Cover: *"Beach Balls,"* oil on canvas, by Lorraine Shemesh, formerly Assistant Professor of Fine Arts, Rhode Island School of Design. Private collection, www.lorraineshemesh.com, courtesy of the Allan Stone Gallery.

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COMMENTARIES

DISASTER PREPAREDNESS: A CME ISSUE
Guest Editor: Robert Woolard, MD

COLUMNS

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COMMENTARIES

On Reviewing Manuscripts

To the editor: I have not enjoyed reading a manuscript this much since the *Journal of Irreproducible Results* closed down. Unfortunately I don't think the authors intended their ms to produce these chuckles.

To the editor: Dr. Jones, and I assume that he wrote this piece himself since I doubt that anyone would want to take credit for it, should be referred for a brain MRI. He seems to be suffering both from aphasia and hypergraphia, suggesting the likelihood of left posterior and right medial temporal lobe lesions.

To the editor: This case control study is interesting only because of the comparison group used. The relevance of the comparators to the cases is no stronger than would be a control group of Canadian geese. Or maybe not.

When one reviews articles for peer reviewed journals there is an occasional temptation to be sarcastic, to display one's rapier wit, demonstrating, after prolonged consideration, "le mot juste," making up for all those disappointing moments when one's repartee in real time falls short of the mark, followed by the thought of a devastating response a few seconds too late. I don't think I've ever done this, taken these pot shots. For one thing there's an unfair advantage, being an anonymous reviewer and having a defenseless opponent. For another I am often on the receiving end of critical commentaries. Although these pot shots are purely for the journal's editors and don't go back to the authors, referees lower themselves by debasing others' work.

I attended a meeting recently, which included the editors of three major journals. Despite my role as editor of this journal (and two corporate-sponsored journals, one for lay people and one for neurologists,) I did not consider myself in their league. They compared notes on numbers of submissions, percentage of acceptances, turn-around time and exchanged a few anecdotes. Their experiences and mine have been quite different.

However, the discussion then turned to manuscript reviews and the playing field leveled. I review all manuscripts to this journal, but our acceptance rate is pretty high since most articles are solicited and we don't receive too many unsolicited articles. I also submit my own manuscripts to other journals and review a fair number of submissions to a variety of journals.

I never thought too much about the time I spent reviewing other people's works. After all, someone reviews mine. So I was shocked to learn that some neurologist had persistently refused to review submissions to a journal in which he himself publishes. He was too busy. In other words, I may be asked to provide a peer review of his work but he's too busy to review mine. I wondered about the ethics of banning him from future submissions to the journals he's too busy to referee for.

A more relevant issue, especially for those of us who do review manuscripts is how to do this. The editors were lamenting the lack of skill of some reviewers and one told the following story.

When he was a post-doctoral fellow in the lab of a famous scientist who subsequently won a Nobel Prize, he was asked to review a paper submitted to a journal the famous scientist edited. All such reviews are anonymous to encourage both candor and honesty. Unfortunately anonymity can also provide a mask for contempt and ill-will. The post-doc ardently reviewed the paper, tearing it to shreds. The older doctor gave it back and said, "You did a wonderful job. Your analysis was completely correct. I agree with everything you said. You found all the problems and exposed all the weaknesses. But you need to remember that a paper is like the author's child. She's invested a lot of time, effort and loving care so you need to critique it in the same way you'd critique the performance of the child of a friend. You should be honest but gentle and always keep in mind that the paper's "parents" love it even if you think it's rotten. So, be as careful in how you convey the message as you are in formulating the message."

I think this is good advice. I like to think of the review process as being akin to reading your child's essay for school. On the one hand, you want the child to get the best grade possible, so you try to provide constructive criticism, but on the other hand, you don't want to undermine the child's confidence by being overly critical or destructive. Even if you recommend against publishing the article, your comments should be used by the authors as constructive advice in rewording the manuscript for submission elsewhere.

– JOSEPH H. FRIEDMAN, MD

Where Are the Words To Heal?

Toward the end of the 19th Century, and for the first time in this nation's history, there were more foreign-born than native-born residents. The United States had truly become a nation of immigrants. A steady flow of newcomers, both documented and undocumented, continues to define the character and ethnic composition of this country. And while a small fraction of the newly-arrived Americans originate from English-speaking nation, the great majority come from over one hundred different nations speaking languages other than English.

In the last decade this nation has admitted 9,095,417 documented immigrants. Presently there are an estimated 19 million adult American residents who speak no English.

The overwhelming majority of current immigrants are distinguishable, on average, from their native-born neighbors by a number of attributes: They are poorer, less educated, less conversant in the English language and more likely to be burdened by nutritional or infectious disease. Many possess no working knowledge of English, its nuances, subtexts, ambiguities or colloquialisms. And thus the very segment of the American population needing the greatest measure of medical help is also that segment with the least capacity to identify and explain their symptoms or provide a pertinent medical history. The medical profession now confronts an expanding portion of the American population incapable of fully understanding therapeutic instructions when rendered in English.

Three overlapping solutions to lessen this problem present themselves. First, train the primary care physicians to be polylingual. [Actually, the Brown Medical School has offered evening classes in Portuguese and Spanish to its students.] Second, more actively encourage the newly arrived immigrants to learn English. And third, develop a cadre of bilingual translators to assist in the process of medical history-taking.

Each of these solutions, though, presents substantial problems.

The nature of modern medical education requires an increasingly stringent curriculum. More and more of the medical student's hours are now absorbed in learning newer technical skills, newer bodies of data, leaving virtually no free time for learning new languages.

Recruiting bilingual translators presents certain financial and ethical problems. The foundation of the patient-physician relationship is the unyielding promise of confidentiality. But a translator, even one sworn to privacy, adds yet another potential threat to this promise; and few clinics or hospitals can afford to maintain translators skilled in each of the many languages spoken by their patients. Using family members also subverts the policy of medical confidentiality and may create intense embarrassment for the adult patient, particularly so since the only bilingual members of the family tend to be the children.

On the other hand, given the sophisticated nature of modern diagnostic procedures such as CT scans, does it really make a difference whether or not the patient and the physician can communicate with each other in accurate English? Has access to, and exploitation of, the health care system by many millions of non-English speaking patients been compromised because of a language barrier between patient and physician?

Additionally, can we be certain that the translators faithfully translate the crucial words from patient to doctor, and then back again? Or are critical words – and therefore patients – being lost in translation? An analysis of the recorded translations in a series of clinic encounters in Milwaukee and in Boston indicates that translators do represent a palpable risk. During the course of 13 taped clinic visits, the examiners noted 231 errors, over all of them judged to be potentially dangerous to the patient's welfare. The authors of this study, appearing in *Pediatrics*, noted parenthetically that a single translational error caused one Florida hospital to lose a malpractice judgment for $22 million dollars.

Despite the intimidating machinery of modern medicine, the core, the very heart of medicine, remains the art of talking and listening to the patient – in his or her language. Medicine functions best when there is mutual respect, time to exchange views, hopes and fears, a fervent belief in the confidentiality of the encounter, and the capacity of both parties to understand precisely what the other is saying. Only then is there a high probability of patient satisfaction and patient compliance. Increasingly, medical schools now insist on the critical importance of accurate communication, particularly so because many of those seeking medical attention are unfamiliar with English.

But even with those who speak and understand fluent English, there remains the inescapable need for accurate communication, precise words that diminish the likelihood of alternative interpretation. Physicians must rely upon language, accurate language, first to understand the messages spoken by their anguished patients, and second to provide explanations, prognostic speculations and therapeutic instructions to their patients. Has this distressed person, distracted by anxiety and with a shortened attention span, truly heard, understood and remembered the physician's instructions?

An incident in Bellevue Hospital, New York City, back in the 1940s is worth recalling. At the Monday morning diabetes clinic a middle-aged, unmarried diabetic man, in order to prevent infections to his diseased toes, was instructed to put on a fresh pair of clean white socks each morning. He did not appear for his regularly scheduled clinic visit the next Monday morning. A telephone call by a concerned social worker found out that he couldn't keep his appointment because his shoes would not fit over all of those accumulated socks. This was not patient non-compliance; rather, this was a vain attempt by the patient to follow ambiguous instructions.

Another example of faulty communication: Some years ago the newspapers carried the story of a mother who bought a box of animal crackers for her four year-old daughter. Instead of eating the crackers, the child carefully spread out the animal profiles upon the kitchen table, carefully examining each one. The puzzled mother asked: "What are you seeking?" The child responded: "I'm looking for the seal." "Why?" The child declared: "You told me not to eat any crackers if the seal is broken."

Both miscommunication and the lack of communication bring an unwanted menace to the practice of medicine. And that elusive thing called humanism in medicine rests principally in the words exchanged between patient and physician. Certainly without accurate and meaningful verbal interchange, as one physician observed, it is like practicing veterinary rather than human medicine.

– Stanley M. Aronson, MD, MPH

Introduction

This issue of *Medicine & Health/ Rhode Island* is the first of a two-part series, 10 articles that will address disaster response and preparedness both in Rhode Island and by Rhode Island physicians. This first issue is dedicated to disaster preparedness. After 9/11/01, physicians, health care workers, public officials and the public at large want to know whether we are prepared for other foreseeable terror-related disasters.

This issue describes many of the pre-hospital and emergency medicine efforts that have made us prepared in RI. Many of these efforts will continue into the next few years. There are efforts within agencies such as state police, emergency management and the department of health that have not been detailed in this issue. No doubt we are better prepared than before 9/11/01 and will be even better prepared over the next two years as an anticipated $11,000,000 flows into R.I. from Homeland Security and other sources. Articles in this issue address information needs, pre-hospital system needs, educational needs, Emergency Department and hospital capacity needs and ED-based hospital preparedness—issues all being addressed in Rhode Island.

Rhode Island has the opportunity to demonstrate a model "disaster ready" system for the nation due to the expertise of local emergency physicians, the manageable population and geographic size, the ease of access to federal programs and the potential coordination between agencies. To help this coordination, efforts of the Rhode Island Disaster Initiative began before 9/11/01 and are funded into 5/05/05.

Many disaster and terrorism experts consider an event with up to 4,000 victims needing decontamination likely and much of our planning focuses on preparing to meet these needs. Even the best plan can be overwhelmed. A disaster or mass casualty event is defined as one that overwhelms local or routinely available resources. All physicians should become and stay familiar with their hospital and community disaster plans, identify websites with information on response to terrorism and participate in disaster drills, including planning and debriefing. Even with better technology, more equipment, new surge capacity, immunization and new paradigm for more coordinated response, many local and regional drills must be conducted with physician participation to develop and maintain readiness. For the readership of this journal the message must be "act locally", get involved in disaster efforts.

Clearly much of our approach to prepare ourselves for a large-scale event (4,000 victims) will be on paper. Few of our drills will test our system to this level. Resources required for this magnitude of casualties will tax the New England region.

National Disaster Medical System with D-MAT teams will be called into action. Sharing admitted patients regional tertiary and trauma centers will be needed. However, preparing locally will provide the backbone of the response to disaster at all magnitudes of casualties.

– Robert Woolard, MD

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The Hospital Emergency Incident Command System —Are You Ready?

Liudvikas Jagminas, MD, and Gary Bubly, MD

Medical disasters often cause great confusion and inefficiency in hospitals. Disasters can overwhelm a hospital's resources: staff, space, or supplies. Mass casualty incidents challenge hospitals already running at seemingly maximal capacity and struggling to remedy inpatient and emergency department overcrowding. In addition, hospitals must prepare for the possibility of being the victim or site of a disaster.

Disasters can impact a hospital's physical plant in ways that radically alter the environment of care, such as structural damage occurring in an earthquake or hurricane, or the sudden loss of electricity or water. Experience with several disasters in the last few decades demonstrates that an organized disaster response system for hospitals is invaluable and can reduce mortality.[1] Integral components of an organized response include clearly identified leadership, well-outlined responsibilities, effective communication, and the capacity to interact and coordinate with other hospitals and governmental agencies. Incident command systems are response plans designed to incorporate these features in the management of disasters. **The Joint Commission on Accreditation of Healthcare Organizations (JCAHO)** mandates hospitals develop disaster plans which identify their command structure and recommends they share this information with surrounding facilities.[2] These systems have been modified for use in hospitals and are available on the Internet as the **Hospital Emergency Incident Command System (HEICS)**.[3] This article reviews the history and features of the HEICS.

HEICS' origins can be traced back to the 1980s, when a multi-jurisdictional committee represented by local, state, and federal authorities created the first Incident Command System, known as FIRESCOPE. This system eventually became the command system of choice for almost every fire department in the country. In 1987, the Hospital Council of Northern California adapted FIRESCOPE for use in response to earthquakes.

California's Orange County **Emergency Medical System (EMS)** developed HEICS in 1991, customizing the command system to the hospital environment and management system. This initial version underwent modification twice before the third and currently used edition was developed. This final version is being implemented across the country as hospitals strive for greater certainty and accountability in the wake of recent disasters around the nation. This system has been successfully used in several disasters. In a 1997 survey of California hospitals, 39 of 115 had used HEICS in an actual hospital response.[4] Of those who used HEICS in a disaster, 82% reported their experience as "positive." Although HEICS is not a panacea, hospitals using it reportedly functioned better in response to the 1993 earthquake in Northridge than those not using the plan.[5]

HEICS offers benefits not found with other disaster management systems. These include:

- Predictable chain of command
- Applicability to varying types and magnitudes of disasters
- Accountability for specific functions
- Thorough documentation of actions taken
- Common terminology to promote communication
- Flexibility and cost effectiveness within organizations

HEICS does not replace but complements a hospital's existing disaster/emergency preparedness plan. Proper emergency preparedness requires up-to-date policies and procedures for dealing with specific issues such as mass casualty, nuclear, biological, chemical as well as natural disasters to be in place. In addition, hospital emergency preparedness policies must specify who is able to initiate the Disaster Plan, outline staff recall procedures, designate a decontamination location and procedures for specific agents if required, triage sites, staging and assembly areas, debriefing, etc.

The benefits of the HEICS plan to function during any sort of mass casualty incident, regardless of its etiology, lies in the plan's predictable, reproducible chain of command, accountability of position function, the flexibility of response to specific emergencies, prioritized response checklists and the use of common language to facilitate interaction with the hospital, other hospitals using the HEICS plan and government agencies.

Once the plan is activated, HEICS is implemented within a hospital by assigning jobs to managers, their designees, or the most competent person available at the time the command system is initiated. While hospitals should plan who will optimally fill specific positions, theoretically anyone can fill any role in the chain of command. The Incident Commander role is assigned first and has overall responsibility for management of the entire facility during the operation. This may be the hospital president or designee, or may temporarily be an individual on-site such as a night nursing supervisor or emergency physician. Activities under the supervision of the Incident Commander are broadly divided into the areas of logistics, planning, finance, and operations. A Section Chief is appointed to head each of these four divisions. They oversee the remaining staff leadership positions in each division, and report to the Incident Commander.

From a mass casualty perspective, the cause of the event does not affect the HEICS system. The inciting event,

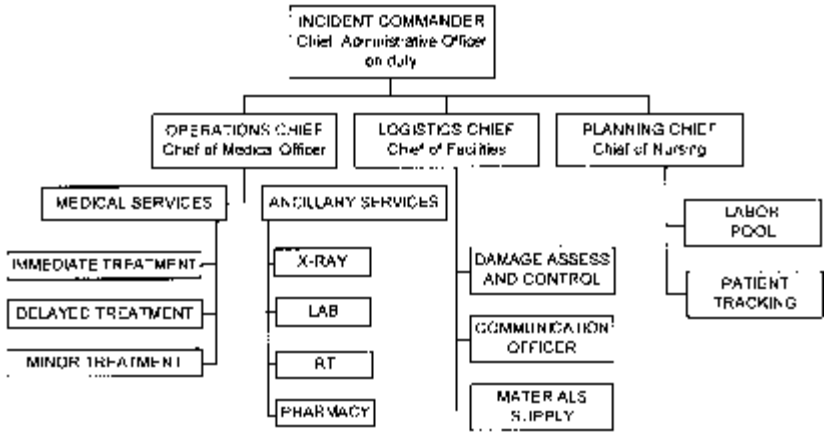

Figure 1 – HEICS Chart for a smaller hospital

however, may require mobilization of different parts of HEICS. For example, in a fire such as the recent Station fire in Rhode Island, the mass casualty aspect would mobilize all hospital personnel since multi-system injuries should be expected, even though the bulk would be primarily focused on burn care and pulmonary injuries. However, if a mass casualty event were secondary to a chemical or biological incident, then HEICS along with the decontamination procedures already in place at the hospital would be activated.

The responsibilities of every position in the tree are delineated on "job action sheets," which are distributed to the individual assigned to each role. (Figure 1) These "job actions" are subdivided into "immediate", "intermediate", and "extended" time frames to help the assigned individuals prioritize their tasks. Hospitals should customize the list of job actions for each position to suit their facilities' needs. These may be easily adapted from their facilities' existing disaster plans. Each job action sheet also explicitly states whom the assigned individual should report to, and whom they need to get reports from. Thus, the job action sheets prompt individuals to perform critical duties and enhance communication, keeping them focused during times of chaos.

A large part of the flexibility of HEICS lies in the tree and the job action sheets. For example, more than one position and job action sheet can be given to a particular individual, or certain parts of the plan may not be used at all. The entire tree of positions may be deployed in a mass casualty incident, which necessitates utilizing the full spectrum of a hospital's staff and resources. On the other hand, an internal problem such as a power outage on one floor may be more efficiently managed by activating only part of the tree, with only a few individuals providing critical roles. Because key staff may be unavailable, or may even be victims of a disaster, the job action sheets help guide remaining personnel in managing the event.

These features of HEICS also confer adaptability for use in different health care settings. HEICS has been used in facilities as diverse as Level I Trauma Centers and small community hospitals. (Figure 1) A modified version for outpatient clinics and urgent care centers entitled the Medical Aid Station Incident Command Center has also been developed.[4] Large-scale disasters may require the involvement of urgent care centers to manage high patient volumes. Again, coordination with other facilities and agencies would be enhanced if all involved understand HEICS terminology.

HEICS has been used in facilities as diverse as Level I Trauma Centers and small community hospitals.

The number of hospitals using HEICS grows, perhaps due to its obvious advantages, perhaps due to regulatory compliance issues. In California alone, 56% of hospitals surveyed in 1997 were already using HEICS.[4] In a 1999 survey of hospitals in New York City, 90% of respondents described using the incident command system model in their disaster plans.[5] Furthermore, hospitals in Canada are using it, and requests for implementation assistance have been received from Germany, New Zealand, Japan, South America, and Saudi Arabia.

Rhode Island has been no exception, having made great strides in adopting HEICS. According to the Hospital Association of Rhode Island, several of the 15 participating hospitals in the state report some degree of implementation of HEICS. For example, Rhode Island Hospital and The Miriam Hospital have rewritten their disaster plans in the HEICS format. Both hospitals have held training sessions to introduce managers and staff to HEICS, run tabletop exercises to increase familiarity with the system, and conducted live drills in HEICS to evaluate its effectiveness. In addition, HEICS was tested in many of the area hospitals participating in the statewide disaster exercise in June, 2002, with excellent results. It is expected that repeated exercises will build competence in using the system. The HEICS manual and other references[6,7] include suggestions on how to apply the plan and provide scenarios for exercises. The Rhode Island Emergency Management Agency is urging Rhode Island hospitals to convert to the HEICS system, to elevate our disaster preparedness and coordinate our overall response efforts.

Obstacles frequently arise when hospitals make plans to convert to the HEICS model. Managers may believe it will be too difficult to change existing plans. Some hospitals have felt that the system is too cumbersome and convoluted. Further concerns deal with the expense of converting, as well as staff reactions to the new system. Most facilities, however, find that implementation of the system is simpler than expected. The HEICS Manual and the templates for the job action sheets are available on the Internet free of charge. The expense of implementation is

mostly due to employee training.[4] Furthermore, most staff understand the flexibility and appreciate the simplicity of HEICS after initial training.

In summary, HEICS has proven to be a flexible and easily implemented system for disaster response that can be integrated into hospitals' disaster plans. It has a record of reliability and cost effectiveness. HEICS facilitates communication and coordination between hospitals and the many local, state and federal agencies typically involved in disasters. Physicians should familiarize themselves with HEICS while implementation continues across the nation, and in Rhode Island.

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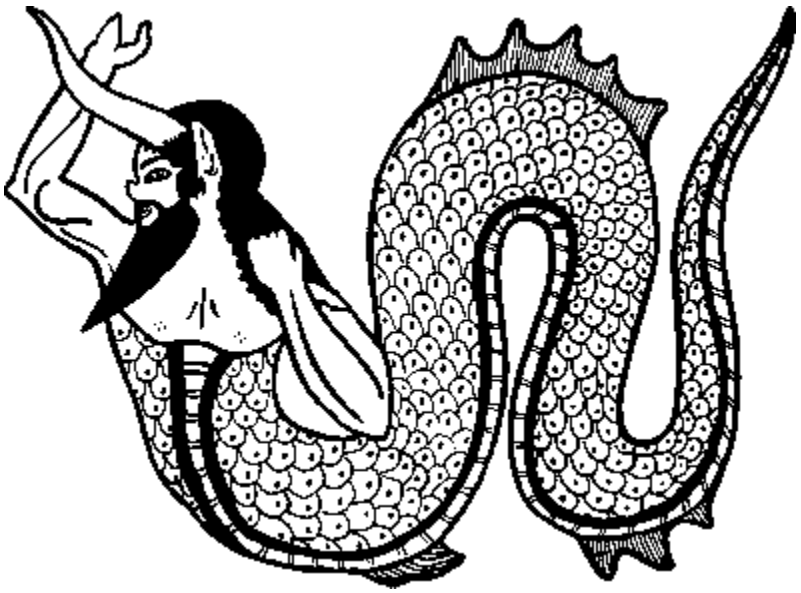


Disaster Medicine: The Potential Role of High Fidelity Medical Simulation for Mass Casualty Incident Training

Leo Kobayashi, MD, Marc J Shapiro, MD, Selim Suner, MD, Kenneth A Williams, MD

With a dramatic increase in highly visible and costly mass casualty incidents over the past few decades, disaster planning and preparedness now represent a prominent part of health care policy and practice. Apart from the upsurge in natural calamities that has accompanied population growth and dispersal as well as global climactic change, willful acts of mass destruction and indiscriminate injury have also cropped up at a disturbing rate. Consequently, significant effort has been directed towards improving the initial management of disastrous events through anticipatory and mitigatory interventions.

The study of disaster medicine, focusing on pre-event planning, emergent medical care and public health measures, has matured rapidly in the past few years through quantum leaps in networking, communications, and computer technologies. Examination of prior events and intercession with ongoing disasters has become much more sophisticated, timely, and pertinent. We now have the opportunity to apply hard-won knowledge to prepare for the next catastrophe.

Implementation of preventive, preparatory, and training protocols has been avidly recommended in the hope of minimizing the harmful consequences of these large-scale events.[1,2] Proactive educational exercises may also serve to lessen the loss of life, limb, and property.[3] Such measures may range from simple regular fit-testing of protective gear, to complex multifactorial computer simulations evaluating hospital bed availability in the event of a community-wide disaster.[4]

Current Disaster Training

Who needs to be trained?

For rescue workers potentially responding to mass casualty incidents, adequate training must be established, implemented, and maintained to ensure their safety, the optimal care of their patients, and the best interest of the public. In some form, these efforts should reach prehospital and hospital-based healthcare providers, law enforcement, fire department personnel, and disaster relief organizations (e.g. American Red Cross). Hospital, state and federal administrators need to be active participants in disaster education and become proficient in incident management, resource planning and allocation, and interagency coordination.

Computer-driven manikins cost $30,000 to $200,000 and are capable of verbal communication, accurate representation of physical exam findings (airway compromise, lung and cardiac sounds, pulses, etc), and physiologic responses to drug and treatment interventions.

Who thinks we should train?

With significant cost and effort, the US Department of Health and Human Servicesí Office of Emergency Response has developed a standardized Web-based program for all National Disaster Medical System (NDMS) field teams. The Department of Defense has been involved with a weapons of mass destruction (WMD) Domestic Preparedness Program for health care providers, but availability is limited.5 Several organizations, including the American College of Emergency Physicians (ACEP), have recommended the inclusion of disaster education in prehospital, nursing, medical school, residency, and post-graduate curricula.[2,6] Notably, the American Red Cross has developed a training center geared to prepare its workers for situations involving WMDs.

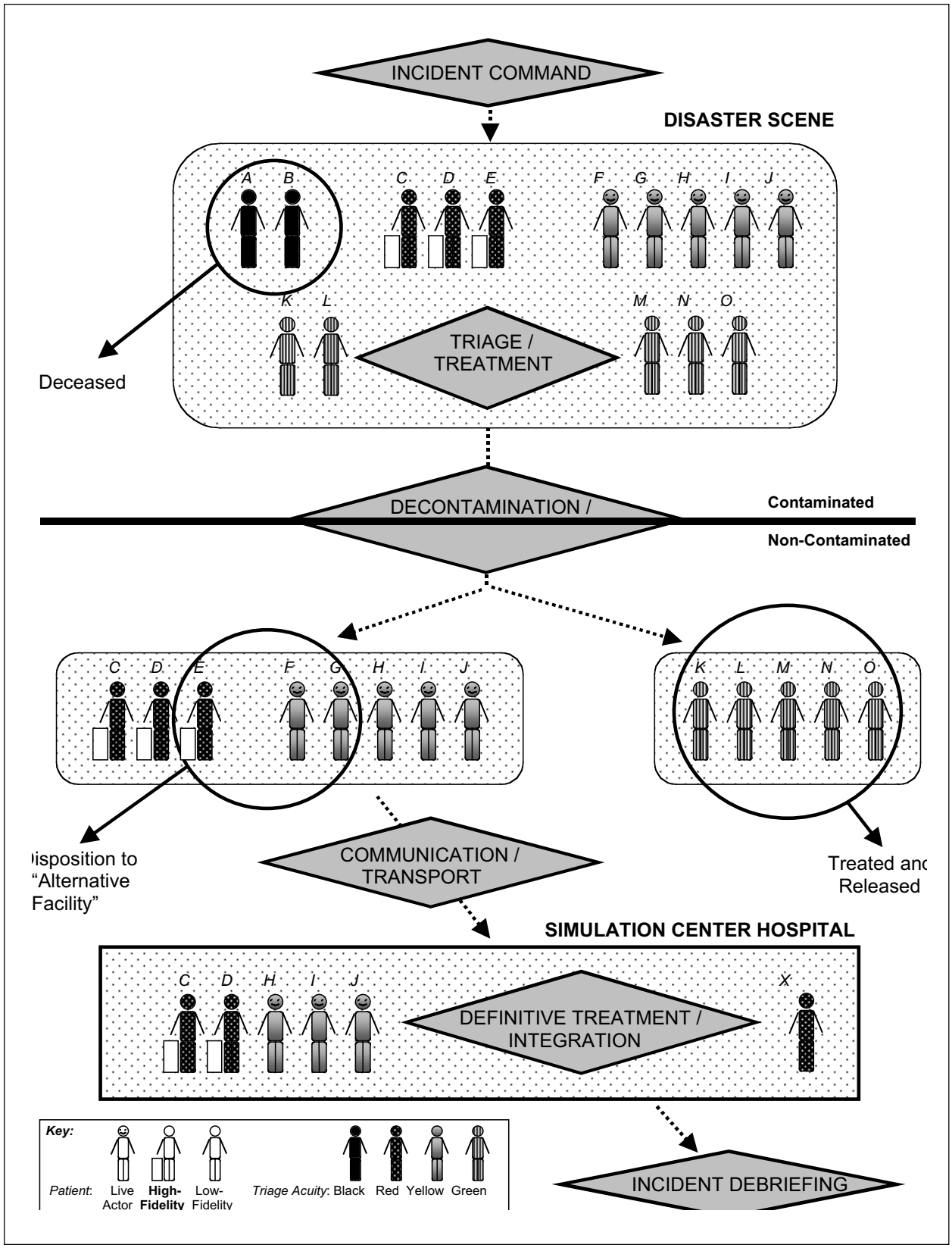
What needs to be taught?

Educational experiences for disaster responders must be accurate, thorough, relevant, and up-to-date. They need to impart a specialized medical knowledge-base and increase the interface with other agencies. Dissemination of key factual knowledge encompassing natural, bioweapon, chemical and nuclear hazards has to take place. Furthermore, the basic tenets of disaster management ñ triage, decontamination, communications, incident command, transport ñ have to be successfully conveyed. The ability to rapidly form multi-disciplinary work teams that communicate and function effectively has to be cultivated. Relevant areas of expertise generally beyond the scope of basic training are crisis psychology, tactical training, and hazardous materials (HazMat).

Adding to the complexity of disaster training is the need to teach specific and unique skill sets, which are uncommonly utilized, yet will need to be performed efficiently when the need arises. As no amount of training will be able to fully prepare for all contingencies, a flexible and dynamic approach to disaster response has to be encouraged. Finally, attrition of knowledge after training is to be expected, creating the need for ongoing training and refresher courses.

How do we currently train?

Lectures and seminars are a large component of any disaster curriculum. Emergency Medical Technician (EMT) courses at all levels incorporate presen-



tations covering the basic elements of disaster response. Emergency Medicine residencies would be expected to do the same, but attainment of such a goal is not uniform.[1] Already burdened with full schedules, medical and nursing schools rarely venture into the realm of disasters. Moreover, a recent ACEP task force analysis of available disaster-related courses for EMTs, nurses, and physicians found them unsatisfactory relative to expert panel-derived teaching objectives.[6] An effort by the Office of Emergency Response to create a uniform curriculum has led

Incident Command -coordination of HazMat, police and security for institution of Hot Zone perimeter
-establishment of upwind staging area, command hierarchy, and communications

Disaster Scene -15 victims scattered in parking lot outside City Hall (5 **bold** patients to be transported to hospital)

	age/sex	responsive*	airway/lungs	resps	pulse	heart rate	pupils	sim**
2 BLACK (dead or expectant dead)								
A.	54 f	U	secretions	0	absent	0	pinpoint	low
B.	52 m	U	secretions	2	absent	<10	pinpoint	low
3 RED (acute / immediate)								
C.	**45 m**	**U**	**secretions**	**26**	**weak**	**50**	**pinpoint**	**high**
D.	**32 m**	**P**	**vomiting**	**30**	**weak**	**40**	**pinpoint**	**high**
E.	36 f	V	secretions	30	weak	40	pinpoint	high
5 YELLOW (urgent, delayed)								
F.	**29 f**	**A**	**wheeze**	**26**	**strong**	**40**	**2mm**	**actor**
G.	**22 f**	**A**	**wheeze**	**26**	**strong**	**40**	**2mm**	**actor**
H.	**54 f**	**A**	**rhonchi**	**24**	**irregular**	**100**	**2mm**	**actor**
I	28 f	A	wheeze	28	strong	50	2mm	actor
J.	12 m	A	wheeze	24	strong	60	3mm	actor
5 GREEN (nonurgent)								
K.	48 m	A	clear	18	strong	80	3mm	low
L.	58 m	A	clear	20	strong	80	3mm	low
M.	45 f	A	clear	16	strong	60	2mm	low
N	33 f	A	clear	12	strong	58	5mm	low
O.	35 m	A	clear	18	strong	70	4mm	low

*"responsive" column indicates awake (A), responsive to verbal stimulation (V), responsive to painful stimulation (P), or unresponsive (U)
**"sim" column indicates whether victim is an actor, low-fidelity simulator (low), or a high-fidelity simulator (high)

Triage: -use of standard triage protocols to 'tag' victims and determine disposition
-initiation of basic life support (BLS) interventions to stabilize

Decontamination: -use of appropriate level of personal protective equipment (PPE)
-clothing removal from victims + showering / washing down
-minimization of further exposure

Treatment: -attempts at identification of toxic agent
-continuation of basic life support (BLS) / advanced life support (ALS) interventions

Communication: -effective communication within and between Hazmat, EMS, fire and police personnel
-effective communication between IC and personnel
-requests for further assistance as needed
-notification of receiving hospitals of incoming patients and status
-hospital disaster plan activation

Transport: -determination of victims to be transported, mode and destination of transfer
physical transfer of victims from field location to hospital setting

Definitive Treatment: -identification and management of cholinergic toxicity with atropine infusion / antidotes
-stabilization and ICU admission

Integration: -coordination of disaster care with standard medical procedures for following patients
2 RED high-fidelity manikins (2 controllers) and 3 YELLOW actors
1 non-disaster ACUTE low-fidelity manikin (1 controller) – 83y female, acute MI, unresponsive, intubated, in ventricular fibrillation with no pulses

Incident Debriefing: -small-group audiovisual-enhanced review of events and actions with moderators
-general discussion

to a novel Web-based course in disaster training, although access is limited to NDMS members.

A central activity in disaster training should be simulation. Disasters are chaotic, and the responses so multifaceted and necessarily labile, that recreating a calamitous event is a better way to teach, reinforce, and test concepts not readily transmitted by the lecture format. By constructing stressful situations that adjust and update themselves in real-time to participant decisions and actions, simulation can cultivate dynamic problem-solving for disaster management. In addition, teamwork and familiarity between personnel from various responding departments and agencies can be fostered during multi-disciplinary simulations.

The scale and nature of the simu-

lated disaster may vary from ìtable-topî computer re-enactments and field exercises with local, state, and federal agency interfacing, down to more moderately scaled disaster drills with cooperation between a few local units or departments.[7,8] Published accounts of recent large-scale exercises, such as the 1999 Wisconsin joint civilian-military field maneuver ìWake-Up Callî involving bioweapon terrorism and the multi-agency crisis administration and consequence management exercise ìTOP OFF,î are available.[9,10]

How does high fidelity simulation fit in?

As with any simulation, the higher the fidelity of the disaster exercise, the greater the immersion in the training experience. Current disaster simulations use actors and volunteers as well as low-fidelity manikins in the role of victim. Physician participation in the role of interactive ìsmart simulated casualtiesî who directly observe and debrief trainee rescue workers has been one method of enhancing simulation.[11] Low-fidelity manikins feature life-like form and surface features, can undergo life-support interventions such as intubation and CPR, but do not exhibit physiologic behaviors such as breathing or blinking. In contrast, invasive or dangerous interventions cannot be practiced on individuals portraying victims, albeit they may be fully interactive and ìrealistic.î

High fidelity medical simulation (SIM) technology can help overcome the obstacles and the resultant disconnect between preparatory exercise and actual incident. Fully programmable to display physiologic responses to injury and absolutely free of the restrictions inherent to live patient actors, SIM allows for ìpractice without riskî and greater verisimilitude.[12] SIM scenarios can bring the distressing, distracting sights and sounds of disasters and their victims to life, ultimately helping reconcile the theory with practice of disaster response. Taking care of a moaning, breathing, moulaged manikin with deteriorating vitals signs in a field setting while wearing a HazMat suit can only assist in improving the incident-readiness of rescue personnel.

High Fidelity Medical Simulation (SIM) Technology

What exactly is high fidelity simulation?

Simulation training is well established in other complex, high-risk industries such as aviation, nuclear power, and the military, all of which are regarded as high reliability organizations. Anesthesiologists pioneered the use of realistic high fidelity interactive patient simulators in the mid-1980s. However, only recently has simulation technology come into more widespread medical use, and its full potential for medical education has not been realized.

SIM allows for clinical scenarios using life-sized computerized patient manikins that respond in real-time to a variety of clinical interventions and pharmacologic agents, letting medical educators control situational learning. Computer-driven manikins cost $30,000 to $200,000 and are capable of verbal communication, accurate representation of physical exam findings (airway compromise, lung and cardiac sounds, pulses, etc), and physiologic responses to drug and treatment interventions. Realistic representations of actual treatment settings allow simulation participants to suspend disbelief and immerse themselves in the exercise.

SIM is currently used in various instructive settings to improve clinical decision-making and psychomotor skills, e.g. airway management and trauma resuscitation. Additionally, a role for SIM lies in the systematized reduction of medical error through teamwork and procedure training with instructive debriefing. The appeal of reproducible enactments embodying critical, stressful real-life situations, without risk of harm to patients or staff, is clear. Drawbacks such as the cost, operation, and maintenance of simulator facilities are not negligible; however, improved funding and national interest in disaster response after recent terrorist events may prove opportune. Extension of SIM training to the field of disaster medicine is logical and to be expected.

Integration of SIM Technology into Disaster Training

How do we integrate SIM technology to improve disaster training?

A disaster exercise outline is presented (see diagrams) to demonstrate how SIM technology may be integrated into responder disaster training, with the focus on the design and planning aspects of a proposed SIM implementation. Chemical agent exposure was chosen for its medical complexity, predilection towards interventions readily performed on manikins, opportunity for performance of rescue activities in personal protective equipment (PPE), applicability to WMD and accidental chemical releases, and the distinct possibility of disaster actualization. A just-published account of SIM-enhanced chemical warfare response education in Israel was instructive in conception of this proposal.[13]

The presence of SIM in this particular exercise should accomplish the following goals:

1. accurately simulate a WMD disaster with subsequent prehospital and hospital response to the exposure, specifically:
   - -incident command
   - -communications
   - -triage
   - -decontamination
   - -transport
   - -treatment
   - -resource management
   - -debriefing
2. provide clinical stimuli and generate a learning environment above and beyond what is attained with current disaster training
3. achieve maximal training with minimal risk to rescuers and "victims"
4. observe and record critical actions in real-time, then evaluate and debrief participants
5. allow participants to become familiar with SIM technology
6. fine-tune SIM technology for the special needs of disaster exercises

These are in addition to the stan-

dard objectives of an exercise not enhanced by SIM technology, namely to assemble multi-disciplinary teams for educational interaction and cooperation, to field-test and familiarize rescuers with communications equipment and PPE in the context of chemical WMD hazards, and to assess prehospital and hospital medical response to disaster conditions.

What is currently available in Rhode Island for SIM-enhanced disaster training?

The Providence-based Rhode Island Hospital Medical Simulation Center (RIHMSC) is composed of a simulation control room and simulator area, two trainee simulation-viewing areas, a conference room for audiovisual debriefings, storage and equipment rooms, and an office suite. The simulation area was designed to be flexible to accommodate multiple simultaneous simulations, recreate other patient care areas (e.g. operating room, intensive care unit, radiology suite), and conduct disaster exercises.

All aspects of actual hospital acute care areas, including triage and communications, resuscitation rooms, standard and advanced resuscitation equipment with medications, medical gases, and computer / imaging display capabilities, have been incorporated into the design. These can be configured to emulate prehospital triage and treatment stations as well. The audio-visual system consists of digital video recorders, viewing room video monitors for displaying patient data, wireless microphones for communication and individual participant recording, and an audiovisual editing setup to create educational materials for remote and off-line learning.

The RIHMSC utilizes SimMan (MPL/Laerdal) equipment and is capable of supporting five separately controlled computerized high fidelity manikins. The current setup includes a SimMan with fully computerized control and audiovisual interactive capability, in conjunction with an intubation and defibrillation-ready Laerdal ALS Skill trainer manikin. Scenarios involving multiple SimMan manikins have already been carried out successfully, and extension to disaster exercises engaging more than ten victims is within reach. RIHMSC is currently working with local disaster management agencies to realize a SIM-enhanced disaster simulation based on the suggested outline in this article.

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Biodefense: Medicine in the Time of Bioterrorism

Andrew W. Artenstein, M.D.

The idea that microbial agents or their toxins could be used as modern weapons of terror has been of grave concern to a small group of military, political and scientific leaders since details of the extensive Soviet and Iraqi bioweapons programs became known during the last decade of the twentieth century.[1,2] Since the terrorist attacks of September 11, 2001 and the anthrax attacks later that fall, however, bioterrorism has become a common topic, covered almost daily by the nation's media. This has engendered major changes in the landscape of medicine in the United States: numerous professional organizations and societies have developed educational resources, programs and websites for their members; medical schools have developed new curricula in bioterrorism; major shifts in research have occurred at academic centers, driven by the allure of expanded federal funding; industry has become interested in the rapid development of new, technology-based surveillance and diagnostic tools for epidemic infectious diseases. It is hoped that the national focus on bioterrorism will lead to the restoration of a robust public health system, one capable of responding to both intentional and natural threats. A recent survey from the Robert Wood Johnson Foundation reveals that an overwhelming majority of Americans believe that the public health system is vitally important in all of its activities and support increased federal funding to ensure its effectiveness.[3]

Anthrax: Lessons Learned, Future Threats

The anthrax attacks in the US in October and November 2001 resulted in 22 cases and 5 deaths.[4] Although the overall disease burden was low, the events placed significant stresses on a public health infrastructure that many believe had suffered from years of neglect and revealed our vulnerabilities to bioterrorism. Some important lessons were learned from the experiences with anthrax, lessons that can be generalized to other potential threat agents. Chief among these is that existing paradigms concerning bioterrorism must be continually re-evaluated. Fortunately, there have been few events from which to derive data.

Before October 2001, it had been widely held that major biological threat

Table 1. ABCs of Toxins

	Botulinum	Ricin	Staphylococcal Enterotoxin B	T-2 Mycotoxins	Nerve Agents (Sarin, VX, Organophosphates)
AWARENESS	**SOURCE** *Clostridium botulinum* **MECHANISM** Inhibition of neuromuscular transmission **ROUTE** Inhalation, ingestion via tainted food/water **SYMPTOMS** Fatigue, dizziness, dysphagia, dysarthria, diplopia, blurred vision, dysphnea, dry mouth **SIGNS** Clear sensorium; ptosis; tongue weakness; fixed, dilated pupils; dry, furrowed tongue; bulbar palsies; facial paresis; loss of gag reflex; respiratory muscle paralysis; skeletal muscle paralysis	**SOURCE** Castor plant bean **MECHANISM** Cytotoxin **ROUTE** Inhalation, oral exposure, intramuscular injection **SYMPTOMS & SIGNS** • **Inhalation** Fever, nausea, chest tightness, cough, nasal congestion, arthralgias, respiratory distress, airway necrosis, ARDS • **Ingestion** Nausea, vomiting, diarrhea, abdominal pain, GI hemorrhage, necrosis of GI epithelium, visceral organ failure • **Intramuscular Injection** Local pain and muscular necrosis, swollen local lymph nodes, visceral organ necrosis	**SOURCE** *S. aureus* **MECHANISM** Superantigen, induces cytokine cascade → shock state **ROUTE** Inhalation, ingestion **SYMPTOMS & SIGNS** • **Inhalation** Fever, chills, headache, myalgias, nonproductive cough, shortness of breath, retrosternal chest pain, nausea, vomiting, anorexia • **Ingestion** Nausea, vomiting, diarrhea, generalized abdominal pain, no fever, hypotension, myalgia	**SOURCE** Filamentus molds **MECHANISM** Cytotoxin **ROUTE** Inhalation, dermal contact, ocular, oral exposure **SYMPTOMS & SIGNS** **Dermal** (mins to hrs after exposure) Skin burning, erythema, blistering →necrosis, sloughing **Respiratory** Rhinorrhea, nasal itching, epistaxis, sore throat, dyspnea, cough, chest pain, hemoptysis, bronchospasm **Ocular** (mins after exposure) Eye pain, tearing, redness, blurred vision, foreign body sensation in eye **GI** nausea, vomiting, diarrhea, crampy abdominal pain, gastrointestinal bleeding **Systemic** Weakness, prostration, dizziness, circulatory collapse	**SOURCE** Chemically-synthesized **MECHANISM** Inhibits cholinesterase → excessive neurotransmission **ROUTE** Inhalation, dermal contact **SYMPTOMS & SIGNS** **Mild** Miosis, dim vision, rhinorrhea, ↑secretions, bronchospasm **Moderate** As above + dyspnea **Severe** As above + loss of consciousness, seizures, flaccid paralysis, fasciculations, apnea **DERMAL SYMPTOMS & SIGNS** **Mild** ↑ Sweating, fasciculations at site **Moderate** As above + nausea, vomiting, diarrhea **Severe** As above + copious secretions, loss of consciousness, seizures, flaccid paralysis, apnea
	CLINICAL PRESENTATION DEPENDS ON ROUTE OF EXPOSURE; SYMPTOMS MAY OVERLAP DUE TO CONCURRENT ROUTES OF EXPOSURE				
BE ALERT	EPIDEMIOLOGICAL CLUES • Case clustering: Time & location • Common source exposures: Food sources, events/gatherings, geographic CLINICAL CLUES • Rapid onset of symptoms • Multi-system involvement • Dermal and/or ocular involvement • Progressive, fulminant disease in healthy people				
CONTROL	**INCUBATION** **Inhalation** 12-60 hours **Ingestion** 12-36 hours **TRANSMISSION** No person-to-person **TREATMENT** 1) Antitoxin available from CDC, useful early in course 2) Supportive care and symptomatic RX **DECONTAMINATION** **Patient** Not dermally active **Environment** Destroy contaminated food/water; household bleach for fomites **INFECTION CONTROL** Standard precautions	**INCUBATION** 4-8 hours **TRANSMISSION** No person-to-person **TREATMENT** 1) No specific RX 2) Supportive care and symptomatic RX **DECONTAMINATION** **Patient** Not dermally active **Environment** Household bleach for fomites **INFECTION CONTROL** Standard precautions	**INCUBATION** 3-12 hours **TRANSMISSION** No person-to-person **TREATMENT** 1) No specific RX 2) Supportive care and symptomatic RX **DECONTAMINATION** **Patient** Not dermally active **Environment** Destroy contaminated food/water; household bleach for fomites **INFECTION CONTROL** Standard precautions	**INCUBATION** Minutes to hours **TRANSMISSION** Dermal contact **TREATMENT** 1) No specific RX 2) Supportive care (standard burn care for skin, standard RX for poison ingestion; eye irrigation as indicated) **DECONTAMINATION** **Patient** Soap and uncontaminated water for skin **Environment** Remove clothes as biohazard →bleach; household bleach for fomites **INFECTION CONTROL** Contact precautions until decontaminated, then standard	**INCUBATION** **Inhalation** Seconds to minutes **Dermal Contact** Seconds **TRANSMISSION** Dermal contact **TREATMENT** 1) Atropine + 2-PAM 2) Diazepam for seizures 3) Supportive care and symptomatic RX **DECONTAMINATION** **Patient** Removal from source; dilute bleach or large volume water flush for skin **Environment** Remove clothes as biohazard → bleach; household bleach for fomites **INFECTION CONTROL** Contact precautions until decontaminated, then standard

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agents would be delivered via large scale aerosolization. While this is still the most likely scenario in a massive bioweapons event, the anthrax attacks illustrated that smaller-scale events can still result in significant economic and psychosocial impact utilizing such primitive delivery devices as letters carried by the U.S. postal system. A variety of other "low tech" methods to deliver agents of bioterrorism have been discussed in the literature and must be considered in public health response planning.

Other new findings continue to emerge from the aftermath of the anthrax attacks. Weis et al. recently reported that indoor, secondary aerosolization of anthrax spores in the Hart Senate Office Building occurred during such routine office activities as paper handling and patting desk chair cushions after the anthrax exposures in that location.[5] These data suggest a higher risk than was previously predicted, largely based on the scarcity of earlier data,[6] again serving as a reminder that our medical systems will have to revise and implement bioterrorism response plans based on evolving information. As was learned during the events of last fall this not only impacts the assessment of exposure risk, prophylaxis and therapeutic delivery, but it also affects the way these messages are communicated to the general public. Uncertainty is a predictable accompaniment of such events. Additional information gleaned from the events of 2001 will help to inform the public health and medical response to future threats. However, we must accommodate our thinking to the harsh reality that definitive, new data about anthrax or other agents of bioterrorism may only emerge during future events. Clearly, our medical response planning cannot await future events. We will need to anticipate potentialities when planning for a broad array of contingencies.

The Clinician's First Role: Early Recognition

An important tenet in the response to bioterrorism, yet an equally vexing problem, is that of early recognition. This is hampered by multiple factors: 1) clinical illnesses due to bioterrorism will likely be manifest in the absence of a known release event; 2) the extent of pathogen exposure will be difficult to discern without specific information about the circumstances surrounding the release, information that is unlikely to be readily available; 3) initial symptoms of many of the syndromes associated with bioterrorism are non-specific and difficult to distinguish from more common diseases, especially within the group of respiratory infections.[7] Further complicating the latter is that the laboratory manipulation inherent in bioterrorism raises the specter that the diseases may present with atypical clinical features, in settings where even the classic clinical features of these uncommon infections are difficult to diagnose.

Clinicians must recognize that any single case of botulism could represent a manifestation of bioterrorism or could signal a warning of a naturally occurring epidemic.

Early recognition of bioterrorism may be facilitated by certain epidemiologic and clinical clues. Case clustering of common syndromes; unusual patterns of disease, especially following common source exposures; or the occurrence of geographically-limited diseases outside of their endemic zones should raise the possibility of a bioterrorism event. The recent focus on bioterrorism has had the desired effect, at least in the short term, of keeping these possibilities foremost in the minds of clinicians. A plethora of resources are now available to aid physicians in the differential diagnosis of diseases associated with bioterrorism.[8] The key issue is to consider the possibility of bioterrorism when evaluating certain presentations of clinical illness.

Botulism and Other Threats

Another important caveat regarding bioterrorism is that the list of potential threat agents is long and ever-expanding. While the anthrax attacks of 2001 resulted in a flurry of educational initiatives concerning anthrax and other respiratory pathogens, the potential threat of smallpox has dominated discussion since that time. Issues surrounding smallpox vaccination will be covered in the September issue of Medicine & Health/Rhode Island. An area that has received relatively less attention recently, but one of clear importance, is toxin-induced bioterrorism. Toxin-induced disease may be associated with a variety of

Table 2
BIOTERRORISM WEB SITES

John Hopkins Medicine: Center for Civilian Biodefense Strategies
http://www.hopkins-biodefense.org/

Institute for Homeland Security
http://www.homelandsecurity.org/

St. Louis University School of Public Health: Center for the Study of Bioterrorism
http://www.slu.edu/colleges/sph/csbei/bioterrorism/

UCLA School of Public Health: Department of Epidemiology
http://www.ph.ucla.edu/epi/bioter/bioterrorism.html

University of Minnesota: Center for Infectious Disease Research and Policy
http://www.cidrap.umn.edu/cidrap/content/bt/bioprep/

Medline Plus Health Information
http://www.nlm.nih.gov/medlineplus/biodefenseandbioterrorism.html

E-Bioterrorism.com
http://www.e-bioterrorism.com/

Infectious Disease Society
http://www.idsociety.org/BT/ToC.htm

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clinical presentations (Table1); botulism represents a classic example.

Botulism is an acute neurologic disease resulting from intoxication with *Clostridium botulinum* that occurs sporadically and in focal outbreaks throughout the world due to bacterial contamination of food and wounds. However, Iraq produced massive quantities of weaponized *C. botulinum* and loaded them into warheads during the first Gulf War. [There is no evidence it was released.] Some experts believe that there are significant technical constraints in its use as a strategic bioweapon on the battlefield; however, it could be used with significant morbidity and mortality in civilian populations.[2]

Botulinum toxin, considered to be among the most toxic molecules known, acts by inhibiting acetylcholine release, thereby blocking neurotransmission across presynaptic vesicles.[9] The disease presents as an acute, afebrile, symmetric, descending flaccid paralysis. Symptoms typically begin in the bulbar muscles with diplopia, dysphagia, dysarthria, ptosis, tongue weakness and facial muscle paresis. Progression typically involves respiratory muscles leading to neuromuscular respiratory failure. Sensation and cognition typically remain intact. The differential diagnosis includes myasthenia gravis, brain stem cerebrovascular accident, chemical intoxication and Guillain-Barre syndrome variant. The diagnosis is largely clinical; laboratory confirmation requires the use of a mouse bioassay. Treatment is largely supportive and may necessitate prolonged mechanical ventilation. While modern methods of support have resulted in substantial reductions in the mortality associated with botulism, a large-scale event or multifocal, simultaneous, smaller events related to bioterrorism and involving botulism could rapidly overwhelm hospital resources.

Clinicians must recognize that any single case of botulism could represent a manifestation of bioterrorism or could signal a warning of a naturally occurring epidemic. In practical terms the differences in the public health and medical response may only be slight and largely involve magnitude. In either case one would anticipate that available surveillance systems would be primed and would incorporate methods for rapid, real-time communication over a national network. Other agents of bioterrorism, including plague and tularemia can occur as natural outbreaks in this country, but in the current climate, a worst-case scenario (from a public health standpoint) may have to be assumed until a full epidemiologic investigation rules out bioterrorism.

The Duality of Biodefense

The technology used for the production of bioweapons is considered "dual use," i.e. it can serve legitimate purposes such as vaccine or pharmaceutical production as well as sinister purposes. This property stymied United Nations inspectors in the past[2] and is expected to be a problem in the current round of inspections. This concept of "dual use" is central to both bioterrorism and biodefense. For the latter, this feature may prove beneficial in preparing our public health system for response.

The economic realties of preparing the public health system for bioterrorism are so enormous that they can only be borne if the revamped system functions effectively in all modalities, i.e. meets the day-to-day public health needs of society as well as the more extreme demands required in the response to public health disasters such as bioterrorism and epidemic disease. Americans expect that their public health infrastructure will be prepared to deal with the full gamut of issues, from childhood vaccination campaigns to emerging pathogens such as SARS and West Nile virus to a bioterrorism event.[3]

Because many of the potential bioterror threat agents can occur as natural outbreaks, a robust biodefense system will be, by definition, dual use. Additionally, we continually face public health threats from emerging infections, not only new ones, but also recurring problems such as epidemic influenza. The surveillance and communication systems, clinical networks, and therapeutic initiatives put into place during biodefense planning will serve all aspects of the public health mission. The threat of bioterrorism has galvanized our medical response planning and should inform the full spectrum of biodefense. The beneficiary of this will be the nation's public health system.

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Emergency Department Design After 9/11/2001

By Robert Woolard, MD, Melisa Lai, MD, Marc J. Shapiro, Leo Kobayashi, MD, Gregory Jay, MD, PhD, Selim Suner, MD, MS, FACEP, Kenneth Williams, MD, FACEP, Francis Sullivan, MD

Hospitals have an opportunity to design new emergency departments every 10 to 20 years. The main concerns of **Emergency Department (ED)** design are to provide efficiency and space for routine levels of care and peak volumes. ED designs must accommodate specialized care; pediatric, cardiac, trauma, geriatric or stroke care depending on the community needs and hospital specialization. Designs allow prioritization of care into critical, emergent and urgent treatment. Finally ED design must allow access to the community for disaster and other mass casualty needs.[1,2] Most EDs are re-designing to meet disaster needs. For the most part, they "retrofit" a decontamination area to their existing ED. After 9/11/01, hospitals have the challenge to design EDs that can better meet needs generated by the impact of terrorist attacks.

Reacting to concerns about **hazardous material exposures (HAZMAT)**, many EDs have included a small series of rooms off an outside entrance to allow for decontamination of a single or a few victims exposed to hazardous materials. Some more recent designs have included the capacity to hose down a large number of victims outside the ED in inflatable tents or covered areas. Recent events chellenge ED planners to build EDs to meet the needs of victims of events triggered by weapons of mass destruction.

We have learned some ED Design lessons from recent **weapons of mass destruction (WMD)** events. From the Tokyo Sarin gas event and subsequent vulnerability analyses we know we must build more surge capacity. Better methods of alerting ED staff to contamination potential and protecting emergency care providers should be built into EDs by design. From the NYC World Trade Center event we know we must add a capacity to respond out to a disaster scene and continue to meet a sustained volume over a prolonged period. In NYC the "clean up" phase after the event was prolonged and most care was provided close to ground zero outside the ED. From the Anthrax mailings we know we must address public reactions and screening needs. Since the EDs remain the most accessible healthcare sites in US medical systems, we should anticipate increased volumes of patients during and after any WMD or disaster-related event. The ED will also get overflow from other providers including public health, psychosocial and primary care providers. While post-traumatic stress, information and health screening needs should be accomplished outside the ED, the ED will need to provide counseling information and screening when other services are overwhelmed. Fortunately, in most disasters, shelter needs can and most appropriately will be met outside the ED.

The greatest post 9/11 challenge is to provide "surge capacity" to meet potential, anticipated WMD needs while the vital services of the ED continue.

ED design after 9/11/01 has become a larger concern of the federal government. A federally funded effort is underway, coordinated by MedStar (Washington Hospital Center) to develop recommendations for ED design that meet these new needs. Their focus is to suggest designs for new EDs that address health needs that could arise in the event of a WMD event. Few of the recommendations of this ED design project for "ER1," have been released. Updates are available at www.er1.org.[3]

We hope ED designers will create "all risks ready" emergency departments using the suggestions of ER1. Their idea is to incorporate the surge capability to handle biological and chemical threats as well as large numbers of injured patients in much larger EDs. When we build urban emergency departments such as the new ED at RIH (to be completed in 2005), it should be built with the capacity to serve as a **Southeastern New England (SENE)** regional resource in the event of a disaster.

New facilities should have physical design and infrastructure to meet requirements driven by WMD scenarios, such as the space to increase treatment capacity, accomplish anticipated tasks and perform decontamination procedures. Information systems should be available to provide real-time point of service information and any needed "just in time" training. ED and pre-hospital staff cannot be expected to have immediate knowledge of all possible terror related biological, chemical, nuclear and conventional weapons. However, the technology needed to respond to WMD, such as personal protective garments and respirators, should be available both in the field and at the ED. The information needed to use the technology should also be immediately available. Large volumes of patients may be generated and should be anticipated from disasters such as a terror event. ED design solutions must be devised to handle these large volumes without major interruptions of lifesaving critical ED care.

Clearly the new EDs must primarily function day-to-day as emergency departments, chest pain centers, stroke and trauma centers. They must also have the capability to handle consequences of a terrorist attack or natural disaster. Trauma centers offer an example of a national and regional network that could expand to become a disaster network as well. Some capacity to handle an inpatient surge volume must be addressed as well as the pre-hospital and ED surge of victims.

Fortunately, with careful planning large spaces can be reserved for contingency ED operations. For example, a garage under or adjacent to an ED could provide additional space during disaster operations. Thus, a new facility could have the capability of handling large surges of patients presenting for care by annexing garage or other adjacent space.

The management of multitude casualties under unusual conditions must begin at point of contact, triage areas, ambulance and public entry points. Previous disaster planning efforts have assumed that victims will be contained, treated and triaged from a disaster scene. Real events suggest that many victims will "appear" at EDs. Individual ED staff (security, nurses, clerks, etc.) cannot be expected to know beforehand the nature of the WMD or disaster event. Even when forewarned they may not recall fully and immediately the pertinent information critical to the particular disaster response. Information access must be built into multiple sites in any new ED facility. Simply worded disaster protocols must be available by computer, telephone, etc.

Investigators from ER1 and the Rhode Island Disaster Initiative are studying responses to a variety of chemical and biologic warfare agents. They are planning and testing new technologies for detection surveillance, disaster communications and informatics. Better addressing psychological health, security, toxic materials, and mass casualties will require innovations in ED design. Recommendations from these experts will further inform the design of new EDs. The aspects of ED design that must be "rethought" include surge capacity, flexibility, decontamination, information needs and security.

Rethinking the Surge Capacity of an ED

The number of routine treatment spaces in an ED is planned to match patient volume, roughly 1/1100 ED annual visits or 1/400 ED hospital admissions is recommended.[1] In addition to routine treatment spaces, procedure areas, critical care and resuscitation areas, and other specialized areas for psychiatric or sexual assault evaluation must be built to provide those services. The greatest post 9/11 challenge is to provide "surge capacity" to meet potential, anticipated WMD needs while the vital services of the ED continue. Hospitals are woefully overcrowded and EDs are routinely housing admitted patients.[4,5,6] Daily volume excess and decreased spending on building hospital bed capacity means that surge capacity must be addressed in the ED and pre hospital environments as well as the hospital.

The design of a post 9/11 ED must allow a complete ED "lock down" for security purposes, to protect health care providers and patients.

Rethinking Structure, Flexibility and Modularity

New EDs should choose a site and structure that allows "growth" into adjacent space, opening a ground level or an upper level, using a garage or expanding into a parking lot. Garage and parking lot space may be most expedient. Often garages and parking lots have access from streets separate from the ED entrance, allowing separation of disaster traffic and ED traffic. Needed WMD response supplies (antidotes, respirators, personal protective gear, etc.) can be stored in the ED or garage facility for deployment when needed. Ventilation, heat, air conditioning, communication, security and access can be built into a garage, and also brought into tenting over a parking lot. A modular "second ED" with collapsible walls (which fold and stack) and flooring panels, could be housed in a garage and unpacked in modules or a system of tents erected to provide surge capacity and meet disaster needs as they grow. More capacity to provide minor and routine care could easily be made available in these new areas. Critical care would most likely remain in the main ED. General access could be preserved in the ED with most disaster victims using the newly opened "surge" space. According to ER1, a major urban trauma center ED built for 100,000 visits per year should have surge contingencies to handle 100 patients per hour for up to four hours and up to 1000 patients per day for up to four days. To address these needs ED designers should plan modularity and flexibility into the use of adjacent spaces. Depending on the WMD scenario anticipated, as many as 40,000 square feet could be needed near the ED.

Rethinking Decontamination and Isolation

Decontamination areas must be adequate to meet expected surges. An uncovered parking lot with heated and vented modular tent units, and modified sprinkler systems could meet most needs for mass decontamination. While mobilizing these systems to decontaminate victims at the scene should be part of the WMD and HAZMAT plan, many victims may come to EDs needing decontamination. An uncovered parking area should be accessible to both the ED and become part of the disaster response area. Underground holding tanks near the tents and at the lowest points of the parking lot could trap hazardous waste. Filtered modular ventilation and water supply should help isolate biohazards.

Rethinking Information Needs

The variety of WMD scenarios argues for a strong emphasis on flexibility, adaptability and immediate "just in time" information access. While information is available and many ED staff have attended courses, immediate correct response is not assured. Multiple computer screens throughout the ED and at remote areas (e.g. parking lot attendants), cellular links and/or wireless portable devices should broadcast messages and be open for staff to access further information needed immediately and specific to the individual staff role.

An example of unanticipated needs is the anthrax mailings and the public hysteria, which taxed the

healthcare system. Post traumatic stress, anxiety and public concern over possible exposure to a biological, chemical, or nuclear agent will generate a surge of minor patients at emergency departments. A post 9/11 ED should be configured to open modules to allow public access for screening and counseling. A media center within the ED could provide health information and media briefings. The media have become the public informers and should be part of any disaster plan. Internet releases from this center in the ED could be displayed on close circuit screens outside and within the ED. This information could allay public concerns and direct the public to appropriate resources and access points.

Rethinking Security

The design of a post 9/11 ED must allow a complete ED "lock down" for security purposes, to protect health care providers and patients. Three units should be considered from a security prospective; the ED, the disaster response area (parking garage or other adjacent space) for surge capacity and the decontamination area (usually a parking lot). Access points to all buildings and parking entrances will need to be sealed by barriers with electronically operated locks to allow ambulance access. Access within the ED treatment areas and from ED to operating rooms, critical care units and other hospital buildings will also need to be controlled with a system of locked barriers to prevent contamination patients, staff and the public. In particular, access into the grounds around the ED should be carefully planned. Ideally, in an isolated ED disaster response and decontamination area bordered by streets and a wall with scale deterrent fixtures would limit access. Plantings within the perimeter could render such a barrier aesthetically neutral. All access points, the ED, hospital interior, disaster areas and the parking lots should be monitored by closed circuit video. Guard stations should be "biosafe", multiple and strategically placed. Most would be unmanned until required during a WMD event.

Conclusion

Plans for EDs built after 9/11 will continue to be informed by the experts at **Rhode Island Disaster Initiative (RIDI)**[7] and ER1. As RIDI, ER1 and other expert panels make recommendations and as technology progresses and becomes more widely available, the builders of any new ED will have the opportunity to adjust and improve their preparedness. As always our hope is that WMD events never happen, but after 9/11 we muct be prepared for terror-related disaster scenarios. The rarity of WMD events creates a need for us to test our disaster plans, skills and capacities in drills. New EDs should be made "drill-ready" by design.

Why pour such resources into building capacity that we hope never to use? Among the lessons learned from recent WMD events is the need to develop disaster skills and disaster response systems that are in daily use. Certainly the surge capacity of a post 9/11, "disaster ready" ED would be used for natural disaster response and disaster drills. The surge space could also be used for public health events, such as mass immunizations, health screening, and wellness events. Systems that are used are more familiar and more likely to be deployed during the real event. A post 9/11 ED should serve as a community resource and deploy its capacities regularly to support other community projects, thus maintaining "readiness" and being of greater value to the community even in the absence of a disaster event.

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Rhode Island Disaster Initiative

Kenneth Williams, MD, Selim Suner, MD, Francis Sullivan, MD, Robert Woolard, MD

The **Rhode Island Disaster Initiative (RIDI)**,[1] is a federally funded research project focused on improving emergency medical response 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. Project planning began in 1999, and congressional funding was released early in September 2001. There are three RIDI project phases. In phase 1 we determined the extent of current knowledge, assessed vulnerabilities, and planned future activities. In Phase 2 we will perform a series of disaster drills, testing equipment and response. In Phase 3 we will demonstrate best practices for disaster response. In this article we report on Phase 1.

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 receive 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.

Readiness and Vulnerability Assessment

The RIDI investigators define 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 are embarrassingly common and recurring.

Disasters can overwhelm local ability for rescue and recovery. Worldwide and nationwide, disasters are common. However, because they are widely distributed geographically, individual EMS systems and EDs infrequently experience a disaster. Consequently, many systems are not ready to respond to a disaster. 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 threatening 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

Table 1. Disaster Management Websites

Health RI, Bioterrorism Preparedness Program:
http://www.healthri.org/environment/biot/home.htm

Rhode Island Disaster Initiative:
http://www.ridiproject.org/

CDC, Public Health Preparedness and response:
http://www.bt.cdc.gov/

United States Army Medical Research Institute of Infectious Disease:
http://www.usamriid.army.mil/education/instruct.html

Center for Civilian Biodefense strategies:
http://www.hopkins-biodefense.org/index.html

Disaster Help:
http://www.disasterhelp.gov/

Federal Emergency Management Agency:
http://www.fema.gov/

personnel, hospital beds, ambulances, police cruisers, and **hazardous material** (**HAZMAT**) response teams 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 aid because they are unable to handle routine increases in patient load. EDs frequently request ambulance diversion because of overwhelming patient loads and full hospitals.

The **Emergency Management Planning Group** (**EMPG**) conducted a second type of vulnerability assessment.[2] While the first obtained broad information such as total resource numbers, the

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.

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.

Literature Review

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 .[1] The literature abounds with case reports from disaster events.[3] A subset of the literature describes proposed solutions.[4] Many recent articles, web sites, (Table 1) 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[5] 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.

Surveillance Technology Evaluation

Three surveillance technologies were considered as potential solutions to a known lack of an online "early warning" system; remote radio monitoring, ED activity monitoring and ED 911 volume surveillance.

Radio Monitoring

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.

Automatic Monitoring of Emergency Department Activity

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 ac-

tivity. 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 Computerized Surveillance

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.

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. Therefore, a variety of other formats will be further explored during Phase 2.

Readiness Expert Panel Discussions

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 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 Expert Discussions

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.

Summary

In summary, RIDI is a multi-year research project to identify and develop solutions to some of the challenges posed by disaster response, with a focus on WMD incidents. 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 will carefully and progressively test 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 improve-

ments 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.

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DISCLAIMER:

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the Office of Naval Research.

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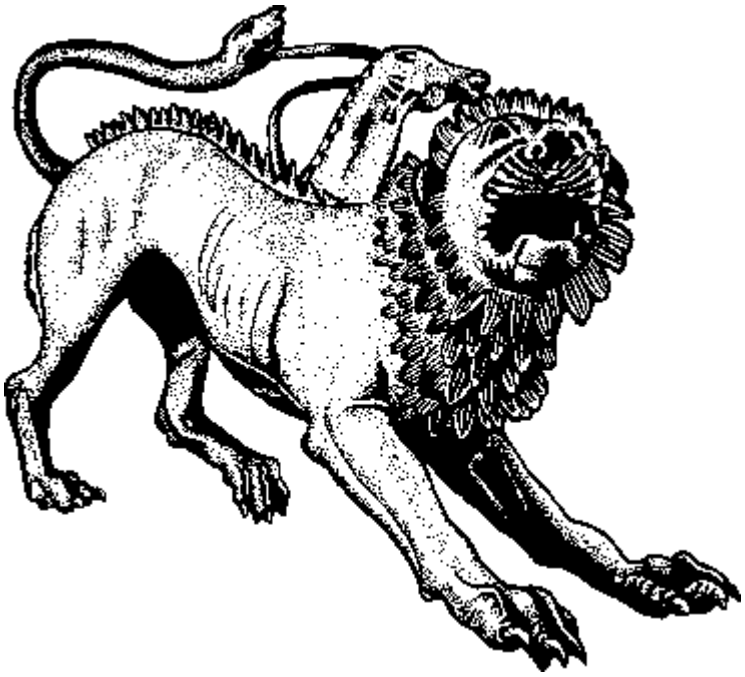

CME Background Information

This CME activity is sponsored by Brown Medical School.

Target Audience: This enduring material is designed for physicians licensed in Rhode Island.

CME Objectives: At the conclusion of this course, participants should be able to:
* discuss the Hospital Emergency Incident Command system
* describe the role of high fidelity medical simulation for mass casualty incident training
* list threats posed for biodefense by anthrax and botulism
* list the features of emergency department design in the post-9/11 era
* list key features of the Rhode Island Disaster Initiative

Needs Assessment: In the wake of terrorist events, both here and abroad, physicians must understand the current disaster preparedness system, as well as efforts needed to improve that system.

Accreditation Statement: Brown Medical School is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

Credit Designation: Brown Medical School designates this activity for a maximum of 2 category 1 credits towards the AMA Physician's Recognition Award.

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Keep a copy for your files. Keep a copy of the answers for your files. Compare them with the correct answers, which will be made available upon request, and receipt of submission requirements.

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Please evaluation the effectiveness of the CME activity on a scale of 1 to 5 (1 being poor, 5 being excellent) by circling your choice.

1. Overall quality of this CME activity	1	2	3	4	5
2. Content	1	2	3	4	5
3. Format	1	2	3	4	5
4. Faculty	1	2	3	4	5
5. Achievement of educational objectives					
* discuss the Hospital Emergency Incident Command system	1	2	3	4	5
* describe the role of high fidelity medical simulation for mass casualty incident training	1	2	3	4	5
* list threats posed for biodefense by anthrax and botulism	1	2	3	4	5
* list the features of emergency department design in the post-9/11 era	1	2	3	4	5
* list key features of the Rhode Island Disaster Initiative	1	2	3	4	5

Please comment on the impact that this CME activity may have on your practice of medicine.

_____

_____

Additional comments and/or suggested topics for future CME activities.

_____

Disaster Preparedness CME Questions: *Circle One Response for Each Question.*

1. HEICS
   a. Is only used for Prehospital command and control.
   b. Was first developed by California's Orange County EMS.
   c. The features of HEICS confers adaptability for use in many different health care settings.
   d. B&C.
   e. All of the above.

2. HEICS can only be used:
   a. At major medical institutions.
   b. By Prehospital personnel.
   c. For environmental disasters.
   d. In response to earthquakes.
   e. None of the above.

3. Major features of HEICS are:
   a. Predictable chain of command
   b. Applicability to varying types of disasters.
   c. Common terminology to promote communication.
   d. Flexibility and cost effectiveness.
   e. All of the above.

4. Which of the following are crucial elements of disaster response that need to be incorporated into a meaningful educational program for potential rescue workers facing terror related events?
   a. incident command
   b. communications
   c. decontamination
   d. medical knowledge of terror related agents
   e. all of the above.

5. What are educational advantages of implementing high-fidelity simulation in disaster training compared with current disaster exercises?
   a. less realistic disaster enactments allowing for reduced cost and less organizational planning
   b. perfect disaster reenactments and scenarios allowing for abandonment of all other disaster medicine educational programs
   c. an integrated learning experience with improved realism of patient clinical care, need for real-time interactive communications, fostering of teamwork, field-testing of responder equipment, and capacity for in-depth debriefing
   d. even though disaster medicine is amenable to high-fidelity simulation techniques, there are no educational advantages in implementing them in disaster training
   e. disaster medicine is not amenable to high-fidelity simulation techniques

6. Early, clinical recognition of illness due to bioterrorism is hindered by all but one of the following:
   a. there may not be an overt release event
   b. symptoms and signs of such illnesses may be non-specific
   c. these illnesses are quite common in the U.S.
   d. disease caused by bioterrorism may not present in classic fashion
   e. surveillance systems are poorly developed across the US

7. Common signs and symptoms of botulism include all but one of the following:
   a. ptosis
   b. bulbar palsies
   c. dysphagia
   d. paresthesias
   e. airway compromise

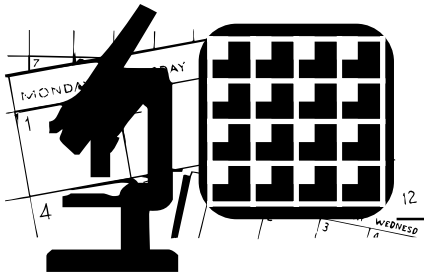
8. The anticipated most accessible point of medical care for terror related disaster victims is thought by RIDI and ER1 experts to be
   a. primary care office.
   b. department of health.
   c. emergency departments.
   d. local fire/rescue stations.
   e. field hospitals erected by national guard or NDMS

9. Concerned physicians should prepare for potential terror related disaster event by
   a. participating in local and regional disaster drills
   b. identifying sources of up to date medical information
   c. reading their hospital and community disaster plan
   d. all of the above
   e. none of the above

10. WMD disaster planners such as RIDI and ER1 experts are developing scenarios involving what surge rate?
    a. at peak 100 patients/hour for 4 hours and 500 patients/day for 5 days
    b. at peak 50 patients/hour for 5 hours and 1000 patients/day for 10 days
    c. at peak 100 patients/hour for 4 hours and 1000 patients/day for 4 days
    d. at peak 500 patients/hour for 1 hour and 5,000 patients/day for one day
    e. 10,000 patients over a week

11. Readiness is:
    a. Saying that something can be done.
    b. Best assessed through estimation of assets.
    c. The demonstrated ability to perform a specified task in a timely manner.
    d. Improved through occasional use of arcane policies.
    e. Assured through complex plans.

12. A major disaster response vulnerability in Rhode Island is:
    a. Lack of surge capacity in the medical system.
    b. Recurring challenges in disaster response such as communications difficulties and uncontrolled medical response.
    c. Disaster plans that do not expand upon daily operations
    d. All of the above.
    e. B and C only.



First Case of West Nile Infection in Rhode Island

Haris Mirza, MD, Shimae Cross, Maria Mileno MD

A 66 year-old woman presented to a RI community hospital on September 24th, 2002 with a chief complaint of fever and headache. The patient had been in her usual state of health until 3 weeks prior to admission when she began to experience weakness, anorexia and myalgias. Ten days prior to admission she also developed fever, nausea and occasional neck pain. Three days prior to admission her condition worsened with the new onset of headache and photophobia. Past medical history was non-contributory

The patient lived in Providence county, Rhode Island. She denied any overseas travel, but had traveled within New England. From August 25th to September 3rd, she had vacationed at a southern Rhode Island beach community, where she remembered getting bitten by mosquitoes. Just prior to admission she was bitten by mosquitoes during a visit to a nearby town in Massachusetts.

On the initial physical exam, the patient's vital signs were normal apart from a temperature of 100°F. She had prominent neck stiffness and enlarged lymph nodes in her right axilla and bilateral anterior cervical chains. Her exam was otherwise normal. Peripheral blood testing revealed 6.6k/Ul **white blood cells (WBC)**'s (65% neutrophils, 25% lymphocytes and 9% monocytes). The **cerebrospinal fluid (CSF)** from the lumbar puncture was clear with 15 **red blood cells (RBC)**'s, 30 WBC's (81% Lymphocytes, 13% Monocytes and 6% Neutrophils), glucose of 60mg/dl (serum glucose of 97) and protein of 50mg/dl. Testing of the CSF for Lyme disease by **enzyme-linked immunosorbent assay (ELISA)** and PCR for HSV 1 and 2 were negative. **Computed tomography (CT)** scan of her sinuses and a **magnetic resonance imaging (MRI)** of the brain showed no abnormalities.

Throughout her hospital stay, the patient continued to have moderate to severe temporoparietal headaches and occasional drenching night sweats. She showed gradual improvement in her neck stiffness and photophobia. The patient was discharged on hospital day 5. Her ELISA of serum and CSF were positive for West Nile directed IgM. A subsequent plaque reduction neutralization antibody test confirmed the WN infection, with a P/N(positive/negative control) value of 11.53 for serum and 12.07 for CSF.(Range P/N <2.0 un-interpretable, P/N 2-2.99 equivocal, P/N> 3.0 positive)

After discharge, night sweats and weakness persisted for several weeks. These symptoms slowly improved. As of this writing she has recovered completely.

EPIDEMIOLOGY

WN virus is a member of the genus *flavivirus* of the family Flaviviridae. The West Nile virus belongs to a subgroup of viruses known as the Japanese encephalitis complex, which includes St Louis encephalitis, Murray valley encephalitis and Kunjin viruses.[1] Birds function as the natural reservoir, while mosquitoes propagate the cycle by feeding on infected birds. It has been isolated from 29 different mosquito species and at least 111 bird species in North America. *Culex pipiens* is the most common species infected with the virus. Infected birds develop viremias which allows the transmission of the virus to feeding mosquitoes.. The virus is particularly virulent in species belonging to the family Corvidae (eg, crows and jays).[2] Although most infected birds develop permanent immunity, some become ill and die. These dead birds are the basis of surveillance programs for tracking the virus. WN virus has also been shown to infect horses, cats, bats, chipmunks, skunks, squirrels, and domestic rabbits.

First identified in 1937 in Uganda, the West Nile virus is known to be indigenous to Africa, Asia, Europe and Australia.[2] Since the mid-1990s, outbreaks have been documented in Romania, Russia and Israel. After an outbreak in New York City in 1999, the American public became increasingly aware of the disease, which has been spreading across the US. States as far south as Florida, as far north as Vermont, and as far west as California have reported the disease.[3] The **Centers for Disease Control and Prevention (CDC)** reported 4156 cases of WN viral infection for the year 2002; of these cases, 284 have been fatal.[4]

Transmission

The peak incidence of outbreaks occurs in late August and early September.[5]

The predominant mode of human disease is the mosquito bite but transmission through blood transfusions and organ transplantation has been documented in the United States.[6] There is one reported case of transplacental (mother-to-child) WNV transmission and two recent cases of WNV infection of laboratory workers.[15] There is one published case of possible transmission to an infant through breast feeding in Michigan.[7] Current recommendations, however, do not suggest cessation of breast feeding due to maternal WNV infection.[7] There is no person-to-person transmission.

Pathogenesis

The WN virus is a single-stranded RNA virus 50mm in diameter. The surrounding envelope contains the E protein involved in cell receptor recognition, fusion, virion assembly, agglutination of red blood cells and induction of antibodies. While the exact mechanism of West Nile virus replication and spread are not known, initial replication is thought to occur within the skin and regional lymph nodes. Replication at these sites leads to a primary viremia with subsequent seeding of the **reticulo-endothelial system (RES).** Replication within the RES could then perpetuate a secondary viremia with the potential for spread to the CNS. Information gained from studies with St Louis virus indicates that likelihood of viral CNS infection correlates with the level and duration of the viremia.[2] Other factors thought to affect the severity of a WN viral infection include the virus strain, the age of the patient, genetic susceptibility and the immune status of the host.[8]

Pathological examination of **central nervous system (CNS)** tissue from fatal cases of encephalitis in the New York outbreak revealed mononuclear inflammation , microglial nodules consisting of lymphocytes and histiocytes and perivascular inflammation in white and grey matter. Findings were most common in the brain stem but also involved the thalamus, cerebellum and cerebral cortex.

Clinical Features

The incubation period ranges from 3 to 14 days.[5] While the most common consequence of West Nile viral infection is an asymptomatic infection, the virus can causing a variety of clinical presentations, including uncomplicated febrile syndrome, meningitis, meningoencephalitis, encephalitis, poliomyelitis-like syndrome,[9] or paralysis resembling Guillan-Barre syndrome. Rare extra-neurological manifestations include myocarditis, pancreatitis and fulminant hepatitis.

The most frequent symptoms reported among hospitalized patients during the 1999 NYC outbreak were fever (90%), weakness (56%), nausea (53%), vomiting (51%), headache (47%), changes in mental status (46%)and diarrhea (27%). Other reported symptoms seen with variable frequency included rash, cough, stiff neck, lymphadenopathy, myalgias and arthralgias.[5]

Approximately 1 in 150 WN infections will progress to severe neurological disease.[10] The case fatality rates reported from the 1999 NYC outbreak were 12% for hospitalized patients. A significant risk factor for development of more severe disease is advanced age. Children and infants have not been found to be at greater risk than the general population.[11]

Diagnosis

The current gold standard diagnostic test for WN viral infection is ELISA detection of IgM and IgG antibodies to the virus in the serum or CSF. IgM antibody can be detected 4 days after onset of symptoms in 40% of cases.The IgM titre peaks around day 21 and may be detectable 2-4 months post-infection. IgG antibody is detectable by the 10^{th} day of clinical symptoms and can persists for years after initial infection. As the IgM antibody does not cross the blood-brain barrier, a positive IgM ELISA test result from the CSF is highly suggestive of CNS infection.[10] A false positive ELISA test can result from cross reactions in patients recently vaccinated against Japanese encephalitis or yellow fever, or recently infected with a related flavivirus (dengue, JE, SLE). It is therefore recommended that a positive ELISA test result be confirmed by the more specific plaque reduction neutralization test.[1] The neutralization test is particularly useful when testing patients from endemic areas as they are likely to have persistent IgM antibody titres from a previous assymptomatic infection. In this case, an increase in the antibody titer in acute and convalescent serum specimens confirms acute infection.

Other diagnostic tests including detection of nuclear antigens and molecular amplification tests such as RT-PCR and TaqMan have limited usefulness because of low sensitivities.[2]

Other laboratory findings include normal or elevated leukocyte counts, lymphocytopenia, anemia and hyponatremia in the peripheral blood. CSF may show lymphocytic pleocytosis, elevated protein and normal glucose levels.[10]

Treatment and Prevention

Treatment for WN viral infections is entirely supportive. There is no specific therapy. Potential future therapies currently under investigation include high dose Ribavirin and IFN-alpha-2b which demonstrate some activity against WN virus *in vitro*.[10] No vaccine against West Nile viral infection is available.[2]

Prevention focuses on both regional mosquito population control and personal protection with protective clothing, insect repellants and avoidance of habitats infested by mosquitoes.

Current CDC recommendations are to use DEET-based repellents on both clothing and exposed skin. The New York City Department of Health is currently recommending that adults limit the concentration of DEET in their repellants to 30%. It is important to remember that DEET-repellents will wash off with heavy perspiration or rain, and are known to have decreased efficacy at higher outdoor temperatures.

DEET has been used and studied for several decades and has a very reassuring safety profile in human adults. Cases of toxicity are rare and associated with long-term, heavy, frequent, or whole body applications.[12] Despite this

safety profile, however, DEET-repellants are not recommended for children younger than 2 years, for pregnant women or on the bedding or bedclothes of children. Furthermore, the New York City DOH and the American Academy of Pediatrics recommend that only repellents with 10% or less DEET concentrations be used for children.[13,14]

We advise travelers to use a permethrin insecticide spray which binds to clothing and kills insects on contact for 2 to 4 weeks. This ingredient is **not** to be applied to skin but is safe and effective once the application has dried on clothing. Travel Medicine experts advise such treatment of clothing for the prevention of exposure to Anopheline mosquitoes which are far more resistant to DEET to avoid transfer of malaria parasites in endemic regions.

Conclusion

This is the first confirmed West Nile case in humans in Rhode Island. It is of great concern that one of four mosquito pools(*Culex pipiens*) that tested positive were found within 2 miles of this patient's residence in Providence county. Around the same time in September last year another patient living within half a mile of the former case was thought to have a probable West Nile infection. Physicians need to be aware about up-to-date testing of mosquito pools in the community and this information is available at the Department of Health's website. This case report also serves to remind physicians of theimportance of screening for West Nile virus and to underscore the importance of counseling patients about measures to prevent West Nile infection. Extra care should be taken to prevent the elderly from being exposed to West Nile virus.

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State plays crucial role in quality of care

By Patricia A. Nolan, MD, MPH

Quality health care matters. Cost and access to care, the hot button issues of health care, do not matter unless quality remains high. The RI Department of Health (HEALTH) is pushing for quality improvement from many different angles.

Our public reporting program encourages high standards among health care providers by rating licensed health care facilities and reporting our findings to the public. The results help providers gauge and improve their own performance.

Purchasers of health care can also benefit from this reporting program. For example, businesses may choose to offer a benefit plan with a restricted provider network—a reasonable way to cut costs, as long as the network still offers access to high-quality providers. By paying attention to the quality data that is publicly reported, businesses can ensure high-quality care is available to employees and their families.

Regulation also contributes significantly to health care quality. HEALTH regulates all health professions, facilities and insurance plans in the state through licensing and standard-setting. Its 35 licensing boards investigate complaints about facilities or professionals and takes actions to bring them into compliance, if necessary. A key factor in the program s success depends on reports from the public about serious problems of health care quality. This is another way that business and the public can promote quality health care in Rhode Island.

So how do we get quality health care? There is no easy answer, but we can make better use of the tools we already have, such as continuous quality improvement, performance measurement, thoughtful purchasing decisions, and regulation, to keep us moving in the right direction.

By paying attention to the quality data that is publicly reported, businesses can ensure high-quality care is available to employees and their families.

Dr. Patricia Nolan is Director of the Rhode Island Department of Health.

Rhode Island Department of Health
Patricia A. Nolan, MD, MPH, Director of Health

Edited by Jay S. Buechner, PhD

Health Risk Disparities Among Rhode Island Adults, 2001

Jana E. Hesser, PhD

Eliminating health disparities among Americans is a national and a Rhode Island goal for the Year 2010.[1,2] Disparities in health outcomes and health risks exist between men and women, between groups defined by race and ethnicity, and between groups defined by other criteria such as education, geography, and income. Disparities in health outcomes and health risks can be attributed to differences in access to adequate health care, exposure to environmental factors, genetics, and individual behaviors. This paper presents survey data from Rhode Island's 2001 Rhode Island **Behavioral Risk Factor Surveillance System (BRFSS)** for nine health risk indicators, and examines disparities between men and women and between groups defined by race and ethnicity.

Methods

The BRFSS is a national telephone survey of randomly selected adults (ages 18 and older) who live in households with telephones. It asks respondents questions about a variety of key health risk behaviors, about health insurance coverage, access to care, and participation in health screening. Fifty states and four territories perform the BRFSS with funding and methodological standards provided by the **Centers for Disease Control and Prevention (CDC)**.[3] Rhode Island has participated in the BRFSS since 1984; a professional survey research firm conducts the annual survey. Results for Rhode Island are reported annually.[4]

In 2001, 4,120 Rhode Island adults were interviewed throughout the year at a rate of approximately 343 per month. This included interviews with 1,550 males, 2,570 females, with 3,404 White **non-Hispanic (NH)** respondents, 122 Black non-Hispanic (NH) respondents, 292 Hispanic respondents, and 302 respondents in other race/ethnicity groups; 3,328 respondents were between the ages of 18 and 64 and 792 were 65 or older.

Results

There are disparities between males and females for several health-risk behaviors, with males more often at higher risk than females. (Figure 1) Rates for males are twice those for females for: no particular place to go if sick or for health advice (15% vs. 8%), binge drinking (21% vs. 10%), and firearms in the home (18% vs. 9%). Males are also at higher risk than females for: overweight (66% vs. 46%), no health care coverage (ages 18-64) (10% vs. 7%), and smoking cigarettes daily or some days (26% vs. 22%). Females are at greater risk than males for no leisure time physical activity (28% vs. 21%).

There are also disparities for groups defined by race/ethnicity for eight of the nine health-risk behaviors. (Figure 2) Black NHs and Hispanics both have higher rates than White NHs for three measures of access to care — no health care coverage, unable to see a doctor due to cost, and have no particular place to go if sick or for health advice. Both minority groups have higher rates than White NHs for two health risk behaviors — overweight, and no leisure time physical activity. The proportion of Hispanics reporting poor or fair general health is higher than that for either Black

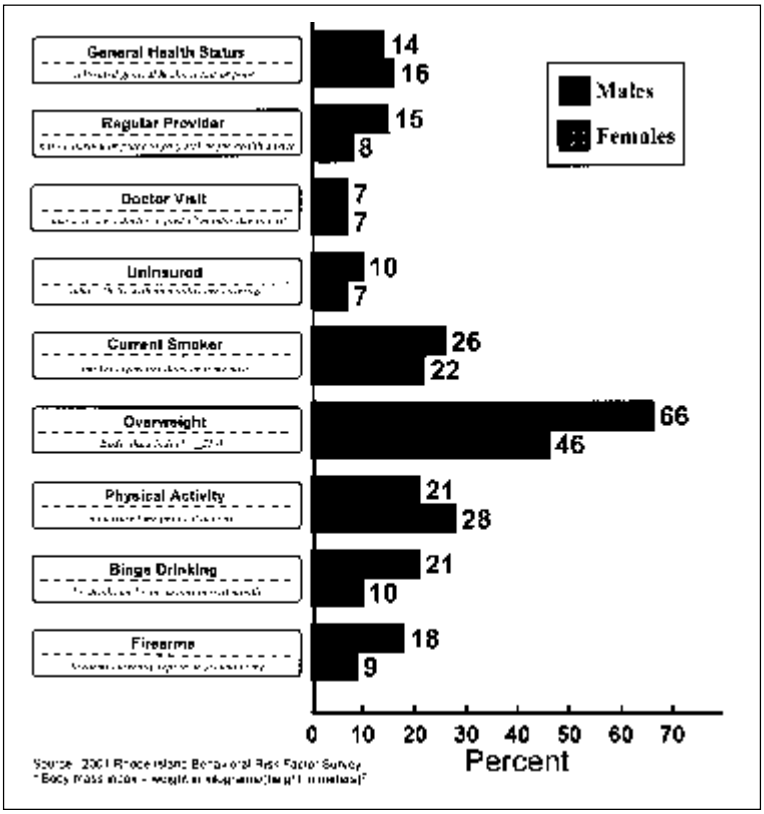

Figure 1. Health Risks Among Rhode Island Adults (Ages 18 and Older) by Gender, 2001.

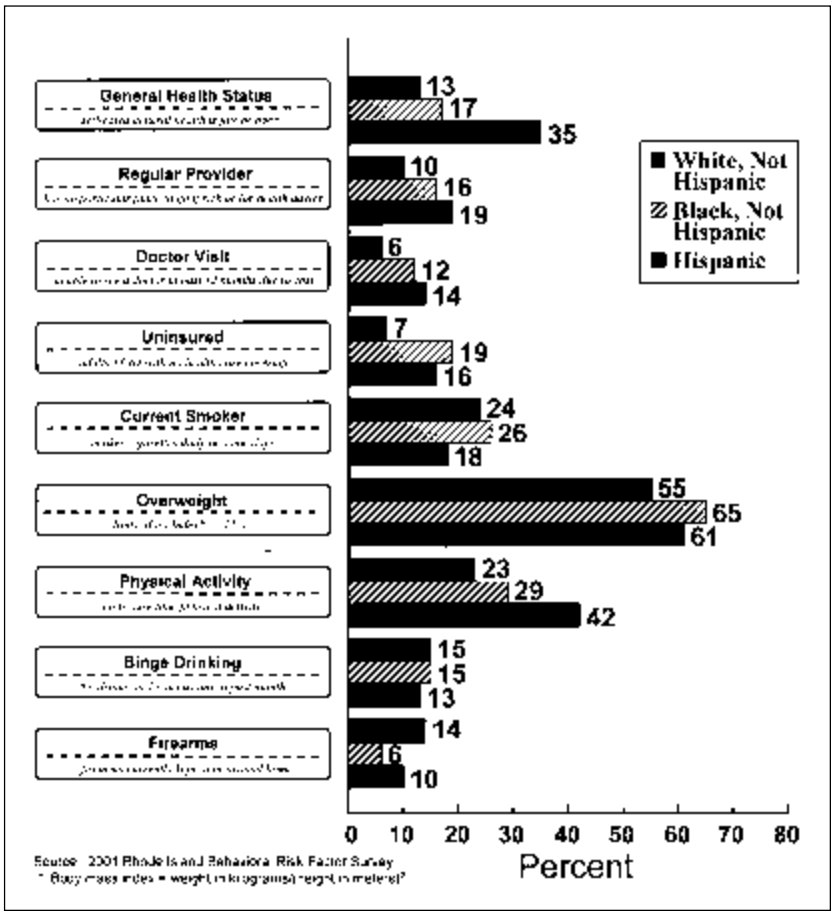

Figure 2. Health Risks Among Rhode Island Adults (Ages 18 and Older), by Race/Ethnicity, 2001.

NHs or White NHs. Black NHs (26%) and White NHs (24%) are at greater risk than Hispanics (18%) for current smoking. White NHs are at highest risk for keeping a firearm in or around the home (14% compared with 6% of Black NHs and 10% of Hispanics). All three groups have comparable rates for binge drinking (between 13% and 15%).

For some of these measures, disparities between these race/ethnic groups are especially large. The percentage of Black NHs and Hispanics with no health insurance coverage (19% and 16%, respectively) is more than twice the rate for White NHs (7%). The percentages of Black NHs (12%) and Hispanics (14%) unable to see a doctor in the past 12 months due to cost are also twice that for White NHs (6%). Forty-two percent of Hispanics report no leisure time physical activity, compared with 23% of White NHs and 29% of Black NHs. 35% of Hispanics rate their health status as fair or poor, more than twice the proportion of Black NHs (17%) and of White NHs (13%).

Discussion

For the majority of the nine BRFSS health risk measures presented here, males are disadvantaged compared with females, and Black NH and Hispanic populations are disadvantaged compared with White NH ones. Overall, greater disparities exist between minority populations and the majority White NH population than exist between the genders. Eliminating disparities is a national overarching health goal for 2010 and Rhode Island shares this goal.[2] To eliminate disparities will require substantial enhancements over the next decade in access to care and in health promotion programs targeting the groups at greatest risk.

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PUBLIC HEALTH BRIEFING

Rhode Island Department of Health
Patricia A. Nolan, MD, MPH, Director of Health

Edited by John P. Fulton, PhD

Progress in the Control of Oropharyngeal Cancer in Rhode Island, 1987–2000

John P. Fulton, PhD, Dorothy M. Darcy, CTR, Leanne Chiaverini

Profile

About 770 Rhode Island residents alive today were diagnosed with cancer of the oral cavity and pharynx at some point in the past (467 men and 299 women in 1998); about 115 are newly diagnosed with oropharyngeal cancer each year (an annual average of 77 men and 38 women in the five years 1996-2000); and about 30 succumb to the disease annually (an annual average of 16 men and 13 women in the five years 1996-2000). Oropharyngeal cancers are not among the most prevalent cancers in the state (and the nation), but they are significant for cancer control efforts, because most tumors of the oral cavity and pharynx are considered preventable.

Control Strategy

Oropharyngeal cancer is strongly related to chronic tobacco use and chronic "high-risk" drinking (14 or more alcoholic drinks per week for men and 7 or more alcoholic drinks per week for women), and is therefore theoretically preventable by abstaining from tobacco and limiting alcohol consumption.[1] The effectiveness of screening for early oropharyngeal tumors is equivocal,[2] although survival is clearly related to stage of disease at diagnosis.[3] The US Preventive Services Task Force last issued a recommendation on screening for oral cancer in 1996, when it stated: "There is insufficient evidence to recommend for or against routine screening of asymptomatic persons for oral cancer by primary care clinicians. All patients should be counseled to discontinue the use of all forms of tobacco and to limit consumption of alcohol. Clinicians should remain alert to signs and symptoms of oral cancer and premalignancy in persons who use tobacco or regularly use alcohol."[2] In line with these recommendations, the Rhode Island Cancer Control Plan,[4] published in September, 1998, recommends:

Tobacco Recommendations

- Do not smoke.

Alcohol recommendations

- Limit alcohol consumption.

Screening Recommendations: Oral Cancer

- Primary care providers should remain alert to the signs of early oral cancer, particularly leukoplakia and erythroplakia, and should refer patients with these lesions to a surgical specialist for further evaluation and treatment.

2010 Targets

Healthy People 2010, the most recent set of health objectives for the United States,[5] suggests the following targets for the control of oropharyngeal cancer:

Tobacco Use

By 2010, reduce cigarette smoking by adults aged 18 years and over to 12% (baseline = 24% in 1998), and reduce tobacco use by students in grade 9 through 12 to 21% (baseline = 40% in 1998).

Alcohol Use

By 2010, reduce the proportion of adults aged 21 years and over who exceed guidelines for low-risk drinking to 50% of people who regularly use alcohol (baseline = 73% in 1992). [Low risk drinking: Men—less than 14 drinks per week; women—less than 7 drinks per week.]

Mortality

By 2010, reduce the oropharyngeal cancer death rate to 2.7 deaths per 100,000 population (age-adjusted to the year 2000 standard population of the United States; baseline = 3.0 deaths per 100,000 population in 1998).

Table 1. Progress in the control of oropharyngeal cancer among Rhode Island residents, by sex:

- % of people ages 18 and over who are current smokers
- % of people ages 18 and over who report an average of two or more alcoholic drinks per day * [see note below]
- Average annual age-adjusted oropharyngeal cancer incidence rates, by sex (among people of all races)
- Average annual age-adjusted oropharyngeal cancer mortality rates, by sex (among people of all races)

Men

Place	Measure	Source	Year of Diagnosis 89	90	91	92	93	94	95	96	97	98	99	00	01
RI	% Smoking	[a]		27.3	24.9	24.2	25.9		24.0	25.6	25.5	24.0	23.1	23.8	25.8
U.S.	% Smoking	[a]		24.9	25.1	24.2	24.0	23.9	24.8	25.5	25.4	25.3	24.2	24.4	25.4
RI	% Chronic Drinking *	[a]			9.5	9.4	10.2	8.6		10.0		7.8		7.3	8.6
U.S.	% Chronic Drinking *	[a]			5.8	6.2	5.2	5.5		5.0		5.3		6.4	6.3
RI	Incidence **	[b]	17.6	16.6	14.9	14.7	14.8	15.0	15.6	16.2	16.8	16.7			
U.S.	Incidence **	[c]	20.1	19.7	19.8	19.6	19.2	18.9	18.6	18.1	17.6	17.2			
RI	Mortality **	[d]	7.0	7.1	6.0	5.4	5.1	4.9	4.3	4.3	4.1	3.5			
U.S.	Mortality **	[c]	5.5	5.4	5.3	5.2	5.1	4.9	4.8	4.7	4.5	4.4			

Women

Place	Measure	Source	Year of Diagnosis 89	90	91	92	93	94	95	96	97	98	99	00	01
RI	% Smoking	[a]		24.0	25.1	20.4	23.1		25.4	19.7	23.2	21.3	21.5	24.0	22.1
U.S.	% Smoking	[a]		21.3	21.3	21.0	21.1	21.0	20.9	21.9	21.1	20.9	20.8	21.2	21.2
RI	% Chronic Drinking *	[a]			1.5	0.9	1.5	1.5		1.2		1.9		3.6	6.6
U.S.	% Chronic Drinking *	[a]			0.6	0.9	0.8	0.9		0.8		0.8		0.9	3.9
RI	Incidence **	[b]	6.6	7.0	6.8	7.5	7.1	6.7	6.9	6.5	6.5	6.3			
U.S.	Incidence **	[c]	7.5	7.4	7.4	7.4	7.4	7.3	7.3	7.2	7.1	6.9			
RI	Mortality **	[d]	1.7	1.6	1.5	1.8	1.9	1.9	1.9	1.9	1.7	1.8			
U.S.	Mortality **	[c]	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.7	1.7			

* Chronic drinking: men – 14 or more drinks per week
women – 7 or more drinks per week (2001) – previously 14 or more drinks per week

** Incidence and mortality rates are based on five years' data (e.g., 1989 = 1987-1991; 1998 = 1997-2000), age adjusted to the 2000 U.S. standard population, expressed as cases per 100,000

[a] Behavioral Risk Factor Surveillance System, Centers for Disease Control and Prevention
[b] Rhode Island Cancer Registry, Rhode Island Department of Health
[c] National Cancer Institute *SEER*Stat. Bethesda, MD: National Cancer Institute. 2005.
[d] Office of Vital Records, Rhode Island Department of Health

Trends

Tobacco Use

From 1990 through 2001, the proportion of Rhode Island men who had reported being a current smoker varied between 23 and 27%, showing no definite trend. The median proportion of U.S. men who had reported being a current smoker remained at around 25% for the entire period of observation.

From 1990 through 2001, the percent of Rhode Island women who had reported being a current smoker varied between 20 and 25%. Among all the states, in comparison, the median proportion of U.S. women who reported being a current smoker hovered around 21%.

Alcohol Use

From 1990 through 2001, the proportion of Rhode Island men who had reported an average of 14 or more alcoholic drinks per week varied between 7 and 10%, showing no definite trend, but substantially exceeding the U.S. state median throughout the period.

From 1990 through 1999, the proportion of Rhode Island women who had reported an average of 14 or more alcoholic drinks per week varied between 1 and 2%, showing no definite trend, but substantially exceeding the US state median throughout the period in all years but one. In 2001, the first year in which the Behavioral Risk Factor Surveillance System (a national surveillance system organized by the CDC and run by the separate states and territories) used the revised standard for chronic drinking among women (an average of 7 or more alcoholic drinks per week), the proportion of Rhode Island women who met or exceeded the standard (6.6%) was almost double the U.S. state median (3.9%).

Incidence

The average annual age-adjusted incidence of invasive oropharyngeal cancer (2000 standard) among Rhode Island men of all races declined from 17.6 per 100,000 in 1987-1991 to 14.7 per 100,000 in 1990-1994, then increased to 16.7 per 100,000 in 1996-2000. In contrast, the age-adjusted incidence of invasive oropharyngeal cancer (2000 standard) among U.S. men of all races decreased from 20.1 per 100,000 in 1987-1991 to 17.2 per 100,000 in 1996-2000.

The age-adjusted incidence of invasive oropharyngeal cancer (2000 standard) among Rhode Island women of all races varied from 7.5 per 100,000 in 1990-1994 to 6.3 per 100,000 in 1996-2000, suggesting a decline. The age-adjusted incidence of invasive oropharyngeal cancer (2000 standard) among U.S. women of all races declined from 7.5 cases per 100,000 in 1987-1991 to 6.9 cases per 100,000 in 1996-2000.

Mortality

The age-adjusted mortality of invasive oropharyngeal cancer (2000 standard) among Rhode Island men of all races declined strongly from 7.0 per 100,000 in 1987-1991 to 3.5 per 100,000 in 1996-2000, paralleled by a weaker decline among U.S. men of all races (from 5.5 in 1987-1991 to 4.4 in 1996-2000). The disparity between the mortality rates for Rhode Island men and U.S. men changed over the period of observation, with Rhode Island beginning the decade with higher-than-U.S. mortality and ending the decade with lower-than-U.S. mortality.

The age-adjusted mortality of invasive oropharyngeal cancer (2000 standard) among Rhode Island women of all races showed little variation over the 1987-2000 period, averaging about 1.8 per 100,000. The age-adjusted mortality of invasive oropharyngeal cancer (2000 standard) among U.S. women of all races declined from 2.0 in 1987-1991 to 1.7 in 1996-2000. The disparity between the mortality rates for Rhode Island women and US women decreased over the period of observation, with US women as a whole benefitting.

Assessment

Among men and women in Rhode Island, the proportion of current smokers varied little from 1990 through 2001, as did the proportion of chronic drinkers. Unfortunately, data on trends in spit tobacco use during the period were unavailable, but the proportion of people who use spit tobacco is far less than the proportion who smoke, and the link between oropharyngeal cancer and tobacco is not limited to spit tobacco. The incidence of all invasive oropharyngeal tumors among men declined, then increased over the 1987-2000 period, but mortality rates plummeted. Among Rhode Island women, there was little change in oropharyngeal cancer incidence or mortality through the 1990s.

Rhode Island has already reached the 2010 goal for a mortality decline from oropharyngeal cancer (when recent mortality rates for men and women are averaged), but given the state's average (for US) rates of tobacco use, and its above-average rates of chronic drinking, will Rhode Island be able to sustain this decline? Is there potential for further decline, or has the state reached a plateau that will not change until we experience declines in the use of tobacco and alcohol? In this vein, public health efforts should focus on discouraging youth from starting to smoke and from all under-age alcohol use, increasing cessation among those who do smoke and discouraging more-than-low-risk alcohol use among all adults. Primary care physicians can assist by addressing chronic tobacco and alcohol use among patients and by performing oral cancer screenings on high-risk patients, in line with the 1996 recommendations of the US Preventive Services Task Force.

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– A Physician's Lexicon –

The Cerebral Hemispheres

The brain, said Emily Dickinson, "is wider than the sky," storing more cherished memories, more facts, more schemes and more dreams than even the firmament above. Long before neuro-anatomists unraveled the complexities of this 1.5-pound organ hiding in the cranium, poets intuitively knew its grander purposes and mission. The names applied to the parts of the brain by the classical anatomists therefore represent a happy mixture of fanciful conjecture, a touch of mythology, far-fetched analogies and practicality.

The cerebral hemispheres, at least in higher mammals, are seen as a complex series of infoldings of the cortical gray matter into numerous, convoluted gyruses and intervening sulcuses. The word gyrus is from the Greek meaning a circule or circling, as in words such as gyroscope or gyromancy [a bizarre form of divination where the seer walks in circles until he develops syncope and collapses, and the direction of his prone body will then indicate the direction a puzzled traveler should take]. The word sulcus is from the Latin, meaning a furrow or a groove.

The major bodies of discrete gray matter buried within the depths of the hemispheres include the globus pallidus, the caudate nucleus, the putamen and the thalamus. The globus pallidus, the pale mass, is taken from the Latin root, *pallio-*, meaning that which is cloaked or mitigated. And thus palliative medicine refers to the cloaking or lessening of symptoms as its goal. The word putamen derives from the Latin *puto*, meaning that which falls off when pruning fruit trees, and specifically the hard nut of some soft-fleshed fruits. The caudate nucleus takes its name from the Latin *cauda*, meaning tail. Cauda then evolved into the French word *couard*, meaning one who turns tail, which in turn became the English word coward.

The thalamus is a Latin word derived from the Greek, meaning an inner chamber and specifically a bedroom or bed. The thalamus is a globoid structure resembling a round pillow and hence the use of the Greek word for bed. The rounded eyeball justifies its use in the word ophthalmic. Hypothalamus defines those gray matter nuclei below the thalamus.

– Stanley M. Aronson, MD, MPH

Vital Statistics

Rhode Island Department of Health
Patricia A. Nolan, MD, MPH, Director of Health

Edited by Roberta A. Chevoya

Rhode Island Monthly Vital Statistics Report

Provisional Occurrence Data from the Division of Vital Records

Underlying Cause of Death	Reporting Period			
	July 2002	12 Months Ending with July 2002		
	Number (a)	Number (a)	Rates (b)	YPLL (c)
Diseases of the Heart	241	3,112	296.9	4,124.0**
Malignant Neoplasms	221	2,454	234.1	7,598.5
Cerebrovascular Diseases	50	545	52.0	770.0**
Injuries (Accident/Suicide/Homicide)	49	417	39.8	8,000.0***
COPD	40	525	50.1	512.5**

Vital Events	Reporting Period		
	January 2003	12 Months Ending with January 2003	
	Number	Number	Rates
Live Births	737	13,193	12.6
Deaths	945	10,418	9.9
Infant Deaths	(11)	(94)	7.1
Neonatal deaths	(8)	(65)	4.9
Marriages	328	8,346	8.0*
Divorces	316	3,376	3.2
Induced Terminations	593	5,598	424.3#
Spontaneous Fetal Deaths	99	1008	76.4
Under 20 weeks gestation	(93)	(936)	70.9
20+ weeks gestation	(6)	(72)	5.5

(a) Cause of death statistics were derived from the underlying cause of death reported by physicians on death certificates.

(b) Rates per 100,000 estimated population of 1,048,319

(c) Years of Potential Life Lost (YPLL)

Note: Totals represent vital events which occurred in Rhode Island for the reporting periods listed above. Monthly provisional totals should be analyzed with caution because the numbers may be small and subject to seasonal variation.

* Rates per 1,000 estimated population
** Excludes one death of unknown age.
*** Excludes two deaths of unknown age.
# Rates per 1,000 live births

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Ninety Years Ago

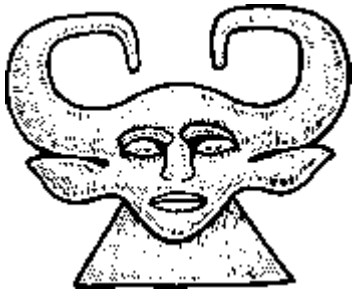
[July, 1913]

An Editorial commented on administrative logistics: "If we had an enemy and wished him evil, we should like to see him appointed on the Committee of Arrangements. The members of the Society do not appreciate the work and worry which is thrust upon the unhappy three who have charge of the …annual meeting, and the criticism…regarding the annual dinner are uncalled for and unjust."

Alexander B. Bruggs, MD, delivered the President's Address, "Some of the Changes that Have Taken Place in the Teaching and Practice of Medicine during the past 40 Years as Viewed by the General Practitioner." Dr. Bruggs cited advances in tuberculosis. When he was a student, 1868-72, it was the era of Villenin's experiments with inoculation. The symptomatology and anatomical characteristics of typhoid have remained the same, but there have been "marked changes" in etiology and treatment, "although the present day treatment does not yield a much greater percentage of cures." Forty years ago, diphtheria was considered a constitutional disease, and there were no calls for quarantine: the disease claimed "a greater percentage of deaths from among its victims than another other malady." Forty years ago, malaria was thought to be a "miasma." Today surgical operations "that would have been considered criminal" are routine.

In "Umbilical Hernia, " P. E. Truescale, MD, describes his experience: over the past 6 years he operated on 20 patients at Highland Hospital and St. Anne's; 10 patients also had gall stones. He used an operation introduced by Dr. William J. Mayo.

Edwin H. Place, MD (Boston) read before the Child Welfare Conference in Providence, January 1913, "Present Mortality of Diphtheria: Causes and Their Presentation." The number of cases was declining, yet the death rate remained high. From 1901-1911. there were 2.5 times more deaths from diphtheria than from scarlet fever in Boston. The mortality of diphtheria was 7.8%; of scarlet fever, 4.8%.



Fifty Years Ago

[July, 1953]

Louis Weinstein, MD, (Associate Professor of Medicine, Boston University School of Medicine) in "What the Practitioners Should Know About Poliomyelitis," discussed diagnosis, paralytic and non-paralytic cases, polioencephalitis, and treatment. He had presented the talk at the 142nd annual meeting of the Rhode Island Medical Society.

At the same meeting, Hanson Baldwin, the Military Editor, *New York Times*, presented "Where Do We Go From Here?" In the 8 years since World War II, the author saw no "absolute security," cited the arms race and the Cold War.

With 20 million veterans in the United States, the American Medical Association advocated limiting Veterans Administration-subsidized care to veterans with service-induced or service-aggravated injuries, and to veterans "with tuberculosis or psychiatric or neurological disorders of non-service connected origin who are unable to defray expenses of…hospitalization." The Journal re-stated the AMA's stance.

Twenty Five Years Ago

[July, 1978]

Frank W. Sullivan, MD, in the President's Address, noted that the Medical Society library's future was under study. Also, the Medical Society had recruited volunteer physicians to give physicals to Ladd School residents (19 physicians contributed 802 hours to update exams on 711 residents).

Fredy P. Roland, MD, contributed "Management of Atypical Pneumonias in View of the New Entity 'Legionnaire's Disease.'" He advised the importance of "serological testing on a large scale."

Gail Barsel, MS, Siegried M. Pueschel, MD, Howard A. Hall, MD, Dianne N. Abuelo, MD, contributed "Experience with Prenatal Diagnosis in Rhode Island." They cautioned: "Physicians have the responsibility of informing at-risk couples of the availability of prenatal diagnosis." From 1974-77 the Genetic Counseling Center at Women & Infants' Hospital counseled 96 patients (only 7 in 1974). The most common cause for referral was advanced maternal age.

James J. Yashar, MD, Ralph J. Burnard, MD, Albert K. Weyman, MD, John Yashar, MD, in "Axillary Distal Profunda Femoral Artery Bypass," described "the new operative approach for infected aortic grafts. "