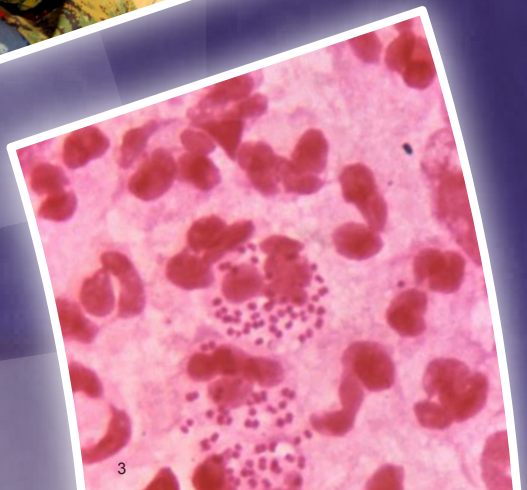
AFHSC

Armed Forces Health Surveillance Center

Health Surveillance, Analysis, and Insight for Action

2014/2015 Report



CAPT Kevin L. Russell

Dr. Julie Pavlin

Friends and Colleagues,

In this year's annual report, you will see that the Armed Forces Health Surveillance Center continued to make significant strides in supporting public health surveillance for the Department of Defense to maintain the health and readiness of its forces, and contribute to the global health security of its allies.

The Epidemiology and Analysis (E&A) division produced more than 1,000 ad hoc analyses and periodic reports that documented trends over time of diseases and injuries among service members on topics such as communicable diseases, training-related injuries, mental health issues, traumatic brain injury and deployment health. The division's staff also completed critical analyses that informed recommendations by the Department of Defense on maintaining the health of service members. For example, a request from the Defense Health Board, a federal advisory committee to the Secretary of the Defense, explored deployment pulmonary health among service members. E&A also provided the Defense Health Agency with quantitative and qualitative analysis on patient access to care, quality of care, and safety within the Military Health System, which appeared in the Secretary of Defense Military Health System Review.

The Global Emerging Infections Surveillance (GEIS) division continued to play a critical role in surveillance and response of emerging infections. GEIS leveraged its existing febrile and vector-borne infection control efforts in Liberia to support the Ebola outbreak response in West Africa. The division's Antimicrobial Resistance program emphasized surveillance of the organisms responsible for healthcare-associated infections and wound infections. In its respiratory pathogens surveillance program, GEIS network partners continued to monitor diseases that often can threaten force health protection. In 2014, GEIS funded network partners to respond to outbreaks of influenza-like illness on a U.S. Navy minesweeper, and *Chlamydia pneumoniae* at Fort Leonard Wood in Missouri.

The Integrated Biosurveillance division boasted a robust program to monitor biosurveillance data in near-real time on hazardous events – such as emerging infectious diseases and environmental incidents – relevant to the health of service members and associated populations. Division staff created and distributed 91 multi-page disease-specific Surveillance Summaries on topics including avian Influenza A(H7N9), Middle East Respiratory Syndrome (MERS-CoV), chikungunya in the Caribbean, the Ebola outbreak, dengue in Japan and enterovirus D68. In addition, staff developed up-to-date Department of Defense guidelines for detecting and reporting chikungunya, Ebola, H7N9 and MERS-CoV.

Providing timely, relevant, actionable and comprehensive health surveillance information is the heartbeat of AFHSC's initiatives. We know that getting these data into the hands of Department of Defense policymakers, military commanders, healthcare providers, public health officers, and researchers is the key to promoting and maintaining the health of service members and associated populations.

AFHSC is proud of its dedicated and energetic staff that is passionate about making a difference in the lives of service members, and those of its allies who deploy around the world to defend our nation. AFHSC will continue to work with our partners and stakeholders to sustain and enhance the impact of our programs. We have much to be proud of, and will continue to build on a solid foundation.

Sincerely,

CAPT Kevin L. Russell
U.S. Navy Medical Corps
Director

Julie Pavlin, MD, PhD
Deputy Director

Vision:

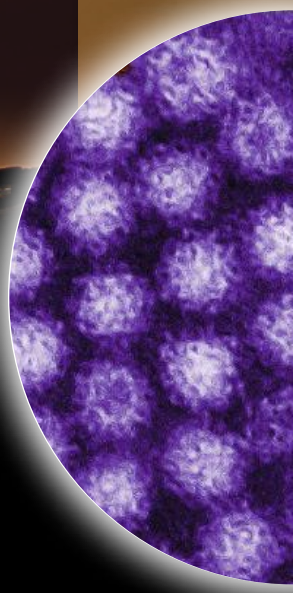
To be the central epidemiologic resource and a global health surveillance proponent for the U.S. Armed Forces.

Mission:

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

AFHSC 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



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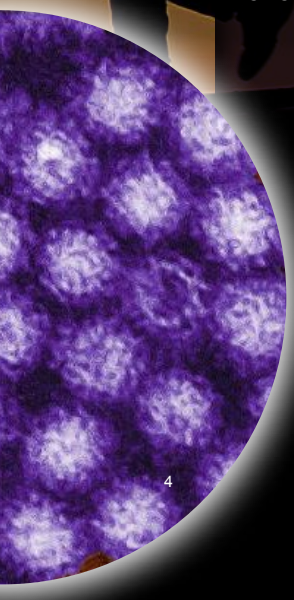
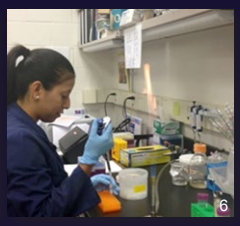
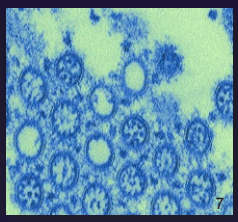
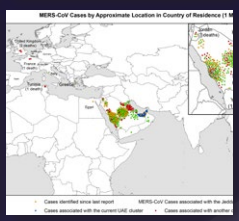
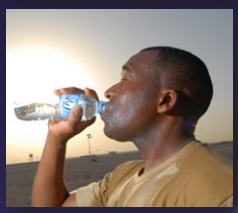


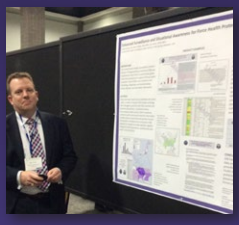
The History of AFHSC











The Origins of AFHSC

In February 2008, the Deputy Secretary of Defense established AFHSC to be the central epidemiologic health resource for the U.S. military. AFHSC was formed by merging the capabilities and resources of the Army Medical Surveillance Activity (AMSA), 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 (OASD/FHP&R).

AFHSC assumed responsibility for AMSA's Defense Medical Surveillance System (DMSS) and the Department of Defense Serum Repository (DoDSR). As the central repository of medical surveillance data for the U.S. Armed Forces, DMSS contains up-to-date 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 more than 2 billion data records on service members and other beneficiaries of the Military Health System (MHS).

The DoDSR was developed in 1985 to store blood sera collected during the Department of Defense testing program for HIV infections and later was designated to receive serum specimens collected before and after operational deployments. The DoDSR is the world's largest repository of its kind with more than 58 million serial serum specimens from more than 10 million individuals.

The Department of Defense mission was expanded through a presidential directive 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 AFHSC's global EID surveillance and response initiatives among a network of partner organizations and executes a militarily relevant surveillance program involving respiratory infections, gastrointestinal infections, febrile and vector-borne infections, sexually transmitted infections (STIs), and antimicrobial-resistant organisms. The AFHSC also serves a key role integrating biosurveillance information to understand the threats from endemic and EIDs relevant to the military worldwide.

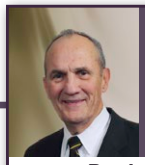
AFHSC publishes summaries of notifiable diseases, trends of illnesses of special interest, and field reports describing outbreaks and case occurrences in its *Medical Surveillance Monthly Report* (*MSMR*) (http://www.afhsc.mil/msmr), a peer-reviewed journal disseminating Department of Defense medical surveillance information. AFHSC also provides up-to-date information on diseases that could impact force health protection as needed.

In 2015, AFHSC will merge with the newly created Defense Health Agency (DHA), whose mission is to streamline health care among the U.S. Armed Forces. As part of the reorganization, AFHSC will be renamed the Health Surveillance Branch and operate under DHA's Public Health Division in the Healthcare Operations Directorate. AFHSC will also join assets from some of the health surveillance capabilities of the Service Public Health Hubs, which include personnel from the U.S. Army Public Health Command, U.S. Air Force School of Aerospace Medicine (USAFSAM), and the Navy and Marine Corps Public Health Command (NMCPHC). The Service Public Health Hubs' select surveillance personnel and assets will be satellites of the Health Surveillance Branch.

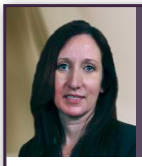
AFHSC is currently organized into three divisions: Epidemiology and Analysis (E&A), GEIS, and Integrated Biosurveillance (IB). ▲

AFHSC Organizational Structure

Director
Armed Forces Health Surveillance Center
CAPT Kevin L. Russell



Science Advisor
Dr. Joel Gaydos



Deputy Director
Dr. Julie Pavlin

Executive Officer/ Chief of Staff
Mr. Robert Welch

Director
Epidemiology and Analysis
COL Dana Dane

Director
Integrated Biosurveillance
Dr. Rohit Chitale

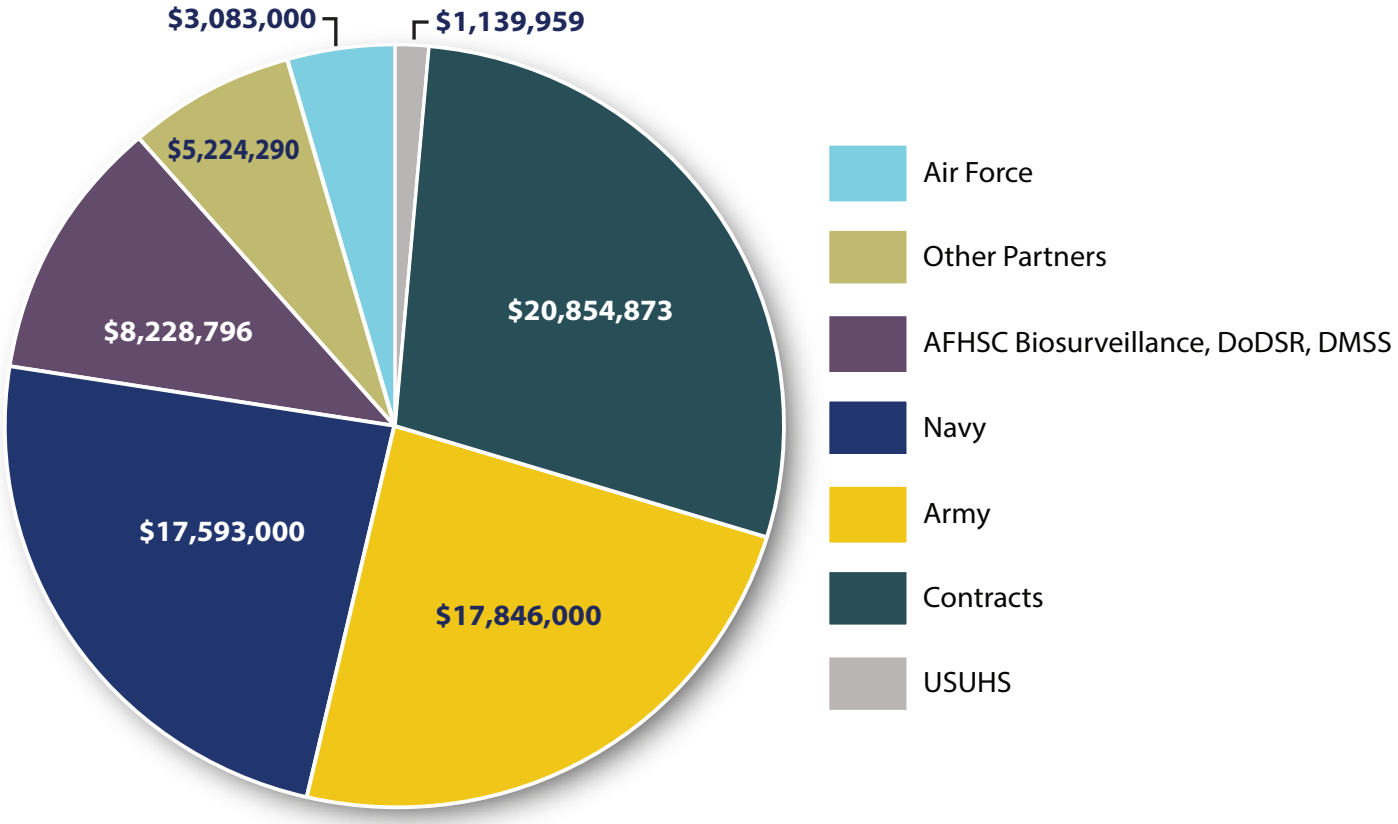
Director
Global Emerging Infections Surveillance and Response
COL James Cummings

AFHSC Finances

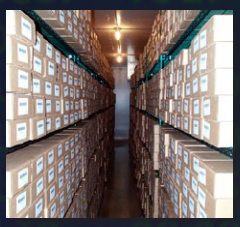
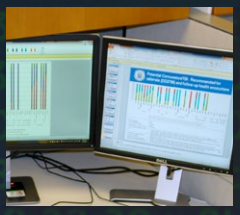
The AFHSC budget was $73.9 million for fiscal year 2014. AFHSC distributed nearly 65 percent of its funds directly to laboratory partners through the GEIS program following an extensive internal and external proposal review process.

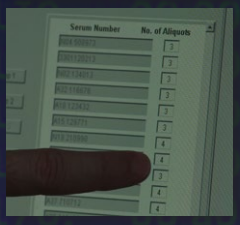
Funding recipients include the Army and Navy overseas laboratories such as the U.S. Army Armed Forces Research Institute of Medical Sciences (AFRIMS), U.S. Army Medical Research Unit-Kenya (USAMRU-K), Naval Medical Research Unit-Asia (NAMRU-A), NAMRU-3, and NAMRU-6. Several CONUS-based military and university partners include the Naval Medical Research Center (NMRC), Naval Health Research Center (NHRC), Walter Reed Army Institute of Research (WRAIR), USAFSAM, Uniformed Services University of the Health Sciences (USUHS), University of Florida Emerging Pathogens Institute, and The Johns Hopkins University Applied Physics Laboratory (JHU/APL), which receive funding in support of their robust programs that benefit the Department of Defense and partners. The remaining funds support AFHSC divisions and headquarters, including biosurveillance initiatives, contracts, *MSMR*, DoDSR, and other infrastructure costs. ▲

Fiscal Year 2014 Financial Management and Accountability

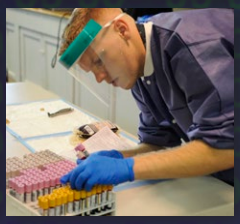


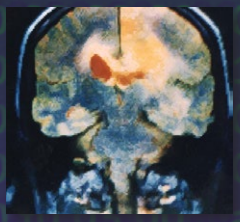
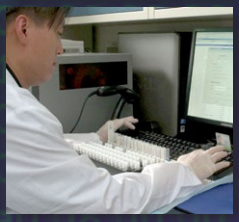
The Elements of Military Health Surveillance







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.

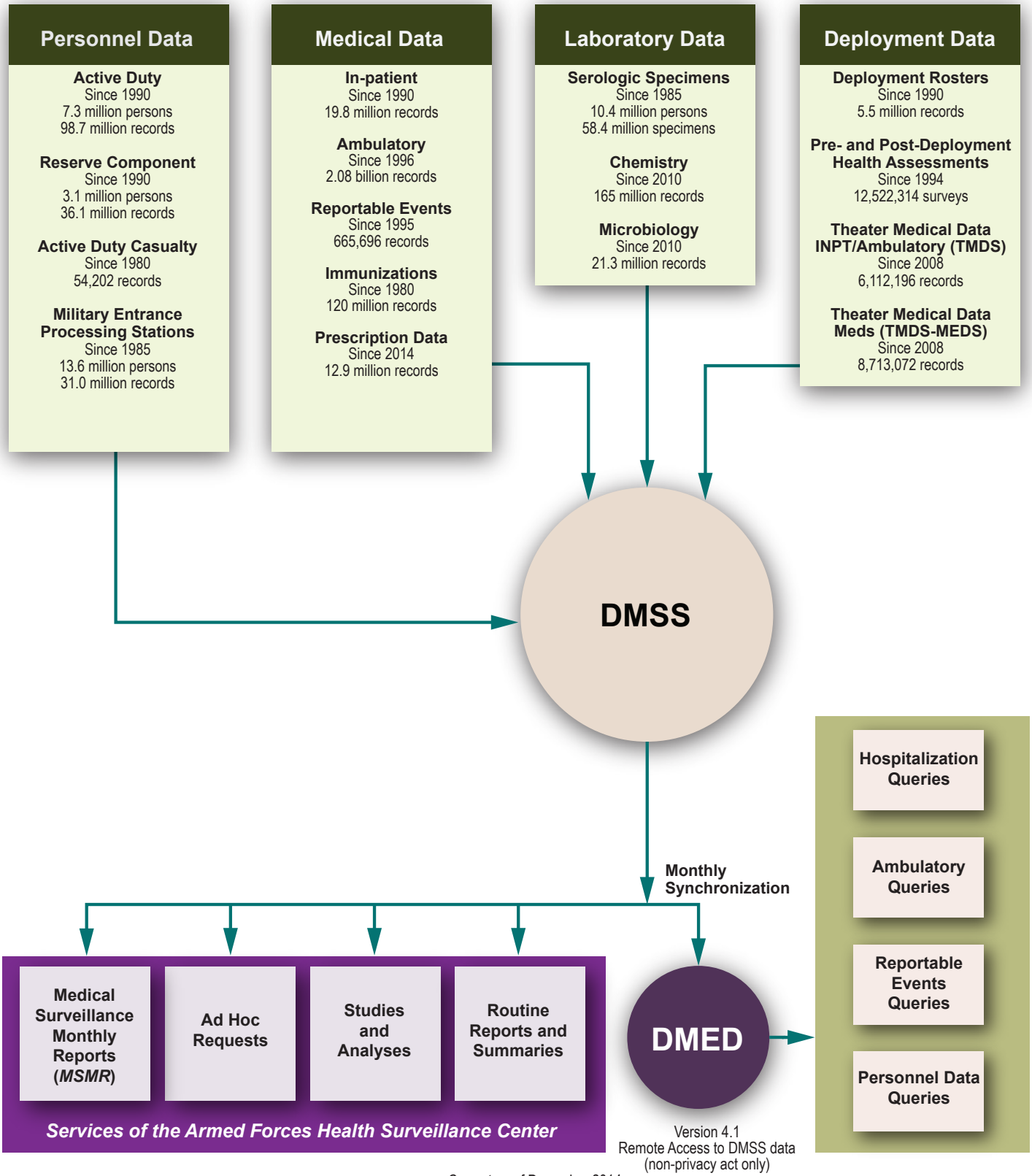
The DMSS receives data from multiple sources and integrates these data in a continuously expanding longitudinal surveillance database for all individuals who have served in the military since 1990. DMSS records are maintained in person, place, and time of reference. The organization of the data facilitates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

AFHSC Director Captain Kevin Russell (far left) leads a tour of the AFHSC laboratory where blood serum is processed for storage in the DoDSR to visiting senior medical officers of the Jamaica Defence Force.

The Defense Medical Epidemiology Database (DMED) is derived from DMSS, providing select data that are de-identified and remotely accessible to individuals (https://www.afhsc.mil/Home/Index). 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 (https://www.afhsc.mil/Home/AboutDmed). In fiscal year 2014, AFHSC retrieved more than 23,000 serum specimens for serologic studies and analyses, making it one of the busiest years in the history of the DoDSR. With the recent transformation of the DoDSR to new state-of-the-art freezers, each freezer operates with advanced cooling equipment and technology. The DoDSR contains more than 58 million serial blood-derived serum specimens collected from more than 10 million active duty and reserve service members throughout their careers. The new freezers have a capacity for more than 100 million specimens, positioning AFHSC to support the Department of Defense's serologic surveillance requirements for the next 20 years. 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.

DMSS Structure and Functional Relationship



Current as of December 2014

Epidemiology Analyses and Reports

The E&A division integrates the expertise of epidemiologists, preventive medicine physicians, and data analysts to provide timely analyses and reports of actionable health information. The division uses AFHSC health surveillance tools—the DMSS and DoDSR—and provides surveillance products to Department of Defense policymakers, military commanders, healthcare providers, public health officers, and researchers. In addition, the division analyzes and interprets large data sets, writes and publishes the *MSMR*, develops and disseminates standards for case definitions, and trains preventive medicine residents.

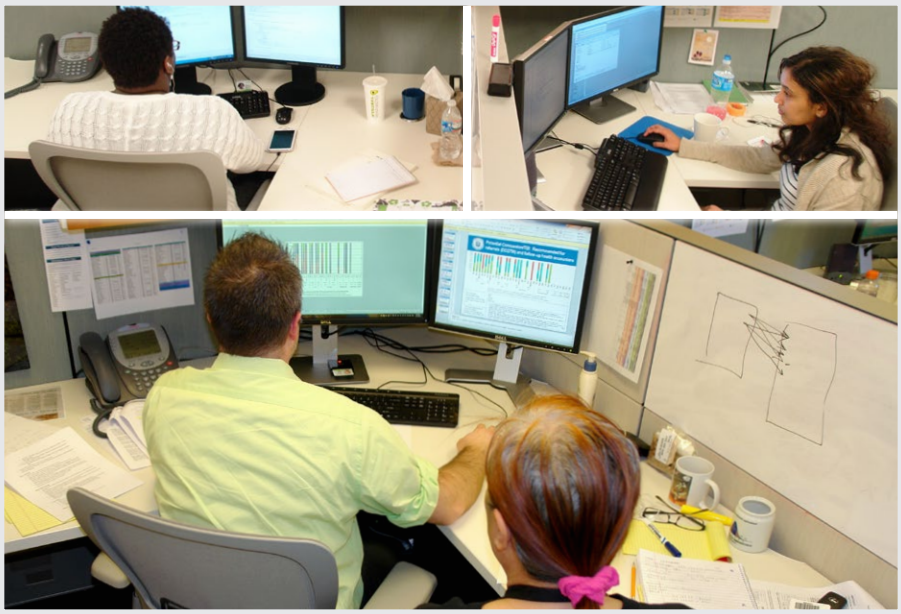
The division receives and responds to hundreds of health-related inquiries and investigations on the U.S. military with the intent of preserving the health of the U.S. Armed Forces. Many inquiries are initiated by key leaders throughout the Department of Defense and relate to military operations. Each analysis and report distributed by the division 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 DoDSR.

The staff prepares analyses that fall into two general categories: periodic and ad hoc reports. In fiscal year 2014, the division distributed 353 ad hoc analyses and more than 700 periodic reports throughout the Department of Defense 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 Department of Defense policymakers to shape their health protection programs, and healthcare professionals to develop preventive measures against diseases or injuries affecting U.S. service members and their beneficiaries.

For example, the staff provides analyses for AFHSC's "DoD Seasonal Influenza Surveillance Summary" during the influenza season. This report contains weekly summaries of influenza activity among MHS beneficiaries by combatant command (CCMD). The influenza report uses outpatient medical encounters for influenza-like illness (ILI), and pneumonia and influenza diagnosed encounters, RME data for hospitalized influenza cases, and Health Level 7 data, provided by the Navy and Marine Corps Public Health Center (NMCPHC) to assess weekly influenza activity in the Department of Defense. Launched in mid-2013, the Reportable Medical Events Monthly Report provides monthly summaries of RMEs among Department of Defense beneficiaries. The report summarizes counts of each RME for the current month and provides comparisons to average counts for the same month and 12-month period from data for the past five years.

The ad hoc analyses originate from health-related requests from operational taskers, congressional inquiries, global health surveillance, serum studies, and *MSMR* analyses. These tailored analyses consist of requests for health surveillance on many 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 special interest by military leaders may become routine and recurrent reports.

In 2014, the division completed multiple analyses in response to congressional inquiries and requests for reports. One report featured an analysis used in the Health Affairs report for Congress on health outcomes for sailors serving on the USS Ronald Reagan during Operation Tomodachi in response to concerns about potential health effects due to radiation exposure. Another request from the Defense Health Board, a federal advisory committee to the Secretary of Defense, required information to inform their deliberation and recommendations on deployment pulmonary health. Several of the division's analyses evaluated respiratory exposure and symptom responses on the



Analysts Devin Hunt (front), Shamola Dye (left) and Sumitha Nagarajan (right) write programs to extract relevant data from billions of health records stored in the DMSS and DoDSR to produce data analyses and reports.

Fiscal Year 2014 AFHSC Periodic Reports in One Year

Deployment Reports

- Civilian PreDeployment Health Assessment (DD2795) Summary Report
- Civilian PostDeployment Health Assessment (DD2796) Summary Report
- Civilian PostDeployment Health Reassessment (DD2900) Summary Report
- Civilian Deployment Health Compliance Report
- Deployment Health Compliance Report
- Deployment Health Report
- PostDeployment Health Assessment (DD2796) Summary Report
- PostDeployment Health Reassessment (DD2900) Summary Report
- PreDeployment Health Assessment (DD2795) Summary Report
- Deployment Numbers
- USCG DHA Report

Disease Reports

- Respiratory Illnesses Report
- Influenza Surveillance Report
- VA Influenza Surveillance Report
- USFK Biosurveillance Report
- DOD Communicable Disease Report
- NCRMD Communicable Disease Report
- Malaria Case-Finding Report
- Reportable Events Monthly Report (REMR)
- Malaria Year To-Date Korea
- Meningococcal Report
- AFPMB Arthropod-Borne Hemorrhagic Fever Report
- AFPMB West Nile Fever Report
- AFPMB Mosquito Borne Encephalitis Report
- AFPMB Dengue/Hemorrhagic Fever Report
- AFPMB Leishmaniasis Report
- AFPMB Lyme Disease Report

Injury Reports

- USASOC Special Reportable Events (Semi-Annual)
- DoD Eye Injury Quarterly Report
- DoD Hearing Injury Quarterly Report
- TRADOC Training-Related Injuries Report

Injury Reports *(continued)*

- Injury Installation Reports
- Lost Duty Application
- TRADOC Cold Injury Report
- DoD Eye Injury Annual Report
- DoD Hearing Injury Annual Report
- TRADOC Heat Injury Report
- Army Annual Injury Report

Mental Health Reports

- FHP&R Mental Health Screen Report
- FHP&R Harm and Violence Report
- FHP&R PTSD Depression Screen Report
- Health Affairs (HA) TBI Report
- Health Affairs (HA) Mental Health Report
- MHS Dashboard Measures
- USASOC Mental Health and TBI Quarterly Report
- AFSOC Mental Health and TBI Quarterly Report
- USASOC Mental Health and TBI Monthly Report
- AFSOC Mental Health and TBI Annual Report
- Health Affairs (HA) PTSD Report

Special Reports

- IB RME Weekly Report
- FHP QA Compliance Audits: ANAM
- DMISID Table
- *MSMR* Deployment Health Assessment Summary
- Special Surveillance (*MSMR*): Motor Vehicle Accidents
- Special Surveillance (*MSMR*): Amputations, TBI, DVT, Leishmaniasis, severe acute pneumonia, and heterotrophic ossification
- EUCOM RMES Monthly Summary
- ANAM Report
- USCG Burden of Disease Report
- USCG RepEvent Report
- Smallpox Cardiac AE Report

Total number of reports: 681

post-deployment health assessment forms to look for trends in reporting of these symptoms. Additional analyses reported the most frequent respiratory symptom diagnoses in deployed personnel.

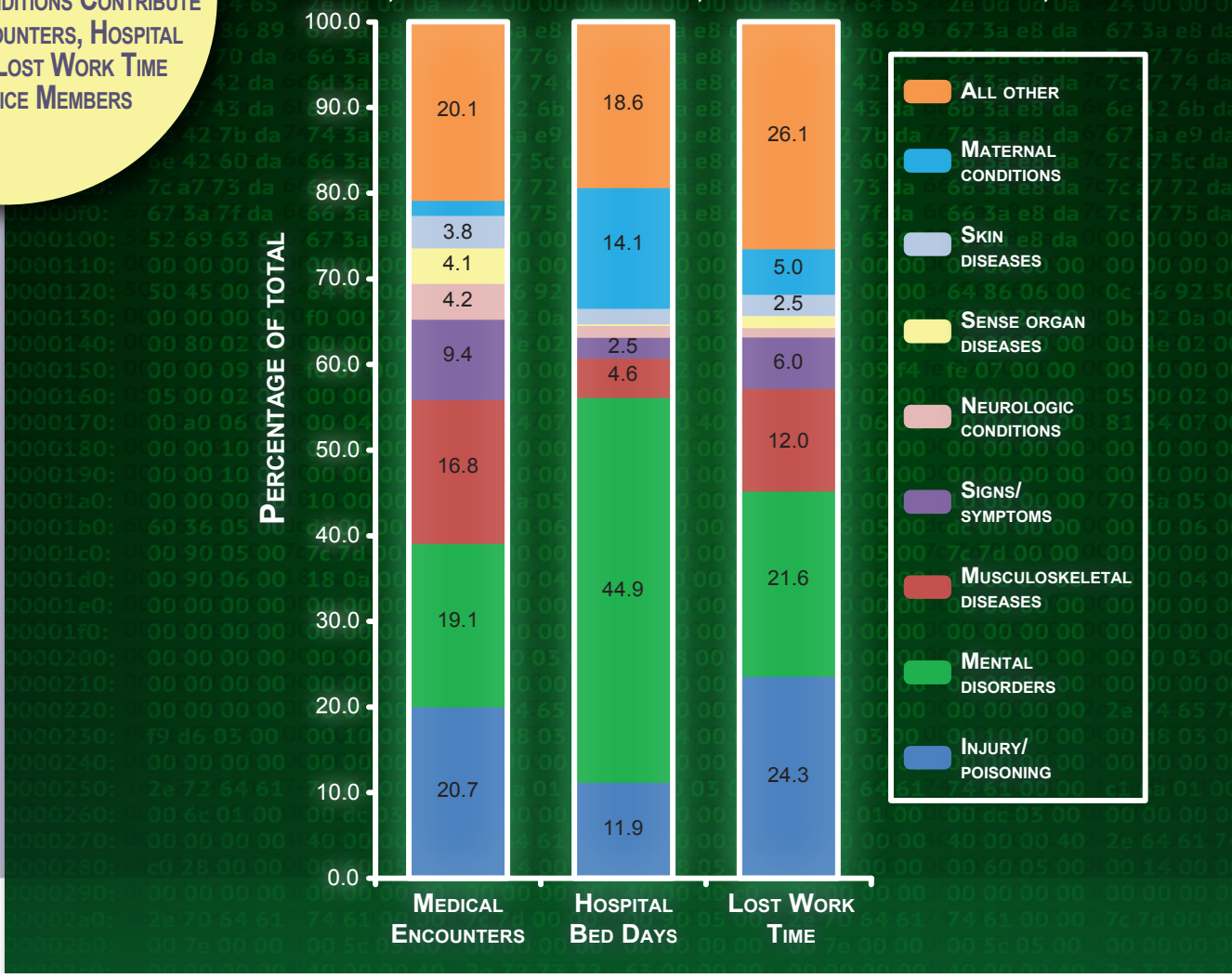
In 2014, the division responded to a request from the DHA for epidemiologic support for an MHS review. The staff provided analysis of quantitative and qualitative data on patient access to care, quality of care, and safety within the MHS. Results from their analyses were incorporated into the final report to the Secretary of Defense Military Health System Review. Senior Department of Defense policymakers also requested an analysis to assess potential risk of adverse events following the use of mefloquine. Division staff designed and implemented a comprehensive, cohort-based study to answer policymakers' questions. The division is also collaborating with the U.S. Army Pharmacovigilance Center and the Department of Veterans Affairs to fully assess this issue.

At the request of the U.S. Centers for Disease Control and Prevention (CDC), in coordination with USAFSAM and NMCPHC, the division staff conducted an analysis to assess the potential suboptimal vaccine performance of the live attenuated influenza vaccine among children during the 2013–2014 influenza season. The results of this analysis helped both the Department of Defense and the Advisory Committee on Immunization Practices (ACIP) to determine the effectiveness of this vaccine.

In 2014, the division supported 24 health-related investigations that requested the use of 23,143 serum specimens from the DoDSR. E&A surveillance data currently support a study that investigates the capability of high-resolution mass spectrometry to detect low levels of environmental agents, metabolites, and inflammatory biomarkers in the serum of individuals potentially exposed to environmental hazards, such as burn pit smoke, during their deployment.

Extract from the *Medical Surveillance Monthly Report* Demonstrating What Diseases, Illnesses and Conditions Contribute to Medical Encounters, Hospital Bed Days and Lost Work Time Among Service Members

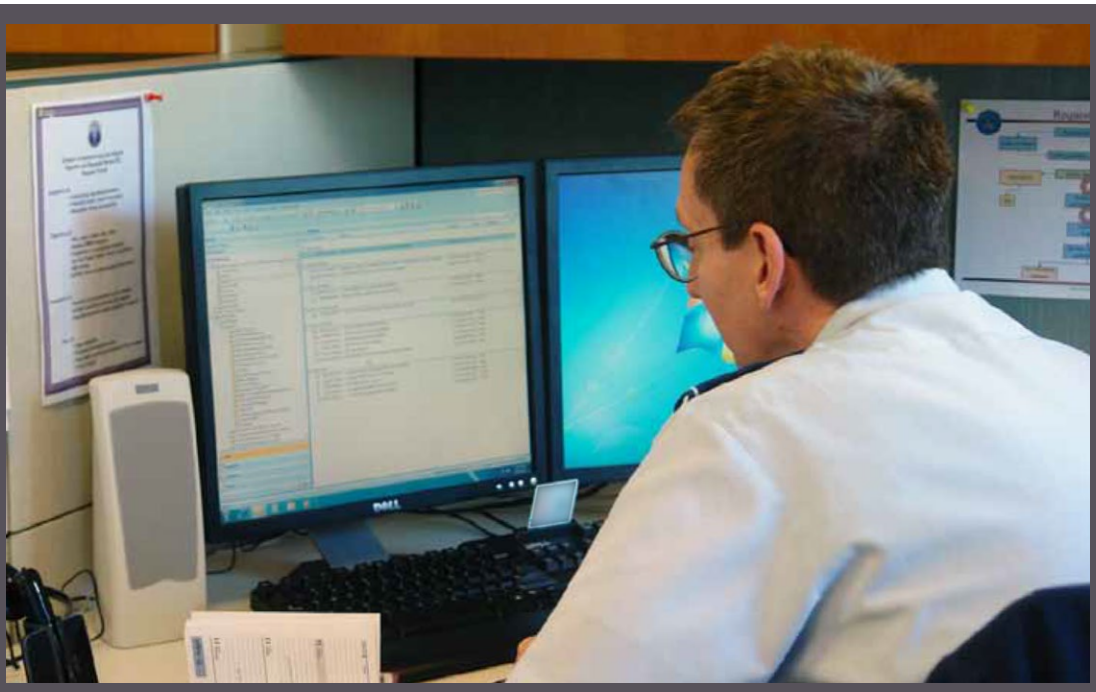
Healthcare Burdens Attributable to Various Diseases and Injuries, Active Component, U.S. Armed Forces, 2013



Service Liaisons

Service liaison officers help their respective services' public health authorities and commanders to access health surveillance information from the AFHSC. The liaison officers are responsible for coordinating requests from their respective services and presenting them at the Request Assessment Process (RAP) meeting. Requests also can come in through the AFHSC website (https://www.afhsc.mil/Home/AboutServiceLiaisons) or other AFHSC subject matter experts (SMEs) and personnel.

At the RAP meetings, senior epidemiologists, preventive medicine physicians, and key scientific advisors review the methodology and feasibility of each request. Once the RAP approves a request, the title and project log are entered into a privacy-protected computer tracking system. Analysts within the E&A division write the computer code to generate the data analysis and provide results in the form of summary tables or limited de-identified data sets. After careful review, the results are sent to the requestor.



Lieutenant Colonel Sean Moore works as a service liaison officer assisting the Air Force to access health surveillance information.

Standard and Surveillance Practices

AFHSC's Surveillance, Methods, and Standards working group documents, develops, and publishes standard surveillance case definitions and methodologies. These case definitions allow Department of Defense public health practitioners to measure disease trends and related biological phenomena in different environments and situations over time.

The ongoing documentation of AFHSC'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 AFHSC case definitions also serve as guidelines for other Department of Defense health surveillance and research organizations. The AFHSC 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 data sets. The definitions primarily use International Classification of Disease, Ninth Revision, Clinical Modification (ICD-9-CM) codes to identify conditions of interest diagnosed in the MHS. Department of Defense topic experts are consulted in the development process when needed.

In 2014, the working group began an initiative to develop International Classification of Disease, Tenth Revision (ICD-10) code sets for its existing case definitions in preparation for the October 2015 transition from ICD-9 to ICD-10 code sets. To date, approximately 40 condition-specific ICD-10 code sets in seven categories have been developed and approved. These include a proposed ICD-10

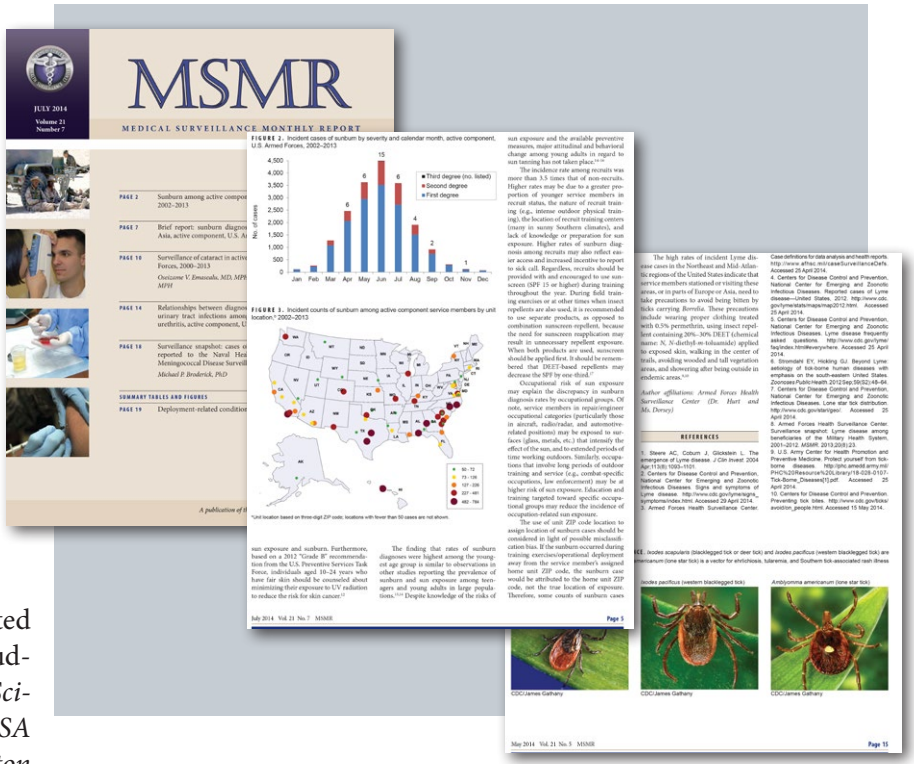
code set for TBI, priority mental health conditions and malaria. The ICD-10 code sets were developed in joint consultation with the services and DHA partners. Additionally, in 2014 the working group reviewed and approved more than 30 AFHSC case definitions, including new definitions for gonorrhea and syphilis. Currently, there are more than 73 condition-specific case definitions in 17 categories available at https://www.afhsc.mil/Home/SurveillanceCaseDefinitions. The AFHSC also maintains and publishes the Armed Forces Reportable Medical Events Guidelines and Case Definitions. The guidelines were revised in 2012—the first time since 2009. Additional revisions are planned for fiscal year 2015. These guidelines are used by the Department of Defense to help military public health officers, healthcare providers, and laboratories to identify and report specific diseases and conditions that are reported to civilian authorities.

Categories for Case Definitions for Data Analysis and Health Reports

Allergy	
	Allergic Rhinitis
Cardiovascular	
	Deep Vein Thrombosis and Pulmonary Embolism
Dermatology	
	Malignant Melanoma, Plant Dermatitis
Ear, Nose, Throat	
	Noise-Induced Hearing Loss, Obstructive Sleep Apnea, Hearing Injuries; Noise-Induced
Endocrinology	
	Diabetes Mellitus, Gestational Diabetes Mellitus
Genitourinary	
	Urolithiasis (Urinary Stones)
Gynecology	
	Uterine Leiomyomas (Fibroids)
Hematology	
	Anemia, Iron Deficiency
Infectious Disease	
	Arthropod-Borne Hemorrhagic Fever, Coccidioidmycosis, Dengue Fever, Hepatitis A, Hepatitis B, Hepatitis C, Herpes Zoster, Influenza, Influenza-Like Illness (ILI), Leishmaniasis, Lyme Disease, Malaria, Mosquito-Borne Viral Encephalitides, Tuberculosis, West Nile Virus, Pneumonia and Influenza (P&I); Weekly, Pneumonia and Influenza (P&I), Hospitalized; Annual
Mental Health	
	Alcohol Dependence, Bipolar Disorder, Major Depression, Post Traumatic Stress Disorder (PTSD), Schizophrenia, Substance Dependence, Suicide, Adjustment Disorders, Alcohol Use Disorders, Anxiety Disorders, Depressive Disorders, Personality Disorders, Psychoses, Substance Use Disorders, Mental Health Problems
Neurology	
	Guillain-Barré Syndrome, Migraine Headache, Multiple Sclerosis, Traumatic Brain Injury (TBI)
Oncology	
	Breast Cancer, Cervical Cancer, Colorectal Cancer, Leukemia, Lung Cancer, Prostate Cancer, Testicular Cancer
Ophthalmology	
	Eye Injuries
Orthopedics	
	Amputation, Deployment-Related, Carpal Tunnel Syndrome, Cruciate Ligament Injuries, Heterotopic Ossification, Low Back Pain, Mechanical, Osteoarthritis, Spondylosis, Tendon Rupture, Injuries, by Anatomic Region
Pulmonology	
	Asthma
Surgical Procedures	
	Appendicitis and Appendectomy
Miscellaneous	
	Hyponatremia, Exertional, Insomnia, Overweight / Obesity, Rhabdomyolysis, Exertional, Cold Weather Injuries, Heat Injuries

Medical Surveillance Monthly Report

Launched in 1995, the *MSMR* is the flagship publication for AFHSC. 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* target readership is professionals throughout the MHS, including public health officials, clinicians, researchers, academicians, healthcare planners, policymakers, and analysts. The publication has more than 1,500 subscribers, a 9 percent increase from fiscal year 2013. The *MSMR* is indexed in MEDLINE®, averaging about 500 online hits per month on PubMed.



Articles published in the *MSMR* have generated media coverage in diverse publications, including *Time Magazine, Fort Campbell Courier, Science Daily, American Forces Press Service, USA Today, The Huffington Post, The Washington Post, The Los Angeles Times, Leesville Daily Leader, Medpage Today, The Olympian, Sundan Vision, Healio.com, Yahoo News, Daily Mail, The New York Times, Infection Control Today, The Columbia Star, U.S. News & World Report, HealthDay, Canada Free Press, Voice of America News, News-Medical.Net*, and Military Times Newsweekly Group.

In fiscal year 2014, the *MSMR* published a total of 35 articles, including 14 original full reports, six updates of previously published data analyses, five brief reports, and 10 surveillance snapshots. Ten (28 percent) of the articles were submitted by authors not affiliated with the *MSMR* editorial staff. Two issues had special themes: malaria, and burden of disease and injury. The most frequent subjects of the original articles and updates in fiscal year 2014 were infectious diseases and immunizations, mental health, injuries sustained by service members, and causes of death. The *MSMR* continues to accept manuscript submissions for relevant articles on topics in military public health, epidemiology, surveillance, and disease and injury prevention. The complete archive of past issues of the *MSMR* is available online (https://www.afhsc.mil/msmr). ▲

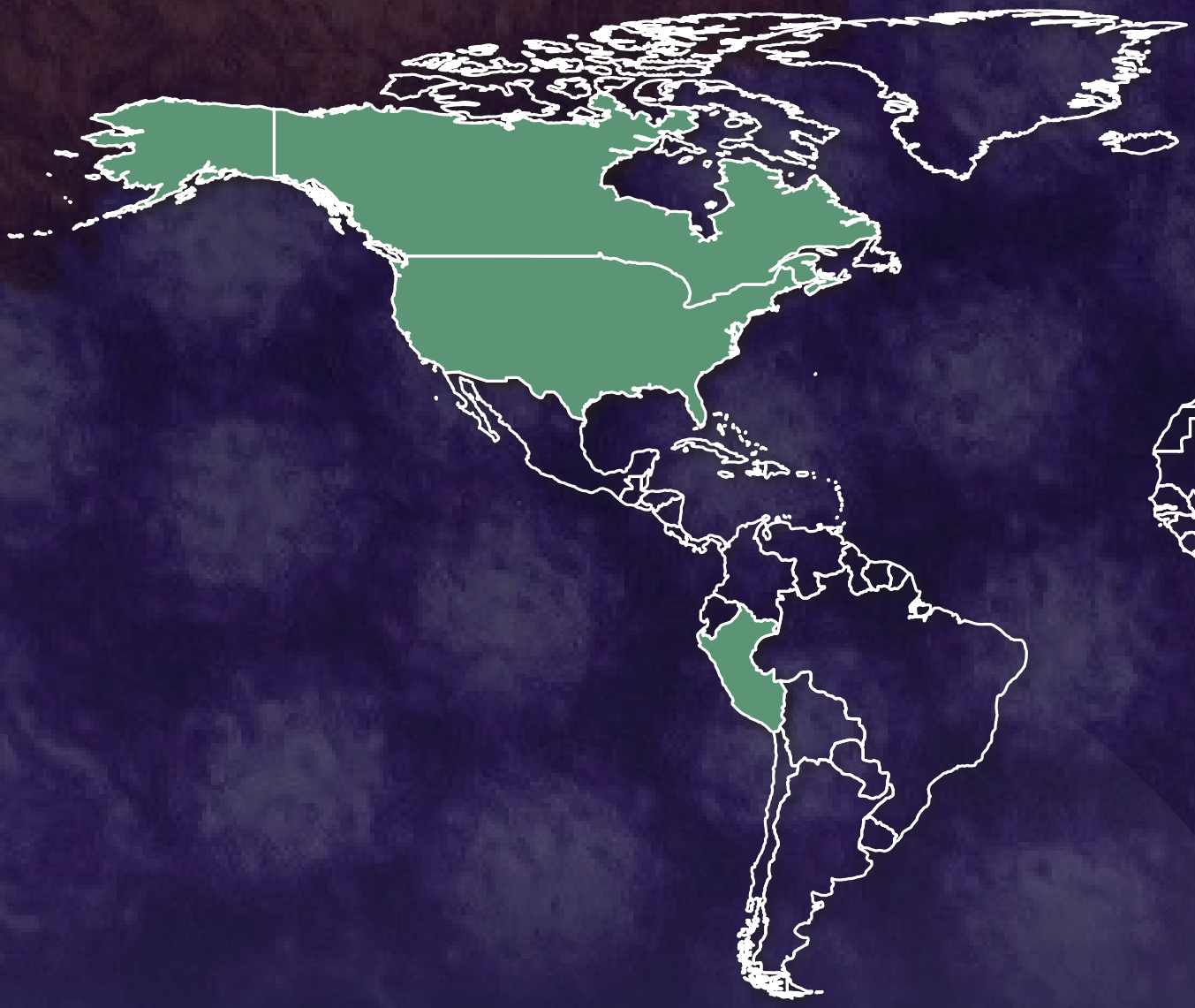
MSMR editors Elizabeth Lohr (left) and Dr. Frank O'Donnell (right) discuss an upcoming issue.

Residency Training

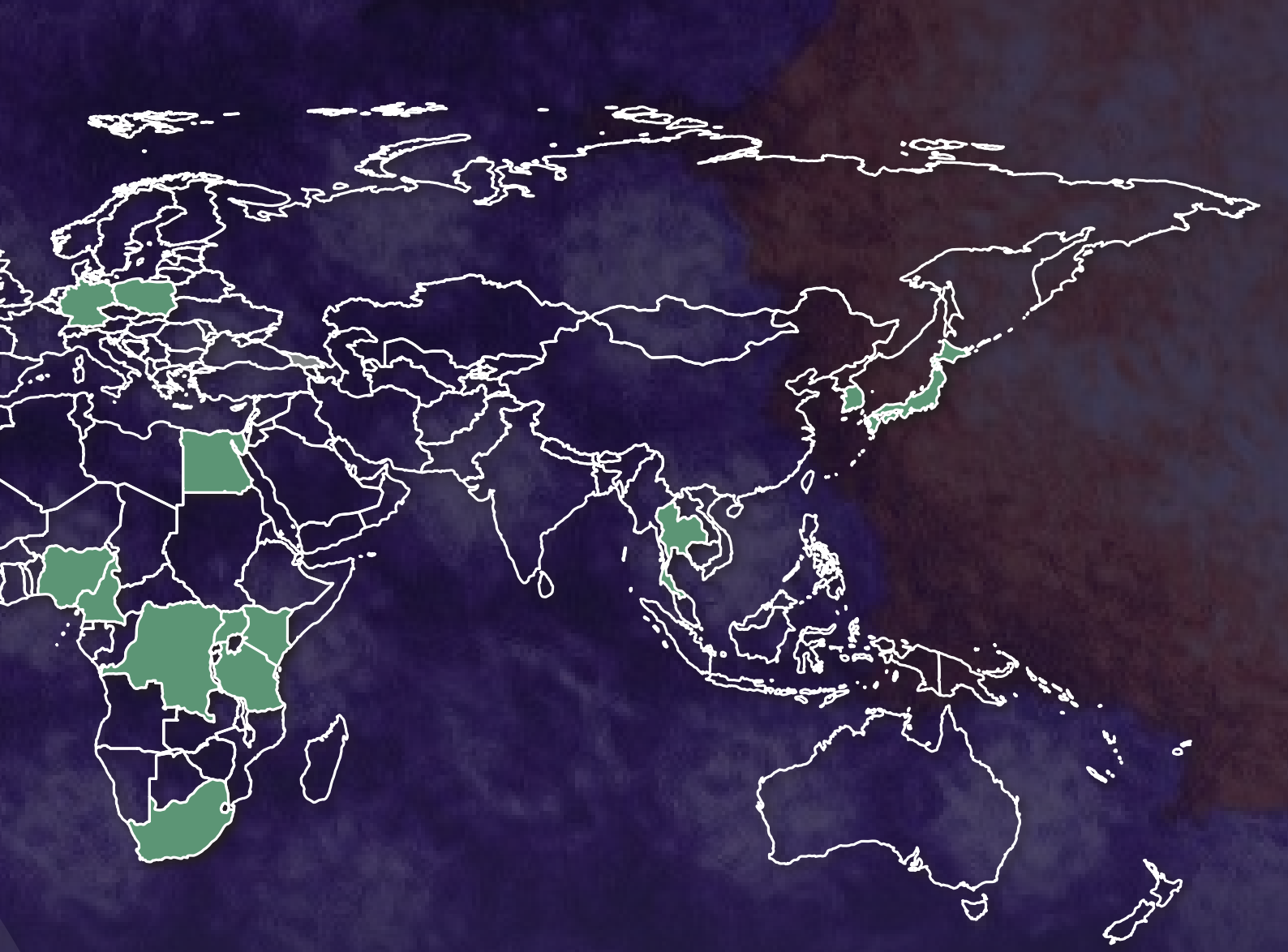
As a key Department of Defense source for health surveillance and epidemiologic training, AFHSC hosts preventive medicine residents from WRAIR and USUHS for a four- to six-week practicum rotation under the supervision and mentorship of senior staff. Residents enhance their understanding of the complexities of health surveillance systems, knowledge and application of epidemiology, and critical analytical skills. They also are exposed to AFHSC daily operations and initiatives. Central to their rotation experience, 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, AFHSC has trained 58 residents from the three services (28 with Army, 15 Navy, and 14 Air Force). Resident projects have examined such topics as the impact of installation alcohol bans on the subsequent number of alcohol misuse medical diagnoses, incident illness and injury diagnoses among U.S. Armed Forces air crew during the 12 months prior to retirement, and the protective association between influenza vaccination and adverse cardiovascular events in active component service members. More than half of the completed resident projects are published in the *MSMR* (https://www.afhsc.mil/msmr) or other peer-reviewed journals and presented at the American College of Preventive Medicine or the American Public Health Association meetings. Additionally, the E&A division 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 USUHS.

USUHS and WRAIR preventive medicine residents present findings from their epidemiologic studies completed during their rotation at AFHSC.



Global Emerging Infections Surveillance network



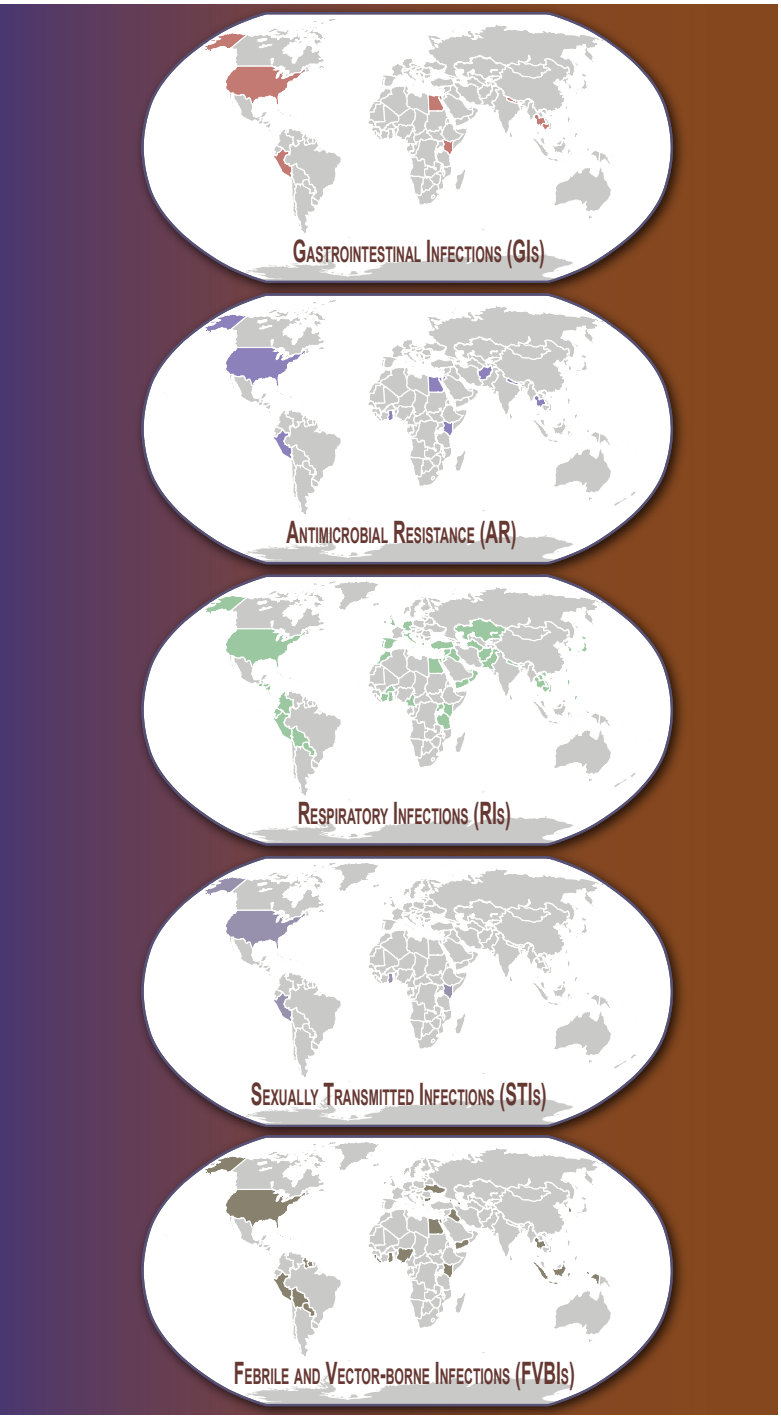
GEIS Network and Major Laboratory Partners

- Armed Forces Research Institute of Medical Sciences (AFRIMS) – Thailand
- Naval Medical Research Center (NMRC-Asia) – Asia
- Naval Medical Research Unit-3 (NAMRU-3) – Egypt
- NAMRU-6 – Peru
- 65th Medical Brigade – Korea
- U.S. Army Medical Research Unit (USAMRU-K) – Kenya
- USAMRU-G – Republic of Georgia
- Landstuhl Regional Medical Center – Germany
- Naval Health Research Center (NHRC) – California
- U.S. Air Force School of Aerospace Medicine (USAFSAM) – Ohio
- Navy and Marine Corps Public Health Center (NMCPHC) – Virginia
- U.S. Army Public Health Command (USAPHC) – Maryland
- Walter Reed Army Institute of Research (WRAIR) – Maryland
- Naval Medical Research Center (NMRC) – Maryland

Managing the Global Emerging Infections Surveillance and Response System

The division of GEIS continues to develop, implement, support, and evaluate an integrated global emerging infections surveillance and response system. Force health protection of U.S. service members and those of their allies remains the strategic focus of its initiatives. GEIS recognizes that adequate global public health provides for country-level and regional stability critical to U.S. national security interests.

The GEIS network and its partners support a wide range of global surveillance efforts across all EID surveillance through a holistic approach that includes: surveillance and response; training and capacity building; research innovation and integration; and assessment and communication of the value added. The division receives strategic guidance on its surveillance efforts from various U.S. government agencies, such as OASD/FHP&R and the CCMDs. Key documents guiding surveillance include the World Health Organization (WHO) International Health Regulations (IHR) 2005, the Presidential Decision Directive NSTC-7, Presidential Policy Directive 2, Homeland Security Presidential Directive 21, and National Strategy on Biosurveillance.



In 2014, GEIS network surveillance efforts reached 65 countries. AFHSC effectively communicates information from its surveillance activities to support increased public awareness and understanding of important global issues and shaping of public health decisions. Surveillance findings are routinely shared with the respective ministries of health and defense departments of the host partner countries. GEIS encourages its partners to present and publish their findings in medical journals and at scientific meetings.

GEIS network engagements are organized around five syndromically defined EID pillars: antimicrobial resistance, gastrointestinal infections, febrile and vector-borne infections, respiratory infections, and STIs. The key GEIS network partners are the six Department of Defense overseas research laboratories, each of which operate a regional disease surveillance network, and the four U.S.-based Department of Defense reference laboratories—NMRC, NHRC, USAFSAM, and WRAIR. These 10 Department of Defense laboratories conduct endemic and global emerging disease surveillance and response missions through regional partnerships with local ministries of agriculture, defense, and health, as well as public and private universities and various non-governmental organizations. The military organizations that use GEIS disease surveillance information are Deputy Assistant Secretary of Defense (DASD)/FHP&R, the Defense Health Board, CCMDs, service public health assets, and interagency collaborators that include the U.S. national security staff, the U.S. Department of Health and Human Services, and the WHO.

In fiscal year 2014, GEIS distributed $43.4 million to support two different kinds of surveillance activities—ongoing initiatives and new novel proposals. Approximately two-thirds of GEIS sustainment funding supports the ongoing initiatives to maintain a robust global EID surveillance portfolio that is standardized across all regions. The remaining one-third of funding is awarded to projects submitted in response to an annual request for proposals that address novel EIDs or surveillance efforts affecting the Department of Defense and global health communities. Each year, proposals for both types of support undergo rigorous evaluation by internal and external review committees.

GEIS-Supported Outbreak Responses Fiscal Year 2014

Country	Laboratory	Disease/Pathogen	No. Outbreaks
Nepal	AFRIMS	Hepatitis E	1
Cambodia	AFRIMS	Influenza A(H3N2)	1
Burkina Faso	NAMRU-3	Dengue	1
Djibouti	NAMRU-3	Malaria	1
Egypt	NAMRU-3	Malaria	1
Liberia	NAMRU-3	Ebola	1
Egypt	NAMRU-3	Influenza A(H5N1)	1
Egypt	NAMRU-3	Influenza A(H1N1)	1
Egypt	NAMRU-3	Ebola Virus Disease	Ref. lab support
Peru	NAMRU-6	Skin Infections (*Klebsiella pneumoniae*)	1
Peru	NAMRU-6	Wound Infections (*Acinetobacter baumanii*)	1
Peru (local military)	NAMRU-6	AGE (Norovirus)	2
Peru (local military)	NAMRU-6	AGE (enterotoxigenic *Escherichia coli*)	1
Peru (local military deployed to Haiti)	NAMRU-6	Shigella	1
Peru (local military)	NAMRU-6	Typhoid Fever (Salmonella)	1
Peru (local military)	NAMRU-6	AGE (*Blastocystis hominis*)	1
Peru (local military)	NAMRU-6	ARI (enterovirus and hMPV)	1
Peru (local military and dependents)	NAMRU-6	Chickenpox	2
Peru (Peruvian PCV deployed to Haiti)	NAMRU-6	Chikungunya Fever	1
USA (GLNTC, MCRD-SD, MCRD-PI)	NHRC	Norovirus (AGE)	4
USA (Camp Pendleton, CA)	NHRC	Conjunctivitis (*Streptococcus pneumoniae*)	1
USA (Fort Leonard Wood, MO)	NHRC	Pneumonia (*Chlamydia pneumoniae*)	1
USA (San Diego, CA, and Singapore, four ships)	NHRC	Influenza A(H3N2)	4
Japan (US Naval Hospital, Yokosuka, three ships)	NHRC	Influenza A(H1N1) & A(H3N2)	3
Liberia	NMRC	Ebola Virus Disease	Ref. lab support
Cambodia	NMRC-Asia	Influenza A(H5N1)	1
Cambodia	NMRC-Asia	Shigella	1
Liberia	USAMRIID	Ebola Virus Disease	Ref. lab support
Sierra Leone	USAMRIID	Ebola Virus Disease	Ref. lab support
Kenya (local military)	USAMRU-K	Dengue	2
Kenya	USAMRU-K	ARI (RSV and PIV)	1
Kenya (local military)	USAMRU-K	Wound Infections (*A. baumanii* and *Pseudomonas aeruginosa*)	1
Kenya	USAMRU-K	VHF (Ebola Virus Disease, Marburg & Rift Valley Fever)	Ref. lab support
Kenya	USAMRU-K	Visceral Leishmaniasis	1
USA (U.S. military installations, 15 states)	USAFSAM	ARI (Enterovirus-D68)	1
Kyrgyzstan (U.S. military, Manas AB)	USAFSAM	Influenza A (H1N1) and A(H3N2)	1
Kuwait (U.S. military, Ali Al-Saleem AB)	USAFSAM	Influenza A(H3N2)	1
USA (U.S. Air Force Academy, CO)	USAFSAM	ARI (*Chlamydia pneumoniae*)	1
Kuwait (U.S. military, Camp Arifjan and Camp Buehring)	WRAIR	Influenza A(H1N1) and A(H3N2)	1
Total no. of outbreaks supported			45
EVD and other VHF laboratory diagnostics support			5

Abbreviations:
GLNTC, Great Lakes Naval Training Center, Chicago, IL • *MCRD-SD*, Marine Corps Recruit Depot, San Diego, CA • *MCRD-PI*, Marine Corps Recruit Depot, Parris Island, SC • *AGE*, acute gastroenteritis • *ARI*, acute respiratory illness • *hMPV*, human metapneumovirus • *PCV*, Peace Corps volunteers • *VHF*, viral hemorrhagic fever • *EVD*, Ebola virus disease • *RSV*, respiratory syncitial virus • *PIV*, parainfluenza virus

Surveillance Activities

GEIS activities enable the partner network to provide military decision-makers with relevant information that informs disease prevention and treatment policies. The following are key 2014 accomplishments for surveillance activities within each of the GEIS pillars:

SIGNIFICANT ACCOMPLISHMENTS FOR 2014–2015

- Leveraged existing capacity building and febrile and vector-borne infection control efforts in Liberia to support the Ebola outbreak response. The GEIS-supported Liberia Institute for Biomedical Research served as a central hub for Ebola diagnostic testing in support of Operation United Assistance with the help of OCONUS GEIS-supported laboratories at NAMRU-3, NMRC and USAMRIID.

- Improved the bioinformatics capacity within the WRAIR Viral Diseases Branch, which increased throughput for genomic sequencing and pathogen discovery by more than 100 percent. Developed a bioinformatics training workshop for deployment in OCONUS GEIS-supported laboratories.

- Supported the Multidrug-resistant Repository and Surveillance Network (MRSN) in the discovery and reporting of a notably virulent and highly antibiotic-resistant clone of *Acinetobacter baumannii* associated with fatal infections in immunocompetent patients.

- Supported MRSN to confirmed methicillin-resistant *Staphylococcus aureus* outbreak attributable to local spa practices in overseas morale, welfare, and recreation settings.

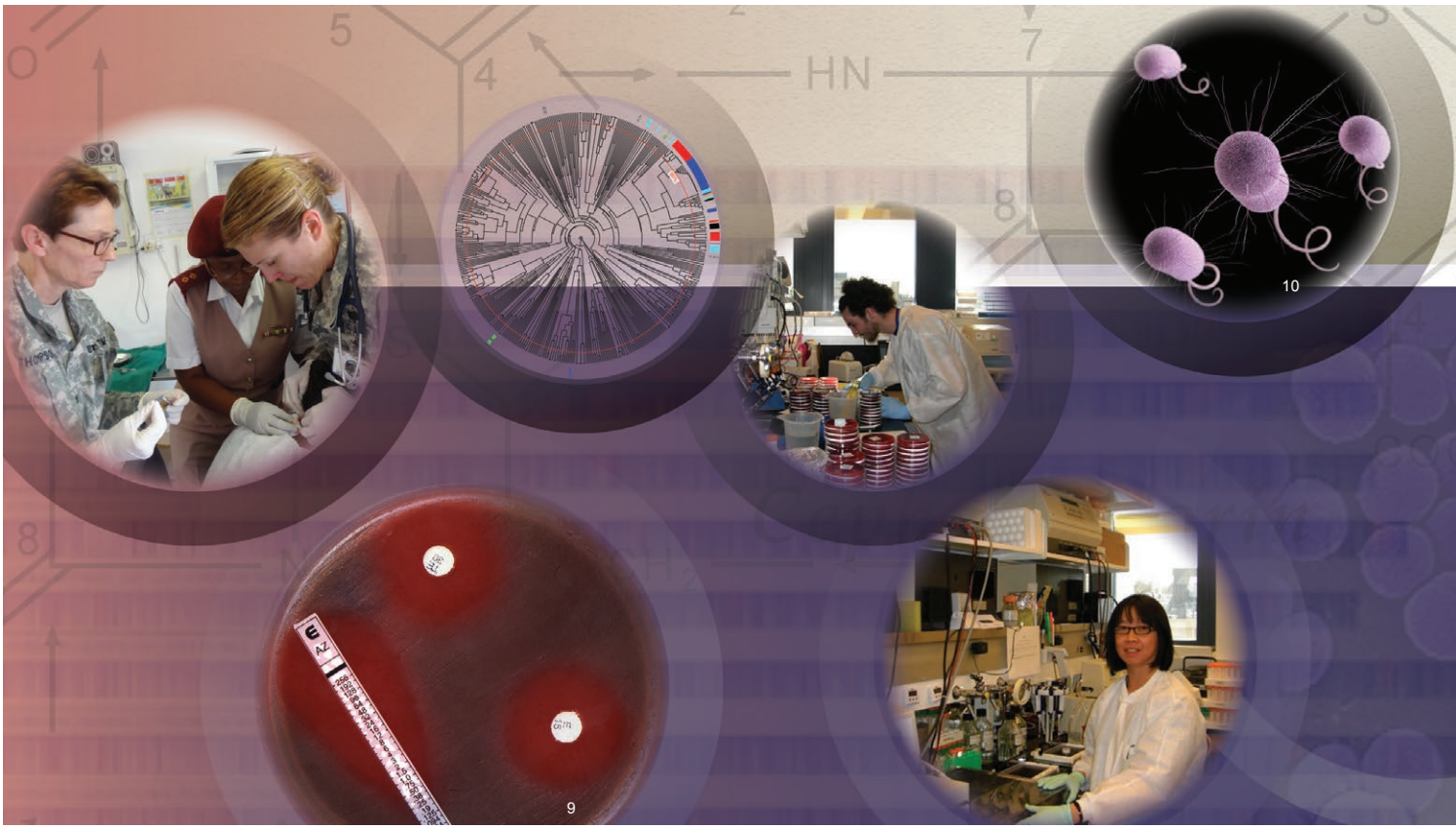
- Initiated standardized surveillance for norovirus and enterotoxigenic *Escherichia coli* in U.S. military and traveler populations at five Department of Defense overseas laboratories: AFRIMS, NAMRU-2, NAMRU-3, NAMRU-6 and USAMRU-K.

- Supported AFRIMS to developed a candidate diagnostic assay for salivirus detection to facilitate studies on the epidemiology and presentation of salivirus.

- Continued support of Suite for Automated Global Electronic bioSurveillance (SAGES) electronic-based disease surveillance systems with militaries in eight countries (Nicaragua, Peru, Cameroon, Uganda, Kenya, Thailand, Cambodia and the Philippines) and new engagements with militaries in Honduras, Jordan, and the Republic of South Korea.

- Continued support of gonococcal resistance surveillance in 10 countries documenting widespread penicillin, tetracycline, and fluoroquinolone resistance and potential emerging resistance to extended-spectrum cephalosporins in Africa.

- Documented high rates of human papillomavirus (HPV) infection among male military personnel (34 percent for a lifetime of service) and associated potential justification for expanding HPV vaccination to male military recruits.



Antimicrobial Resistance

Through the GEIS Antimicrobial Resistance (AMR) program, network partners conduct global surveillance of antibiotic-resistant pathogens. The program helps public health authorities to identify and respond to resistance threats; helps Department of Defense policymakers to develop both infection control policy and therapy recommendations; and supports research and development of new vaccines, therapeutics, and diagnostics—all with the goal of preventing further illness and disease from resistant bacterial pathogens.

The program emphasizes surveillance of organisms responsible for healthcare-associated infections (HAIs) and wound infections such as *Clostridium difficile*, methicillin-resistant *Staphylococcus aureus*, and the ESKAPE (*Enterobacter* spp., *Escherichia coli*, vancomycin-resistant *Enterococcus*, *Klebsiella* spp., *Acinetobacter* spp., and *Pseudomonas* spp.) pathogens. These pathogens are particularly important because of their impact on human illness, and the limited available data about the frequency and nature of drug resistance in many regions of the world. By enhancing HAI surveillance capabilities, the U.S. military gains valuable information on resistant pathogens that may affect its personnel during overseas military exercises and deployments. In addition, HAI surveillance information helps track the spread, and related mechanisms, of some of the most virulent resistance genes. The host country ministries of health also gain information to help shape local infection control programs to treat patients more effectively.

In the past year, GEIS funded AMR surveillance efforts in Peru, Jordan, Cambodia, Thailand, the Philippines, Kenya and Uganda. In addition, GEIS also supported the work of the Multidrug-resistant Organism Repository and Surveillance Network (MRSN) laboratory located within the U.S. These activities demonstrated value for ongoing surveillance and infection control efforts in their respective regions as well as more globally, with the MRSN.

There are multiple ongoing AMR surveillance efforts from the GEIS partners outside the contiguous United States (OCONUS). Efforts by NAMRU-6 include an estimation of prevalence of *S. aureus* in active duty military personnel of the Peruvian Air Force, and identification of potential risk factors associated with nasal colonization. The highest rates of S. *aureus* nasal colonization by location were at two major cities in Peru, suggesting that S. *aureus* is more prevalent in large urban centers. AFRIMS, in conjunction with the Armed Forces of the Philippines Medical Center, tested more than 450 isolates, revealing several pathogens of military importance. Of the isolates tested, most were *E. coli*, followed by *Pseudomonas* spp., *S. aureus*, and *Klebsiella* spp. In Uganda six laboratory technicians were trained which resulted in the enhanced local identification and antimicrobial susceptibility testing (AST) of cultured isolates. GEIS support for

AMR surveillance in HAIs in Ugandan civilian and military populations will ultimately enable clinicians to make informed and timely patient treatment decisions based on AST results. The MRSN has continued to enhance its ability to collect and characterize relevant multidrug-resistant pathogens throughout the MHS. Significant contributions by the MRSN made in fiscal year 2014 with GEIS support include the following:

- Discovery and reporting of a correlation between inpatient consumption of fluoroquinolones and carbapenem resistance in *E. coli* in Northern and Southern MHS referral centers.
- Discovery and reporting of a notably virulent and highly antibiotic-resistant clone of *Acinetobacter baumannii* associated with fatal infections in immunocompetent patients.
- Publication of the first report of in vivo development of antibiotic resistance secondary to gene amplifications resulting in therapy failure.
- Assay development and validation to improve efficiency of screening for multiple resistance genes.

By enhancing U.S. military and partner nation surveillance capabilities, valuable information on resistant pathogens is gathered that aids in early detection, prevention, and timely response to limiting the spread of disease and illness from resistant pathogens. The GEIS partner network is poised to further AMR surveillance within its expansive international coverage. Additionally, as a principal member of the Department of Defense participation in the executive-level Combating Antibiotic-Resistant Bacteria effort, and of the Global Health Security Agenda–AMR package work, GEIS aims to take action against the threat of AMR. With ever-expanding international travel and commerce, AMR is truly a global health threat, requiring a concerted response between the U.S. and governments around the world. ▲

Febrile and Vector-Borne Infections

During fiscal year 2014, GEIS funded more than 40 surveillance initiatives to better inform febrile and vector-borne infection (FVBI) risks and threats to U.S. force health protection, and to identify the public health needs of partner nations. Although traditional vector-borne infections such as malaria continue to cause substantial morbidity and mortality, other newly emerging and re-emerging infectious causes of acute febrile illness require further characterization to better determine health risks. Surveillance activities for FVBI seek to integrate human, vector, animal, and ecologic data to support greater awareness of disease risks and threats, primarily through the generation of mapping and modeling tools to help determine the disease transmission risk for relevant geographic areas.

Residents stand in line to receive diagnoses from malaria testing in Kisumu County, Kenya. (Photo credit: Hoseah M. Akala of the Kenya Medical Research Institute and USAMRU-K)

GEIS partners supported several FVBI outbreak response efforts. Most notably, several GEIS collaborators were involved in the Ebola virus outbreak response in West Africa. GEIS has supported collaborations between the Armed Forces of Liberia (AFL), the Liberia Institute for Biomedical Research (LIBR), and NAMRU-3 since 2010, when an outbreak of malaria among U.S. service members deployed to Liberia required a joint response from the Department of Defense and local agencies. GEIS support also has focused in recent years on capacity building to sustain FVBI control efforts among AFL members, and has led to the establishment of enhanced molecular laboratory capacity in country. This past year, these local capabilities have been heavily leveraged to support the Ebola outbreak response effort, with LIBR serving as a central hub for Ebola diagnostic testing in support of Operation United Assistance. Other Department of Defense partners in Africa have also established capacities to help respond to the Ebola crisis, such as the NAMRU-3 laboratory in Egypt, which is one of only four Department of Defense laboratories certified to conduct Ebola testing. GEIS partners at USAMRU-K support the Kenya Medical Research Institute laboratory to test suspect samples for Ebola and Marburg virus, among other viral hemorrhagic fevers, serving as the regional

GEIS supported a training course on the taxonomy and identification of ticks, mosquitoes and sand flies for the Lao PDR hosted by NMRC-A and IPL. (Photo credit: NMRC-A)

reference laboratory and providing training to local and regional medical providers on the proper use of personal protective equipment and safe handling and shipping of suspect Ebola virus samples. Department of Defense laboratories within the U.S. have also played a major role in the Ebola virus outbreak response through the provision of Ebola virus testing reagents. The Naval Infectious Diseases Diagnostic Laboratory at NMRC in Silver Spring, Maryland, is now qualified to run the Ebola kit. The U.S. Army Medical Research Institute of Infectious Diseases in Frederick, Maryland, has performed more than 5,000 assays from Liberia and Sierra Leone since April 2014.

In South America, FVBI surveillance at the NAMRU-6 laboratory in Peru during 2014 has determined that rickettsial agents of the spotted fever group (SFG) are responsible for 2 percent of unspecific febrile episodes in Iquitos, Peru, while no evidence exists of disease caused by typhus group rickettsioses. SFG antibodies in the population indicate a burden of SFG rickettsial disease in this region that was previously unknown. NAMRU-6 has also established training activities in Peru on the most important vector species groups for the identified militarily important diseases: malaria, dengue, and leishmaniasis. New records found through these activities for vector species in Peru are improving our understanding of pathogen distribution and transmission in South America.

In Southeast Asia, GEIS-supported FVBI surveillance at AFRIMS demonstrated that *Coxiella burnetii* (the causative agent of Q fever) is widely prevalent in Thailand, and that circulating strains include one that is associated with human disease. Q fever was also identified as a cause of acute febrile illness in Nepal. Collaborative efforts between AFRIMS and the Mongolian Armed Forces showed that Mongolian troops deployed to South Sudan were exposed to Q fever, West Nile virus, dengue, *Rickettsia*, leptospirosis and malaria.

Since 2012, NMRC-A and the Institut Pasteur du Laos (IPL) have recognized the need for a collaborative assessment of both the ticks and the pathogens they carry into Lao People's Democratic Republic (PDR), which has been a site of increasing U.S. Pacific Command (PACOM) activity over the past several years. GEIS assisted scientists, military and public health workers in the country to create a core team of entomologists, arbovirologists, and allied specialists committed to raise local capacity to identify and manage local vector-borne threats. In 2014, GEIS helped establish the IPL entomology specimen collection and training laboratory. This directly resulted in the country's first medical entomology course that brought together specialists from the U.S. government and Department of Defense and the IPL to train participants from the Lao Ministry of Health, Lao People's Armed Forces, and nine provincial divisions of the Centre for Malaria Parasitology and Entomology. After course completion, participants conducted field and laboratory work throughout Lao PDR, leading to the collection and analysis of approximately 15,000 tick specimens. Preliminary results have already indicated wide tick diversity, representing six medically important genera (e.g., *Haemaphysalis*). Additionally, a wide variety of pathogens and high infectivity rates have been observed, including bacteria (e.g. *Rickettsia* spp., 12.2 percent of all tick pools) and viruses (e.g., pan-alphavirus, 2.2 percent of all tick pools). Although data analysis is still in progress, these findings already include some of the first information available on tick-borne pathogens in Laos.

GEIS partners in Egypt and East Africa contributed substantially to malaria surveillance and outbreak response efforts in 2014. This past year, NAMRU-3 supported malaria outbreak investigations in Upper Egypt and Djibouti, providing training and diagnostic confirmation to the Egyptian Ministry of Health and microscopy and rapid diagnostic test training to the Djiboutian Ministry of Health. USAMRU-K provided training to more than 300 clinicians and laboratory technicians in Kenya on accurate malaria microscopy, further enhancing the USAMRU-K Malaria Diagnostic Center's role as the leading

malaria diagnostic training center in East Africa. GEIS continued to support ongoing prospective surveillance studies at USAMRU-K to determine patterns and trends in malaria drug resistance across Kenya using in vitro testing and molecular marker analyses. Although 2014 GEIS-supported assessments found no molecular evidence of artemisinin resistance in Kenya, recent studies identified the lack of adherence to treatments as an emerging challenge to artemisinin combination therapy effectiveness.

GEIS-funded surveillance efforts also strive to enhance the detection and characterization of novel pathogen threats globally. In 2014, collaborators at the WRAIR Viral Diseases Branch performed pathogen discovery on 705 mosquitoes, clinical samples, and mosquito blood meals, identifying two new viruses from mosquitoes captured in Korea. Efforts to improve the bioinformatics capacity within the WRAIR Viral Diseases Branch led to the development of three pipelines that have increased bioinformatics for genomic sequencings and pathogen discovery by more than 100 percent, the creation of robust computing and storage capacity, and the development of a bioinformatics training workshop to be deployed in OCONUS GEIS-supported laboratories. GEIS laboratory partners also successfully identified several novel pathogens, including a new Group C *Orthobunyavirus* species, called Itaya virus, discovered in two regions in the Peruvian Amazon. The time and distance that separated these two independent isolates indicates that Itaya virus could be widely spread throughout the northeastern Peruvian Amazon Basin, and therefore must be considered during ongoing regional febrile surveillance. Previously recognized pathogens were also detected in new geographic areas, including the first identified case of human Zika virus infection in the Philippines, which has the potential to interact with other common flavivirus infections such as dengue and Japanese encephalitis.

Another critical objective for FVBI surveillance is the development of accurate disease risk maps in important geographic areas that are used to inform public health decision-making within the Department of Defense and the global health community. GEIS supports collaborative disease and vector mapping initiatives that integrate data streams and outputs from across the partner network. GEIS network partners conducted vector collections by documenting global positioning system data that is then entered and collated within VectorMap (http://www.vectormap.org/), a mapping tool that determines vector location and disease transmission risks through an intuitive geographical interface. The web-based program is readily accessible to deployed entomology and preventive medicine personnel to support ongoing operational risk assessments for vector-borne infections. In 2014, VectorMap collaborators added nearly 35,000 new records, bringing the system's total records to approximately 460,000 across the four hosted vector species: mosquitoes, ticks, sand flies, and fleas. VectorMap is now producing regional Vector Hazard Reports, including a report on chikungunya risk in the Caribbean and a report on vector-borne disease risks in West Africa. ▲

Enterics

Enteric infections are a threat to maintaining the operational readiness of U.S. military personnel, and have the ability to affect the political and economic stabilities of U.S. military partner nations. The aim of the GEIS division's gastrointestinal infection surveillance program is to provide actionable information to Department of Defense personnel and related populations. The GEIS partner network conducts activities that inform regional infectious disease threat assessments and contribute to an epidemiologic understanding of pathogens that can affect the U.S. military and our allies.

GEIS supports surveillance in host nation civilian and military populations to assess the prevalence, burden, and risk factors for infections through the Department of Defense overseas laboratories. These laboratories have long-established enteric surveillance studies in Bhutan, Cambodia, Kenya, Peru, and Thailand, and work with the appropriate local and national health authorities to generate data that can be used to develop disease prevention and mitigation strategies in the respective populations. The overseas laboratories have also partnered together to conduct harmonized surveillance in U.S. military and Western adult traveler populations. Efforts to integrate standard case definitions, data elements, and laboratory procedures across all participating study sites will increase understanding of the burden of infection and disease severity across regions over time. Standardized methods for surveillance of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norovirus and enterotoxigenic *E. coli* were implemented in 2014, and plans are under way to begin standardized testing for *Salmonella*, *Shigella*, *Campylobacter*, and additional diarrheagenic *E. coli* in 2015.

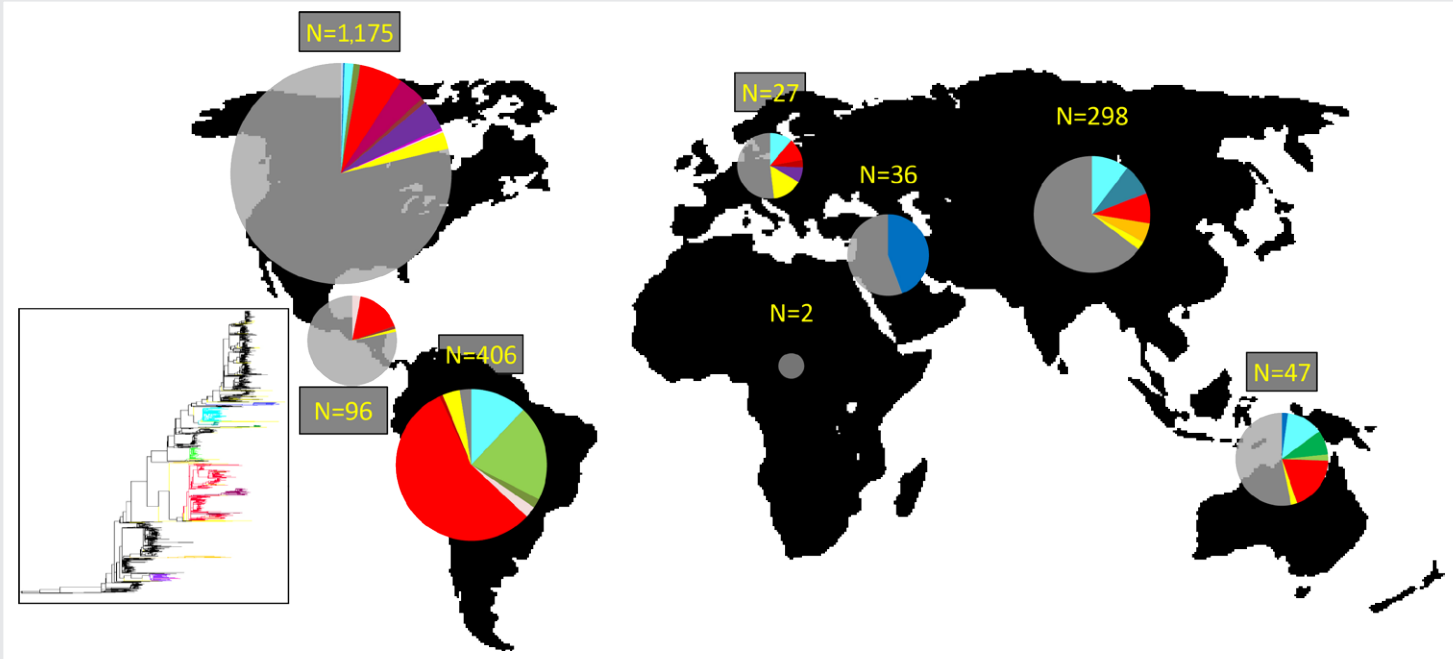
Within the U.S., GEIS supports acute gastroenteritis (AGE) clinic-based surveillance in U.S. military recruits through the NHRC. Over the past two years, NHRC has applied an enhanced pathogen screening protocol on diarrheal samples that previously tested negative for norovirus, *Salmonella*, *Shigella*, *Campylobacter*, and ETEC. They found that 7–8 percent of the samples could be attributed to a pathogen in the enhanced screening panel (e.g., adenovirus, astrovirus, sapovirus). Given that more than 90 percent of acute diarrheal samples remain pathogen negative, advanced molecular characterization methods will be used to identify potential etiologic causes of acute diarrhea. The ability to identify and understand the causes of AGE within the recruit population will facilitate development of targeted disease intervention policies, including development of pathogen-specific prophylactics.

Based on the need to improve identification of existing and emerging enteric pathogens, AFRIMS has worked on the optimization of polymerase chain reaction and sequencing methods to improve identification of *Campylobacter* species and differentiate them from closely related microorganisms such as *Arcobacter* spp. and *Helicobacter* spp. These results help identify potential under-recognized causes of acute diarrhea from *Campylobacter coli* and *Campylobacter jejuni*. Additionally, AFRIMS also developed a candidate diagnostic assay for salivirus detection to facilitate studies on the epidemiology and presentation of salivirus. ▲

Respiratory Pathogens

The respiratory pathogen surveillance program monitors the incidence and types of respiratory pathogens that have a deleterious effect on U.S. military forces and global public health. The program identifies changes in circulating influenza virus subtypes and genotype strains, and assesses their impact on disease severity, transmissibility, and treatment and prevention effectiveness across time and geographic areas. The program also seeks to support the conduct of zoonotic influenza studies that elucidate its risk, transmission modes, and risk factors in the human–animal interface.

GEIS partners continue to detect emerging pathogens that may be of threat to force health protection. In fiscal 2014, GEIS funds confirmed recent cases of H5N1 in Egypt by NAMRU-3 and promptly reported to the WHO per the IHR (2005) reporting regulations. Investigators at WRAIR sequenced the full genome of 151 influenza H3N2 samples collected from 37 different countries between 2009 and 2014. The frequency and types of reassortment events was large, suggesting that the intra-subtype reassortment burden of H3N2 was fairly high (38.8 percent) during the time period. The findings were documented early in 2014 in the Southern Hemisphere in advance of the appearance of drifted H3N2 influenza strains in the U.S. later in 2014.



Global distribution of the H3N2 intrasubtype reassortants. Colors represent different reassortant variants. Non-reassortant viruses are colored transparent gray. N=number of samples. Circle size is not proportional to N.

Middle East respiratory syndrome coronavirus (MERS-CoV) continues to be a threat in and near the Arabian Peninsula and for those traveling to and from these countries. In fiscal year 2014, NAMRU-3 worked to develop a reliable and specific serologic assay to detect novel coronavirus antibodies in at-risk populations. Additionally, NAMRU-3 received approval from the College of American Pathologists to perform clinical diagnosis using the U.S. Food and Drug Administration–cleared MERS-CoV Diagnostic Emergency Use Authorization Assay. NMRC and NHRC also completed its validation and can also perform clinical diagnostic testing for MERS-CoV. NAMRU-3 continues to conduct surveillance for MERS-CoV, with the goal of early detection, in sentinel sites throughout Egypt.

The GEIS-supported outbreak response activities allow for timely, accurate and actionable data for decision makers within the Department of Defense and global public health community. In February 2014, NHRC responded to on outbreak on a U.S. Navy minesweeper in San Diego, California, where over the course of three days, 25 of the 102 crew members sought medical care for ILIs. NHRC quickly provided diagnostic and epidemiologic support identifying 20 samples with influenza A (18 of which were subtyped as H3N2). Similar outbreak response support was provided for five other U.S. Navy ships as well as in response to a *Chlamydia pneumonia* outbreak at Fort Leonard Wood, Missouri in the spring and summer 2014. In addition, support was provided in the investigation of a *Streptococcus pneumonia* conjunctivitis outbreak at Camp Pendleton, California. NAMRU-3 was also able to promptly respond to an increase in ILI and severe acute respiratory illness activity in Egypt by testing 109 samples and gene sequencing for five positive cases (all pandemic H1N1). These GEIS-supported efforts have allowed leadership to make informed decisions for preventing and responding to these outbreaks.

NHRC staff collect samples for polymerase chain reaction testing.

ILI crewmembers wait aboard the U.S.S. Ardent, February 2014.

Although enteroviruses are usually common in the U.S. during the summer, in 2014, states started seeing more children in hospitals with severe respiratory illness caused by enterovirus-D68 (EV-D68). Although infants children and teenagers are at higher risk of being infected because of their lack of immunity, the Department of Defense enhanced diagnostic capabilities to detect this virus in dependent children and active duty service members. As of December 1, 2014, a total of 15 bases across the U.S. submitted 87 specimens to USAFSAM for EV-D68 testing. Of the 87 samples submitted, 54 (62 percent) tested positive for rhinovirus/enterovirus on the multiplex PCR platform and the specimens were submitted to the CDC for confirmatory testing. Of the 30 specimens sent to the CDC for sequencing, 30 were found to be EV-D68. In addition, NHRC completed validation to perform clinical diagnostic testing for EV-D68. These GEIS-funded efforts responding to the increase in circulation of EV-D68 in fiscal year 2014 allowed the Department of Defense to quickly identify illness to improve public health and clinical interventions.

In addition, GEIS partners continued surveillance of multidrug-resistant tuberculosis (MDR-TB) throughout the network to evaluate levels of disease and resistance among host nation civilians as well as military personnel in South America, Africa, and Southeast Asia. These projects aim to enhance host nation's capabilities by summarizing and interpreting information regarding MDR-TB using newer molecular assays such as the WHO-supported Microscopic Observation Drug Susceptibility assay. With the support of GEIS, AFRIMS was able to coordinate efforts in enhancing diagnostic capacity within the Armed Forces of the Philippines so that they could become a member in their National TB Surveillance Network in the Philippines. These projects also will help validate and initiate use of the MDR-TB Color Test, a low-cost test technique that can be used in austere, resource-limited environments. Information collected will help inform policy and clinical management decisions, as well as the implementation of preventive measures consistent with the IHR (2005) and the World Health Assembly Resolution (2009).

Sexually Transmitted Infections

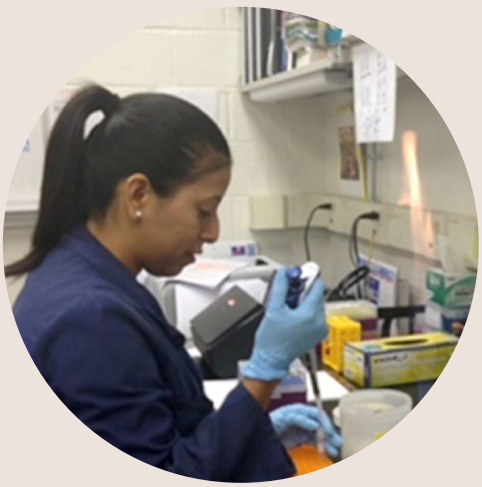
AFHSC Deputy Director Dr. Julie Pavlin (second from the left in first row), Assistant Director of GEIS Lieutenant Commander Matthew Kasper (second from right in back row) and STI Pillar Lead Dr. Jose Sanchez (far right in back row) celebrate the opening of the DoD Gonorrhea Isolate Repository at USUHS (Photo credit: Dr. Ann Jerse).

GEIS continues to support surveillance of STIs of military relevance to service members and associated populations. With a young adult population and frequent deployment of U.S. military personnel, STIs have a significant impact on military personnel. Chlamydia and gonorrhea are the two most commonly reported infections in the MHS. In recent years, GEIS has continued to broaden its STI surveillance worldwide due to the threat of antibiotic-resistant *Neisseria gonorrhoeae* (NG) as well as the recognition of human papilloma virus (HPV) and herpes simplex virus type 2 (HSV-2) as significant infections among military personnel. In fiscal year 2014, surveillance and response efforts focused particularly on antibiotic-resistant NG, HPV, and HSV.

GEIS continued to support NG surveillance activities with Department of Defense CONUS and overseas laboratory partners and international military and civilian partners worldwide during 2014. Surveillance activities were conducted in at least 33 sites in nine countries: U.S. (six), Haiti (one), Peru (six), Ghana (five), Cameroon (three), Kenya (four), the Republic of Georgia (one), Bhutan (one), and Thailand (six). As of October 2014, a total of 6,917 individuals had been enrolled and tested for STIs at these sites, with 340 (4.9 percent) individuals testing positive for NG. Antimicrobial susceptibility testing has been accomplished on 172 NG isolates. These data continue to show widespread penicillin, tetracycline, and fluoroquinolone resistance (limited data for the U.S.); potential emerging resistance to extended-spectrum cephalosporins in Ghana and Kenya; and potential emerging resistance to azithromycin in Ghana, Cameroon, and Kenya. Re-engagement of military health authorities in the Republic of Djibouti in early fiscal year 2015 is being coordinated by the NAMRU-3 in Cairo, Egypt, to be able to establish NG surveillance efforts in the near future.

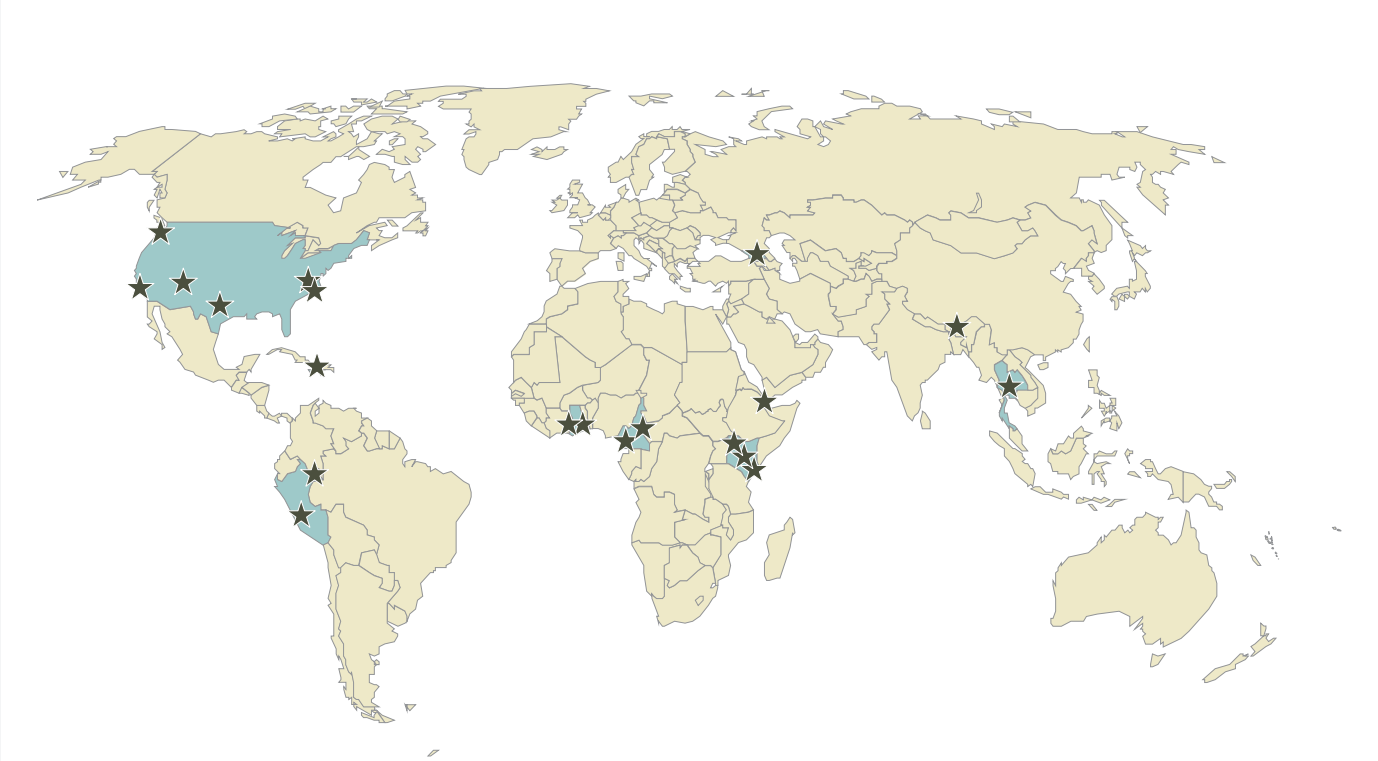
Last year, GEIS continued to fund an enhanced laboratory NG strain reference capacity within the U.S. military with a Department of Defense Gonorrhea Reference Laboratory and Repository housed at USUHS, which was officially inaugurated with a ribbon-cutting ceremony on May 5, 2014. The repository will continue to allow U.S. military health officials to better monitor NG resistance worldwide in support of its mission in protecting military personnel and securing global health. These GEIS-sponsored NG drug resistance surveillance efforts continue to be coordinated with the CDC, the University of Washington's *Neisseria* reference laboratory as part of the Gonococcal Isolate Surveillance Project, and the WHO's Gonococcal Antimicrobial Susceptibility Program in support of routine monitoring of NG strain resistance worldwide.

The continued interest in potential use of an HPV vaccine among male military personnel has continued to be a focus for GEIS-sponsored HPV surveillance, conducted in coordination with partners at the Infectious Disease Clinical Research Program at USUHS. Based on a serologic study of 200 U.S. military male personnel (during 2000–2004), new HPV infections were



Michelle Polligua-Lucas, manager of the DoD Gonorrhea Isolate Repository, works in the laboratory located at USUHS. (Photo credit: Dr. Grace Macalino)

GC resistance surveillance expanded to 10 countries



	United States	Peru	Ghana	Cameroon	Kenya	Djibouti	Thailand	Georgia
Population and risk group	Heterosexual military	Heterosexual military, *MSM, *FCSW/male clients	Heterosexual military and civilians	Heterosexual military and civilians	Heterosexual military and civilians, FCSW	Heterosexual civilians	Thai military personnel	Heterosexual military
Enrolled and tested subjects	112	3,092	626	2,534	273	168	17	95
No. of *NG-positive (%)	23 (21%)	25 (1%)	162 (26%)	14 (0.005%)	59 (22%)	38 (23%)	9 (53%)	10 (11%)
Antimicrobial resistance (% resistance or decreased susceptibility)								
No. of isolates tested	18	25	34	11	50	24	8	2
Cefepime	-	-	-	-	-	3 (13%)	-	-
Cefixime	0	0	1 (3%)	0	1 (3%)	-	0	-
Cefpodoxime	0	-	-	-	-	-	-	-
Ceftriaxone	0	0	1 (3%)	0	1 (3%)	3 (13%)	0 (7 tested)	0
Ciprofloxacin	3 (17%)	21 (84%)	30 (88%)	0	21 (42%)	9 (38%)	7 (88%)	2 (100%)
Tetracycline	4 (22%)	10 (40%)	34 (100%)	4/8 (50%)	41 (82%)	21 (88%)	8 (100%)	0
Azithromycin	0	0	3 (9%)	2/8 (25%)	6 (12%)	0	0	0
Penicillin	1 (6%)	23 (92%)	34 (100%)	7/7 (100%)	25 (50%)	6 (25%)	6 (85%) (7 tested)	0
Spectinomycin	0	0	1 (3%)	1/4 (25%)	2 (5%)	-	0	0

Note: A dash (-) denotes "not tested"
*MSM: Men who have sex with men
*FCSW: Female commercial sex workers

documented in 68 (34 percent) to one or more of the four vaccine-preventable serotypes, including higher infection rates among black, non-Hispanics (50 percent) compared to Hispanics and other race/ethnicity groups (21 to 33 percent). Thus, these data continue to serve as the basis for support of routine administration of HPV vaccine to male military recruits, in addition to the present voluntary administration to female recruits in accordance with guidelines by the CDC's ACIP. There is now a need to evaluate the cost-effectiveness of male-based HPV vaccination as well as the assessment of its impact and burden to the U.S. military in terms of hospitalizations, lost duty days, and disability.

In a second study of the prevalence and incidence of HSV-2 infection among 200 male and 200 female military personnel (during 2006–2010), new HSV-2 infections were documented in 34 (9 percent) of 389 susceptible personnel, including higher infection rates among females (approximately 2.8 times as likely), as well as among black, non-Hispanics (20 percent) compared to Hispanics and other race/ethnicity groups (5–7 percent). Interestingly, HSV-1 infection rates (overall approximately 18 percent) were found to be higher than for HSV-2. HSV-1 infection rates were still seen to be more common among females (approximately 1.6 times as likely), as well as among Hispanic and other race/ethnicity groups (26 percent) compared to white, non-Hispanics (17 percent) and black, non-Hispanics (14 percent). This study serves as the basis for future serologic studies of HSV and other STIs in the military in the near future, with support from the AFHSC's DoDSR and the DMSS databases. ▲

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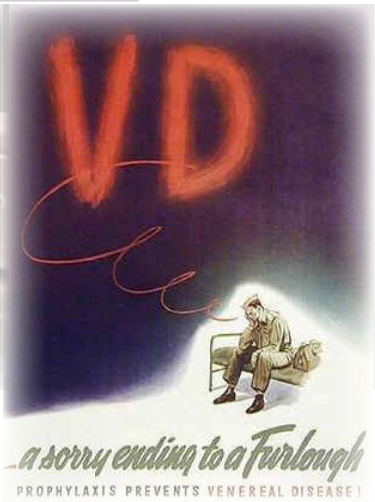

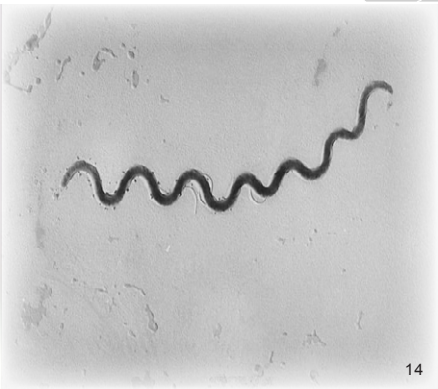
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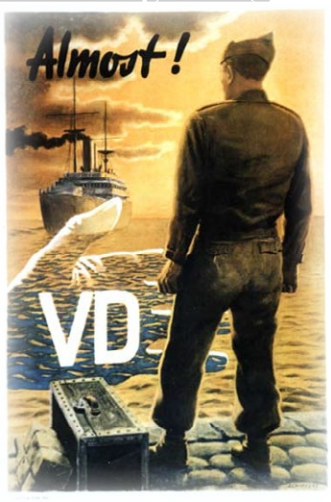


CCMD-coordinated Training 2014

August 11–13, 2014: GEIS and PACOM co-sponsored the PACOM Regional Forum on Malaria Control and Elimination among Military Populations in Phnom Penh, Cambodia. Civilian and military health professionals from seven countries and multiple international organizations convened to discuss prevention, control, surveillance and management of malaria, particularly drug-resistant malaria, in the Greater Mekong subregion of Southeast Asia. This forum is part of an ongoing effort to eliminate drug-resistant malaria through coordinated, cooperative, multisectoral approaches, linking civilian and military health systems.

The meeting's local hosts included the Royal Cambodian Armed Forces and NAMRU-2. Additionally, 60 participants from the Presidential Malaria Initiative, Bill and Melinda Gates Foundation, Global Fund, and the WHO enhanced the value of these discussions, contributing strategies to address the immediate threat posed by malaria. This forum was the second regional meeting on military health and malaria control.

August 25–27, 2014: GEIS and the U.S. Africa Command (AFRICOM) co-hosted the first joint meeting of the East and West Africa Malaria Task Forces in Bujumbura, Burundi. The meeting was hosted by the Burundi National Defense Force in Bujumbura. GEIS and AFRICOM sponsored 60 military and medical personnel and disease experts from 13 of the 15 member nations: Benin, Burkina Faso, Burundi, Djibouti, Ghana, Kenya, Niger, Nigeria, Rwanda, Republic of Senegal, Tanzania, Togo, and Uganda. Department of Defense organization attendees included GEIS, AFRICOM, USAMRU-K, NAMRU-3, U.S. Army Combined Joint Task Force–Horn of Africa, and representatives from the U.S. Embassy in Burundi.

The meetings were structured to facilitate discussion between task forces and among contributing experts to share resources, strategies, and expertise to address malaria challenges, including prevention and treatment. The ideas developed and discussed between the task forces and participating partners help continue the synergistic effort to battle this devastating infectious disease. ▲

AFHSC Director of GEIS Division James Cummings (behind banner: front row, right), and U.S. Ambassador to Burundi Dawn Liberi (behind banner: front row, left) participated in the first joint meeting of the East and West Africa Malaria Task Forces. The event was funded by AFHSC and coordinated by U.S. AFRICOM.

Navy Rear Admiral Colin G. Chinn (behind banner: front row, second from left) and Navy Captain Kevin Russell (behind banner: front row, right) hosted civilian and military health professionals from seven countries in the Greater Mekong Region of Southeast Asia to discuss prevention and surveillance of malaria.

Biosurveillance in the Department of Defense













Integrated Biosurveillance (IB)

The AFHSC plays a key role in supporting, promoting, improving, and coordinating biosurveillance activities within the Department of Defense and across the interagency. AFHSC leadership, in coordination with Office of the Assistant Secretary of Defense for Health Affairs (ASD (HA)), created the IB division in April 2012.

The driving U.S. government policy document on biosurveillance is the National Strategy for Biosurveillance, signed by President Barack Obama on July 31, 2012. This document urgently calls for a coordinated approach across all levels of government to achieve a well-integrated national biosurveillance enterprise. The U.S. Armed Forces promote health security by improving relations with partner nations, increasing overall global stability, and augmenting the situational awareness of health threats at all levels of government. Given this backdrop, federal officials determined that a robust framework to organize biosurveillance activities was required within the Department of Defense.

Biosurveillance in the Department of Defense focuses on awareness and understanding of the potential threats from EIDs and other hazards relevant to the military. The Health Affairs contribution to biosurveillance consists of force health protection and readiness, as well as comprehensive health surveillance. Department of Defense components conduct comprehensive military health surveillance using technologies, practices, and procedures in a manner relatively consistent across the services. The gap, or challenge, is largely related to the coordination and integration of these efforts.

A key finding of the July 2010 STRATCOM Global Synchronization Conference was that there are multiple Department of Defense components, federal agencies, allies, and non-governmental organizations conducting biosurveillance with no single coordinating body to synchronize these activities. In early 2012, the Joint Staff, its Force Structure, Resources, and Assessment Directorate, and the Joint Requirements Office for Chemical, Biological, Radiological and Nuclear Defense conducted a Joint "Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy" Change Request (JDCR) to document and implement non-material actions to improve the current Department of Defense biosurveillance capability. The completed JDCR resulted in a number of actions to be executed.

One action called for a joint baseline operational assessment (BOA) tabletop exercise (TTX) that could elucidate the communication and information gaps existing between the disparate offices involved in Department of Defense biosurveillance. The biosurveillance BOA was held at U.S. Strategic Command (STRATCOM) headquarters in February 2014, and it was attended by a dozen major Department of Defense offices with more than 100 participants. The outcome of the BOA TTX was an official report from STRATCOM that highlighted the strengths and weaknesses in the current Department of Defense biosurveillance framework.

The need for a common Department of Defense biosurveillance lexicon was one of the most important findings of the BOA. This is being addressed through a new Department of Defense Instruction (DoDI) for Biosurveillance. The IB team is the lead office for drafting and coordinating the DoDI with the Office of the Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs (OASD(NCB)), Office of the Undersecretary of Defense for Intelligence (OUSD(I)), OASD(HA), Office of the Undersecretary of Defense for Policy (OUSD Policy), and the individual service branches. The biosurveillance DoDI will be the official road map for how biosurveillance is conducted within the Department of Defense. It is currently in the draft stages and is due to be published in early 2016.

IB staff members possess a wide variety of skills in the fields of infectious disease epidemiology, preventive medicine, family practice medicine, veterinary epidemiology, and occupational and environmental health. The staff lends its expertise by collaborating with many other offices in the Department of Defense, 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, OUSD Policy, and the Office of the Joint Staff.

IB continues to engage with its Department of Defense and interagency partners to be the focal point for biosurveillance information in the Department of Defense with the following objectives:

- Assist the AFHSC in accomplishing its mission of comprehensive health surveillance for the Department of Defense
- Augment existing Department of Defense biosurveillance capabilities to meet the needs of the Geographic Combatant Commands and other Department of Defense components
- Reduce fragmentation and synchronize biosurveillance efforts across Department of Defense programs
- Provide near real-time surveillance situational awareness for Department of Defense customers
- Provide a resource within the Department of Defense to link medical, public health, and medical intelligence data.

IB is primarily organized into two offices:

- Office of Alert and Response Operations (ARO)
- Office of Innovation and Evaluation (IE).

ARO monitors biosurveillance data sources and communicates within the Department of Defense, U.S. government interagency, and civilian and international partners to detect and communicate all-hazard events (e.g., EIDs, environmental incidents) relevant to the health of service members and associated populations; produce timely and relevant reports based on the data and information; provide expertise on issues relevant to the health of Department of Defense populations; and coordinate additional information gathering and resource leveraging as available. ARO disseminates information through various communication methods depending on urgency. Information available to the general public is available at https://www.afhsc.mil/Home/Divisions/IB.

Fiscal year 2014 accomplishments by ARO include the following:

- Created and distributed 91 multipage, disease-specific Surveillance Summaries on topics including avian influenza A (H7N9), MERS-CoV, chikungunya in the Caribbean, the Ebola outbreak in West Africa, dengue in Japan, and EV-D68.
- Wrote and distributed 28 Executive Summaries and 14 Spot Reports for relaying quick information on topics including the WHO Emergency Committees, Ebola, polio, several different types of influenza, dengue, rabies, unaccompanied children at the border, meningitis, and other outbreaks.
- Researched, wrote, and presented a weekly report on current health events being tracked, RMEs, and global health items of interest.
- Participated on the steering committee of the Biosurveillance Indications and Warnings Analytic Community with interagency partners, including the use of the WILDFIRE portal for relaying and requesting information from U.S. government sources. In fiscal year 2014, ARO posted 20 queries and made 11 responses on disease-specific topics.
- Developed up-to-date guidance for detecting and reporting chikungunya, Ebola, H7N9, or MERS-CoV. The office distributed this guidance to our partners and it is available at https://www.afhsc.mil/reports/DIB.
- Answered numerous requests for information on specific diseases as well as laboratory testing information and processes for detecting and reporting specific diseases.
- Operated a virtual Operations Cell for ABLE RESPONSE 2014 in the Republic of Korea with the ARO's Chief participating in country as an SME.
- Participated in interagency policy committees, including the Biosurveillance sub-Interagency Policy Committee, the Biological Defense Research and Development sub-Committee, and the Foreign Animal Disease Threats Working Group.
- Collaborated 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 currently issued daily to the White House.

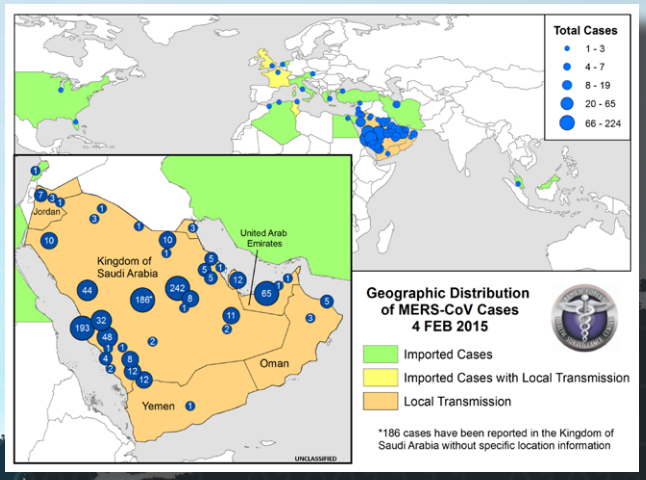
The Office of IE assesses biosurveillance needs through evaluation and consultation on the use of existing and potential development of new biosurveillance systems, data and data sources. IE also pilots new systems and methods to assess biosurveillance activities. Within the IE Office, the Epidemiology Investigations team provides expertise and coordination for large scale public health investigations and consultations that utilize the expertise of AFHSC'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 Department of Defense organizations, and non-government U.S. organizations.

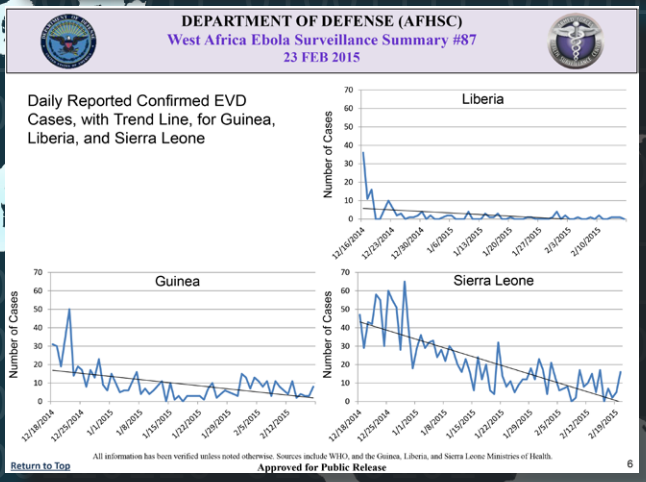
Fiscal year 2014 accomplishments by the Office of IE include the following:

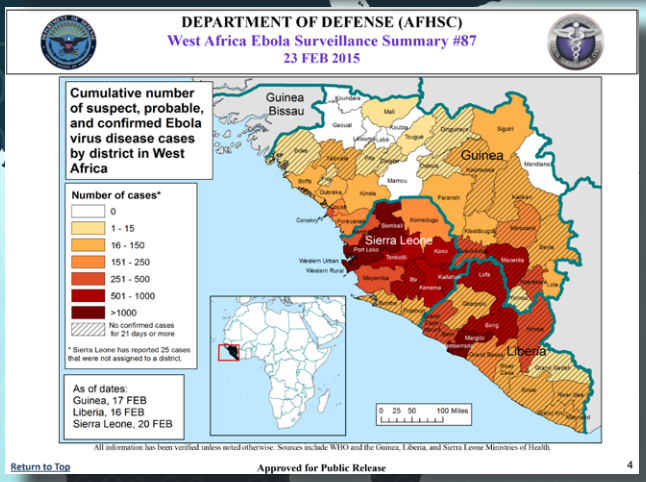
- Conducted an assessment of Department of Defense capabilities for surveillance and detection of chikungunya, dengue, and other vector-borne diseases, through a one-day workshop including Department of Defense, other federal, and state public health experts; and follow-on interviews with key Department of Defense vector surveillance personnel. Recommended ways to improve covered prevention strategies, vector surveillance capabilities, and reporting and data-sharing, among other areas.
- Coordinated a Department of Defense–wide investigation of dietary supplement-associated hepatitis in collaboration with the services, CDC, and the FDA.
- Launched an investigation of a multistate outbreak of fungal meningitis associated with steroid injection in collaboration with the TRICARE Management Activity and TRICARE Regional Offices.
- Coordinated AFHSC efforts to provide reports and data to biosurveillance portals developed by the Joint Program Executive Office, including portals for U.S.

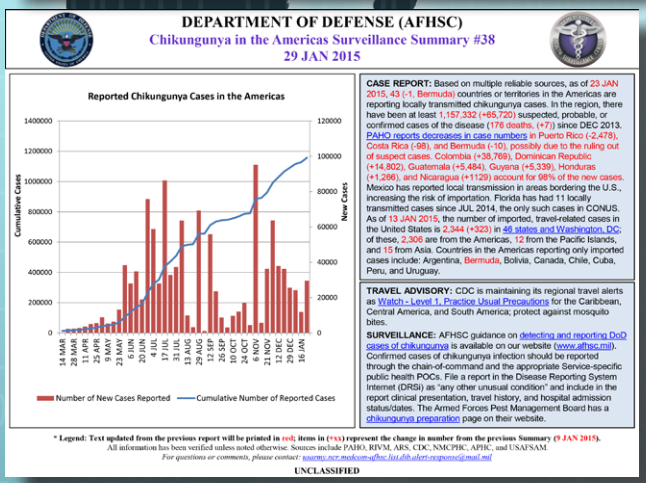
Forces Korea/Republic of Korea, and U.S. Special Operations Command.

- Identified opportunities to improve AFHSC biosurveillance using social epidemiology methods.
- Developed ILI forecasting models for Department of Defense populations using AFHSC surveillance data and novel machine-learning approaches, in collaboration with JHU/APL.
- Initiated a project using social media data and AFHSC surveillance data to enhance Department of Defense biosurveillance, in collaboration with Pacific Northwest National Laboratory (supported by the Defense Threat Reduction Agency [DTRA]).
- Participated in interagency epidemiologic modeling coordination efforts, including the White House Office of Science and Technology's Pandemic Prediction and Forecasting Working Group (Co-chair), and the Biomedical Advanced Research and Development Authority's Model Coordination Group (Steering Committee member). Toward the end of fiscal year 2014, these efforts focused on coordination of modeling to support response to the West Africa Ebola epidemic.
- Provided extensive expert support to major biosurveillance-related efforts, including DTRA's Biosurveillance Ecosystem, the Defense Advanced Research Projects Agency's Chikungunya Forecasting Challenge (contest judge), and the International Society for Disease Surveillance (Board of Directors member).

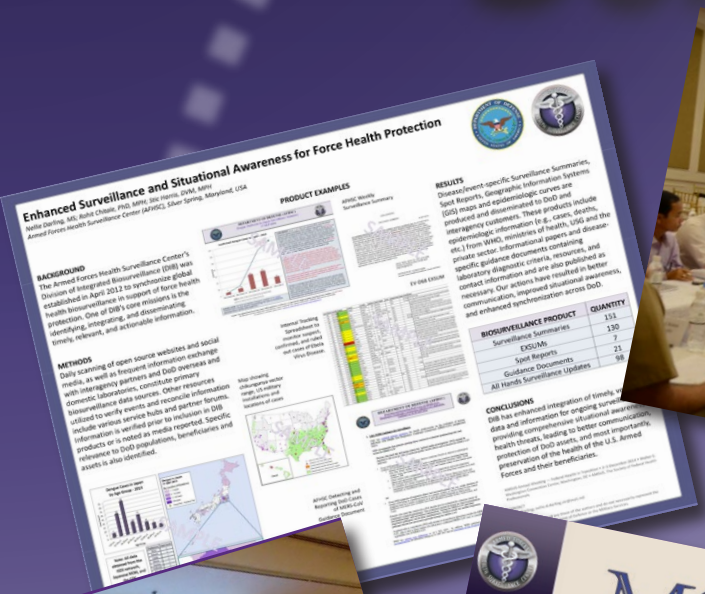


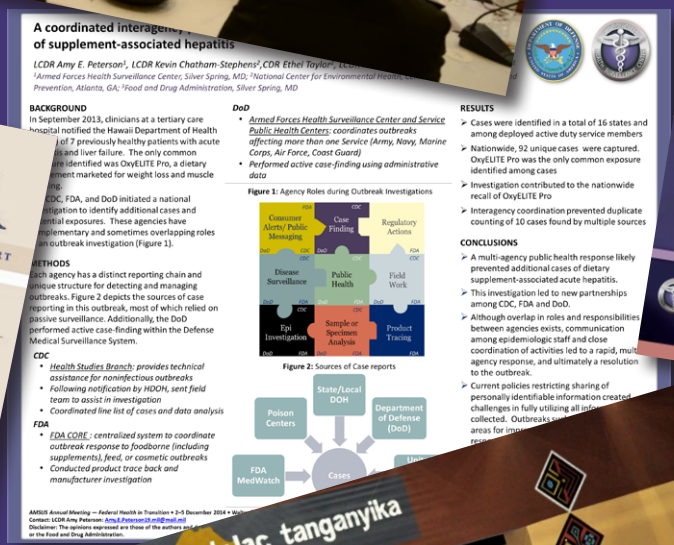






Spreading the News on Medical Surveillance





AFHSC 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. AFHSC 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, AFHSC partners submit proposals for collaboration and these usually provide the background and the basis for the development of internal reports, abstracts, and manuscripts.

In 2014, AFHSC staff and GEIS partners prepared and published 116 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. AFHSC reports and publications may be viewed at www.afhsc.mil.

A large number of AFHSC 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. The AFHSC Director initiated the Director's Abstract and Publication Development and Mentoring Program (DAPDAMP) to ensure that mentoring opportunities are not lost, and that worthy projects and studies are identified for development and submission of abstracts and manuscripts.

A DAPDAMP Working Group convenes regularly to review entries and identify future professional meetings and conferences that may be suitable for presentations by AFHSC staff members. The DAPDAMP provides a structure for the identification and review of AFHSC projects that are suited for mentoring and the development of abstracts and archived reports. Because some work done by the AFHSC staff is of great interest to Department of Defense and other government agencies. AFHSC 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. ▲

Acronyms

ACIP	Department of Defense Advisory Committee on Immunization Practices
AFHSC	Armed Forces Health Surveillance Center
AFL	Armed Forces of Liberia
AFRIMS	U.S. Army Armed Forces Research Institute of Medical Sciences
AGE	acute gastroenteritis
AMR	antimicrobial resistance
AMSA	Army Medical Surveillance Activity
ARO	Alert and Response Operations
AST	antimicrobial susceptibility testing
BOA	Joint Baseline Operational Assessment
CCMD	Combatant Command
CDC	Centers for Disease Control and Prevention
DAPDAMP	Director's Abstract and Publication Development and Mentoring Program
DHA	Defense Health Agency
DMED	Defense Medical Epidemiology Database
DMSS	Defense Medical Surveillance System
DoD-GEIS	Department of Defense Global Emerging Infections Surveillance and Response System
DoDSR	Department of Defense Serum Repository
DTRA	Defense Threat Reduction Agency
E&A	Epidemiology and Analysis division
EID	emerging infectious disease
ESKAPE	*Enterobacter* spp., *Escherichia coli*, vancomycin-resistant *Enterococcus*, *Klebsiella* spp., *Acinetobacter* spp., and *Pseudomonas* spp.
EV-D68	enterovirus-D68
FVBI	febrile and vector-borne illness
HAI	healthcare-associated infection
HIV	human immunodeficiency virus
HPV	human papilloma virus
HSV	herpes simplex virus
IB	Integrated Biosurveillance division
ICD-10	International Classification of Disease, Tenth Revision, Clinical Modification
ICD-9-CM	International Classification of Disease, Ninth Revision, Clinical Modification
IE	Office of Innovation and Evaluation
IHR	International Health Regulations
ILI	influenza-like illness
IPL	Institut Pasteur du Laos
JDCR	Joint "Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy" Change Request
JHU/APL	Johns Hopkins University Applied Physics Laboratory
LIBR	Liberia Institute of Biomedical Research
MDR-TB	multidrug-resistant tuberculosis
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 3
NAMRU-6	Naval Medical Research Unit 6
NAMRU-A	Naval Medical Research Unit–Asia
NG	*Neisseria gonorrhoeae*
NHRC	Naval Health Research Center
NMCPHCD	Navy and Marine Corps Public Health Center
OASD/FHP&R	Office of the Deputy Assistant Secretary of Defense for Force Health Protection and Readiness
OCONUS	outside the contiguous United States
PACOM	U.S. Pacific Command
PDD	Presidential Decision Directive
PDR	People's Democratic Republic
RAP	Request Assessment Process
RME	reportable medical event
SFG	spotted fever group
STI	sexually transmitted infection
STRATCOM	U.S. Strategic Command
TBI	traumatic brain injury
TTX	tabletop exercise
USAFSAM	U.S. Air Force School of Aerospace Medicine
USAMRU-K	U.S. Army Medical Research Unit–Kenya
USUHS	Uniformed Services University of the Health Sciences
WHO	World Health Organization
WRAIR	Walter Reed Army Institute of Research

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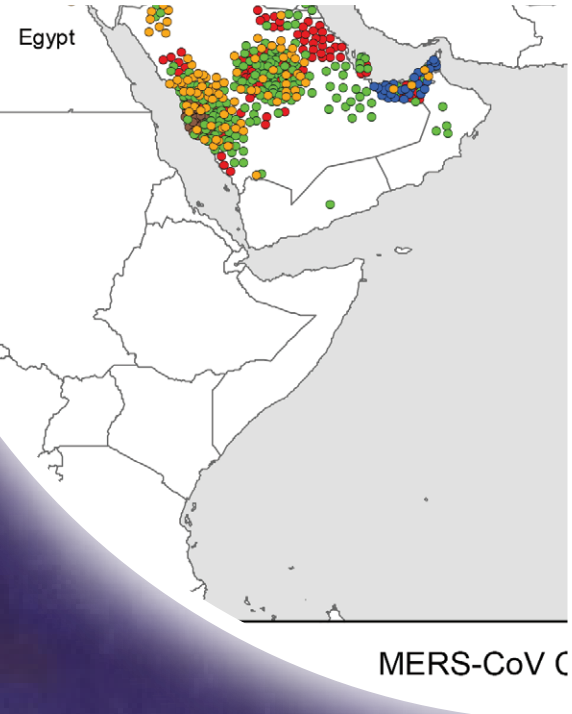
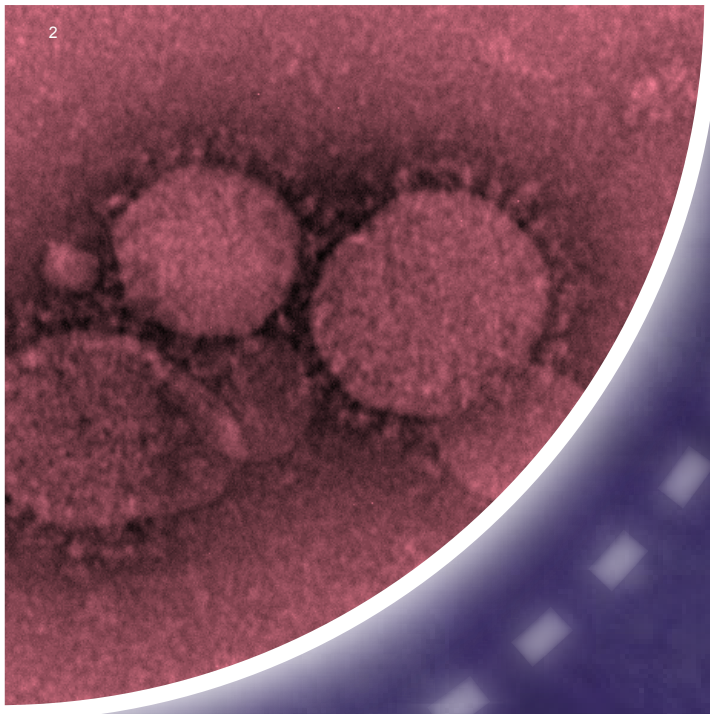


MERS-CoV C



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