Testimony of

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May 11, 2004

STATEMENT OF:

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UNIVERSITY OF ARIZONA HEALTH SCIENCE CENTER

BEFORE THE:

COMMITTEE ON THE JUDICIARY
UNITED STATES SENATE US SENATE

CONCERNING

TERRORISM, TECHNOLOGY AND HOMELAND SECURITY

PRESENTED ON:

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Good morning Chairman Kyl, Senator Feinstein and Members of the Committee. Thank you for the opportunity to appear before you to discuss challenges facing the United States medical system in light of the new potential for terrorist attacks at home.

CURRENT STATUS
Today, in the United States, the first physician point of contact for acute medical crises, 24/7, is the local Emergency Room (ER). ER care has become an essential community service providing front-line health care for injury, illness, local disasters, and even terrorist attacks. The ER safety net not only delivers medical care but coordinates disaster planning, medical direction of pre-hospital emergency medical services (EMS), poisoning and infectious disease management, and public health surveillance.

ERs across our country are in crisis and this safety net is collapsing. Over 1/3 of our population seeks care at an ER (114 million visits annually). Over 10% of our population accesses the 911 system annually. In spite of this, from 1988 - 1998 over 1,128 ERs have closed. ERs today are over-crowded, understaffed, have almost no surge capacity to

handle mass casualties, are lacking in diagnostic tools and medical training, and yet remain the front-line medical safety net for communities throughout this country.

To prepare for terrorist threats, we have put considerable resources into the federal response and the public health system. However, little effort has been paid to the place where victims will actually be cared for, the local ER. During times of medical crisis, as in the Tokyo subway sarin attack in 1995, victims went to the local hospital ERs well before local emergency medical systems could bring them. In the United States the public health system is better prepared to identify victims of disaster and terrorism; yet ERs lack the capacity to care for them. Likewise, realistic simulations have demonstrated that in the event of a bioincident, local capabilities are ill-informed and lack the tools necessary to coordinate with the federal response system.

Hospital-based ERs lack the education, diagnostic tools and therapeutic resources to care for victims of a terrorist attack. Emergency physicians and nurses have existing training requirements that already strain the system, yet contain almost nothing regarding chemical, radiological, or biological attacks. Even today, there is no approved or standardized body of educational content in this area.

I can tell you that most physicians charged with caring for the acutely ill and injured had little knowledge about the diagnosis and management of anthrax before the fall of 2001. Likewise, physicians knew almost nothing about sarin before the Tokyo subway attack in 1995. The knowledge gained from these isolated events is fading as most physicians believe they will never care for patients exposed to these toxic materials.

There is a disconnect from what is happening in the basic sciences and research, and the application of this new knowledge on the front lines of medical care. The gap between scientific discovery and what is applied at the bedside widens everyday. As you will hear today, techniques and skills that currently exist at the bench research level have the ability to identify normal versus abnormal pathogens based upon either their genomic expression or the human response to that pathogen. Yet few of these innovations have made their way to the front line of patient care, in the ER and EMS systems, where critical life and death decisions are constantly made.

CHALLENGES:
Medical aspects of an effective biodefense require:
? Education and Training: Physicians and first-line medical responders must receive training in the medical management of victims exposed to hazardous materials and toxic terrorism events including:
o Toxicodynamics: the study of the cellular and molecular mechanisms of action of a poison, "What the poison does to the body."
o Toxicokinetics: the study of the absorption, distribution, metabolism and elimination of a poison, "What the body does to the poison."
o Identification and Medical Management of Hazmat and Toxic Terrorism Victims: using the standardized Poisoning Treatment Paradigm.
? Prevention: identifying and removing perpetrators and bioweapons before an incident
? Intervention:
o Early alert and warning: This must occur at the local, regional and national level. Faster diagnosis of the cause of a bioattack saves lives.
o Rapid medical diagnosis and treatment: Diagnostic tools that identify pathogens, normal, abnormal and weaponized, are within our grasp. These diagnostic tools have an immense value for our citizens in peace time and at war. Faster diagnosis helps contain the event and accelerates treatment. Who will make the diagnosis of a smallpox victim at 3:30 AM? It will be an Emergency Physician.
o Availability of vaccines and suitable drugs: We need these therapeutic agents, as well as the training, to know who to treat, who not to treat, how to treat, and how to identify appropriate responses and complications to therapy.

FUTURE DIRECTIONS:
? Education and Training: The likelihood that many of our front-line medical personnel will face a terrorist event is small. The chance that they will face a local hazardous materials event is very likely. Just as we have trained our nation's medical community to respond to sudden cardiac events via the American Heart Association's Advanced Cardiac Life Support (ACLS) program and respond to traumatic injuries with the American College of Surgeon's Advanced Trauma Life Support (ATLS) program, we should do the same to provide for the medical management of victims exposed to hazardous materials events including toxic terrorism. These life support programs, such as ACLS

and ATLS, have to be retaken or refreshed every few years so medical personnel stay current with state-of-the-art diagnoses and treatment. Similarly, the advantage of having one interdisciplinary training program focusing on the medical management of patients exposed to hazardous materials and toxic terrorism incidents is that it has use in situations that occur regularly in every community (e.g. chemical spills, pesticide exposures) during peacetime yet also prepares medical professionals for toxic terrorism and bioterrorist attacks.
? Intervention:

? Early alert and warning:
o On the front line of medical care, we must create an ER surveillance and communication System. We need to know what others are experiencing and keep a surveillance database both as an interventional and preventative strategy.
o Local, regional and national information should be shared to aid in the diagnosis and treatment of victims including issues such as quarantine, public health, patient privacy concerns, public information, and crowd control.
o Telemedicine capabilities across the nations could enhance medical care on the front lines, especially in rural areas.

? Rapid medical diagnosis and treatment:
o Rapid high-performance diagnostic tests must exist throughout all major communities and risk-prone areas.
o Research is needed to quickly and accurately identify pathogens at the bedside. In the event of a bioattack, we cannot wait 2-3 days for a culture result to come back. We need diagnostic tools that rapidly identify natural and weaponized biopathogens. Clinicians on the front lines of medicine need to work closely with the researchers on the cutting edge of science who can identify the genomic expression of a toxin and the body's response to such a poison. Likewise researchers need to understand the clinician's environment, especially one as complex as the ER, so researchers can rapidly develop front-line applications of their research. .
o Diagnostic tools need to be simple for the user and specific for the pathogen. These devices must be able to identify a broad array of offending pathogens (e.g. viruses, bacteria, fungi), differentiate the routine from the rare (chickenpox vs. smallpox), and alert us when pathogens are weaponized.

? Availability of vaccines and suitable drugs
o Identification of appropriate vaccines, antibiotics and other treatment modalities and their sensitivities to the offending pathogen must be swift and accurate.
o Vaccines and suitable drug stockpiles needs to be available and easily obtained at the local ER and EMS system.

POLICY RECOMMENDATIONS:
1. Promote a standardized interdisciplinary training program, such as the Advanced Hazmat Life Support program (AHLS), sponsored by the American Academy of Clinical Toxicology and the Arizona Emergency Medicine Research Center, that are specifically designed to teach physicians, nurses and other medical personnel the medical management of patients exposed to hazardous materials incidents, including toxic terrorism.
2. Develop a national telemedicine communication system among the country's ERs to coordinate surveillance, communication and medical care and link that system to relevant Federal and State agencies.
2. Fund specific programs that will develop diagnostic tools for the rapid identification of routine, rare, and weaponized pathogens.
3. Create funding programs to improve collaborations between clinicians and basic science researchers to enhance epidemiological data collection and accelerate development of diagnostic tools to use on the front line of medical care.

CLINICAL SCENARIO:
Today:
It's February in the height of flu season and a young college student walks into the ER complaining of a severe headache, stiff neck, fever and the inability to keep down food since her return from the Far East. The treating physician suspects meningitis and does a spinal tap and submits the fluid obtained to the lab for a culture that will take 2-3 days for results.
The physician knows that there are two types of meningitis, viral and bacterial but is also concerned because the newspaper reported West Nile virus in his state, SARS in the Far East, and concern of a bioweapon similar to equine encephalitis. The course and threat of each is very different, but the ability to distinguish between them is outside his immediate capability. The physician has no choice but to assume the worst, quarantine the patient, her dormitory, and the ER. He then initiates a shotgun approach of expensive antiviral and antibiotic agents, notifies local, state, and

federal public health authorities, and initiates a series of decisions that imposes significant additional burdens both on the healthcare system and on the individual, her family, and close contacts. A nationwide investigation occurs to identify a potential bioweapon and/or rare or emerging pathogen. After several days, the patient recovers uneventfully with a diagnosis of viral meningitis and is discharged. The cost, in direct and indirect resources, is close to a million dollars and thousands of man-hours.

Tomorrow:
It's February in the height of flu season and a young college student walks into the ER complaining of a severe headache, stiff neck, fever and the inability to keep down food since her return from the Far East. The treating physician suspects meningitis and does a spinal tap and submits the fluid obtained. The physician knows that there are two types of meningitis, viral and bacterial but is also concerned because the newspaper reported West Nile virus in his state, SARS in the Far East and there has been some concern of a bioweapon similar to equine encephalitis. A micro array genomic analysis of the spinal fluid is performed and the offending pathogen is quickly identified as this year's adenovirus, an agent commonly seen among college-age students. Knowing it is viral meningitis; he treats her with fluids and anti-emetics and discharges her from the ER three hours later. He communicates on the national ER communication system that he has seen another case of viral meningitis. Her hospital bill is a few hundred dollars.

SUMMARY:
ERs today are over-crowded, understaffed, have almost no surge capacity to handle mass casualties, are lacking in diagnostic tools and medical training, and yet remain the front-line medical safety net for communities throughout this country.
Today the medical systems in this country simply are not prepared to diagnosis and respond to a common pathogen, while concurrently ruling out a bioterrorist pathogen or a rare, emerging natural but potentially lethal pathogen. Another vulnerability in our system is the very uniqueness of the events under consideration. We all hope that a bioterrorist attack will never happen. Yet, in some ways, the very fact that it is rare makes its successful implementation more likely. Today we train individuals after an event occurs; and by the time the information is needed again, the training is stale and often the personnel have moved on to another environment.

Tomorrow, we can obtain a true war dividend. The same tools, training and reporting systems that can be developed to diagnosis the biopathogen or rare, emerging natural pathogen have the capacity to improve the care of patients every day, in every hospital and medical office in this country. They can truly reduce patient costs as well as patient time away from work and school. Of even more importance is that the everyday use of such tools and reporting assures that when the unexpected does occur, the same tools and procedures will be used because they have also become routine and have a proven importance to individuals and the healthcare system.

As you have and will hear from my colleagues, the science and technology necessary to accomplish these goals is within our grasp. This is not an academic exercise. We can develop these tools and achieve a level of practicality that will be valued everyday by the individuals treated in the healthcare system.

Mr. Chairman, thank you for allowing me to participate in this important hearing. I hope that we will be able to develop a process where researchers and clinicians work together to create and deliver educational programs, medical devices and diagnostic tools and a communication system that will help the citizens of our country in our war on terror as well as in everyday life.

I would be pleased to answer any questions you may have. Thank you