

# United States Air Force

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Presentation



Before the House Armed Services Committee  
Subcommittee on Oversight and Investigations

## ***Multi-drug Resistant Infections***

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Chairman Snyder, Representative Wittman, and distinguished members of the Committee, thank you for the opportunity to discuss this critical issue with you today. The Air Force is working hard with our sister Services to control infectious disease in-theater and in our medical treatment facilities. This problem continues to challenge the medical community in both the public and private sectors around the globe, and we appreciate your support in our endeavors to address it.

### Background

Throughout history, the development of resistance in bacteria, viruses and parasites to therapeutics and prevention strategies has been commonplace. Shortly after discovery and usage of a new therapeutic agent or prevention modality, most pathogens will develop one or more mechanisms to counteract these treatments or control measures. The use of antimicrobial treatment and control strategies, no matter how judicious or well controlled, inevitably leads to the selection and growth of resistant pathogens. Over the last several decades, we have seen many epidemics of resistant bacteria, viruses and parasites affecting the global health community with an increasing scope and scale.

The epidemic of concern for the discussion today is multidrug-resistant organisms (MDROs), and more specifically multidrug resistant (MDR) gram-negative bacteria. MDROs are microorganisms, particularly bacteria, that develop resistance to one or more therapeutic classes of antimicrobial agents. While there are many bacteria which can meet this definition, only certain MDROs have complicated the care of injured U.S. military personnel returning from Iraq and Afghanistan. The MDROs seen since

the onset of Operations IRAQI FREEDOM (OIF) and ENDURING FREEDOM (OEF) causing colonization and or infection include *Acinetobacter baumannii-calcoaceticus* complex, extended-spectrum beta-lactamase (ESBL) producing enterobacteriaceae (e.g., *E. coli*, *Klebsiella pneumoniae*), MDR *Pseudomonas aeruginosa*, and methicillin-resistant *Staphylococcus aureus* (MRSA). These bacteria typically colonize and lead to infections in hospitalized patients through transmissions between patients through nosocomial (i.e., healthcare/hospital-acquired) spread. This cross- contamination occurs because these bacteria can remain viable on environmental surfaces; equipment, including mechanical ventilators and dialysis machines; air ventilation systems and water sources; hands and clothes of healthcare workers; and the respiratory, urinary, gastrointestinal tracts and wounds of hospitalized patients. These pathogens are frequently resistant to most available antimicrobial agents.

This epidemic of increasing infections with MDRO is not limited to the Department of Defense. The increase in MDRO infections has resulted in a shortage of safe and effective antibiotics. This is a far-reaching U.S. and global health problem. In 1999, the Interagency Task Force on Antimicrobial Resistance was formed to address the problem of MDROs and antimicrobial resistance with the Centers for Disease Control (CDC), the Food and Drug Administration (FDA), and the National Institutes of Health (NIH) as co-chairs, and 7 other agencies including the DoD and the Department of Veterans Affairs (VA).

Despite the significant amount of effort put forth by many countries and organizations, the problem has continued to worsen, prompting the Institute of Medicine (IOM) of the National Academy of the Sciences' Board of Global Health to sponsor a

workshop “*Antibiotic Resistance: Implications for Global Health and Novel Intervention Strategies*. On Sept. 7, 2010, the IOM released a 440-page report discussing the nature and sources of antimicrobial resistance, implications for global health, and strategies to mitigate the current and future impacts of antimicrobial resistance.

While both civilian and DoD hospitals are dealing with this challenging epidemic, the demographic of patients with MDRO infections are different. Most U.S. hospitals have reported these problems among patients with an increased length of stay, frequently the elderly, with multiple complicated medical problems and usually in an intensive care unit. Military hospitals experience cases of MDRO infections occurring in the younger, combat-injured patients. MDROs complicate chronic skin and soft tissue infections, osteomyelitis and, in some of the injured, led to increased limb loss, sepsis and death.

Although bacteria colonize our skin, it is not common to find MDRO strains of these bacteria colonizing healthy adults with the exception of MRSA. In recent studies looking at the bacterial colonization on healthy soldiers, no MDR gram-negative bacteria have been found. Several small studies have also refuted that environmental contamination of war wounds at the time of injury in Iraq and Afghanistan is the source of MDROs. In civilian hospitals, MDROs are spread through nosocomial transmission. The etiology of MDROs in our returning combat-injured personnel has not been fully elucidated, however current data indicate that cross-contamination from host-nation patients likely plays a large role in our deployed military hospitals. It appears most likely these bacteria are spread nosocomially both in theater, and in our level III to level V medical centers.

In response to this challenge of treating and managing MDRO infections in our returning service members, the DOD has instituted coordinated Tri-service efforts in the areas of infection control and prevention, surveillance, and in research and development. I will briefly review some of the Air Force roles in these important collaborations.

### Infection Control and Prevention

According to DoD regulation (6025.13R), all military treatment facilities (MTFs) have a Healthcare Quality Assurance Program. This program is responsible for activities such as infection control, staff credentialing function, patient care environment, patient care assessment, review of healthcare records, health resources management review, and risk management review. Military MTFs are held to the same standards as civilian institutions, and are accredited through The Joint Commission (TJC). Current TJC and CDC guidelines suggest that MDRO-specific responses/policies at individual MTFs are based on local risk assessment and identified needs. Personnel involved in the oversight and management of these facility-based programs receive standardized training in infection control practices and standards. Additionally, Fort Sam Houston in San Antonio, Texas, offers an "Infection Control in the Deployed Setting" course four times a year for those assigned to infection control duties during an upcoming deployment.

Clinical practice guidelines developed by a U.S. Army, Air Force, Navy, and civilian consensus conference on the prevention of infection after combat-related

injuries have been produced and promoted for use for MTFs. These guidelines provide a military perspective on infection control standards and practices for both forward deployed and CONUS facilities. Following the development of these clinical practice guidelines, a joint inspection team has conducted several in-theater assessments of infection control practices. Findings from these inspections helped to promote a renewed focus on basic infection control preventions and practices and the development of a standardized infection control policy for MTFs in the Afghanistan theater. Also, reports from these inspections have suggested that forward theater-wide infectious diseases and infection control oversight and management would improve patient care and outcomes. The Air Force has a specific package, the Expeditionary FFHA2 Infectious Disease team, which is available to provide dedicated infectious disease and infection control assets for the theater surgeon.

In 2008, the DoD joined the CDC's National Healthcare Safety Network (NHSN) and began exploring system-wide use of NHSN for reporting device-associated infections and hospital-associated infections (HAI). Appointed infection control professionals participate in the Infection Prevention and Control Panel (IPCP) that serves as the oversight board for DoD issues pertaining to infection prevention and control, including healthcare acquired infections. The IPCP is a collaborative committee comprised of Service and DoD Health Affairs (HA)/TRICARE Management Activity (TMA) representatives with responsibility for providing oversight, direction and guidance for Infection Control in the Military Health System. The joint IPCP group meets monthly to discuss infection prevention across the military by Navy, Army and Air Force infection

prevention subject matter experts (SMEs). The SMEs and TMA track and report on NHSN data.

The Air Force is committed to infection control throughout our continuum of care. The most common patients in our Air Force Theater Hospitals (AFTH) to develop MDRO infections are those who remain in intensive care units (ICU) for extended periods of time. Active duty ICU patients are stabilized and sent to Landstuhl Regional Medical Center (LRMC) or CONUS hospitals as quickly as possible. In contrast, injured Iraqi patients have very limited resources for long-term medical care within their country; thus tend to stay longer in the Theater Hospitals. This population is the one most susceptible to MDRO infections. The AFTH commander appoints a physician and nurse as the Infection Control officer and representative to provide ongoing oversight and promote continuing awareness of infection control standards. They conduct surveillance, provide educational briefings on antibiotic resistance issues/wound management and emphasize basic infection control (IC) efforts to prevent spread between hospitalized patients throughout the deployment rotation.

As the primary source of patient transportation from theater hospitals to LRMC and throughout CONUS, Aeromedical Evacuation (AE) is the linchpin of our health care continuum. Our AE crews are trained annually in infection control. In addition to the usual standard precautions, crews are trained to mitigate risk of transmitting nosocomial infections in the operational environment. They are trained to disinfect equipment (litters, litter pads, IV pumps, etc). They learn about airflow in the different airframes and where to position patients to avoid spreading of infection. In-flight kits contain spill

kits and Personal Protective Equipment (PPE) to include hand sanitizer that is placed throughout the cabin.

The Air Force has formal infection control courses that are conducted at Sheppard AFB, Texas. There are three levels of training provided: for those assigned to infection control positions (officer and enlisted) on the active duty side, for Reservists, and for those assigned as the Infection Control Function/Committee Chairperson. There are civilian infection control courses available that are equivalent in infection control program management. Two organizations that provide courses are the Association for Practitioners in Infection Control and Epidemiology (APIC) and the Society for Healthcare Epidemiology of America (SHEA).

The new, draft Air Force Instruction I44-108, "Infection Prevention and Control Program," has added an optional element suggesting an Infection Control Assistant active duty officer be rotated through the infection control office for those facilities that have a civilian infection preventionist assigned. This is designed to facilitate actual hands-on management of the IC Program in garrison for the active duty officer so he or she has some experience prior to deploying.

### Surveillance

While none of the Air Force MTFs consistently receive combat-injured U.S. personnel at this time, our medics practice in all of the main MTFs responsible for the care of these patients, to include the forward hospitals and the Air Evacuation system. It is incumbent upon Air Force medics to understand the programs and principles of



managing MDRO patients in the Military Health System. Currently, an admission MDRO colonization screening process of OIF/OEF wounded is in place at the San Antonio Military Medical Center (SAMMC), Landstuhl Regional Medical Center (LRMC) in Germany, the National Naval Medical Center (NNMC), and Walter Reed Army Medical Center (WRAMC). This screening program initially was started to identify and track patients with *Acinetobacter spp.* colonization and infections in 2005, and since 2008 has been standardized to track and analyze the MDRO problem. A recent review of this data has shown a significant decrease in the number and percentage of patients colonized with *Acinteobacter spp.* on arrival to LRMC and the three level V CONUS facilities.

The military infectious disease and microbiology community have recently established a MDRO Repository and Surveillance Network (MRSN) to collect bacterial isolates and provide support for epidemiologic study of the MDRO problem both in the deployed and CONUS setting. This repository, in conjunction with clinical and transportation data, will allow detection of localized sources of MDROs to enhance and focus infection control responses. The four major receiving medical centers (LRMC, NNMC, WRAMC, and SAMMC) have established standardized molecular epidemiologic testing (using pulse field gel electrophoresis) along with the Walter Reed Army Institute of Research (WRAIR), with the support of the DoD Global Emerging Infection Surveillance and Response System (GEIS), a division of the Armed Forces Health Surveillance Center (AFHSC). This standardization will allow comparison of bacterial isolates to enhance epidemiology and infection control efforts.

## Research

As this epidemic has unfolded in our service members and MTFs, DoD has expended research in the prevention and treatment of MDROs through two main programs. The first program is an intramural wound infection research section in the Military Infectious Diseases Research Program (MIDRP). This program seeks to better define the pathophysiology of MDRO infections including biofilms, diagnostic testing and evaluation of wound microbiology, and treatment and prevention modalities. This is closely tied to an extramural program to promote DoD/civilian collaboration.

The second program resides within the Uniformed Services University of Health Sciences (USUHS) Infectious Diseases Clinic Research Program (IDCRP) and capitalizes on resources centered at USUHS and the National Institute for Allergies and Infectious Diseases (NIAID) as well as the distributed network of DoD MTFs. Research in the IDCRP is focused toward clinically important infectious disease threats to the warfighter and military community including MRSA and other MDROs, and infectious complications of war wounds. The research is primarily performed through interservice MTFs, and many projects have collaboration with civilian research organizations and companies. In 2009, the Trauma Infectious Diseases Outcomes Study (TIDOS) was launched, a DoD/VA joint effort under the IDCRP to study interventions and outcomes in our combat wounded who develop MDROs.

## Conclusion

While much remains to be done and understood to eliminate this complex medical dilemma, we continue to strive with the world's foremost infectious disease experts to find the answers that will prevent future patients from contracting disease from others in the very environment designed to protect and heal them. Whether they are our military and family members at home, or our Wounded Warriors in theater, we must find a solution to this constantly evolving challenge. We appreciate your support, Mr. Chairman, and that of the Committee, as we seek to achieve this daunting but critical goal.