

**Kenneth A. Williams, MD, FACEP -
RIDI Principal Investigator, Project Medical Director**

Dr. Williams' career in EMS began in the 1960s with Red Cross courses, followed by EMT and emergency department experience in New Jersey and Massachusetts in the 1970s. Dr. Williams attended Hampshire College in Amherst, MA, where his studies included technology assessment, public policy science, computer models of thermodynamic systems, and a National Science Foundation grant program to teach high school physics through alternative energy projects. He taught CPR and first aid courses during and after college, wrote a first aid textbook for preschool teachers and parents, and received a fellowship grant in exercise physiology.

After graduating from medical school at the University of Massachusetts in 1984, he completed residency in emergency medicine at the University of Pittsburgh, where he was a Chief Resident and received a resident research award from the Emergency Medicine Foundation. Returning to the University of Massachusetts as faculty in the emergency department, Dr. Williams served as Medical Director for UMASS Life Flight, Chief, Division of EMS, Director of Emergency Medicine Informatics, and received a National Library of Medicine Fellowship in Medical Informatics. He holds a faculty appointment as Associate Professor of Clinical Emergency Medicine at the University of Massachusetts.

During his tenure at UMASS, Dr. Williams was also active in regional, national and international emergency medicine organizations, serving as EMS Medical Director for Central Massachusetts and in a variety of positions with the Massachusetts chapter of the American College of Emergency Physicians, the Massachusetts Dept. of Health Office for EMS, the Association for Air Medical Services, the Air Medical Physician Association, the National Association of EMS Physicians, the Alliance for Critical Care Transport, and the MA-2 Disaster Medical Assistance Team. He founded the New England Airmedical Alliance in 1989.

Dr. Williams accepted a position at Brown University and the University Emergency Medicine Foundation in 1997, and holds an appointment as Clinical Associate Professor of Surgery at Brown University. He is also Medical Consultant to the Rhode Island Department of Health EMS Division, President of the Air Medical Physician Association, and Past-President of the Rhode Island Chapter, American College of Emergency Physicians. Dr. Williams, along with other project leaders, began planning for the Rhode Island Disaster Initiative in 1999.

Dr. Williams' research and publications cover a range of topics, including EMS, medical informatics, and include many papers and textbook chapters. He has delivered several hundred lectures as an invited speaker at international, national, and local medical conferences.

**Testimony of
Kenneth A. Williams, MD, FACEP**

**On the
Rhode Island Disaster Initiative (RIDI)**

**Before the
Democratic Task Force on Homeland Security
U.S. House of Representatives**

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Testimony of Kenneth A. Williams, MD, FACEP
Principle Investigator, Rhode Island Disaster Initiative (RIDI)

INTRODUCTION

Thank you for the opportunity to offer testimony to the Task Force. I am an emergency physician, a first responder as part of the Rhode Island Disaster Medical Assistant Team (DMAT), and a disaster response researcher. My wish is that I could be here and say I knew of many disasters where the plan was followed and it worked. Sadly, I don't know of a single incident where that statement applies. There are recurring problems with medical response to disasters. Because of these problems, several of us, with funding support from Congress, began the Rhode Island Disaster Initiative, or RIDI, in 1999. I will focus my testimony on RIDI and findings to date, but first I want to address the questions posed by the Task Force.

Yes, we are more prepared for disasters and terrorism than we were on 9/11. Increased awareness, more frequent drills, accelerated planning, and additional equipment and training efforts have improved preparedness. For example, the recent Station Nightclub fire in West Warwick demonstrated that Rhode Island's emergency responders can rapidly rise to a challenge and provide excellent care. The small number of fatalities among patients transported to hospitals is testimony to the quality of care provided. However, this excellent response did not follow existing disaster plans and exposed significant communications and resource challenges.

No, the federal government is not doing all it can to protect us, but I believe we are making progress. Understanding the emergency medical response system and the essential contribution of emergency medical technicians (EMTs) and their physician and nursing partners in emergency departments is essential to this progress. These medical first responders need additional support from the federal government. I would be surprised if any member of this Task Force is not aware of overcrowded emergency departments, diversion of ambulances, and the triage of patients upon emergency department arrival. Triage was developed as a means to best manage overwhelming casualties on the battlefield. The fact that it is necessary as a routine function in our nation's emergency departments is sad testimony to the lack of surge capacity in the very place we call the safety net of our health care system. Improved efficiencies in medical care, and additional support for medical first response are still necessary.

One of the things I have been doing as an emergency physician to assist in this regard is serving as Principal Investigator for the RIDI Project. One RIDI belief, after the initial phases of our research, is that disaster response works best if it expands from daily routine practices. A beneficial side effect of this approach is that disaster response is more efficient and less costly. By expanding from daily practices, disaster responders can use the same equipment, protocols, and

training that they use every day, reducing the need for unique and costly supplies, training, and practices pulled out of the closet during disaster events.

As the Department of Homeland Security develops, I am seeing the early stages of coordination and direction. It is not yet complete, but what I have seen is logical and in agreement in what we have found with the RIDI project. It appears that the principles of expansion from daily practices, focus on interagency cooperation, organized control of incidents, and need for improved communication are in agreement with our research findings. Working in the Ocean State, I serve as liaison to the Coast Guard from the Rhode Island DMAT team. Additional support for equipment, training, and personnel for the Coast Guard is apparent, particularly, from my emergency physician perspective, in the area of medical response and care. I hope that the Department of Homeland Security will rise to this challenge. Fortunately, I have not had to respond to a major incident such as the Egypt Air crash, the World Trade Center disaster, or the Station Nightclub Fire since Homeland Security became a functional Department and therefore cannot fully answer the Task Force's question. However, at each of those incidents I was impressed by the cooperative and knowledgeable support available from the responding federal agencies, and hope that the new Department structure will only strengthen that capability.

The final question posed by the Task Force, what should Congress be doing, I believe can be answered by looking at our current challenges and shortfalls first. One of the major findings of RIDI Phase 1 is that a disaster creating over 500 victims in an area with a population of 1 million will overwhelm the medical system. Rhode Island has a population of about 1 million, and so do hundreds of metropolitan areas in other states. The Station Nightclub fire created fewer than 500 victims, yet it certainly taxed Rhode Island's emergency medical care system. Congress should be supporting significant efforts to build surge capacity in terms of personnel, equipment, readiness and response practices, and facilities in our emergency medical care system. In the end, disasters create victims and cause damage. Those of us who provide emergency medical care need support to care for those victims. Additionally, support for disaster response applied properly will benefit the daily needs of emergency patients and providers throughout the country.

RIDI EXECUTIVE SUMMARY

The Rhode Island Disaster Initiative (RIDI) is a federally funded research project to determine best practices for emergency medical responses to disasters. The focus of the project is emergency medical services (EMS), first responders and emergency department (ED) staff during the first few hours of a disaster event. The project began in 1999 as an attempt to understand emergency medical personnel's responses to disaster and develop a model of best response. Prior reports have focused on disaster outcomes or proposed but untested solutions. RIDI's research allows first responders to develop tools and techniques and properly test them using research techniques to develop a model exportable

solution.

- Our studies of readiness and a vulnerability assessment have allowed us to develop an objective definition of readiness as a timely measurable task performance. Such a definition was not noted in the available medical or government literature.
- Through research we have determined that emergency medical first response is the weak link in our current disaster system. 500 casualties would overwhelm the medical system in a metropolitan area similar to Rhode Island, which has a population of approximately 1 million.
- RIDI research found that medial surveillance systems must be rapid, flexible, and automatic, and that monitoring of 911 and/ or emergency department case rates are promising surveillance techniques.
- Redundant and flexible communication systems are essential for disaster response and coordination. Monitoring of radio communications is potentially helpful for command and control. Internet remote control of radios is a promising technique, particularly when coupled with deployable communications vehicles.
- First responders have limited time for training. High-fidelity simulation, adult learning and distance learning techniques are important alternatives for first responder training.
- The majority of disaster victims are rescued and transported within the first hours after the event. Critical care transport systems can serve as role models and as coordination resources immediately after disaster events, and can arrive at the scene long before other disaster resources.
- Many disaster victims circumvent ambulance transport. Resources should be allocated to emergency departments for surge capacity to care for these victims.

RIDI OVERVIEW

RIDI Timeline

RIDI is a multi-year research project that will identify and develop solutions to some of the challenges posed by disaster response, with a focus on WMD incidents. Project planning began in 1999, and Phase 1 funding was released on September 4, 2001. The events of September 11, 2001 changed the RIDI timeline with increased pressure to produce tangible results and

recommendations rapidly.

Phase 1 was an effort to identify problems and potential solutions through vulnerability assessment, literature review and expert panel discussion. Many disaster response "solutions" may fail because of a rush to use untested equipment or processes. RIDI is working cooperatively with other Rhode Island disaster experts to avoid these failures.

Informed by Phase 1, RIDI Phase 2 is carefully and progressively testing potential "solutions" during research trial disaster drills. Only after research can RIDI identify best practices in disaster response.

As RIDI progresses to Phase 3, the demonstration project phase, specific improvements are expected in Rhode Island's readiness for disaster. A main feature of Phase 3 is use of a RIDI demonstration vehicle to bring identified solutions to the scene as requested by Rhode Island EMS agencies. Together with others working to improve Rhode Island readiness for disaster threats, RIDI hopes to improve the outcome for patients and providers in Rhode Island as they face the current disaster threats.

RIDI Phase 1: Background, Vulnerabilities, and Study Design

The RIDI Principal Investigators, Drs. Sullivan, Suner, and Williams, examined three main areas: readiness, training, and technology during Phase 1. Various federal agencies have supported the RIDI effort, including the Department of Health and Human Services (Phase 1) and the Office for Naval Research (Phases 2 and 3). The RIDI project investigators collaborate with other Rhode Island state agencies such as the Emergency Management Agency, Department of Health, and others who are receiving federal funds for disaster preparedness.

The Chemical-Biological Information Analysis Center (CBIAC) and Battelle Memorial Institute coordinate administration and funding for the project. Charles Seekell, Battelle Principal Research Scientist, is the Battelle On-Site Project Manager in Rhode Island. In RIDI Phase 1, the tasks completed include the vulnerability assessment, literature review, technology evaluation, training program development, and multiple expert panel discussions.

An objective, measurable definition of readiness was not found in the literature reviewed. The RIDI investigators defined readiness as the ability to perform specified tasks upon request, in a timely manner. In drills and in actual events, many disaster responses fail to meet readiness challenges posed by the situation. These failures are noted in the medical literature, popular press, and anecdotal reports from actual events. Recurring failures include unfamiliarity with the disaster plan, failure to follow the plan, improper or inadequate equipment for responders, logistic and communication failures, difficulties controlling access to the disaster scene, delays in treatment, contamination of the hospital and EMS equipment, and a variety of other issues. While some of

these failures can be attributed to the challenges disasters pose, many of them are embarrassingly common and recurring.

Disasters can overwhelm local ability for rescue and recovery. Worldwide and nationwide, disasters are common events. However, because they are widely distributed geographically, individual EMS systems and EDs infrequently experience a disaster. This creates a situation where readiness for medical response to disasters poses challenges. The threshold that separates manageable tragedy from disaster is variable. The death of a single important individual may lead, through psychologic impact, to disaster for a company, school, or hospital. A large number of people may be killed in an event, but, because no survivors need medical care, the local medical system may not be overwhelmed. An incident that is easily managed within a busy city health care system may overwhelm the rural emergency care system a few miles away. Thus, the number of injured or killed persons necessary to constitute a disaster varies widely.

Most systems have planned, to some degree, for multiple casualties from locally anticipated natural disasters (hurricanes, floods, forest fires, etc.) and transportation accidents. These plans typically activate assets, provide resources, and invoke procedures in use daily. However, these plans traditionally do not consider epidemics, weapons of mass destruction (WMD), internal disasters at facilities, and other currently contemplated scenarios. Rhode Island is more prone to hurricanes than tornados, although the latter are possible. Some disasters are more concerning for some types of responders than others. A flu epidemic raises more concern for hospitals than for snowplow operators, while a blizzard has the opposite impact.

During RIDI Phase 1, an external analysis of Rhode Island first responder readiness was conducted. This analysis determined the number of personnel, hospital beds, ambulances, police cruisers, and HAZMAT response teams available within the state. Assumptions made included limited aid from other states and an ability to focus all available state resources on the disaster at hand. Fifty-one potential disaster scenarios were modeled with variations in type of disaster (biological, chemical, explosion, radiation, electromagnetic pulse, and natural), location (indoors, contained, outdoors) and environmental conditions (wind, geography). The casualty load was matched against available medical resources. Again, assumptions were made to determine the resources available, such as the number of casualties transported in each ambulance, and the number of patients each emergency physician could treat during one episode. Based on these scenarios and assumptions, the analysis determined whether available resources could manage the casualty load.

In almost all scenarios, medical response capability was inadequate. Public safety, sanitation, food, shelter, and other disaster resources were more available than rescue, transport, and emergency care. Without significant assistance from outside Rhode Island, the emergency medical response system will be overwhelmed by any event producing between 500-1000 casualties

according to this analysis. Events that produce more seriously ill or injured casualties, or contaminate and incapacitate resources, could be even more challenging.

The current Rhode Island emergency medical system lacks surge capacity. Years of budget constraints and increasing patient volumes have led to an emergency care system with almost no capacity to handle a surge in patient volume. In fact, EMS services in Rhode Island frequently call neighboring communities for mutual aid because they are unable to handle routine increases in patient load. Emergency departments frequently request ambulance diversion because of overwhelming patient loads and full hospitals.

The Emergency Management Planning Group (EMPG, www.EMPGinc.com) conducted a second type of vulnerability assessment. While the first obtained broad information such as total resource numbers, the EMPG review included facility disaster plans and site visits at a sample of three Rhode Island hospitals and two urgent care facilities. For example, the EMPG team asked not just how many masks were available, but if the staff on duty knew where they were, and when and how to use them. Each hospital visited was found to have the required disaster plans in place, but was unlikely to follow these plans in a real event. Instead, functional success would occur because of strong and talented leadership in a dedicated and flexible staff environment. The hospitals were prepared to handle disaster victims with traumatic injury, but less prepared for victims with contamination or medical illness. EDs estimated that 60% of their beds could be dedicated to caring for disaster victims. Decontamination would be a challenge for hospitals and cross contamination with other patients was likely. Lack of facilities outside of EDs for performing emergency decontamination was a vulnerability. Access to hospitals was easy, making them vulnerable because of weak security programs. Urgent care facilities surveyed were prepared for typical, traumatic injury, but unprepared for biological or chemical disasters.

The RIDI Principal Investigators and Battelle consultants reviewed recent medical literature related to disaster response, management, and research. An annotated bibliography was produced from these efforts and is available at www.RIDIproject.org. The literature abounds with case reports from disaster events. A subset of the literature describes proposed solutions. Many recent articles, web sites, and other sources focus on WMD issues. There is almost no literature describing any controlled research on multiple casualty or disaster events. A few articles describe the success of an intervention (a triage technique or piece of equipment) at a single drill or in a non-disaster environment. However, there is a paucity of true evidence, randomized controlled trials, etc. supporting protocols, techniques or equipment.

Phase 1 Technology Insertions: Surveillance, Communications

Internet control of remote frequency-agile radio equipment or internet transfer of

audio from such receivers enables monitoring of radio traffic from command sites and other areas distant from the disaster. This technology requires placement of radio receiver/internet computer units to cover a geographic area, intact electrical power and internet connection during the disaster. Potential benefits are the ability of remote listeners in a command or control situation to gain real-time information of scene operations. The disadvantages are needed technical expertise to operate the radio interface, possible information overload from unfiltered radio transmissions, and technical challenges involved in ensuring operating equipment within the disaster scene.

Use of motion sensors, door switches, or other passive monitors to measure facility activity was proposed as a surveillance technique. These measures potentially correlate with overall ED activity. A preliminary trial demonstrated feasibility. As a monitor of a terrorism-related event emergency department volume may be as sensitive as passive surveillance systems. Automated measures of ED visit volume may be easier to implement than syndromic systems, and require no access to HIPPA-sensitive patient information.

Emergency department census, chief complaint log and/or 911 data could serve as a surveillance source. An internet link between Rhode Island EDs was designed and a web site established to host this link. Surveillance using patient data is possible, but raises HIPPA-related privacy concerns. Volume data from 911 and EDs is expected to be the main source providing an early warning of disaster. During RIDI Phase 2 this option will be further explored.

RIDI Phase 1 Training Program Development

Various options, including brief and extensive courses delivered in a variety of formats, were explored. An overview of EMS education and training techniques, and a variety of training technologies, including emerging techniques such as hand-held computers, internet distributed learning, interactive video, and high-fidelity simulation were explored. Traditional extensive lecture and psychomotor skill development was felt to be needed for some topics. Time, funding, and staff availability will limit the use of this type of training for ED and EMS staff. Since the events of September 11, 2001 a large number of courses related to WMD have been promoted and developed. Many courses are available but most are longer than one day. During Phase 2 a brief lecture format, traditional full lectures, and a format based upon high-fidelity simulation are being compared. Simulation is highly regarded by students.

RIDI Phase 1 Expert Panel Discussions

Readiness

Outcome measures for disaster drills or actual events are necessary to evaluate interventions and improve performance. Surprisingly, no objective measure of EMS performance during disaster drills could be found in the literature. Objective measures of performance were therefore developed. A data collection

tool and scoring system based on time to perform critical actions, patient outcomes, and quality of performance was developed for use during drills. An individualized score sheet is used, based on the critical actions necessary for each drill patient's medical problems. An acceptable elapsed time to each critical action (e.g. locate victim, stop hemorrhage, splint fracture) is developed through expert panel discussion. The data collection tool allows observers to score responder performance as it relates to each victim. In addition to elapsed times, the quality of each critical action is also scored on a scale. Combined results give an overall evaluation of the drill. This system was widely distributed to a panel of experts, and accepted as a viable means of measuring readiness.

The role of EMS in disaster response as related to WMD issues must change. Traditionally, EMS professionals are trained to rush in and render aid in a disaster. WMD events, on the other hand, involve contamination with hazardous materials. EMS professionals are currently trained to stay away from such incidents and request assistance from HAZMAT teams. While HAZMAT response capabilities are improving, many EMTs will be needed in any large-scale WMD event. They currently lack the equipment, training, and response paradigms to safely and effectively provide this care.

Technology

Surveillance systems based on analysis of patient records for specific symptoms are cumbersome, expensive, and slow. In addition, they may raise HIPPA concerns. The quest for high levels of specificity may miss an event with a cluster of unrelated symptoms. For example, many proposed systems suggest that an electronic search of records for "flu symptoms" will provide early warning of an anthrax attack. However, there are significant challenges involved in accessing and parsing records for "flu symptoms". If an attack involves ingesting anthrax (in dry cereal, for example), then the primary symptoms will be gastrointestinal, and may not fit the "flu symptoms" model programmers envisioned. Chief complaints may vary, particularly symptoms experienced by those with suspected exposure to a WMD agent.⁶ Instead, a more promising, flexible and efficient model appears to be detecting surges of volume which prompt an expert investigation to discern the cause.

Current Rhode Island emergency communications systems are not redundant and do not provide interagency interoperability. Systems based on cellular technology are vulnerable to the system, radio communication, and circuit availability during a disaster. Experts suggest collaborating to improve multiple communication avenues, interagency radio communications, an internet link, a web site and software allowing status posting, real-time chat communications, and information security. In cooperation with efforts by state agencies, RIDI will explore some of these options during Phase 2.

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