Deployment Health Surveillance

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ABSTRACT

A major lesson learned from the Gulf War was the need for a comprehensive deployment health surveillance system. Suspected adverse affects from vaccines and other preventive health measures, and unconfirmed exposures to toxic substances have resulted in long term challenges for military leaders and health care professionals. It has been impossible to determine the causes of ill health among Gulf War veterans, in part because of the lack of a comprehensive deployment health surveillance system.

The Department of Defense has responded to this clear need through the development of a force health protection program designed to insure the health of service members before, during and after deployment, and a number of automated systems providing comprehensive medical and environmental surveillance.

These established and emerging surveillance systems continue to evolve as technology advances, continually improving DoD's ability to monitor, and make sound decisions about, the health of service members.

1.0 INTRODUCTION

Good morning. I'm Ellen Embrey, Deputy Assistant Secretary of Defense for Force Health Protection and Readiness. Today I will tell you how the U.S. Department of Defense uses automated systems to help support our force health protection and enhance awareness of deployment health.

1.1 A Layered Force Health Protection System

But first I'd like to discuss the framework we use to accomplish force health protection. Force health protection embodies all the department's policies and programs assigned to provide quality health and medical services to servicemembers and their families throughout their careers. These policies and programs strive to ensure that we recruit and sustain a fit and healthy force, protected from health threats across the full spectrum of military operations, and supported by mobile, technologically advanced clinical teams capable of effectively treating any injuries and illnesses that occur.

Our force health protection priorities are evolving in response to a revolution in military affairs and globalization. Since the 1980s, we have recalibrated our forces to meet the new global threats. Today, we must protect against the not only threats of nation states with massive armies and weapons of mass destruction, but also against the threats of individual terrorist groups as well. We are in the process of

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changing the fundamental basis for military force development – from a threat-based approach, which focuses on who the adversary might be, to a capabilities-based approach, which focuses on countering how the adversary might fight.

If we apply this evolution to military medicine, the focus shifts to a medical force that is capable of not only delivering care anywhere in the world, but also preserving and enhancing the service member's performance in any environment. To accomplish this, effective medical and environmental surveillance become essential, because there is no other way to empirically understand and effectively assess the effects of a combat environment on service member health and performance.

Our force health protection program is designed to optimally protect and maintain the most valuable warfighting assets that the U.S. fields — its soldiers, sailors, airmen, Marines and Coast Guardsmen. Clearly, a fit and healthy force is essential for mission success because they are more resilient and resistant to illness, less prone to injury or the adverse influences of stress, and more likely to rapidly recover from injury or illness.

Our force health protection program depends heavily on automated systems that gather and store data that will inform and support our efforts to preserve force health. This includes environmental and medical surveillance, tracking injuries and accidents, and implementing a deployment health quality assurance program. To understand the significance of these automated systems, you need to understand the three pillars of force health protection, and how they are interrelated.

1.2 The pillars of Force Health Protection

The first pillar of force health protection -- ensuring a healthy and fit force -- focuses on programs that set standards and promote health and fitness force-wide. This is accomplished primarily through prevention and treatment, such as conducting periodic health assessments, assessing medical readiness, running health promotion programs, providing stress management support, and executing a rigorous pre- and post-deployment health screening program.

Our healthcare providers practice preventive medicine, promote healthy lifestyles among their patients, encourage good eating habits, and most importantly, encourage patients to take responsibility for their own long-term health and fitness.

Maintaining a healthy and fit force requires dedication and commitment from every service member and command emphasis on maintaining medical readiness. To that end, commanders' support of health promotion programs is essential. In fact, the presence or absence of command emphasis is the primary reason we succeed or fail in achieving a healthy and fit force.

For example, we rely on commanders' emphasis to achieve our goal of having 95 percent of the force demonstrate excellence in physical fitness by achieving standards of cardiovascular fitness, muscular strength and endurance, flexibility, and agility. We offer service members nutrition education programs and emphasize dental health readiness requirements. We offer substance abuse counselling, maintain a vigorous immunization program for servicemembers, and offer expanded services to deploying forces to better prepare for the stresses of the combat environment. Commanders have also significantly helped us to perform timely and accurate pre- and post-deployment health assessment screenings.

We sustain the health of our forces and their families through the TRICARE health plan, which delivers comprehensive health benefits to 8.3 million servicemembers, retirees and their families, worldwide. In addition to providing the best care possible, the system offers its beneficiaries TRICARE On-Line, a Web site that provides in-depth health education resources, appointment scheduling, and information on military medical facilities and providers.

To better support reserve component service members now eligible for care because of their service in Operations Iraqi Freedom and Operation Enduring Freedom, we are engaged in special efforts to increase access to care and enhance their awareness of health care benefits.

As I mentioned before, we rely on service members to take individual responsibility for their health and fitness. This includes avoidance of unhealthy behaviors like alcohol abuse and cigarette smoking. Respiratory tract infections are among the leading mission-impacting health events in military contingencies, and smoking is associated with an increased incidence of those infections. For example, we had 19 cases of severe pneumonia in Operation Iraqi Freedom. Cigarette smoking was common among all of those patients, indicating that it may have been a contributing factor in the severity of the cases. To reduce this risk, we have been offering smoking cessation programs at every DoD installation.

We are equally concerned about the 80 servicemembers we lose on average each year to alcohol-related accidents. We believe that command emphasis and prevention could dramatically reduce the number of such deaths.

Working together, individual servicemembers, leaders at all levels, and military health care providers can enhance the health and fitness of our forces through individual commitment and full participation in health promotion and fitness programs.

The second pillar of force health protection focuses on programs designed to prevent injury and protect the force against health hazards. We accomplish this through pre-deployment immunizations, countermeasures, and our efforts to maintain safe and healthy working conditions.

Preventing injury includes prevention of casualties from operational, environmental and occupational threats, and protection from biological and chemical threats.

Historically, our forces have suffered more losses from disease and non-battle injury than from enemy action. With 183,000 troops currently deployed to Operation Iraqi Freedom, we have suffered 345 hostile deaths and 155 non-hostile deaths as of January 15th. In Operations Desert Shield and Desert Storm, 235 deaths were caused by accident or illness, and in the Vietnam conflict, more than 10,000 were lost to accidents or illness. Clearly, our recent efforts have been remarkable in reducing the number of deaths due to accident or disease.

The basic principles of disease prevention in the field really haven't changed much. Hand washing, food sanitation, water purification, proper waste disposal and correct use of insect repellents remain essential. And while our vaccinations against potential biological weapons like anthrax and smallpox receive a lot of attention, routine immunizations and prophylactic pharmaceuticals are just as important to prevent endemic diseases.

Comprehensive and ongoing environmental surveillance is also vital to our prevention efforts. By analyzing the air, soil and water, we can potentially avoid environmental contaminants and potentially harmful exposures.

Often the best approach to preventing disease and injury is to use protective equipment. In the most common situations, this means consistent use of earplugs for hearing protection, goggles for vision protection, and the proper application of sunscreen or insect repellent. At the other extreme, it could mean preparing our troops to face the risk of chemical or biological attack with protective suits and masks that provide good visibility and reasonable comfort.

Over the last year, we have also become more focused on ways to prevent and protect against the disabling effects of stress on military life during wartime. Refined and expanded outreach programs offer a variety of venues for servicemembers and their families to receive mental health counseling and family support services to help reduce combat stress casualties.

And just as servicemembers bear the responsibility for maintaining physical fitness, they also contribute much to casualty prevention through measures such as properly wearing protective equipment and uniforms. Individuals must also follow approved procedures for food and water sanitation and waste disposal. Simply washing their hands regularly will help avoid gastrointestinal illnesses. Following safety precautions goes a long way toward injury and illness prevention.

The third pillar of force health protection focuses on DoD's programs that provide world class medical and rehabilitative care anywhere in the world. This includes first-responder care, forward surgery, theater stabilization, en route care, and movement to definitive care. The capabilities in this pillar are changing as advanced and mobile technologies continue to enhance our ability to deliver a lighter, faster, more responsive medical capability in theater.

Our first responders provide field treatment focused on saving life and limb, while additional medical professionals provide essential care to achieve stabilization in theater. Our "critical-care capable" transportation and clinical support teams and systems maintain essential care during all phases of evacuation, supported by improving communication and management systems designed to permit flexible and timely evacuation from theater.

We have reintroduced rehabilitative care as a critical component of this pillar to emphasize our commitment to restoring servicemembers to a state of health that will support their return to duty as soon as possible. Restorative care is an essential feature of good medical care which facilitates a seamless transition to rehabilitative care, if needed, by our clinicians in DoD or within the Department of Veterans Affairs.

The long-term success of our force health protection program requires smart investments in our military health system's infrastructure. Without the ability to plan and execute high-quality military medical training, logistics, information management systems, and cutting-edge research and development, we will not be able to improve, evolve and sustain the quality of our health care system. Ongoing investments in these programs are yielding important force health protection enhancements for our future force. Our medical research, development and delivery programs are being increasingly linked to enhance operational capabilities. We are currently tailoring information systems to satisfy the requirement for smaller, lighter, and more flexible medical forces in theater, while also working to provide real-time decision tools to commanders and other decision makers for assessing ongoing environmental and health risks in theater.

Because our evolving doctrine calls for the delivery of essential care in theater and timely and rapid evacuation to definitive care locations outside the theater of operations, we must continue our efforts to provide an advanced evacuation system that provides rapid movement of casualties from point of injury or illness to point of care. Enhancing the "Golden Hour," or better yet, the "Brass Ten Minutes," through

advanced life saving technology is critical to success, particularly if the future force becomes more dispersed in the battlespace. Future medical capabilities will rely even more heavily on a first responders' ability to provide initial life-saving essential care, while forward resuscitative surgery teams will treat and stabilize casualties prior to evacuation for definitive care.

1.3 Medical Surveillance Systems in Action

Now that you are familiar with the three pillars of force health protection and the infrastructure that is needed to support them, I want to discuss our view that health and environmental surveillance is essential. It offers empirical data to help study health outcomes. It permits us to propose ways to optimize servicemember performance and improve resilience and endurance in different environments and under various operational conditions. Health and environmental surveillance includes the collection and assessment of data on the safety and effectiveness of vaccines and medical pre-treatments, which protect against naturally occurring diseases and chemical, biological, radiological and nuclear threats.

We have learned that necessary vaccines and pre-treatments can cause as much concern as comfort to our servicemembers. To allay those concerns, and to be sure that our forces receive the correct immunizations at the proper time, records of all military vaccinations are now tracked electronically. The Military Vaccine Agency — called MILVAX — maintains surveillance on vaccinations given to counter threats against anthrax and smallpox attacks. And our Defense Medical Surveillance System provides a link between the DoD Serum Repository and other surveillance databases. This repository contains over 30 million frozen serum specimens and is the largest of its kind in the world.

A specific program of medical surveillance has been established to capture health information on deployed service members before they deploy, while they are deployed and upon their immediate redeployment from theater. The Defense Medical Surveillance System maintains this health data. In addition to maintaining health assessment results, this information system contains up-to-date and historical data on reportable diseases, hospitalizations, ambulatory visits, HIV tests, and longitudinal data on personnel and deployments. The department routinely publishes summaries of notifiable diseases, trends of illnesses of special interest and field reports describing outbreaks and case occurrences in the Medical Surveillance Monthly Report, our principal vehicle for disseminating medical surveillance information of broad interest.

In addition to documenting the health status of our deployed servicemembers, we also need to document the location of troops who have illnesses or injuries. Five years ago, we started building a system to track medical evacuations from the theater of operations. That system is now the Transportation Command Regulating and Command & Control Evacuation System. We call it TRAC2ES. Today, TRAC2ES combines transportation, logistics and clinical risk information to enable us to effectively manage patient movement and evacuation anywhere in the world. This system is capable of assessing and prioritizing requirements, assigning proper resources, and distributing relevant data in time to deliver patients to the right facility for the right care. This system also tracks illnesses from the point of occurrence.

One area of medical surveillance that may surprise you is "focused logistics." Our medical logistical services are increasingly applying commercial practices to reduce expensive inventory investments, speed resupply, and more rapidly respond to ever-changing military situations. Similarly, individual medical training has become more intensive, more flexible, and more high tech, from full situational training for medical providers to preventive and first aid training for forces at all levels.

In order to give medical commanders visibility of in-theater assets and capabilities, we developed the joint medical workstation, or J-MeWS. This system, recently fielded in Operation Iraqi Freedom, allows commanders visibility into theater-wide medical command and control operations such as the blood supply in each of the field hospitals, how many empty beds there are at each forward facility, and other vital information. The workstation also serves as the key system for electronically capturing in-theater patient encounter records, as well as disease and non-battle injury data.

As effective as the automation systems I just described are, these will ultimately be subsumed by implementation of more capable DoD-wide standard systems. Let me give you a brief view of the future. J-MeWS is the leading edge of what will soon grow into the Theater Medical Information Program, or TMIP. The objective with TMIP is to provide a theater-based medical information system fully interoperable with and utilizing the same data repository as all medical facilities within the department worldwide. TMIP's integrated medical information systems will ensure precise, interoperable support for rapid mobilization, deployment, and sustainment of all theater medical services anywhere, anytime, in support of any mission. Through TMIP's medical surveillance system, theater commanders will gain situational awareness for critical decision-making. Commanders will be able to track trends, take preventive actions, and keep their forces fit through a heightened new ability to collect, analyze, and make use of collective medical information across the Services throughout the theater in near real-time. They will be able to determine the location and health status of injured warfighters across the theater and the types and skills of replacement personnel required. Needless to say, TMIP will provide the information needed to support force health protection in the theater.

As a complement to medical surveillance, vigilant environmental surveillance helps us quickly identify and quantify levels of chemical, biological, radiological, nuclear, occupational or environmental exposures. Such surveillance provides empirical data needed to assess health risk resulting from various contaminant levels in food, water, air and industrial chemicals.

Today the Department, primarily through the great work of the U.S. Army Center for Health Promotion and Preventive Medicine, conducts environmental surveillance by monitoring the air, water and soil where servicemembers are deployed overseas. This allows us to avoid areas that may pose more serious health threats due to industrial pollution or endemic diseases. By further automating this activity, we can get a better historical view of health effects as they relate to troops in a particular area. That is why we are developing the Defense Occupational and Environmental Health Readiness System, or DOEHRS. This automated information system will provide timely and efficient access to data and information for DoD users throughout the world. When completed, the system will capture data on environmental and occupational exposures for transfer to a computerized patient record. While deployment exposure data isn't being fed into DOEHRS yet, the system already supports data relating to our hearing conservation and industrial Hygiene programs within the Military Health System. Ultimately, DOEHRS will enhance readiness by providing information to enable exposure-based medical surveillance and enhanced industrial hygiene risk management, and will enhance our ability to provide occupational health care and wellness programs for the Department of Defense workforce.

Medical surveillance isn't solely for the protection of deployed servicemembers. As I said at the beginning, the number one pillar of force health protection is to maintain a fit and healthy force. That's why we're so proud of our newly published standards for achieving individual medical readiness. To assure adherence to these new standards, a new automation tool is emerging. Currently the Services maintain separate systems for this data, but they are now using a common set of individual medical readiness standards to monitor the collective readiness of the force. For a servicemember to be fully medically ready, all immunizations must be current and any important dental work must be done. They must have all medical readiness lab tests completed, including HIV tests, have no deployment-limiting medical conditions, have completed a current

health assessment, and have all the medical equipment they need, including ear plugs, eyeglasses and mask inserts. The individual medical readiness standards are less than a year old, so there's no prior data to compare yet. However, we plan to have the databases populated by the end of this fiscal year. By tracking compliance to these individual medical readiness standards, commanders will be able to monitor medical readiness and will be able to take specific actions to improve it. This is an important new commander's tool.

If this sounds like a narrow focus, let me give you an example of a broader perspective on these health issues. The DoD Global Emerging Infections Surveillance and Response System — DoD-GEIS — is designed to strengthen the prevention of, surveillance of and response to infectious diseases that could threaten military personnel and their families. DoD-GEIS creates a centralized coordination and communication hub to help organize DoD resources and link with U.S. and international efforts. This system leverages the surveillance and response assets of a network of DoD service hubs and overseas medical research units. It gives us a global view of the presence and movements of diseases.

DoD-GEIS brings with it a new prototype system called ESSENCE: Electronic Surveillance System for the Early Notification of Community-based Epidemics. This system is specifically geared to early detection of infectious disease outbreaks at military treatment facilities. It provides for surveillance of syndromes recorded at the time of patient visit instead of specific diagnoses reported after laboratory or other diagnostic procedures. This can greatly lessen the time it takes to determine that an outbreak is occurring. Using historical data, a prediction of normal ranges can be performed. Our current ESSENCE version prepares a list of the most aberrant down to less aberrant sites whose syndrome-specific incidences exceed the modeled expectation. These "suspicious" data are hyperlinked to show relevant graphical trends for expert surveillance analysis and response actions, as appropriate.

A similar system developed by the Pentagon is called LEADERS – the Lightweight Epidemiology Advanced Detection and Emergency Response System. LEADERS isn't just a system for military leaders. Public health officials, emergency management agencies, hospitals and physicians can also access LEADERS over secure phone lines or satellite connections using a Web browser to determine if there is a potential health risk in a community. Hospitals enter symptom and abnormalities data into Web collection forms to determine if a particular syndrome needs to be tracked. The system then analyzes the medical data to spot trends. If the system finds an unusual trend it posts a warning on the alert screen. Health officials then analyze alert details. Doctors can transmit the information to the federal Centers for Disease Control and Prevention in Atlanta to determine if there is a public health emergency.

The next big step in force health protection automation systems will be to erase the line between deployed and non-deployed medical surveillance. We can accomplish that with the Composite Health Care System. The CHCS was conceived as a fully integrated automated medical information system for Department of Defense health care facilities worldwide. It automates inpatient and outpatient medical information in patient administration, patient appointment and scheduling, radiology, pharmacy, laboratory, nursing and clinical services management. The system has already evolved into CHCS II, a medical and dental clinical information system that will generate and maintain a comprehensive, life-long, computer-based patient record for each Military Health System beneficiary. CHCS II was designed to meet the challenge of making medical and dental records immediately available to providers caring for a highly mobile population that includes 1.4 million active duty Armed Service members around the world. The system provides access to a beneficiary's comprehensive health record, which includes data on preventative care, illnesses, injuries, and exposures treated at any military treatment facility. In concert with TMIP, DOEHRS and the other systems I've mentioned today, CHCS II will eventually be the foundation of a universal health surveillance system, supporting both deployment health policy and force health protection programs.

The future of force health protection will rely on persistent detection of threats with an integrated and shared view of the battlespace, and on timely dissemination of accurate warnings, risk assessments and decisions which will allow the force to protect itself against specific attacks and threats. Force health protection must be proactive, focused, and conducted by integrated military forces.

Automated health surveillance capabilities will soon enable rapid collection and analysis of data on diseases, battle injuries and non-battle injuries, including combat stress. This information will be available as a by-product of capturing patient encounter data in an electronic medical record.

Eventually, we expect to be able to use these automated medical records to help us correlate relationships between an individual's deployment experience and any medical problems. Perhaps with well-documented electronic health and environmental surveillance systems, we can begin to understand the health impacts of low-level exposures to various toxic substances and take appropriate actions to prevent or minimize such exposures.

Rapid and effective medical treatments of the future must come through joint capabilities that are light, agile, interchangeable, and interoperable. We'll need to be able to support highly mobile and dispersed joint forces rapidly projected anywhere on the globe. It is imperative we provide the best support possible to our most important weapon of all: the men and women of our Armed Forces.

We have the technology to meet most of our force health protection requirements, and other technical solutions for the remaining requirements are on the horizon. It has been an honor and a pleasure to be here today to discuss these important topics. Thank you.