for the GCCs to inform FHP decision-making. To obtain such information, the GEIS Program Office has developed a process for monthly monitoring of surveillance findings from each GEIS-funded project and subsequent reporting to the GCCs. To kick off the Data-to-Decision initiative, GEIS developed and implemented a process of collecting, prioritizing, and disseminating new surveillance information from its funded surveillance projects on an immediate and monthly basis.



## Global Emerging Infections Surveillance Network

In addition, GEIS launched another new initiative in 2017—the Next-Generation Sequencing and Bioinformatics Consortium. GEIS established the consortium to rapidly detect and characterize known, emerging, and novel infectious disease agents by establishing a harmonized Defense Department laboratory capability that uses data from consortium to inform FHP decision-making. The consortium will bring GEIS partners together to share information on capabilities, standard operating procedures, and expertise so that a harmonized approach to sequencing and bioinformatics is achieved and improving FHP decision-making within the next five years.

### ANTIMICROBIAL RESISTANCE (AMR) SURVEILLANCE

**FOCUS:** The [AMR Focus Area](#) surveillance projects address antimicrobial resistant pathogens causing healthcare-associated infections (HAI), wound infections, and drug-resistant sexually transmitted infections and emerging resistance patterns, providing information for military health initiatives such as improved

antibiotic stewardship and medical countermeasures development.

**WHAT'S NEW IN FY17:** The AMR Focus Area supported 10 competed projects and sustainment activities for eight of the GEIS core laboratories, totaling approximately \$8.9 million, including funding from GEIS and the Combating Antimicrobial Resistant Bacteria initiative. An increasing number of projects at the overseas laboratories focused on advanced molecular methods, which provided a more in-depth evaluation of genetic mechanisms of antimicrobial resistance on a more real-time basis. This information was translated into actionable FHP reports, allowing for informed decisions on the need for improved infection control and stewardship programs, and effective combat treatment regimens for each GCC area of responsibility.

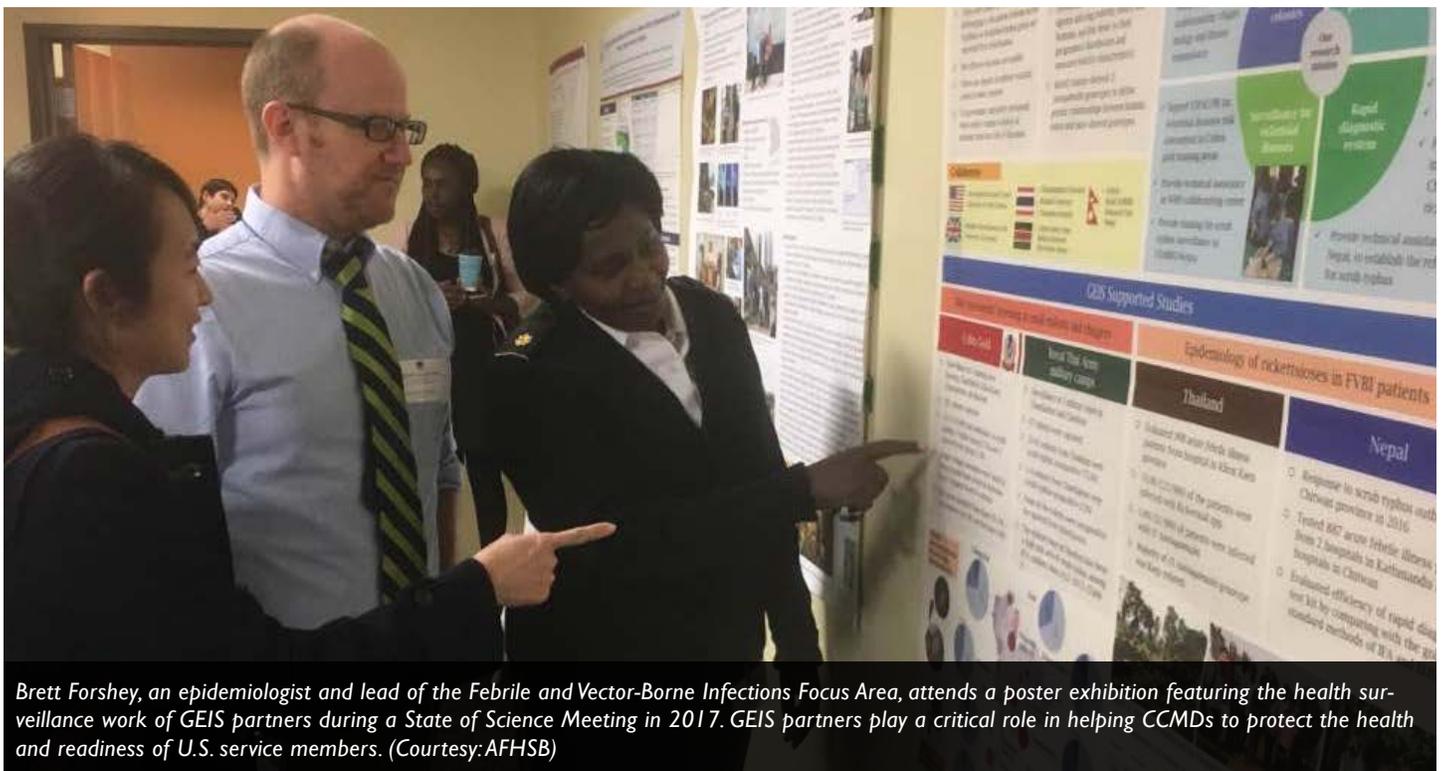
**WHERE WE'RE GOING:** The AMR Focus Area will work to enhance coordination of advanced characterization through whole genome sequencing to better compare global patterns of resistance. This will provide GCC Surgeons awareness of

circulating patterns of resistance specific to their area of responsibility, and will provide clinicians the information necessary to prescribe effective treatment specific to Defense Department populations encountering exposures not commonly found in the U.S.

**SERVICE LABORATORIES SUPPORTED IN FY17:** AFRIMS, NAMRU-3, NAMRU-6, NMCPhC-EDC, NMRC, NAMRU-2, Office of the Surgeon General Pharmacovigilance Center (OTSG-PVC), US-AMRD-G, USAMRD-K, USU, WRAIR

### FY17 ACCOMPLISHMENTS:

▶ The Multidrug-resistant organism Repository and Surveillance Network (MRSN) responded to an increased number of carbapenem-resistant (CR) isolates reported from LRMC. Prior to this year, the number of CR isolates at LRMC has been very low. Advanced characterization at the MRSN revealed a variety of CR genes, including bla<sub>NDM</sub>, bla<sub>VIM</sub>, bla<sub>KC-PC</sub>, bla<sub>OXA48</sub>, and bla<sub>IMP</sub>. A single *Escherichia coli* isolate carrying mcr-1 was also detected.



Brett Forshey, an epidemiologist and lead of the Febrile and Vector-Borne Infections Focus Area, attends a poster exhibition featuring the health surveillance work of GEIS partners during a State of Science Meeting in 2017. GEIS partners play a critical role in helping CCMDs to protect the health and readiness of U.S. service members. (Courtesy: AFHSB)

- ▶ NAMRU-6 identified the first *Acinetobacter baumannii* strain confirmed to express New Delhi metallo-beta-lactamase-1 (NDM-1) in Peru, and detected significant circulation of NDM-1 in a Honduran hospital.
- ▶ AFRIMS identified colistin resistant *Klebsiella pneumoniae* from two patients in a medical facility in Thailand, and isolated 45 bla<sub>NDM</sub> (43)- and bla<sub>VIM</sub> (2)-harboring *Enterobacteriaceae* from patients in a medical facility in the Philippines.

## ENTERIC INFECTIONS (EI)

**Focus:** [EI surveillance projects](#) address militarily relevant pathogens of the intestines that degrade readiness through surveillance for acute gastroenteritis (AGE) in the U.S. military (including recruit, shipboard, and forward-deployed populations) and in foreign military and civilian populations, characterization of travelers' diarrhea in immune-naive travelers, advanced characterization and antimicrobial susceptibility testing of enteric pathogens and detecting emerging pathogens in previously tested "pathogen negative" stool samples.

**WHAT'S NEW IN FY17:** The EI Focus Area supported eight competed projects and seven core laboratory sustainment activities totaling approximately \$5.3 million. The multi-site Global Travelers' Diarrhea (GTD) study continued prospective surveillance efforts in Cambodia, Honduras, Kenya, Nepal, Peru, the Republic of Georgia, and Thailand. EI surveillance activities were initiated in the Philippines, expanding global awareness of pathogens associated with AGE and on several U.S. Naval combat vessels, improving detection of outbreaks in U.S. service members. EI surveillance activities have also supported enhanced detection of EI pathogens through improved methods for detecting parasitic pathogens, and through comparison of three multi-pathogen platform technologies.

**WHERE WE'RE GOING:** The EI Focus Area will continue to expand global awareness of circulating EI pathogens by implementing surveillance at additional sites, including Djibouti, Egypt, Liberia, and Uganda, implement standard operation procedures for multi-pathogen platform technologies to enhance pathogen detection and identification of co-pathogens within the GTD study, expand focus on U.S. military populations, particularly military treatment facilities that have not historically conducted surveillance for EI (e.g., Brian Allgood Community Hospital, South Korea). These efforts will lead to improved actionable information for FHP, in the most cost-effective manner, across militarily relevant geographic locations within each GCC.

**SERVICE LABORATORIES SUPPORTED IN FY17:** AFRIMS, LRMC, NAMRU-3, NAMRU-6, NEPMU-5, NHRC, NAMRU-2, USAMRD-G, and USAMRD-K

## FY17 ACCOMPLISHMENTS:

- ▶ NHRC collected and tested 558 samples from four recruit training centers. Norovirus was tested on 548 of 558 samples; positive results were detected in 19, 21, 40, and 31 samples, respectively from the U.S. Army's Fort Leonard Wood base and Marine Corps Recruit Depots in Parris Island and San Diego. Surprisingly, no *Salmonella*, *Shigella*, or *Campylobacter* were isolated during the entire fiscal year. Findings from this sentinel site surveillance suggest that viral enteric pathogens continue to contribute to acute gastroenteritis in recruit settings.
- ▶ LRMC collected and tested 879 specimens from EUCOM and CENTCOM. Of those tested, 381 (43 percent) samples were positive for at least one enteric pathogen. The most frequently detected pathogens to date include enteropathogenic *E. coli* (EPEC), *Campylobacter*, and *Clostridium difficile*.

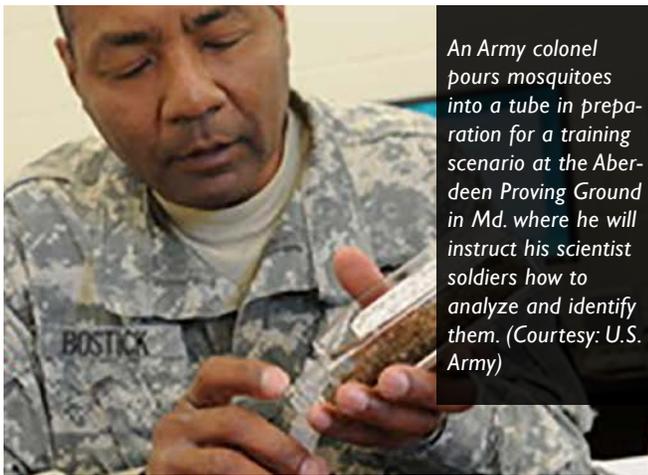
- ▶ Tripler Army Medical Center identified the potential clonal relationship of a particular capsular/sequence type strain and fluoroquinolone resistance in Hawaii, better informing the epidemiology and clinical presentations of campylobacteriosis in an area with active duty service members and Defense Department beneficiaries from the Army, Navy, Air Force, and Coast Guard.

## FEBRILE AND VECTOR-BORNE INFECTIONS (FVBI)

**FOCUS:** The [FVBI 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, and environmental drivers of exposure and infection.

**WHAT'S NEW IN FY17:** The FVBI Focus Area supported 46 competed projects and sustainment activities at 10 core partner laboratories, totaling approximately \$20.6 million. Several efforts established in 2017 increased the GEIS network's FVBI surveillance capabilities, including enhanced next-generation sequencing at USAMRD-K, improved vector surveillance capabilities at USAMRD-G, multiplex surveillance platforms at USAMRIID, and a prototype of a mobile sequencing unit at the Navy Entomology Center of Excellence. These efforts bolster and expand the FVBI surveillance network at a time when vector-borne pathogens are of high importance to FHP.

**WHERE WE'RE GOING:** The FVBI Focus Area will work to increase coordination and collaboration on vector-borne diseases across the GEIS network, particularly with regard to acute febrile illness surveillance, antimalarial drug resistance, and detection of malaria rapid test failure, capitalize on the Next-Generation Sequencing/Bioinformatics Consortium for validated pathogen



An Army colonel pours mosquitoes into a tube in preparation for a training scenario at the Aberdeen Proving Ground in Md. where he will instruct his scientist soldiers how to analyze and identify them. (Courtesy: U.S. Army)



An Army colonel does a field tick drag as part of training scenario during a field training exercise at the Aberdeen Proving Ground, Md. (Courtesy: U.S. Army)

detection, identification, and characterization, increase available molecular data for dengue virus and other FVBI pathogens in the U.S. Africa Command (AFRICOM) area of responsibility and improve surveillance and risk mapping for pathogens, vectors, and reservoirs in Central America and other GCC priority regions. These activities will enhance the capability to identify known and/or emerging FVBI vectors and pathogens for expanded FHP decision-making capabilities globally.

**DOD SERVICE LABORATORIES SUPPORTED IN FY17:** 18 AMDS/SGPL, 65th MED BDE, AFRIMS, NAMRU-3, NAMRU-6, NECE, NEPMU-2, NHRC, NMRC, NAMRU-2, PHC-E, USAMRD-G, USAMRD-K, USAMRIID, USU, WRAIR

### FY17 ACCOMPLISHMENTS:

▶ NMRC, AFRIMS, and USAMRD-K studies continued to expand the known range of scrub typhus outside of Southeast Asia, documenting molecular and serologic evidence for *Orientia* spp. transmission in Africa and South America. These studies indicate that scrub typhus may be a threat to Defense Department personnel even outside of Southeast Asia.

- ▶ USU surveillance among Operation Iraqi Freedom deployers found that approximately one in five had evidence of asymptomatic latent visceral leishmaniasis, including one percent that were polymerase chain reaction (PCR) positive. This raises questions as to whether further transmission in the U.S. could occur through blood or tissue donation, and whether these deployers could be at higher risk for activation to symptomatic visceral leishmaniasis.
- ▶ AFRIMS documented resistance to piperazine, mefloquine, and artemisinin in *Plasmodium falciparum* isolates in Cambodia and Thailand. Southeast Asia is a hotbed for emerging antimalarial drug resistance. Drug resistance there and elsewhere may limit prophylaxis and treatment options for Defense Department personnel.
- ▶ The 65th Medical Brigade and WRAIR Viral Diseases Branch collaborated to identify three novel rickettsial genotypes from mosquitoes (*Mansonia uniformis*, *Culex pipiens*, and *Aedes esoensis*) collected in the demilitarized zone in the Republic of Korea, expanding our understanding of rickettsial genetic diversity and suggesting a potential role for mosquitoes in transmission of rickettsial pathogens.

## RESPIRATORY INFECTIONS (RI)

**FOCUS:** [RI surveillance projects](#) address rapid detection and response to respiratory pathogens, especially those with pandemic potential in humans through surveillance of U.S. military, including recruit, shipboard, and deployed populations, and in foreign military and civilian populations, the human–animal interface, designed to develop knowledge regarding zoonotic transmission of emerging RIs, advanced characterization of viruses, designed to monitor viral drift and potential shift, and vaccine effectiveness and response studies.

**WHAT'S NEW IN FY17:** The RI Focus Area supported 10 competed projects and 10 core laboratories' sustainment activities, totaling approximately \$20.1 million. To enhance ability to detect novel viral respiratory pathogens, multiplex and next-generation sequencing technologies were used in series on respiratory samples testing negative by traditional PCR, supporting an assessment of respiratory pathogen laboratory testing algorithms. Another project conducted surveillance of acute respiratory infection etiologies in high-risk agricultural workers in Cambodia at the human–animal interface. Shipboard respiratory infection surveillance was also initiated, capturing an under-surveilled population where the mission can be significantly impacted

when infections have the opportunity to rapidly spread through the crew.

**WHERE WE'RE GOING:** The RI Focus Area will continue the DoD Global Respiratory Pathogen Surveillance Program to provide broad, global surveillance of respiratory infections in service members and beneficiaries. The RI Focus Area plans to further expand surveillance at the human–animal interface, especially in populations where spillover is likely. The RI Focus Area will also augment existing surveillance sites with the ability to detect additional respiratory pathogens while working on opportunities to reduce the number of specimens where no pathogen is detected. The program will continue to encourage the use of the DoDSR for analyses that might provide information to improve FHP.

**DOD SERVICE LABORATORIES SUPPORTED IN FY17:** AFRIMS, BAACH, LPMC/PHC-E, NAMRU-3, NAMRU-6, NHRC, NMRC, NAMRU-2, USAFSAM, USAMRD-G, USAMRD-K, and WRAIR

### FY17 ACCOMPLISHMENTS:

- ▶ NMRC provided more than 10,000 hemagglutination inhibition assays to support a Defense Department clinical trial, and also bio-banked numerous HAI titers and standardized influenza virus stock, which are available for partner laboratory use. NMRC completed and published results of a study involving influenza antibody-dependent cellular cytotoxicity, which may be of future practical use for informing influenza vaccine and/or therapeutics development.
- ▶ USAMRD-G identified a potential association between bocavirus, metapneumovirus, and parainfluenza virus. The epidemiology of bocavirus is not well understood; therefore this information adds to epidemiologic knowledge and will inform risk assessments for service members in the area.
- ▶ USAMRD-K conducted surveillance at live poultry markets in Uganda where influenza A(H9N2) continued to be isolated. Investigators

concluded that influenza A(H9N2) is now established in these poultry markets, better defining the human–animal interface in regions important to the U.S. military.

- ▶ USAFSAM continued to manage the DoD Global Respiratory Pathogen Surveillance Program with more than 95 participating sites worldwide, and more than 4,000 specimens tested annually. Data from this program are used to estimate the midseason vaccine effectiveness, informing the selection of the next influenza season's vaccine strains.
- ▶ USU identified potential behavioral risk factors for disease spread, finding that at an advanced individual training site, 68 percent of trainees reported influenza-like illness symptoms but only 36 percent of them sought care, and only 60 percent of trainees washed their hands after sneezing. This information provides opportunities for targeted interventions to increase the use of preventive measures. ■



Researchers examine a positive malaria blood smear at NAMRU-6 in Peru. GEIS funds Defense Department laboratories in the U.S. and abroad to assist CCMDs in force health protection and readiness. (Courtesy: U.S. Navy)

# BIOSURVEILLANCE IN THE DEFENSE DEPARTMENT

## INTEGRATED BIOSURVEILLANCE

Biosurveillance is defined as “the process of gathering, integrating, interpreting, and communicating essential information related to all-hazards threats or disease activity affecting human, or plant health to achieve early detection and warning, contribute to overall situational awareness of the health aspects of an incident, and to enable better decision-making at all levels.”<sup>1</sup> The Defense Department uses global biosurveillance networks to identify and track these public health threats to national security that are unbounded by state, regional and intercontinental borders. Defense Department partners are from multidisciplinary agencies, including Nuclear, Chemical, and Biological Defense Programs, DHA, and military service research agencies.

The Defense Department biosurveillance enterprise has two primary strategic goals:

- ▶ **SITUATIONAL AWARENESS** of biological warfare programs, threat agents and technologies, intent and use
- ▶ **ENHANCED DEFENSE DEPARTMENT PUBLIC HEALTH** by providing situational awareness of naturally occurring microbial pathogens and infectious disease incidence, prevalence, and emerging countermeasures.

Effective biosurveillance requires an integrated approach that coordinates efforts across all agencies. Accurate capture of threat information, thorough risk assessment, and rapid communication are critical for countermeasure development and other response activities.

With the recent designation as a Combat Support Agency, the DHA must design and deliver solutions to Combatant Commands that meet the demands of the 21st century battlespace. This future battlespace will feature a Joint Force Aligned to execute Globally Integrated Operations characterized by global agility, flexibility, and small, low-signature capabilities, increased partnership and cross-domain synergy to maintain the initiative in every domain.<sup>2</sup> This creates a challenge for the MHS in providing comprehensive health surveillance to deployed forces in a highly distributed operating environment and minimally, if any, pre-established health service infrastructure to detect, respond to and/or prevent disease threats from reducing health security and threatening the health of the force.

The AFHSB established the IB section to execute global horizon scanning of Defense Department public health threats

to forces operating in all six GCCs. The vision of **IB** is to provide enhanced FHP and national security through providing comprehensive health surveillance support to the GCCs and military services. To achieve this, IB’s mission is to inform FHP decision-making and enhance global health security by detecting, and rapidly communicating public health threats in support of GCCs and U.S. government national security priorities.

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 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 U.S. Department of Homeland Security’s Science and Technology Directorate and Office of Health Affairs, Office of Undersecretary of Defense for Policy, and the Office of the Joint Staff.

IB continues to engage with its Defense Department and interagency partners to be the focal point for biosurveillance

1. The National Strategy for Biosurveillance, April 2012  
2. [http://www.defenseinnovationmarketplace.mil/resources/JV2020\\_Capstone.pdf](http://www.defenseinnovationmarketplace.mil/resources/JV2020_Capstone.pdf)

information. This comprehensive health surveillance strategy will:

- ▶ Scan the horizon for global event-based, open-source raw or aggregated data to gather, analyze, and rapidly disseminate information on current and emerging health events of military interest
- ▶ Provide indicator-based surveillance and analysis of raw unstructured data and relevant information technology platforms to identify potential healthcare and non-healthcare information that can provide early detection of possible outbreak activities
- ▶ Leverage strategic international relationships established in the Global Health Security Agenda (GHSA) process to build global defense sector engagements that promote stability and strengthen theater campaign plan objectives that aim to stabilize key regions against the negative impacts of disease outbreaks
- ▶ Reduce fragmentation and synchronize biosurveillance efforts across the Defense Department programs
- ▶ Provide near real-time surveillance, Defense Department public health threat assessment and situational awareness for its customers
- ▶ Provide a resource within the Defense Department to link medical, public health, and medical intelligence data.

IB is primarily 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 the 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 military personnel, including dependents and beneficiaries. ARO develops timely and relevant products based on these 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 FY17 ACCOMPLISHMENTS INCLUDE:

- ▶ Producing and distributing [175 disease-specific surveillance summaries](#) on topics, including avian influenza A (H7N9), Middle East Respiratory Syndrome (MERS-CoV), chikungunya in the Caribbean, the Ebola outbreak in West Africa, and Zika virus in the Americas.
- ▶ Developing fully unclassified 508-compliant versions of [surveillance summaries](#) on the AFHSB website and share with non-governmental organizations and foreign nations.
- ▶ Producing and distributing three executive summaries and six spot reports for relaying quick information on topics, including the World Health Organization (WHO) Emergency Committees, several types of influenza, Ebola in Democratic Republic of Congo, Zika virus, yellow fever in Africa, and other events.
- ▶ Researching, writing, and presenting weekly reports on current health events being tracked, RME, and global health items of interest.
- ▶ [Developing two interactive animated gallery maps](#) for the [AFHSB website](#) highlighting the outbreaks of

chikungunya in the Western Hemisphere and Ebola in West Africa.

- ▶ Participating on the steering committee of the Biosurveillance Indications and Warnings Analytic Community (BIWAC) with interagency partners. BIWAC manages the Wildfire web-based discussion portal for relaying and requesting information from U.S. government sources. In 2017, ARO posted nine queries and made two responses on disease-specific topics.
- ▶ Developing up-to-date guidance for detecting and reporting Zika virus, chikungunya, Ebola, and H7N9. ARO distributed this guidance to our partners.
- ▶ Developing the gold-standard for tracking and recording Zika virus cases in the MHS beneficiary population; coordinated data flow from each of the services, collated all data, including laboratory and RME data and ad hoc reporting.
- ▶ Answering numerous requests for information on specific diseases as well as laboratory testing information and

*AFHSB senior leaders attend a briefing on the interactive disease health surveillance products the IB staff created to help CCMDs in force health protection and readiness.*



## Biosurveillance in the Defense Department

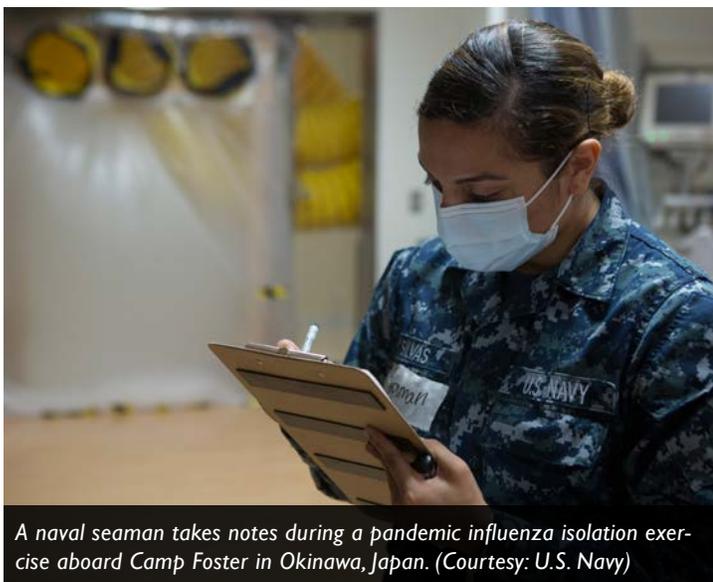
processes for detecting and reporting specific diseases.

- ▶ Participating in Operation EAGLE RESOLVE, CENTCOM exercise to enhance regional and global health surveillance through multilateral military participation in the event of a biological event within the AOR.
- ▶ Supporting CCMD exercises as a subject matter expert in epidemiology and event based surveillance by providing significant support in developing exercise scenarios, injects, recommendations and feedback during the Table Top Exercise.
- ▶ Participating in interagency policy committees, including the Biosurveillance Sub-Interagency Policy Committee, the Biological Defense Research and Development Subcommittee, 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.
- ▶ Presenting several articles and presentations on ARO activities, including presenting, "Surveillance (Local, State, and Federal) and Foodborne Illness Investigations" at the DHA's Military Health Speaker Series and publication of "Integrated Biosurveillance: ARO Products" surveillance maps in ESRI's 2017 "Mapping the Nation: GIS for Good Governance" publication.
- ▶ 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).
- ▶ Enhancing ESSENCE. In collaboration with the services, improved the functionality of ESSENCE which brings advanced visualization capability on par with the civilian sector and
- ▶ Providing Global Health Engagement (GHE) subject matter expert support to Health Affairs, DHA, and the GCCs, leveraging strategic health engagements with partner nations to enable ministry-level relationships between the Defense Department and the Ministries of Defense of key strategic partners, and supporting intra- and interagency coordination on high-profile health security issues that could have an impact on AFHSB stakeholder's programmatic execution. Key activities:
  - Provided staffing, coordination, content, and expertise for Acting Assistant Secretary of Defense for Health Affairs (A/ASD HA) and AFRICOM command surgeon attendance at the Global Health Security Agenda Ministerial Meeting, including the

The Office of IE assesses biosurveillance needs through evaluation and consultation on the use of existing and potential development of new biosurveillance systems, data, and data sources. Within IE, the Epidemiology Investigations team provides expertise and coordination for large scale public health investigations and consultations that utilize the expertise of AFHSB's other divisions and collaboration among partners within the interagency such as the CDC, WHO, U.S. Department of Homeland Security, U.S. Department of Agriculture, other Defense Department organizations, and non-government U.S. organizations.

### IE'S FY17 ACCOMPLISHMENTS INCLUDE:

- ▶ Implementing a browser-based tool into the daily workflow of AFHSB analysts to visualize RME data and outpatient data from the DMSS.



A naval seaman takes notes during a pandemic influenza isolation exercise aboard Camp Foster in Okinawa, Japan. (Courtesy: U.S. Navy)



A medical support team on Joint Base San Antonio–Fort Sam Houston augmentation class learns how to use Personal Protective Equipment when working in areas contaminated with the Ebola virus during outbreak in West Africa in 2014. (Courtesy: U.S. Air Force)

AFHSB-Integrated Biosurveillance

## Analysis of the MERS-CoV Epidemic

Overview
DoD Relevance
Progression of Epidemic
Interactive Demographics
Cluster Analysis
Timeline of Events

Photo Credit: CDC  
For the optimal functionality of this application, we recommend using Mozilla Firefox.  
If problems persist, restart your browser and reopen the application in a new window.

### Analysis of the MERS-CoV Epidemic

Darling, N.<sup>1,2</sup>, Schoelen, M.<sup>1,2</sup>, Poss, D.<sup>1,2</sup>, Metcalf-Kelly, M.<sup>1,2</sup>, Hill, S.<sup>1,2</sup>, Harris, S.<sup>1</sup>, & Olson, D.<sup>1,2</sup>

Adapted from "Influenza-Za" [informationisbeautiful.net](http://informationisbeautiful.net)  
Infographic last updated: 22 DEC 2017

first-ever defense-focused panel, bringing together experts from the U.S., United Kingdom, and Uganda to discuss the role of the defense sector in health security around the world. The panel was attended by more than 70 people from various partner nations, including the Minister of Health of Uganda, and the Deputy Minister of Health of Liberia

- Supported high-level bilateral military to military strategic dialog between HA and key partners, including the Republic of Korea,

Indonesia, the United Kingdom, and Italy

- Provided planning, content, coordination, and expertise to A/ASD HA's GHSA defense sector engagement strategy, working to enable Defense Department and partner nation's MODs to work with civilian and military partners under the GHSA framework to enable strategic GHE activities
- Provided primary subject matter expert support to A/ASD HA's role on the GHSA Interagency

Review Council, including Policy Coordination meetings convened by the National Security Council

- Provided reachback support to GCCs, OCONUS laboratories, Defense Department teams at U.S. embassies, and other stakeholders on GHE-related issues at the strategic level, enabling improved awareness of key activities and developments in the multilateral and policy space in support of Defense Department priorities. ▲

# 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 2017, 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. [AFHSB reports and publications](#) are located on its website. 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 is 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. ■



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## ACRONYMS

A/ASD HA	Acting Assistant Secretary of Defense for Health Affairs
AFHSB	Armed Forces Health Surveillance Branch
AFI	acute febrile illness
AFMR	Air Force Mortality Registry
AFRICOM	U.S. Africa Command
AFRIMS	U.S. Armed Forces Research Institute of Medical Sciences
AMR	antimicrobial resistance
ARO	Office of Alert and Response Operations
BAACH	Brian Allgood Army Community Hospital
BIWAC	Biosurveillance Indications and Warnings Analytic Community
CCMD	Combatant Command
CDC	Centers for Disease Control and Prevention
CENTCOM	U.S. Central Command
CR	carbapenem-resistant
CSA	Combat Support Agency
DHA	Defense Health Agency
DMED	Defense Medical Epidemiology Database
DMSS	Defense Medical Surveillance System
DMTS	Data Management and Technical Support
DoD	Department of Defense
DoD-GEIS	DoD Global Emerging Infections Surveillance and Response System
DoDSR	Department of Defense Serum Repository
DRSi	Disease Reporting System internet
E&A	Epidemiology and Analysis
ECBC	Edgewood Chemical Biological Center
EDC	EpiData Center
EI	enteric infection
EID	emerging infectious disease
EPEC	enteropathogenic E. coli
ESSENCE	Electronic Surveillance System for the Early Notification of Community-based Epidemics
EUCOM	U.S. European Command
FDA	U.S. Food and Drug Administration
FHP	force health protection
FVBI	febrile and vector-borne infection
GAO	Government Accountability Office
GCC	Geographic Combatant Command
GEIS	Global Emerging Infections Surveillance
GHE	Global Health Engagement
GHSA	Global Health Security Agenda
GTD	Global Traveler's Diarrhea
H7N9	avian influenza A (subtype H7N9)
HAI	healthcare-associated infection
HIV	human immunodeficiency virus
HPV	human papilloma virus
IB	Integrated Biosurveillance
ICD-10-CM	International Classification of Diseases, Tenth Revision, Clinical Modification

ICD-9-CM	International Classification of Diseases, Ninth Revision, Clinical Modification
IE	Office of Innovation and Evaluation
IHR	International Health Regulations
ILI	influenza-like-illness
IPL	Institut Pasteur du Laos
LOE	line of effort
LRMC	Landstuhl Regional Medical Center
MDR-TB	multidrug-resistant tuberculosis
MED BDE	Medical Brigade
MERS-CoV	Middle East Respiratory Syndrome–Coronavirus
MHS	Military Health System
MRSN	Multidrug-resistant organism Repository and Surveillance Network
MSMR	Medical Surveillance Monthly Report
NAMRU-3	Naval Medical Research Unit No. 3
NAMRU-6	Naval Medical Research Unit No. 6
NDM-1	New Delhi metallo-beta-lactamase-1
NECE	National Center of Excellence
NEPMU-2	Navy Environmental Preventive Medicine Unit 2
NHRC	Naval Health Research Center
NMCPHC	Navy and Marine Corps Public Health Center
NMRC	Naval Medical Research Center
NMRC-A	Naval Medical Research Center-Asia
NORTHCOM	U.S. Northern Command
OCONUS	outside the contiguous United States
OEM	Occupational Environmental Medicine
OTSG-PVC	Office of the Surgeon General Pharmacovigilance Center
PACOM	U.S. Pacific Command
PCR	polymerase chain reaction
PHD	Public Health Division
RME	Reportable Medical Event
SAMMC	San Antonio Military Medical Center
SMS	Surveillance Methods and Standards
SOUTHCOM	U.S. Southern Command
SSBP	Surveillance of Suicidal Behavior Publication
TAMC	Tripler Army Medical Center
TBI	traumatic brain injury
TMDS	Theater Medical Data Store
TMDS-MEDS	Theater Medical Data Meds
USAFSAM	U.S. Air Force School of Aerospace Medicine
USAMC	U.S. Army Medical Command
USAMRD-G	U.S. Army Medical Research Directorate–Georgia
USAMRD-K	U.S. Army Medical Research Directorate–Kenya
USAMRIID	U.S. Army Medical Research Institute for Infectious Diseases
USAPHC	U.S. Army Public Health Center
USU	Uniformed Services University of the Health Sciences
VE	vaccine effectiveness
WHO	World Health Organization
WRAIR	Walter Reed Army Institute of Research



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