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Editor's Notes

By James D. Hessman, Editor in Chief

"Getting the bugs out of the system" sounds relatively casual and suggests that the task implied is reasonably safe, easy to carry out, and probably low in cost. But that is not the case with, and within, this month's printable issue, which focuses on the deadly and rapidly expanding threat – to communities both large and small throughout the United States – posed by biological agents. Those agents – the most harmful ones are called pathogens – are everywhere, and they exist not by the millions or billions but, literally, by the trillions.

They have the most clever disguise imaginable; because of their microscopic size they are invisible to the naked (human) eye. They have caused literally millions of deaths through the countless centuries that have passed since the earliest humans and other visible animals first emerged from their caves, or wandered in from the sea.

Thanks to unprecedented improvements in bio-detection technology in recent years, complemented by parallel advances in medicine, many but far from all of the most dangerous (to man) pathogens are now not only well known but also capable of being defeated. The usual battlefield, unfortunately, is the human body. Even more unfortunate is the unhappy fact that the humans involved do not always win the battle.

That gloomy assessment is no longer always the case, though, thanks to the rapid and ingenious improvements in bio-detection equipment in recent years – reported here by Glen D. Rudner, who predicts additional advances, some of them rather spectacular, within the foreseeable future. His article is followed, felicitously enough, by a layman's guide – by Christina Flowers – to what might be called "The ABCs of Pathogens."

Theodore (Ted) Tully, Patti Riggs, JL Smither, and Chris Weber all focus their educated eyes on pathogens, infectious diseases in general, detection equipment, and bio-preparedness plans and policies. Each examines a different aspect of an extremely complex topic – about which all of the "answers" developed lead almost inevitably to numerous additional questions. Ted focuses on the many and costly difficulties facing hospital Emergency Departments – the "first line of defense" in the unending battle between man and microbes -- at the start of, and throughout, the outbreak of an infectious disease. Patti provides a helpful Case Study on the collection of samples – an extremely complicated but vitally important capability. Chris looks at recent improvements in bio-detection technology both in the United States and overseas – and speculates on even more advanced systems now in the RDT&E (research, development, test, and evaluation) pipeline. And JL rounds out the discussion with a report on advance, and advanced, training (related to all types of bio-dangers and disasters), emphasizing the need to "get policy planners" and decision-making officials personally involved in such training.

Five highly respected career professionals – Craig DeAtley, Joseph Cahill, Cameron W. Slocum & James Lee Witt, and Adam McLaughlin – expand the reader's horizon with insider reports on a broad spectrum of other topics relevant to the clear and present dangers and difficulties facing the nation, and the world, both now and for the foreseeable future. DeAtley: the recent revision and upgrading of HICS (Hospital Incident Command System) guidelines; Cahill: the political, operational, and budgetary implications driving official policy guidelines; Slocum & Witt: the many lessons learned by UTMB (the University of Texas Medical Branch) during and after several recent hurricanes – and how those lessons are being used to develop, refine, improve, and promulgate the school's future disaster plans; Adam provides his always current four-state report on recent domestic-preparedness events and occurrences in (this issue) the great states of Arizona, Michigan, New Hampshire, and Pennsylvania.

About the Cover: "RUN, don't walk, to the nearest shelter (or other safe refuge)!" That is the vivid message conveyed by this dramatic iStock photo of the universally recognized symbol indicating the presence of a significant and extremely dangerous biological hazard.

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Biodetection: Today, Tomorrow & Years Later

By Glen D. Rudner, Fire/HazMat

Because of the notorious anthrax-laden letters mailed out shortly after the 2001 terrorist attacks on the Pentagon and the World Trade Center towers – and several other bio-warfare incidents that have occurred since then – a debate has raged throughout much of the U.S. homeland-security community about field testing and a host of other issues related to the biological threats that threaten U.S. cities, counties, and other jurisdictions on a continuing basis each and every day of the year.

Unfortunately – and despite numerous "official reports," private-sector recommendations, and political mandates citing an urgent need to develop a much improved bio-detection capability – there is still no truly *national* bio-detection strategy in place to cope with future bio-warfare incidents that could occur at almost any time, in any community throughout the nation. In large part because of this extended inertia, U.S. private-sector and public health agencies – many of which still rely, to a large extent, on outdated technology to track and identify bio-warfare agents and substances – are hampered by delayed diagnoses, which in turn lead to delayed responses that facilitate a more rapid spread of the possible agents involved in any bio-warfare incident, accidental or manmade.

Nonetheless, U.S. bio-detection technology has in fact actually improved, significantly, during the past decade, and several new methods of detection and response are now either currently available, or in various stages of development, that are not only both rapid and sensitive but also have the ability to identify, sometimes simultaneously, a broad range of biological agents. Here it should be noted, though, that most if not quite all of these recent improvements have depended primarily on the development of strong working relationships between and among first-responder agencies, the nation's public health laboratories (PHLs), numerous law-enforcement organizations and agencies, and the work being carried on by the Laboratory Response Network (LRN) – a broad spectrum of APHL (Association of Public Health Laboratories) and CDC (Centers for Disease Control and Prevention) laboratories. Without the solid working relationships that have been developed between and among these disparate entities, any "deployment models" of new and even more advanced field-detection instruments or devices would probably be ineffective.

Visual Observation, Protein Test Kits And Operational Consistency

Quick and accurate biological detection depends primarily on the full use of a continuum of technologies ranging from "the basics" – e.g., visual observation, protein test kits, and pH (the term used to measure the acidity or basicity of a solution) readings – to such higher-order systems and methods as lateral-flow immunoassay test strips, polymerase chain reaction (PCR) instruments and devices, and mass spectroscopy.

Among several major issues that have stalled or at least slowed down the development and deployment of even the most basic biological detection instruments is the

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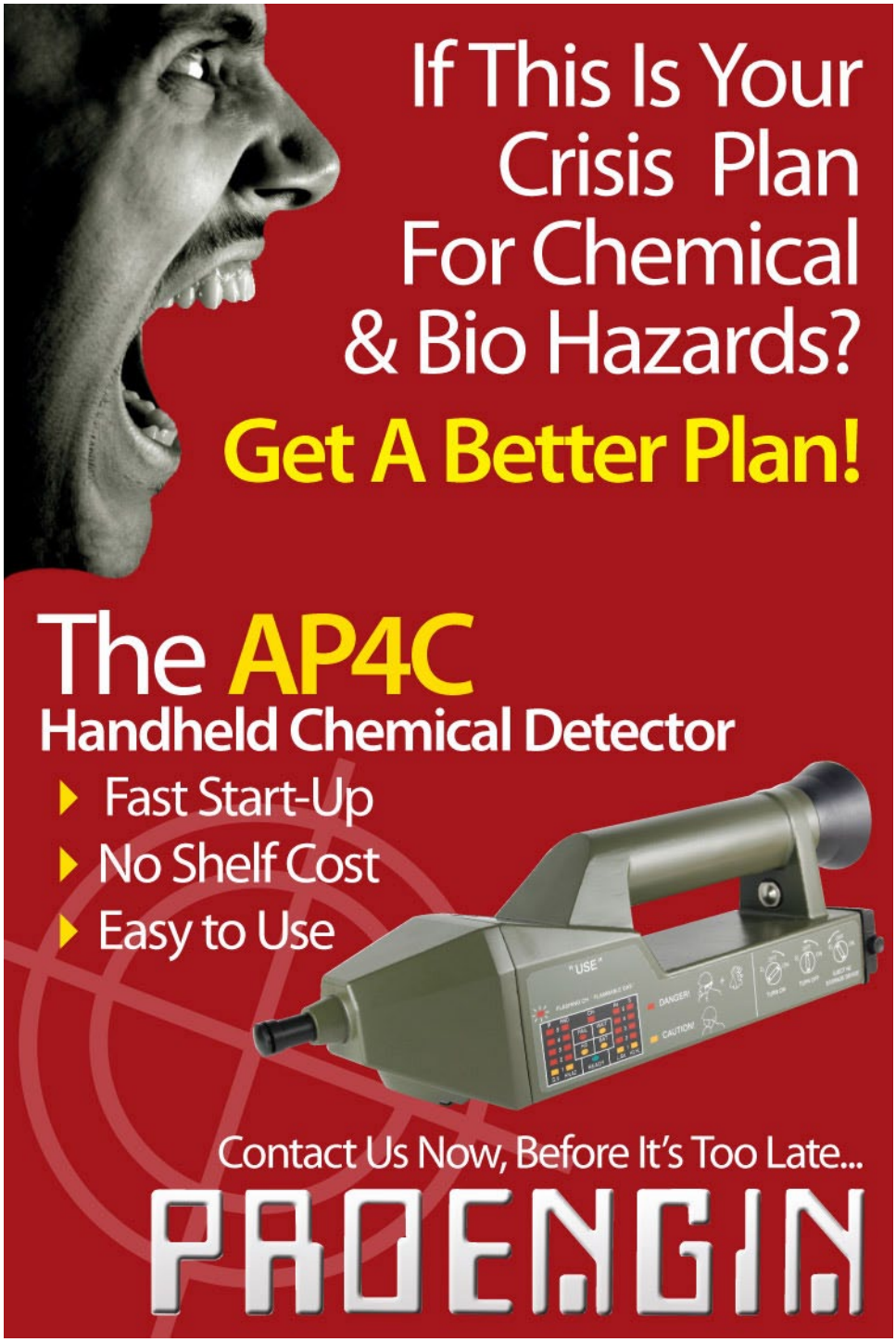
understandable position of public health laboratories that the detection instruments used in the field should possess the same range of capabilities as those used in the laboratories, both public and private. The PHLs have in fact asked that field instruments possess the same sensitivity and specificity as the instruments that they use in their own labs.

Another major issue hampering additional and/or more rapid progress is the fact that many manufacturers are finding it difficult to design, test, develop, and produce instruments possessing sensitivity and specificity capabilities comparable to those of similar instruments and devices used in the laboratories. Many manufacturers also are finding it difficult to meet such operational goals for their wares as simplicity of use, limited or no major maintenance problems, usability in a broad spectrum of weather conditions – including very high humidity and extreme temperatures – and a number of training issues that have also slowed progress.



All of these problems, and a few others that might be mentioned, have proved to be virtually insurmountable for many manufacturers. At present, in fact, it seems probable that there may be no single system, instrument, or device that meets all of the requirements, and/or expectations, of the PHLs for responders to possess the ability to carry out field detections both safely and effectively.

To briefly summarize: It has been pointed out many times in the past that – although the field-detection technologies, kits, systems, and devices now in use were not specifically designed to provide the same definitive results available when laboratory instruments are used – they still must be highly reliable in terms of expectancy, sensitivity, and specificity. The need and desire are both abundantly clear, therefore. Whether the new systems now or soon to be in the design/development/test & production pipeline will meet the ambitious goals set for them, though, is still somewhat uncertain.

Glen D. Rudner is a project manager for CRA-USA, where he works with senior management executives on major corporate issues; he is currently assigned to management of the Target Capabilities List project for the U.S. Department of Homeland Security. A recently retired Northern Virginia Regional Hazardous Materials Officer, he has been heavily involved during the past 32 years in the development, management, and delivery of numerous local, state, federal, and international programs for such organizations as the National Fire Academy, the FBI, and the Defense Threat Reduction Agency.

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"Pathogens for Knuckleheads": Invisible and Infectious

By Christina M. Flowers, MPH, Public Health

Throughout the ages, life has fostered competition between and within different species. Human as well as non-human societies and cultures have continuously been seeking competitive advantages over others, and in the modern world that unceasing quest has paved the way, within humans, for so many new technologies that it is sometimes easy to forget why and how such rivalries originated.

It also is easy to forget, though, that humans are not the only species to thrive on fierce competition. Even at a microscopic level organisms are constantly vying to out-compete their hosts. However, until the modern era of technology, few humans, except scientists, were even the slightest bit aware of the existence of life – non-human life in particular – as seen through a microscope, but invisible to the human eye.

Even today, if one were to pose a relevant question – "What is a pathogen?" – the responses from the American people would probably range from ballpark "guesstimates" to in-depth scientific analyses – and elicit more than a few blank stares. But when pathogens pose a serious threat to human life – be it in a massive disease outbreak or through an act of bioterrorism – the nation's collective ignorance of "Pathogen 101" basics can no longer be acceptable.

Today, most U.S. first responders are reasonably knowledgeable about the massive destruction and loss of life that could be caused by chemical, radiological, and nuclear weapons – as well as, more recently, the somewhat smaller-scale threats posed by improvised explosive devices (IEDs). But biohazard-specific training has in comparison been somewhat neglected – for a number of reasons, including the fact that the topic is not only very complex but also frustratingly difficult to deal with effectively. In addition, the various educational and outreach programs that *have* focused on biological agents usually concentrate on events in recent memory – the anthrax-laden letters mailed shortly after the terrorist attacks of 11 September 2001, for example, and the installation and use of hand-sanitizing stations during and since the H1N1 flu pandemic.

Nonetheless, developing a comprehensive understanding of pathogens as a whole – not just as a "flavor of the month" type of recent threat – is critical for responding to and mitigating future biological threats. Following are brief comments on some but by no means all of the more important facts and theories – "Pathogens for Knuckleheads," as one expert described it – about the nature of pathogens, how to recognize them, how to cope with them, how they are affecting U.S. public policy, and what changes, both in the threat itself and in the systems and processes developed to cope with the threat, might be expected in the foreseeable future.

"Pathogen": What it is; what it does. The word pathogen comes from the Greek words "gen" and "pathos," which mean "give birth to" and "suffering." In its most basic form, a pathogen is an infectious agent that causes disease. There are many different ways the disease can be triggered, and many different types of organisms that can be involved.

Pathogens are living creatures: The term "pathogens" usually refers only to living "things": bacteria, viruses, fungi, parasites, and prions. One might not think of these microscopic creatures as "living" in the same way a cat or dog – or a human being – lives, but each has very specific "life styles," lives in certain well defined environments or habitats, and goes through more or less the same cycles of life, and death, as dogs, cats, humans – and other much larger creatures visible to the human eye – live, grow, procreate, and die.

Sometimes the lines get blurred: The assertion that all pathogens are living organisms is mostly true, but with certain qualifications. "Science" is about truth, accuracy, and precise definitions – but in real life is seldom if ever absolute. For example, it has been argued that prions and viruses are not really "living" as most humans understand that word. In the case of botulism, the bacterium itself is not the pathogen but, rather, the deadly toxin the bacterium produces. Infections caused by anthrax occur only from certain strains of *Bacillus anthracis*, which contain plasmids encoded with an anthrax toxin. As a general rule, though, pathogens usually refer to something "biological" in nature – i.e., either living, or derived from a living "thing" of some type.

There is no cure-all in the modern medicine bag: In order for a pathogen to survive, it must first invade and then take over the cells of a host; here, the word "host" means another living thing – something much larger than the pathogen itself. The human immune system provides a formidable natural defense against most if not all of these foreign invaders – and modern science has significantly strengthened the human side of the

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battle by creating a broad and growing spectrum of antibiotics, vaccines, fungicides, and anti-viral medications.

Here it should be noted that, as many cold sufferers already know, viruses do not respond to antibiotics. But the scientific facts are much more complicated than that. Each pathogen requires different response reactions, tailored to defeat specific organisms. Anthrax infections respond well to such antibiotics as doxycycline and ciprofloxacin, for example, but tularemia infections respond better to streptomycin and gentamicin. Also worth noting: Ricin is a toxin derived from a plant (the castor bean) – not a bacterium – and there is no currently known antitoxin for it. (The "cure" currently favored requires decontamination of the exposed victims, and use of a stomach pump.)

It is easy to forget that humans are not the only species to thrive on fierce competition – even at a microscopic level, organisms are constantly vying to out-compete their hosts; however, until the modern era of technology, few humans, except scientists, were even the slightest bit aware of the existence of life as seen through a microscope, but invisible to the human eye

There are many different ways a pathogen can be transmitted: There has been considerable medical progress in recent years in such disparate fields related to and/or affecting human health as personal hygiene and both food and water safety. Unfortunately, though – and no matter how sophisticated human defenses are – pathogens always seem to find a way to win at least some of the battles. Contaminated food or water, for example, are still among the primary sources of pathogen transmission. What makes these battles even more difficult, though, is the fact that pathogens themselves have evolved in many ways over the years to "outcompete" more advanced organisms – such as mankind. Some pathogens can be transmitted person-to-person via body fluids; others are concealed in the air droplets caused by a cough or sneeze; and still others live, thrive, and swim through the human bloodstream. In addition, a number of pathogens are described as being "opportunistic" – meaning that they are naturally resident in the human body as healthy bacteria. But they also can become extremely harmful, and even fatal, when something happens to upset their natural balance – a staph infection following surgery, for example.

Bioterrorism is not a modern concept: Pathogens possess certain unique characteristics that make them particularly useful as weapons – and they have, in fact, been used as extremely lethal weapons for hundreds and perhaps thousands of years. Biological agents are, in fact, the oldest of the "NBC triad" (nuclear, biological, chemical) of lethal agents. Today it is easy to remember the "anthrax letters" mailed to certain congressional offices (and other addresses) following the 9/11 terrorist attacks – but the use of bioterrorism as a weapon of war started much earlier. They were used in the 1300s, for example, when the Tartars catapulted plague-infected corpses over the walls of Kaffe (Crimea). Four centuries later, during the 1700s, Sir Jeffrey Amherst ordered British troops to give smallpox-infected blankets to some troublesome Indian tribes. In World War II, German troops, and scientists, used anthrax to kill "enemy" (i.e., U.S. and Allied) horses and mules, and in 1984 members of the Rajneeshee Cult sprayed salmonella on salad bars of almost a dozen restaurants in The Dalles, Oregon – sickening more than 750 people.

Not incidentally, the ability to obtain and use pathogens as weapons is not as difficult as one might think. Until recently, many toxic agents could be obtained from reference collections – created for research purposes, primarily – and the devices and systems used to disperse agents are usually easy to find available on the open market. Moreover, because pathogens are living creatures they have a natural tendency – like dogs, cats, and humans – to replicate and propagate themselves by creating new generations of their own species.

Bioterrorism pathogens as categorized by the CDC: "Category A" agents are high-priority organisms that are defined by the CDC (the U.S. Centers for Disease Prevention and Control) as posing a significant risk to national security because they can be easily transmitted from one person to another. In addition, because they also may cause a large number of deaths in a very short time, Category A agents could easily, and rapidly, cause public panic and/or massive social disruption. Among the best known examples of Category A agents are anthrax, smallpox, plague, tularemia, and botulism.

"Category B" agents are second highest on the CDC priority list, because they are relatively easy to disseminate and would result in moderate amounts of illness (and somewhat lower

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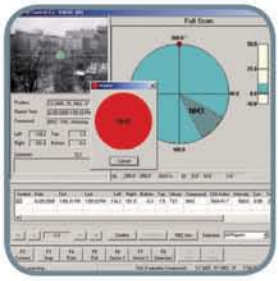

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death rates). Among the best known "Cat B" agents are brucella, ricin, and salmonella.

"Category C" agents are "emerging" diseases that do not – so far, at least – have a big enough "footprint" to be considered Category A or B.

Recognizing a bioterrorism attack or outbreak: If there is an incident in which a potentially hazardous "bio substance" has been released, it is the responsibility of local hazmat teams – those that have been properly trained on how to respond – to keep emergency managers and other decision-makers aware of how they assess the situation. A major problem with identifying biohazard agents in the field, though, is that such agents are much more complex than chemicals or explosives – and require much more sophisticated technologies to identify with an acceptable degree of accuracy.

The most sensitive and most accurate way to test for pathogens in the field is to use Real-Time PCR (polymerase chain reaction) systems and devices. PCR searches out the pathogen's unique DNA and uses it to make a positive identification. After being tested, the samples are sent directly to a regional laboratory to be "grown" in a carefully controlled culture – and at the same time quantified in accordance with other DNA standards.

There are several other factors to consider if is not blatantly obvious that there has been an biological attack per se. Most pathogens have what is called an "incubation period" – i.e., a certain length of time when there are no obvious symptoms of disease, but the disease is still active and quite possibly already contagious. This period is where public health monitoring comes into play. Epidemiologists regularly, and routinely, evaluate hospital statistics in search of unexpected spikes in fever, rash, gastrointestinal illness, and/or other disease symptoms. If a drastic increase or growth is identified in any one of these symptomatic areas an immediate investigation should be launched to discover the cause.

Responding to an incident involving pathogens: When a potential source of infection has been identified, there are several escalating methods of limiting the spread of the pathogen. The specific response selected will vary, though, in accordance with the type of pathogen that has been identified. If there has been an intentional release of anthrax, to cite but one plausible example, prophylactic medications may be provided, and those persons infected may simply be permitted to return home – this is a safe option, because anthrax is not capable of being spread from one person to another. However, if an infectious agent such as smallpox or plague is intentionally released (or appears as a natural outbreak of either of those diseases), voluntary isolation and/or quarantine are more likely to be considered.

The isolation process separates a sick person from those who are not sick, but dealing with the infection, and caring for the sick, requires health providers, and visitors, to wear effective personal protective equipment – e.g., gowns, masks or respirators, and gloves – while treating those who are infected. Quarantine is somewhat less drastic than isolation, but it does restrict the movements of otherwise healthy persons who may have been exposed to a communicable disease so that the pathogen is not spread more widely during its incubation period. A recent well publicized event worth noting: Quarantines were used widely, and successfully, in Canada during the 2006 SARS (severe acute respiratory syndrome) outbreak.

Communicating with the public: During any incident or event that is suspected to involve potentially deadly pathogens, it is crucially important to provide accurate and reliable information to the public – quickly, and on a continuing basis. Experience shows that tailoring presentations to the public's attitude – and remembering to reiterate the most important parts of the message over and over again, as many times as is necessary – will yield the best results. These messages should be simple, straightforward, honest, accurate, realistic but not alarmist, and should include specific instructions on where to find additional information – a hotline call number for continuing updates, for example. Empowering citizens by using essential communications tools during times of unusual stress can be one of the most effective way to mitigate fears and restore public confidence.

Dangerous pathogens will undoubtedly be a continuing threat to mankind for generations to come, and on occasion may be able to "out-compete" humans. But with consistent and improved training of healthcare professionals, continued monitoring, and advanced testing capabilities it now seems possible, for the first time in recorded history, to prevent pathogens from "outsmarting" humans as well.

Christina M. Flowers, MPH (Master of Public Health), is currently working with ITI, a supplier of solutions in the field of biodefense preparedness. She previously served as an emergency planner for the Virginia Department of Health, possesses a wealth of experience in grants management, and participated in a number of emergency preparedness and response efforts in Norfolk, Virginia. Certified both in tropical medicine for vector-borne emerging infectious diseases and as a Level 1 hazmat instructor, she also provided essential technical laboratory assistance during the anthrax attacks on Capitol Hill seven years ago and now manages the U.S. East Coast sales of real-time disease-identification equipment.

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The Hospital ICS: Mainstream Solution, or Barely Used?

By Craig DeAtley PA-C, Health Systems

The latest version of the Hospital Incident Command System (HICS) was released in 2006. Several noteworthy changes were made at that time, including the incorporation of a revised Incident Management Team (IMT) design, revised Job Action Sheets (JASs), a new Users Guide, and new tools such as Incident Planning Guides and Incident Response Guides. Intended to help hospitals of all sizes prepare for and respond to all-hazard emergencies, the system materials – including education modules – are available at no cost from two websites.

These were significant and much-needed changes and improvements. However, the way that the HICS guidelines and the new materials have been received has not been well studied. The best proof of that assertion, perhaps, was provided in 2009, when the Center for HICS Education and Training – headquartered at the Washington, D.C., Hospital Center – conducted a national survey of healthcare personnel to investigate user perspectives on the importance of HICS and each of its key attributes.

The way that the HICS guidelines have been received has not been well studied; the best proof of that assertion, perhaps, was provided in 2009, when the Center for HICS Education and Training conducted a national survey of health-care personnel to investigate user perspectives on the importance of HICS and its key attributes

A SurveyMonkey program was used as the method for responders to share their online responses to 64 questions – which ranged from information about job roles and responsibilities, and the use of HICS guidelines, to questions specific to each of the individual HICS tools and attributes. Each question was followed by multiple-choice answers, some of which included the option of adding written comments and suggestions. Personal contact, mass emailings, and general publicity (usually generated by the American Hospital Association) were used to promote participation in the survey. The survey "tool" remained available for completion for three weeks; by the end of that time there had been 886 participants – enough, probably, to develop some general but not necessarily definitive conclusions.

Anatomy of a Well Planned Survey

The responders came primarily from hospitals (95.5 percent), with many serving as emergency program managers (59.2 percent), followed by safety officers (27 percent), and department heads (25.5 percent). Their responses represented hospitals of all sizes: 25-100 beds (28.3 percent), 150-200 beds (16.9 percent), more than 250 beds (20.6 percent), and more than 500 beds (11.4 percent). [Because of "rounding errors," dual-purpose responsibilities, and similar factors some response totals are above 100 percent.]

The results revealed that 96.8 percent follow Incident Command System (ICS) guidelines, with 89.5 percent indicating they use the more specific 2006 HICS guidelines. The remaining 10.5 percent said they use the Hospital Emergency Incident Command System (HEICS). Training in National Incident Management System equipment standards (NIMS ICS) 100 and 200 classes had been provided by 95.3 percent of the hospitals to their staff. There were no questions asked about completion of more advanced courses such as IC 700 and 800.

The Guidebook, which was included as one of the principal HICS tools, was considered to be well organized (90.6 percent) and was frequently used – by the hospital representatives responding to the survey – to evaluate or develop their emergency operations plans (EOPs, 80.6 percent). Some respondents suggested improvements such as expanding the information provided on implementation and/or incident action planning.

The new Incident Planning Guides (IPGs) were reported to be used to evaluate or develop their EOPs by 57.1 percent of those surveyed. Evacuation (65.5 percent), bomb threat (42.6 percent), and severe weather (40.5 percent) are the IPGs most frequently used. The Incident Response Guides (IRGs) were used by 46.9 percent of those responding.

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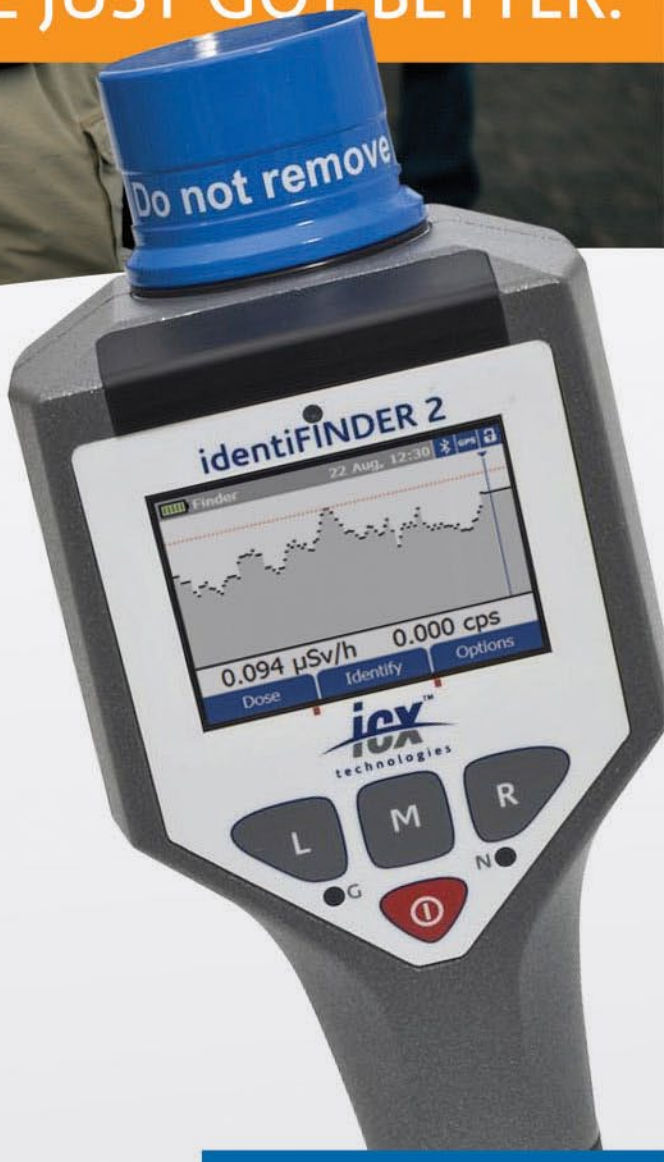

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Evacuation (67.3 percent), bomb threat (53.1 percent), loss of power (46.1 percent), and pandemic flu (46.1 percent) were the most often used IRGs – but many others were not far behind. Suggested improvements included the addition of IPGs and/or IRGs on active-shooter, tornadoes, and wildland-firefighting situations.

The IMT design is used by 73.9 percent of those responding; a large majority (71.8 percent) of them agreed that the IMT chart was easily adaptable by their respective facilities. The accompanying job-action sheets (JASs) are used by an impressively high percentage of the responders (83.7 percent). Suggested improvements included providing additional and more detailed information on certain JASs, but limiting unnecessary redundancy. The HICS forms now used have been included, usually as part of an EOP, at 74.5 percent of the hospitals represented – 82.6 percent of the hospitals reported that their staff has been provided training on use of the HICS forms.

Less than half (39.6 percent) of those responding reported using the education modules included as part of the HICS materials. However, 71.7 percent indicated they would be interested in attending an HICS course, particularly if instructions on implementation (76.0 percent) and/or Incident Action Planning (77.7 percent) were being taught.

A Few Tentative Conclusions

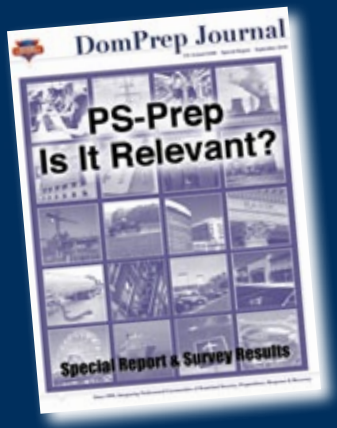
Although the survey has several limitations – including its design, scope, and relatively small sample size – the results and implications drawn do seem to indicate that HICS is the incident command system most often used by hospitals of all sizes.

The 2006 improvements in the original HEICS materials – e.g., IMT, Guidebook, JASs, and forms – as well as the new materials included (IPGs and IRGs, for example) – are seen as particularly beneficial. The education modules were not rated highly – but that semi-conclusion may be, at least in part, the result of responders not being familiar with the availability of the modules.

The Center for HICS Education and Training is continuing to review the results, but has already started the process of formulating improvement suggestions in all of the HICS materials. Those suggestions will be discussed at a future HICS Stakeholders Conference sometime in 2011 and included in future training programs developed by the Center.

Craig DeAtley is the director of the Institute for Public Health Emergency Readiness at the Washington Hospital Center, the District of Columbia's largest hospital. Prior to assuming his current position, he was an Associate Professor of Emergency Medicine at George Washington University for 28 years before leaving to start the Institute. He also works as a Physician Assistant at Fairfax Hospital, a Level Trauma Center in Northern Virginia, he has been a volunteer paramedic with the Fairfax County Fire and Rescue Department since 1972, and a member of their Urban Search and Rescue Team since 1991. He currently serves as the team's Medical Team Coordinator and also serves as the Assistant Medical Director for the Fairfax County Police Department. For the past 11 years he has been working as a consultant on projects related to DOD's/DOJ's WMD Domestic Preparedness Programs, and a variety of HHS/CDC's Public Health Department projects related to preparedness and response.

Private-Sector Preparedness Webinar



The jury is still out about Private-Sector Preparedness (PS-Prep), but this webinar is a good springboard for further talks. Listen to this compelling discussion with views expressed from both the private and public sectors – some supportive, some not so supportive, and some unsure. The survey results and report were published in the September 2010 issue.

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Hospital Emergency Departments

Infectious Diseases: The First Line of Defense

By Theodore (Ted) Tully, Public Health

The first symptoms of a biological attack by terrorists – or of an emerging infectious disease – will usually be somewhat similar to those of the common cold or flu. Such symptoms as respiratory coughs, fever, and/or body aches may therefore be the chief complaints noticed by the first victims. How the victims react, though, then how public health services respond, can determine just how deadly an outbreak is likely to become. If the first cases of an outbreak can be identified, isolated (if infectious), and possibly treated, the public health agencies involved probably can control not only the outbreak itself but also the potential panic that might quickly follow.

Over the past decade, health care has seen several newly emerging infectious diseases that have provided a blueprint that also can be useful in reacting to a terrorist bio-warfare attack. Avian flu, SARS (severe acute respiratory syndrome), and most recently the H1N1 global pandemic flu virus have provided health care institutions several valuable lessons that show what to do – and, of sometimes greater importance, what not to do – to identify and, if possible, counter an infectious disease. Those same outbreaks have shown health care institutions, and public health services: (a) how most if not all people will react to their symptoms; and (b) how most citizens are likely to react after the outbreak of a major infectious disease has become public knowledge. The avian flu, SARS, and H1N1 outbreaks provided several valuable "lessons learned," therefore, that – prior to those outbreaks – public health personnel could only theorize about on the basis of other outbreaks in the more distant past – the so-called "Spanish" flu global pandemic of 1918-20, for example.

The U.S. health care system has found that the initial indicator of such outbreaks is, in many albeit not all cases, a significant increase in the number of patients showing up at the emergency departments (EDs) of local hospitals. When an unusually large number of patients present themselves to an ED during a short period of time, or when a large number of patients report the same suspiciously acute symptoms or circumstances – e.g., recent travel overseas, or an inexplicable rash accompanying other health problems – health-care providers should recognize that such symptoms may be the first indicators of a potentially major outbreak. They also might turn out to be the index cases of a new disease outbreak – or of a new wave, in a new community, of an already existing outbreak The patients involved, and the valuable information they provide when arriving in a hospital's ED, may quickly become the human "new frontier" where the disease battle will be fought.

OTC Medications, Insurance Issues And the EMTALA Factor

Today's health-care reality in many areas of the country is one in which the local hospital ED is what most people consider their primary-care facility. If a person develops a significant medical symptom that an OTC (over-the-counter, or non-prescription) medication cannot help, he or she usually goes to the nearest local hospital's ED to seek medical treatment. The principal reasons for this almost instinctive reliance on local EDs are that many Americans either: (a) do not have a primary care physician; or (b) usually face a sometimes long delay in obtaining an appointment with their physicians; or (c) have various insurance "issues" to resolve. Whatever the reason, though, the ED at the local hospital must – by law (EMTALA – the Emergency Medical Treatment and Active Labor Act) – evaluate all patients regardless of their financial status. This is perhaps the principal reason why local EDs are the first health care facilities where victims of an outbreak usually seek medical relief – it also is why the resulting surge in ED patients following an outbreak should trigger an alarm for a quick public health response.

Most states now have computerized systems in place to ensure that a sudden influx or surge of patients into a local ED automatically alerts public health officials – especially when a high percentage of those patients exhibit flu-like symptoms. The computerized systems help local agencies implement response plans quickly – while also sending experienced professionals to investigate the surge. Such computerized systems therefore serve, in effect, as an early warning alarm system for the local community (or for the nation as a whole), especially if the systems provide real-time information and/or are linked to several hospital departments – e.g., pharmacy, laboratories, and/or electronic medical records – that can provide valuable corroborating information. The same systems can be used, of course, to detect potential patterns in the early stages of an outbreak, a capability that can lead to early decisions by local public health agencies to seek an aggressive release of medicines and medical equipment from geographically dispersed PODs (points of

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distribution) of the Strategic National Stockpile (SNS) of pharmaceuticals, medications, and medical systems and devices.

The development and improvement of these surveillance systems, along with other systems that identify certain sales of over-the-counter medications being purchased from pharmacies or chain stores, can give the same agencies a much earlier start on their response and recovery plans. For several reasons, though, it would be a serious mistake to rely exclusively on these computerized systems. For one thing, if a hospital's own computer system is offline, the data it normally provides might well be delayed for a period of several hours, if not longer. Also, if a true ED surge does occur at a hospital, and/or if a hospital's departments are suddenly overwhelmed by an unexpected number of patients, the hospital staff may revert to the use of a paper system and not enter the data until much later – i.e., when there is more time available for non-medical tasks such as the updating of files and similar office chores. Whatever the reason, such occurrences could significantly delay the data showing up in an electronic form to other health care agencies and facilities, and for that reason might indefinitely prevent the sounding of an alarm that could have triggered a much quicker public health response.

Hospitals must realize, therefore, that they not only must put their emergency plans in motion as early as possible when reacting to an unexpected surge in patients that overcrowds the hospital's ED (and/or other departments), but also must establish and maintain continuing and effective communications with other health agencies and facilities in the local community. In short, reliable and continuous communications are the best (and sometimes only) way to keep all health care organizations in the same community quickly and fully aware of unusual surges of patients -- and/or of the sudden presentation of even a relatively small number of severely acute patients exhibiting unusual symptoms – e.g., flu patients before or after the normal flu season, or a very large number of rashes and other symptoms of certain diseases.

Reluctant Compliance vs. Overcrowding vs. Code Violations

In most U.S. hospitals, their public health service agency usually also serves as their compliance agency. For that reason alone, there is often an inherent reluctance to bring public health officials into the hospital itself. Probably most but certainly not all hospital administrators may obviously be concerned that representatives of the local or state public health agency may see a potential health code violation during such visits. When an ED is overcrowded, to cite but one example of many situations when patient-care issues may easily be delayed – a potential health code violation may last for a brief but legally measurable period of time. If a public health agency responds as it should during an unexpected surge of patients, certain code violations may be both obvious and visible – stretchers in hallways, for example, or a large number of patients already admitted, but remaining in the ED for several hours. These situations, and many others that might be cited, understandably make some hospitals reluctant to voluntarily notify a public health agency of certain temporary medical difficulties – particularly if such notification might expose the hospital to a violation warning and/or a potential fine.

If hospitals work more closely, though, with their public health agencies on emergency preparedness – through plan development, POD (points of distribution) activations [for medicines and medical supplies], surge drills, and frequent meetings – the hospitals and public health agencies involved all will feel more comfortable about communicating during potential real-life incidents and events. Both of these important organizational stakeholders must feel comfortable when they react and when they report unusual issues. In short, hospital ED staff must serve as the "fail-safe" backup if and when electronic systems are not available, for whatever reason, to alert public health agencies. The ED staff also must feel reasonably comfortable, as must hospital administrators, in notifying public health agencies of any potentially dangerous and/or difficult situations that might develop.

In addition, the public health agencies involved must use both logic and common sense when they are asked to respond to information provided by a hospital's ED. When a sudden patient surge event occurs hospital EDs almost always react as best they can, and as fast as they can – but still, because of overcrowding and/or other circumstances beyond their own control, may not be capable of adhering to all normal health codes at the same time. The best, longest lasting, and perhaps only effective long-term solution in such circumstances, therefore, is to develop and maintain the mutual respect and confidence needed to form the true working partnership necessary to develop and implement the effective response system required to protect the public from an unexpected outbreak.

Theodore "Ted" Tully is the Administrative Director for Emergency Preparedness at Mount Sinai Medical Center in New York City. He previously served as Vice President for Emergency Services at the Westchester Medical Center (WMC), as Westchester County EMS (emergency medical services) Coordinator, and as a police paramedic/detective in Greenburgh, N.Y. He also helped create the WMC Regional Resource Center, which is responsible for coordinating the emergency plans of 32 hospitals in lower New York State.

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Swabs and Samples; Assays and Analytes

By Patti Riggs, Principal Chemist, QuickSilver Analytics, Case Study

The process of sample collection is often minimized during the planning phase of remediation and other on-site activities. However, sampling can provide the empirical data needed for reliable decisions to be made. Therefore, greater emphasis on collecting samples will or should provide support to decision-makers when they have to answer "why, how, and where" questions.

The challenges involved in collecting samples are both multifold and multilayered. They usually begin when the decision to collect samples has been made. Proper planning is essential to successful sample collection, though, and largely for that reason a number of questions should be asked ahead of time – specifically including the following: (1) "Why sample?" (2) "What is the purpose of the sampling?" (3) "How will the resulting data be used – and/or what decisions will it be expected to support?" (4) "What methods will be used to collect the samples?"

The effectiveness of the sample collection required to find answers to these questions usually depends primarily on the use of proper statistical techniques – which themselves almost always are determined by the purpose, or intent, of the decision to collect samples. One of the techniques used is to collect "discrete" or "grab" samples. This method is particularly useful when: (1) the areas being searched are and/or have been exposed to an equal or near-equal level of contamination; and (2) it has become obviously necessary to find the proverbial "needle in the haystack."

In the second of these situations, a large number of samples – or, ideally, samples from the entire population/decision area – must be collected. If it has been decided that the "average" level of contamination in the area has to be determined, the more effective way to sample is to identify, as precisely as possible, the full extent of the decision area and carry out a multi-incremental sampling process, usually preceded by developing a sampling grid.

Selection, Use, Documentation & Other Challenges

Even after the purpose of the sampling has been identified and the sampling strategy has been selected, several additional challenges remain. Among the more important of those challenges are: (1) selecting the best tools and equipment; (2) using those tools correctly; (3) properly documenting the entire process; and (4) preserving the collected samples from the time of collection until their receipt at the laboratory.

The error rate associated with sample analyses usually ranges from 2 to 20 percent, and is linked to and/or dependent on: (1) complete extraction of the target analytes (the substances being analyzed); (2) correct calibration of the analytical instrument(s); (3) proper execution of analysis; and (4) verification that the correct samples are being analyzed. In a typical laboratory environment, these issues are carefully and effectively met, reducing the error rate to a very low and therefore scientifically acceptable level.

Here it is important to remember that sample preparation usually is associated with a higher level of error – ranging from 100 to 300 percent, depending on the type and level of preparation required. The problems associated with preparation are primarily linked to the subsampling process, where the goal is to obtain a homogenous sample representative of the larger sample.

The error rate associated with sample collection is significantly greater – up to as much as 1000 percent, in fact – than the rates associated with sample preparation and analysis. The errors found are linked to any of several factors involved, including but not limited to the following: insufficient sample mass; the improper selection and/or use of tools; limited access to the population that should be sampled; sample contamination, loss, and/or reactions; and even the improper or erroneous selection of the sampling location.

Detailed Planning, Beforehand, Is the Key Requirement

Most if not all error rates can be reduced to at least some extent by careful planning. The planning process ideally should address all of the numerous issues (not all of them scientific in nature) related to sample collection. For example, the purpose of the specific task(s) involved needs to be identified. Also, an adequate budget should be developed and approved, and an optimum strategy selected to mesh the need for the collection of samples with the budget available.

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The development of a detailed sampling plan is also an essential prerequisite. That plan should address such generic topics as: sample collection, preservation, and shipment; the sample collection tools needed; the documentation required; and the statistical sampling process.

Because a significant cause of sample collection error is linked to the sample process itself, particularly careful attention must be paid to the choice of sample collection tools and equipment. Use of the "wrong" tools (and/or improper use of the "right" tools) can introduce an unintentional bias into the findings. Unfortunately, there seems to be no practical way to measure such biases, so the level of error also cannot be calculated.

To avoid cross contamination, sample collection tools should therefore, whenever possible, be sterile, single-use in nature, easy to use, and compatible with both the sample being collected and the analytical method used to evaluate the sample.

Cost, Compatibility, and Other Decision-Making Factors

QuickSilver Analytics offers several examples of collection systems specifically designed for the collection of biological samples while avoiding cross contamination. The company's All-in-One Swab, for example, is a self-contained swab system designed for sampling either a very small location or a specific point-source sample. The All-in-One Swab is also compatible with the Critical Reagents Program's Hand Held Assays, and provides a low cost per sample. In addition, the company's B2C (Bulk Bio Collection) and SP2C (Swab Powder Sample Collection) Kits are designed for the collection of powders from nonporous surfaces. The B2C is capable of sampling a large area, while the SP2C is designed for a smaller area. Moreover, the B2C and SP2C kits meet the sample collection requirements postulated both by the American Society of Testing and Materials (ASTM) and the Association of Official Analytical Chemists (AOAC – the latter acronym is an "unofficial" name derived from an earlier (1884) acronym for the Association of Agricultural Chemists).

One technique used is to collect "discrete" or "grab" samples – this method is particularly useful when: (1) the areas being searched are or have been exposed to an equal or near-equal level of contamination; and (2) it has become obviously necessary to find the proverbial "needle in the haystack"

In addition to having the "right" tools available and meeting the other requirements mentioned earlier, each sample must be thoroughly documented. That documentation should include, but not necessarily be limited to: (1) the exact sampling location (determined by GPS and/or photography); (2) the means (e.g., tools, methods) by which the sample was collected; and (3) the person(s) who collected and/or witnessed the collection process.

Equally important is the chain-of-custody documentation, which records exactly how the sample was transferred from one individual to another and from the sample-collection location to the laboratory. Documenting the chain of custody preserves the traceability of the sample from the time of collection through analysis and reporting. However, without proper packaging and preservation during transit, such documentation is almost always useless.

The requirements for sample preservation, which will vary based on the analyte(s) of interest, must also be fully and correctly identified during the planning phases of the project. Extensive thought and planning are necessary, therefore, to select, collect, and handle the samples needed to provide all of the data required to support decision making.

To assist in this planning, there are several published guidelines such as those available not only from ASTM but also the U.S. government – more specifically, the Environmental Protection Agency. In short, with proper planning, sampling can and should be used as a valuable tool whenever critical decisions must be made.

Patti Riggs is the Principal Chemist and Quality Manager at QuickSilver Analytics, where she has been employed for the past fifteen years. She has a Master of Science degree from the University of Delaware, and a strong interest in improving all aspects of chemical analysis.

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Bio-Preparedness: From the Top Down

By JL Smither, Exercises

All political jurisdictions must be prepared for a biological event, whether a manmade threat such as an anthrax attack or a natural threat such as pandemic influenza. Because some jurisdictions throughout the United States conduct exercises on these and other threats on a regular basis, other jurisdictions – at all levels of government – can learn valuable lessons from the documented experiences of others. By collecting and sharing these and other lessons, and implementing the recommendations derived from those lessons, the nation as a whole can be much better prepared to cope with biological threats in general. (Many such lessons – from biological and other threats – can be found on Lessons *Learned Information Sharing (LLIS.gov).)*

During the fall of 2007, the State of Washington sponsored an annual bioterrorism exercise to test the state's readiness to cope with biological threats in that state. The exercise involved a simulated biological attack that resulted in an outbreak of *Salmonella typhi* caused by tainted communion wafers. However, despite their personal awareness of the outbreak, several local health officers were not sure whether it constituted a "significant" public health event that would have required them to declare a public health emergency.

Some local health officers did decide, in fact, not to declare such an emergency, which meant that they also did not: (a) request a county-level declaration of emergency; and/or (b) request that the county emergency operations center be activated. During the after-action review of the exercise, region officials recommended adding specific "triggers" into public-health preparedness plans that would remove any ambiguity about what is and what is not a significant public health threat.

The same type of regional planning has proved valuable in other parts of the country as well. In both 2006 and 2007, for example, the Louisiana Department of Public Health sponsored regional tabletop exercises, throughout the state, to test various aspects of both local and statewide preparedness for biological threats. During the Region III exercise – an area that includes the parishes between New Orleans and Baton Rouge that were hit especially hard by Hurricane Katrina – public health professionals noted a sharp increase in the number of mental health patients, including pediatric cases. The demand for psychological services in the area far exceeded the supply at that time.

Because of that finding, the region's representatives worried that any additional stress caused by a pandemic or other biological threat might completely overwhelm the system. The after-action report therefore recommended that the region work with other jurisdictions in the area, as well as the state, to accommodate a possible future surge in mental health cases by resource sharing and/or by mutual-aid agreements.

Direct Involvement & Hands-On Participation

Another Louisiana region faced a different problem in its efforts to cope with biological preparedness – namely, getting elected officials more directly involved in the preparedness efforts. Prior to the Region VI tabletop exercise, the regional Office of Public Health sent invitations for participation to a number of elected officials. However, none of them attended the exercise, which meant that they had no input or insight into the issues, recommendations, and corrective actions proposed by those (at lower levels of government) who did participate in the exercise. Because so many citizens turn almost automatically to elected officials for guidance during emergencies, it is essential to have those same officials directly involved during the preparedness and exercises stages of bio-preparedness planning.

The after-action review therefore recommended developing, and conducting, workshops specifically designed for elected officials not only to bring them all together in one space at the same time but also, and of greater importance, to make them more fully aware of their own important roles during emergencies of all types. The after-action review also strongly recommends encouraging these same officials to participate directly and personally in the workshops and exercises scheduled, instead of sending staff members.

Being prepared for biological threats involves cooperation at and from all levels of government as well as clear guidance for each individual involved. By learning from these exercises, and by implementing positive changes in plans and procedures from the local level up, the nation as a whole can be much better prepared for whatever threats it might face in an increasingly uncertain future.

For additional information on biological preparedness and various related subjects, visit www.llis.gov.

Jennifer L. Smither is the outreach and partnerships manager for Lessons Learned Information Sharing (LLIS.gov), the Department of Homeland Security/Federal Emergency Management Agency's national online network of lessons learned, best practices, and innovative ideas for the U.S. homeland-security and emergency-response communities. Ms. Smither received her bachelor's degree in English from Florida State University.

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The Driving Forces Behind Policy Making

By Joseph Cahill, EMS

Why would Emergency Medical Services (EMS) staff need policies on driving? Providing medical care, of course, is the primary task and responsibility of EMS personnel. However, the many hours EMS staff are on the road – almost all of it to and from the scene of a traffic accident or other incident – makes driving one of the highest-risk tasks that they routinely carry out – at all times of day, and in all types of weather. Developing, promulgating, and implementing an official "policy" on driving, therefore, could and probably would help mitigate that risk considerably.

Official policies at any level of government are, in general, mandatory for three principal reasons: (1) they provide operational (and political) guidance to staff; (2) they help ensure compliance with what is sometimes a rather confusing jumble of laws, rules, and regulations; and (3) they offer protection not only for the EMS agency involved but also for individual members of the EMS staff.

The first step to developing a new or revised policy is to set forth the primary goals. In the case of driving, agency vehicles should be operated in a manner that permits the agency's primary mission to be carried out safely and effectively, and without causing additional risk to the staff and/or the public at large.

The first step in developing a new or revised policy is to set forth the primary goals – in driving, agency vehicles should be operated in a manner that permits the agency's primary mission to be carried out safely and effectively, and without causing additional risk to the staff and/or the public at large

The next step in the process is to keep staff members fully informed about all current rules and regulations. To consider but one example: Lights and sirens are powerful tools, so it should be made clear, in advance, when it is both warranted and acceptable to use them. In this particular operational area, the guidelines postulated must be defined very carefully, because lights and sirens give drivers the authority to take specific risks – e.g., exceeding the speed limit, if and when necessary, proceeding (very carefully) through red lights, and wending their way through and/or around stalled traffic. Some systems have instituted policies requiring that all drivers keep their lights and sirens activated during any response – but other jurisdictions require specific and more limited authorization for their use.

Responsibility, Accountability And Continuing Updates

Laws are created to maintain order. When officials disregard those laws, society assigns, and expects, responsibility and accountability. In the same manner, an intelligent and acceptable policy needs to specify: (a) how authority will be defined; and (b) how both risk and liability may and should be minimized. A well-defined policy should also include the circumstances under which this permissive authority can be "turned on" – and by whom.

Most states already have enacted legislation covering the operation of emergency vehicles, including the use of lights and sirens. Any policy that is enacted must be in compliance with the respective state's statutes. In some cases, the purpose of the policy may be to bring the agency into compliance with existing laws. In other cases, it may have nothing to do with statute, but is intended solely to meet the needs of that agency.

Nonetheless, the policy should, in all cases, reference the statute under which it falls. After a statute is approved and/or enacted, the agency must then keep up to date with that law. When changes are made to the statute, therefore, the policy must also be updated accordingly.

Good Policies and Reasonable Questions

A "good" policy – i.e., one that is not only legally permissible but also meets operational requirements and, above all, makes common sense – is designed to protect the agency as well as the staff by managing risk, assigning authority, and defining expectations. In that context, among the several

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questions that should be addressed are: (a) When risks could and perhaps should be taken; (b) Who has the authority to order or take such risks; and (c) When EMS staff are permitted to refrain from taking those risks. Certain ancillary questions – such as who is allowed to waive the policy, and under what circumstance a waiver may be permitted – also should be covered.

By controlling risk, a reasonable and effective driving policy provides protection to the public as well as to emergency responders. Intelligent and effective policies also protect EMS staff by setting forth explicitly what is expected from them and specifying how differing opinions should and will be settled between staff members, between staff and supervisors, and between staff and the public. All of those involved can simply "look up" the answers.

Two additional points worth remembering: (a) Having a reasonable and effective policy in place is important, but it can be "effective" only if it is well known and understood by all EMS staff (including supervisors) likely to be involved. To meet that common-sense requirement, policies should be both published and promulgated – to all personnel who might be directly or even indirectly affected. Those personnel, including supervisors, who will be responsible for enacting the policy must be thoroughly familiar with it. (b) Although this brief discussion focuses primarily on the "driving" policy of a specific jurisdiction, driving itself is only one example of why *all* official policies matter – not only for legal reasons, but for operational requirements as well. Policies related to guidance, compliance, and protection also should be clearly stated, therefore; they also should be widely spread and promulgated and, most important of all, they should meet the true "golden standard" of all policies: everyday common sense.

To review an excellent example of a well-defined driving policy, visit the University of Texas Police Department's website (http://www.utexas.edu/police/manual/a5.html).

Joseph Cahill, a medicolegal investigator for the Massachusetts Office of the Chief Medical Examiner, previously served as exercise and training coordinator for the Massachusetts Department of Public Health, and prior to that was an emergency planner in the Westchester County (N.Y.) Office of Emergency Management.

The Limits of Detection: A New Horizon Beckons

By Chris Weber, Fire/HazMat

First responders – whether law-enforcement personnel, firefighters, or EMS (emergency medical services) technicians – need real-time, easy-to-operate biological-agent detection technology, designed with detection limits below what is considered an infectious dose. Such detection capabilities are currently available for solid and liquid samples, but not yet for the analysis of airborne samples.

First responders also need clear guidance – immediately – at the scene of a potential release, for several reasons: (a): to protect the public through isolation and quarantine; (b) to recommend further medical care to any persons who might have been exposed to the biological agent(s); (c) to make a decontamination decision; and/or (d) to protect and collect potential evidence.

Current technology leaves much to be desired, unfortunately, in terms of most individual systems' sensitivity, accuracy, reliability, and ease of use. Some experts have suggested that the American people could serve as hundreds of millions of human "detectors" per se – but that suggestion certainly does not measure up to the modern standards of care either in medicine or in public health matters in general.

A complex and expensive *ad hoc* bio-surveillance system has emerged in the United States that includes hundreds of air samplers and clinical laboratories as well as epidemiological monitoring on a large scale. Airborne biological-agent detection programs – such as BioWatch – have generally been handicapped by a 24-36 hour time delay between the initiation of detection efforts and the receipt of definitive results. The BioWatch program currently relies on an extended cycle – approximately 24 hours – of air sampling, followed by laboratory analysis of the samples collected. The combination of delayed results and comparatively high cost makes this approach less than ideal. However, this system provides earlier detection than previously was available by relying solely on epidemiological surveillance.

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Quantum Improvements In Sight; Also Additional Hurdles

The next generation of the BioWatch program – Generation 3.0 – is currently testing and deploying highly accurate, autonomous biological-agent detectors that have the ability to monitor more than 20 agents, continuously, for 30 days at a time, and without human intervention required. These newer detectors also have the capability to collect samples, carry out the analyses needed, and quickly relay the results developed to decision-making authorities – all within the space of only a few hours. The numerous benefits provided by this technological development promise to revolutionize first-responder biological-agent detection for years to come.

The primary technologies used to detect biological agents fall into two categories – those that are antibody-based; and those that are DNA-based. Antibody-based detection devices, which use shape recognition of a specific region of the target as their primary indicator, can identify a relatively broad spectrum of biological agents. These devices have not been reliable in the past, but the improved current technology can be extremely accurate and, depending on the type of antibody used, acceptably precise for most operational purposes.

It is important to recognize, though, that antibodies can be relatively non-specific, a characteristic that can lead to many false positives. On the other hand, when the antibodies used are specific to a single disease-causing organism, they can be extremely accurate. The hand-held assays that responders have become familiar with are examples of antibody-based technology capable of detecting bacteria, viruses, and toxins. Their primary advantage is speed – less than 15 minutes for accurate identification in most if not all cases, for example. However, there also is a primary disadvantage – namely, a lack of sensitivity, because they are not able to detect biological agents below the infectious dose postulated.

DNA-based detection devices recognize biological agents by analyzing their genetic material (deoxyribonucleic acid, or DNA). These devices first amplify, or copy, a specific region of the target agent's genetic material and use the information provided to detect the presence of the amplified DNA. The amplification process, which copies the genetic material through use of an enzyme known as polymerase, is commonly known as a polymerase chain reaction (PCR).

Sensitivity and Speed – Or the Lack Thereof

Theoretically, PCR technology has the ability to detect a single biological agent – if and when the genetic material is intact. The primary advantage of a PCR analysis is sensitivity; its primary disadvantage is speed or, more accurately, the lack of speed – assays typically take an hour or more, which in most life-or-death situations is unacceptable.

Neither of these improved biological-agent detection technologies currently has the ability to detect viable organisms. For that reason, culturing the organism in a laboratory is still the gold standard for biological agent identification. Nonetheless, BioWatch Gen 3.0 technology – because it automates biological agent detection – represents a major step forward in developing rapid, sensitive, and accurate new bio-detection capabilities for the nation's first responders. Other advances in the biotechnology arena – e.g., in the field of micro-fluidics – promise to miniaturize and further automate biological-agent detection in the future. (Microfluidics is the multi-disciplinary science dedicated to the manipulation of liquids on a miniature scale.)

Theoretically, all biochemical reactions – e.g., air sampling, biological sample preparation, DNA amplification, antibody-antigen recognition, and identification – can be automated and analyzed on a computer chip-sized device. Eventually, therefore, first responders may carry highly accurate and automated pager-sized devices capable of identifying biological agents in ambient air in as little as 15 minutes – using two or more complementary technologies such as antibody- and DNA-based detection.

Nonetheless, there is still a long way to go. Given the additional technological hurdles that still must be overcome, real-time airborne bio-detection at the first-responder level – i.e., using devices capable of detecting bacteria, viruses, and toxins at levels below the "probably harmful" threshold – is in all probability still a generation away.

Chris Weber runs the training and consulting firm Dr. Hazmat Inc. and serves as a subject matter expert with the Longmont, Colorado, HazMat Team. His past experience includes serving on the Washtenaw County (Michigan) HazMat Team for over a decade, including a tour as deputy director. Weber has been a firefighter for over 20 years and has extensive experience involving hazardous-materials chemistry; he also holds a Ph.D. in Biological Chemistry from the University of Michigan, Ann Arbor. He is the author of "Pocket Reference for Hazardous Materials Response" (Brady/Pearson) and has written specialized chapters of several other books.

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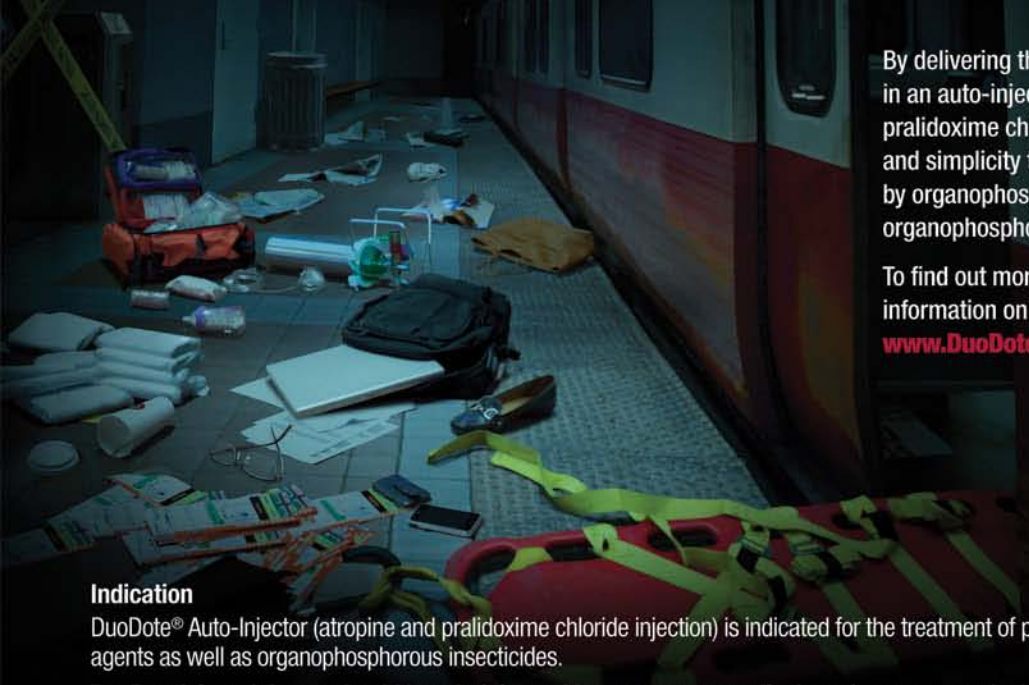
IN A CHEMICAL NERVE AGENT ATTACK

Have No Regrets. Be Prepared.



By delivering the 2 recommended antidotes in an auto-injector, DuoDote® (atropine and pralidoxime chloride injection) offers the speed and simplicity to help you respond to poisoning by organophosphorous nerve agents or organophosphorous insecticides.[1-3]

To find out more about DuoDote® and for information on grant assistance, visit **www.DuoDote.com** or call **1-800-638-8093.**

Indication

DuoDote® Auto-Injector (atropine and pralidoxime chloride injection) is indicated for the treatment of poisoning by organophosphorous nerve agents as well as organophosphorous insecticides.

DuoDote® Auto-Injector should be administered by emergency medical services personnel who have had adequate training in the recognition and treatment of nerve agent or insecticide intoxication. DuoDote® Auto-Injector is intended as an initial treatment of the symptoms of organophosphorous insecticide or nerve agent poisoning; definitive medical care should be sought immediately.

Important Safety Information

Individuals should not rely solely upon agents such as atropine and pralidoxime to provide complete protection from chemical nerve agents and insecticide poisoning. Primary protection against exposure to chemical nerve agents and insecticide poisoning is the wearing of protective garments including masks designed specifically for this use. Evacuation and decontamination procedures should be undertaken as soon as possible. Medical personnel assisting evacuated victims of nerve agent poisoning should avoid contaminating themselves by exposure to the victim's clothing.

In the presence of life-threatening poisoning by organophosphorous nerve agents or insecticides, there are no absolute contraindications to the use of DuoDote® Auto-Injector. When symptoms of poisoning are not severe, DuoDote® Auto-Injector should be used with extreme caution in people with heart disease, arrhythmias, recent myocardial infarction, severe narrow angle glaucoma, pyloric stenosis, prostatic hypertrophy, significant renal insufficiency, chronic pulmonary disease, or hypersensitivity to any component of the product. Elderly people and children may be more susceptible to the effects of atropine. DuoDote® Auto-Injector is Pregnancy Category C and should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. Safety and effectiveness in children have not been established.

Muscle tightness and sometimes pain may occur at the injection site.
The most common side effects of atropine can be attributed to its antimuscarinic action. Pralidoxime chloride can cause changes in vision, dizziness, headache, drowsiness, nausea, tachycardia, increased blood pressure, muscular weakness, dry mouth, emesis, rash, dry skin, hyperventilation, decreased renal function, excitement, manic behavior, and transient elevation of liver enzymes and creatine phosphokinase. When atropine and pralidoxime are used together, the signs of atropinization may occur earlier than might be expected when atropine is used alone.

DuoDote® AUTO-INJECTOR
(atropine and pralidoxime chloride injection)

READY TO RESPOND

Please see brief summary of full Prescribing Information on adjacent page.

References: 1. Agency for Toxic Substances and Disease Registry. Medical Management Guidelines (MMGs) for nerve agents: tabun (GA); sarin (GB); soman (GD); and VX. http://www.atsdr.cdc.gov/MHMI/mmg166.html. Updated August 22, 2008. Accessed May 20, 2010. **2.** DuoDote Auto-Injector [package insert]. Columbia, MD: Meridian Medical Technologies, Inc.; 2007. **3.** Rebmann T, Clements BW, Bailey JA, Evans RG. Organophosphate antidote auto-injectors vs. traditional administration: a time motion study. *J Emerg Med*. 2009;37(2):139-143.

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DuoDote® AUTO-INJECTOR
(atropine and pralidoxime chloride injection)

BRIEF SUMMARY OF FULL PRESCRIBING INFORMATION

Rx Only
Atropine 2.1 mg/0.7 mL
Pralidoxime Chloride 600 mg/2 mL

Sterile solutions for intramuscular use only

FOR USE IN NERVE AGENT AND INSECTICIDE POISONING ONLY

THE DUODOTE™ AUTO-INJECTOR SHOULD BE ADMINISTERED BY EMERGENCY MEDICAL SERVICES PERSONNEL WHO HAVE HAD ADEQUATE TRAINING IN THE RECOGNITION AND TREATMENT OF NERVE AGENT OR INSECTICIDE INTOXICATION.

INDICATIONS AND USAGE

DuoDote™ Auto-Injector is indicated for the treatment of poisoning by organophosphorus nerve agents as well as organophosphorus insecticides.

DuoDote™ Auto-Injector should be administered by emergency medical services personnel who have had adequate training in the recognition and treatment of nerve agent or insecticide intoxication.

DuoDote™ Auto-Injector is intended as an initial treatment of the symptoms of organophosphorus insecticide or nerve agent poisonings; definitive medical care should be sought immediately.

DuoDote™ Auto-Injector should be administered as soon as symptoms of organophosphorus poisoning appear (eg, usually tearing, excessive oral secretions, sneezing, muscle fasciculations).

CONTRAINDICATIONS

In the presence of life-threatening poisoning by organophosphorus nerve agents or insecticides, there are no absolute contraindications to the use of DuoDote™ Auto-Injector.

WARNINGS

CAUTION! INDIVIDUALS SHOULD NOT RELY SOLELY UPON ATROPINE AND PRALIDOXIME TO PROVIDE COMPLETE PROTECTION FROM CHEMICAL NERVE AGENTS AND INSECTICIDE POISONING.

PRIMARY PROTECTION AGAINST EXPOSURE TO CHEMICAL NERVE AGENTS AND INSECTICIDE POISONING IS THE WEARING OF PROTECTIVE GARMENTS INCLUDING MASKS DESIGNED SPECIFICALLY FOR THIS USE.

EVACUATION AND DECONTAMINATION PROCEDURES SHOULD BE UNDERTAKEN AS SOON AS POSSIBLE. MEDICAL PERSONNEL ASSISTING EVACUATED VICTIMS OF NERVE AGENT POISONING SHOULD AVOID CONTAMINATING THEMSELVES BY EXPOSURE TO THE VICTIM'S CLOTHING.

When symptoms of poisoning are not severe, DuoDote™ Auto-Injector should be used with extreme caution in people with heart disease, arrhythmias, recent myocardial infarction, severe narrow angle glaucoma, pyloric stenosis, prostatic hypertrophy, significant renal insufficiency, chronic pulmonary disease, or hypersensitivity to any component of the product. Organophosphorus nerve agent poisoning often causes bradycardia but can be associated with a heart rate in the low, high, or normal range. Atropine increases heart rate and alleviates the bradycardia. In patients with a recent myocardial infarction and/or severe coronary artery disease, there is a possibility that atropine-induced tachycardia may cause ischemia, extend or initiate myocardial infarcts, and stimulate ventricular ectopy and fibrillation. In patients without cardiac disease, atropine administration is associated with the rare occurrence of ventricular ectopy or ventricular tachycardia. Conventional systemic doses may precipitate acute glaucoma in susceptible individuals, convert partial pyloric stenosis into complete pyloric obstruction, precipitate urinary retention in individuals with prostatic hypertrophy, or cause inspiration of bronchial secretions and formation of dangerous viscid plugs in individuals with chronic lung disease.

More than 1 dose of DuoDote™ Auto-Injector, to a maximum of 3 doses, may be necessary initially when symptoms are severe. **No more than 3 doses should be administered unless definitive medical care (eg, hospitalization, respiratory support) is available.**

Severe difficulty in breathing after organophosphorus poisoning requires artificial respiration in addition to the use of DuoDote™ Auto-Injector.

A potential hazardous effect of atropine is inhibition of sweating, which in a warm environment or with exercise, can lead to hyperthermia and heat injury.

The elderly and children may be more susceptible to the effects of atropine.

PRECAUTIONS

General: The desperate condition of the organophosphorus-poisoned individual will generally mask such minor signs and symptoms of atropine and pralidoxime treatment as have been noted in normal subjects.

Because pralidoxime is excreted in the urine, a decrease in renal function will result in increased blood levels of the drug.

DuoDote™ Auto-Injector temporarily increases blood pressure, a known effect of pralidoxime. In a study of 24 healthy young adults administered a single dose of atropine and pralidoxime auto-injector intramuscularly (approximately 9 mg/kg pralidoxime chloride), diastolic blood pressure increased from baseline by 11 ± 14 mmHg (mean ± SD), and systolic blood pressure increased by 16 ± 19 mmHg, at 15 minutes post-dose. Blood pressures remained elevated at these approximate levels through 1 hour post-dose, began to decrease at 2 hours post-dose and were near pre-dose baseline at 4 hours post-dose. Intravenous pralidoxime doses of 30-45 mg/kg can produce moderate to marked increases in diastolic and systolic blood pressure.

Laboratory Tests: If organophosphorus poisoning is known or suspected, treatment should be instituted without waiting for confirmation of the diagnosis by laboratory tests. Red blood cell and plasma cholinesterase, and urinary paranitrophenol measurements (in the case of parathion exposure) may be helpful in confirming the diagnosis and following the course of the illness. However, miosis, rhinorrhea, and/or airway symptoms due to nerve agent vapor exposure may occur with normal cholinesterase levels. Also, normal red blood cell and plasma cholinesterase values vary widely by ethnic group, age, and whether the person is pregnant. A reduction in red blood cell cholinesterase concentration to below 50% of normal is strongly suggestive of organophosphorus ester poisoning.

Drug Interactions: When atropine and pralidoxime are used together, pralidoxime may potentiate the effect of atropine. When used in combination, signs of atropinization (flushing, mydriasis, tachycardia, dryness of the mouth and nose) may occur earlier than might be expected when atropine is used alone.

The following precautions should be kept in mind in the treatment of anticholinesterase poisoning, although they do not bear directly on the use of atropine and pralidoxime.

- Barbiturates are potentiated by the anticholinesterases; therefore, barbiturates should be used cautiously in the treatment of convulsions.
- Morphine, theophylline, aminophylline, succinylcholine, reserpine, and phenothiazine-type tranquilizers should be avoided in treating personnel with organophosphorus poisoning.
- Succinylcholine and mivacurium are metabolized by cholinesterases. Since pralidoxime reactivates cholinesterases, use of pralidoxime in organophosphorus poisoning may accelerate reversal of the neuromuscular blocking effects of succinylcholine and mivacurium.

Drug-drug interaction potential involving cytochrome P450 isozymes has not been studied.

Carcinogenesis, Mutagenesis, Impairment of Fertility: DuoDote™ Auto-Injector is indicated for short-term emergency use only, and no adequate studies regarding the potential of atropine or pralidoxime chloride for carcinogenesis or mutagenesis have been conducted.

Impairment of Fertility: In studies in which male rats were orally administered atropine (62.5 to 125 mg/kg) for one week prior to mating and throughout a 5-day mating period with untreated females, a dose-related decrease in fertility was observed. A no-effect dose for male reproductive toxicity was not established. The low-effect dose was 290 times (on a mg/m^2 basis) the dose of atropine in a single application of DuoDote™ Auto-Injector (2.1 mg).

Fertility studies of atropine in females or of pralidoxime in males or females have not been conducted.

Pregnancy:

Pregnancy Category C: Adequate animal reproduction studies have not been conducted with atropine, pralidoxime, or the combination. It is not known whether pralidoxime or atropine can cause fetal harm when administered to a pregnant woman or if they can affect reproductive capacity. Atropine readily crosses the placental barrier and enters the fetal circulation.

DuoDote™ Auto-Injector should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

Nursing Mothers: Atropine has been reported to be excreted in human milk. It is not known whether pralidoxime is excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when DuoDote™ Auto-Injector is administered to a nursing woman.

Pediatric Use: Safety and effectiveness of DuoDote™ Auto-Injector in pediatric patients have not been established.

ADVERSE REACTIONS

Muscle tightness and sometimes pain may occur at the injection site.

Atropine

The most common side effects of atropine can be attributed to its antimuscarinic action. These include dryness of the mouth, blurred vision, dry eyes, photophobia, confusion, headache, dizziness, tachycardia, palpitations, flushing, urinary hesitancy or retention, constipation, abdominal pain, abdominal distention, nausea and vomiting, loss of libido, and impotence. Anhidrosis may produce heat intolerance and impairment of temperature regulation in a hot environment. Dysphagia, paralytic ileus, and acute angle closure glaucoma, maculopapular rash, petechial rash, and scarletiniform rash have also been reported.

Larger or toxic doses may produce such central effects as restlessness, tremor, fatigue, locomotor difficulties, delirium followed by hallucinations, depression, and, ultimately medullary paralysis and death. Large doses can also lead to circulatory collapse. In such cases, blood pressure declines and death due to respiratory failure may ensue following paralysis and coma.

Cardiovascular adverse events reported in the literature for atropine include, but are not limited to, sinus tachycardia, palpitations, premature ventricular contractions, atrial flutter, atrial fibrillation, ventricular flutter, ventricular fibrillation, cardiac syncope, asystole, and myocardial infarction. (See **PRECAUTIONS**.)

Hypersensitivity reactions will occasionally occur, are usually seen as skin rashes, and may progress to exfoliation. Anaphylactic reaction and laryngospasm are rare.

Pralidoxime Chloride

Pralidoxime can cause blurred vision, diplopia and impaired accommodation, dizziness, headache, drowsiness, nausea, tachycardia, increased systolic and diastolic blood pressure, muscular weakness, dry mouth, emesis, rash, dry skin, hyperventilation, decreased renal function, and decreased sweating when given parenterally to normal volunteers who have not been exposed to anticholinesterase poisons.

In several cases of organophosphorus poisoning, excitement and manic behavior have occurred immediately following recovery of consciousness, in either the presence or absence of pralidoxime administration. However, similar behavior has not been reported in subjects given pralidoxime in the absence of organophosphorus poisoning.

Elevations in SGOT and/or SGPT enzyme levels were observed in 1 of 6 normal volunteers given 1200 mg of pralidoxime intramuscularly, and in 4 of 6 volunteers given 1800 mg intramuscularly. Levels returned to normal in about 2 weeks. Transient elevations in creatine kinase were observed in all normal volunteers given the drug.

Atropine and Pralidoxime Chloride

When atropine and pralidoxime are used together, the signs of atropinization may occur earlier than might be expected when atropine is used alone.

OVERDOSAGE

Symptoms:

Atropine

Manifestations of atropine overdose are dose-related and include flushing, dry skin and mucous membranes, tachycardia, widely dilated pupils that are poorly responsive to light, blurred vision, and fever (which can sometimes be dangerously elevated). Locomotor difficulties, disorientation, hallucinations, delirium, confusion, agitation, coma, and central depression can occur and may last 48 hours or longer. In instances of severe atropine intoxication, respiratory depression, coma, circulatory collapse, and death may occur.

The fatal dose of atropine is unknown. In the treatment of organophosphorus poisoning, doses as high as 1000 mg have been given. The few deaths in adults reported in the literature were generally seen using typical clinical doses of atropine often in the setting of bradycardia associated with an acute myocardial infarction, or with larger doses, due to overheating in a setting of vigorous physical activity in a hot environment.

Pralidoxime

It may be difficult to differentiate some of the side effects due to pralidoxime from those due to organophosphorus poisoning. Symptoms of pralidoxime overdose may include: dizziness, blurred vision, diplopia, headache, impaired accommodation, nausea, and slight tachycardia. Transient hypertension due to pralidoxime may last several hours.

Treatment: For atropine overdose, supportive treatment should be administered. If respiration is depressed, artificial respiration with oxygen is necessary. Ice bags, a hypothermia blanket, or other methods of cooling may be required to reduce atropine-induced fever, especially in children. Catheterization may be necessary if urinary retention occurs. Since atropine elimination takes place through the kidney, urinary output must be maintained and increased if possible; intravenous fluids may be indicated. Because of atropine-induced photophobia, the room should be darkened.

A short-acting barbiturate or diazepam may be needed to control marked excitement and convulsions. However, large doses for sedation should be avoided because central depressant action may coincide with the depression occurring late in severe atropine poisoning. Central stimulants are not recommended.

Physostigmine, given as an atropine antidote by slow intravenous injection of 1 to 4 mg (0.5 to 1.0 mg in children) rapidly abolishes delirium and coma caused by large doses of atropine. Since physostigmine has a short duration of action, the patient may again lapse into coma after 1 or 2 hours, and require repeated doses. Neostigmine, pilocarpine, and methacholine are of little benefit, since they do not penetrate the blood-brain barrier.

Pralidoxime-induced hypertension has been treated by administering phentolamine 5 mg intravenously, repeated if necessary due to phentolamine's short duration of action. In the absence of substantial clinical data regarding use of phentolamine to treat pralidoxime-induced hypertension, consider slow infusion to avoid precipitous corrections in blood pressure.

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UTMB: From Disaster Planning to Long-Term Recovery

By Cameron W. Slocum & James Lee Witt, Case Study

Established in 1891 as the Medical Department of the University of Texas and housed in a single building with a class of 23 students, the University of Texas Medical Branch (UTMB Health) today is a sprawling and modern health science center with an annual budget of $1.5 billion. Home to a network of hospitals, a student body of more than 2,500 in four professional schools and a work force of 11,500 employees, UTMB Health is one of the region's largest employers and has been an important component of the regional and state economy for decades.

In early September 2008, a monstrous Category 5 storm, Hurricane Ike, battered the Caribbean en route to the Gulf of Mexico. When the storm approached the Texas coast as a strong Category 2 with a potentially catastrophic storm surge, UTMB quickly launched its disaster plan.

Three years earlier, UTMB had learned several important lessons when Hurricane Rita narrowly missed Galveston – and the university. The unplanned dress rehearsal provided UTMB leadership with valuable information in protecting lives, property, and research programs. Among the other strategies and actions put into place at UTMB since, and because of, Hurricane Rita were: establishing a command center; identifying, beforehand, the leadership and personnel needed to staff the center; developing and promulgating the center's guiding principles and rules for operation; identifying and reaching agreements with strategic partners; and conducting periodic trial runs of emergency-preparedness drills and exercises.

The unplanned dress rehearsal provided UTMB leadership with valuable information in protecting lives, property, and research programs

By all accounts, UTMB's disaster-operations plan was and remains excellent – and worked nearly seamlessly both before and during Hurricane Ike. Lacking an actual catastrophe, however, UTMB – like many other organizations and the city of Galveston itself – was not quite as well prepared to initiate recovery operations. Hurricanes along the Gulf Coast almost always have been accompanied by heavy rains and high winds. In contrast, the bulk of the wreckage left in the wake of Hurricane Ike was caused by flood waters, which damaged about 80 percent of the commercial and residential properties on Galveston Island.

At UTMB, campus flooding ranged from 15 inches to 15 feet of storm surge, with nearly 90 percent of all facilities experiencing at least some water damage. Early "eyeball" estimates anticipated about $650 million in damages – actual damages will climb beyond $1 billion, however. Today, at the two-year mark, UTMB facilities are approximately 40 percent recovered from the tragedy – so considerable work remains to be done.

Lessons Learned, Successes Achieved, Future Plans

Prior to the storm, UTMB engaged the services of a specialized firm to assist the center with: (a) securing financial assistance in the wake of the next disaster; and (b) helping with future recovery plans – and the implementation thereof. More specifically, UTMB contracted with Witt Associates, which already had over 30 years of disaster recovery experience of its own – an asset that proved vital in counseling UTMB on several early and key decisions. The UTMB/Witt team identified numerous opportunities for disaster recovery awards by highlighting important nuances and exceptions in the federal regulations governing recovery operations. Thanks to its experience with and clear understanding of FEMA's required documentation – through the Project Worksheets (PWs) required – Witt was able to help secure substantial funding for numerous campus recovery projects.

Of equal if not greater importance is the fact that Witt also counseled UTMB to preserve damaged records that might otherwise have been discarded. In addition, Witt advised UTMB, well in advance, to have emergency clean-up contracts in place ahead of time, and to position work teams on standby – at sites outside of Galveston from which they could move in quickly after the storm passed. Having such specialized assistance from a firm not only with decades of experience but also immediate access to numerous experts

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in post-disaster recovery operations turned out to be key to the campus's own recovery efforts.

Following are brief summaries of the problems faced and resolved, the changes and improvements already recorded, and some additional changes currently anticipated.

Deficits in Communications: The need to communicate, both clearly and rapidly, in the immediate aftermath of the storm presented a number of challenges that UTMB was able to overcome – but which merited additional consideration after the immediate crisis subsided. Although the university already had in place a state-of-the-art emergency communications system, the demands placed on it during and immediately after the storm were exceptionally complex – and some users were not as experienced with the gear as they might and perhaps should have been. The technological issues involved might have been averted, though, if the communications systems and protocols had been exercised on a regular basis – and the results evaluated to identify lessons learned.

Although all patients were evacuated safely, and the UTMB students and staff had received timely and effective warnings, both before and after Hurricane Ike, several problems and deficits have since been identified – and rectified. One example: The UTMB staff experienced a number of software incompatibilities in transmitting health records to the other health institutions to which patients had been evacuated. With the help of the Witt team (and other companies and organizations), the center has reviewed and continues to review its various communications systems and procedures and is taking the actions needed to remedy deficiencies in areas that fell short of optimum effectiveness.

Building Smarter and Stronger: In the slightly more than two years since Hurricane Ike, UTMB: (1) has established a mitigation plan for its facilities and functions; (2) is proactively strengthening its priority research, clinical, and academic facilities; and (3) has put plans in place to construct smarter and stronger buildings as it continues to grow and thrive. Among the more visible of those plans and projects are efforts to reposition critical elevator and infrastructure controls, and other essential systems, to heights above 20 feet (to protect them against future flood events), reaching formal agreement with FEMA on a much-needed hazard mitigation plan, and completing several other campus capital improvements to protect students, staff, and the center's physical assets from future damage.

Staying Safe and Being Prepared: Rebuilding what was damaged, and building anew for the university's future, UTMB is using the lessons learned from Hurricane Ike to be not only well prepared for a sudden future disaster but also to have well planned systems and well trained staff already in place for post-event recovery operations. The center has already moved its strategic information systems functions 50 miles inland, for example, to ensure future business continuity. Other key operations – payroll, for example – have been relocated off-site to create an intentional redundancy. In addition, well honed plans for locating and delivering the resources needed immediately after an incident have been completed and promulgated, and the university has assembled the material resources needed – bedding and temporary lighting, to cite but two major requirements – to ensure that the skilled personnel directly involved in recovery operations will have the basic essentials they need while on the job.

A Long and Winding Road to Full Recovery: Carrying out a comprehensive review and completing a final after-action report are the final and in certain respects most critical components of an effective disaster preparedness plan. UTMB has given itself high marks – very well deserved – for emergency preparedness and implementation. And it has used the two years plus since Hurricane Ike to focus on even better and more detailed planning for the many challenges that presented themselves – in the days and weeks immediately after the storm; in the work carried on in the two years and two months that have passed since then; and in the additional improvements and breakthroughs expected during the next five to seven years while full recovery is being achieved.

Cameron Slocum (pictured), UTMB's vice president of finance and administration, is responsible for all financial, operational, and strategic functions within the UTMB Academic Enterprise and Faculty Group Practice. In that role he serves as principal business officer of the Schools of Medicine, Nursing, Health Professions, and Graduate School of Biomedical Sciences. He also coordinates for all of the institution's business-related disaster-recovery efforts with FEMA and a number of other agencies. Slocum holds a bachelor's degree in finance from Texas A&M University and an MBA from the University of Houston-Clear Lake.

James Lee Witt is CEO of Witt Associates, a public-safety and crisis-management consulting firm based in Washington, D.C., that provides disaster-recovery and mitigation-management services to numerous state and local governments, educational institutions, private-sector businesses and corporations, and the international community. A former FEMA director, and the first to be elevated to cabinet status, he played a key oversight and decision-making role in the U.S. responses to more than 350 major disasters of all types, including the most costly flood in the nation's history, the most costly earthquake, and a dozen damaging hurricanes. Before his FEMA appointment he had been a highly successful businessman, and also was elected, seven times, to the post of County Judge for Yell County, Arkansas.

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Arizona, Michigan, Pennsylvania, and New Hampshire

By Adam McLaughlin, State Homeland News

Arizona
Biometrics Now Being Shared By All Counties in the State

In late October, the U.S. Department of Homeland Security's Immigration and Customs Enforcement (ICE) agency began using the federal government's information-sharing system in all Arizona counties. The system uses its biometrics capability to identify immigrants now in the United States, either lawfully or unlawfully, who have been identified by local law-enforcement agencies as having been charged with a crime. The new information-sharing capability is a key component of "Secure Communities" – ICE's comprehensive strategy to improve and modernize the identification and removal (to their country of origin) of criminal immigrants.

Previously, fingerprint-based biometric records were taken of individuals charged with a crime and booked into custody. The fingerprints were then checked against the Department of Justice's Integrated Automated Fingerprint Identification System to determine if such individuals had a previous criminal history. The information-sharing process between DHS and the U.S. Department of Justice (DOJ) now has been enhanced. In the future, fingerprint information submitted by a state to the Federal Bureau of Investigation (FBI) will be automatically checked against both the FBI's own criminal history records and the biometrics-based immigration records carried in the DHS Automated Biometric Identification System.

If fingerprints match those of someone already in the DHS biometric system, the new automated process will notify ICE, which will evaluate each case to determine the individual's immigration status and then take the appropriate enforcement action needed. This process will apply both to immigrants who are in the United States in a lawful status and those who are in the United States without lawful authority. After the individual is identified through fingerprint matching, ICE will take the legal action required – but with the highest priority assigned to those who have been convicted of the most serious offenses.

ICE is now already using the system in 746 jurisdictions in 34 states – but hopes to be able, by 2013, to respond to all fingerprint matches generated nationwide. Since the system became operational in October 2008, immigration officers have transferred, out of the United States, more than 46,800 immigrants who had been convicted of one or more crimes.

ICE officials said the agency does not regard immigrants charged with, but not yet convicted of, crimes to be "criminal immigrants" per se. Instead, a "criminal immigrant" is legally defined as an immigrant who has been convicted of a crime. ICE continues to take action on all immigrants subject to removal, therefore: (a) in accordance with the Immigration and Nationality Act; and (b) as expeditiously as the agency's own personnel and funding resources permit.

ICE is currently making the federal biometric information-sharing capability available to lower jurisdictions in the following states: Arizona, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Iowa, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, Missouri, Montana, Nebraska, North Carolina, Nevada, New Mexico, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, and West Virginia.

Michigan
Emergency Responders Receive Awareness Training on IEDs

On 1 November, local law enforcement officials, emergency responders, and police officers gathered at Howell High School in Livingston County for a special training session focused on the threat posed by improvised explosive devices, or IEDs. The session was headed by Michigan State University instructor – and certified bomb technician – Scott Hasse, and was funded by a grant from the U.S. Department of Homeland Security.

"This is an awareness class to get us thinking about what we could be facing in an emergency situation," said Deputy Chief Ronald Hicks of the Howell Area Fire Department, one of the senior officials who attended the session. "Basically, the course covers recognition of the different materials used in IEDs," he said. "That way, if you enter a certain building or house … and see [any of] those signs, it starts to trigger warning bells."

There is good reason for the increased focus on IED training. Incidents involving IEDs – which are "pretty much anything that explodes," Hicks commented – are becoming more fre-

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quent not only overseas but in the United States as well. IEDs used to be associated mostly with terrorism, unconventional warfare in general, and urban violence – but, as Hicks also pointed out, have become a problem "almost everywhere," specifically including Livingston County. "I have responded to pipe bombs here before," Hicks said.

The know-how to build and trigger IEDs has been spreading rapidly in one country after another throughout the whole world, as Livingston County Sheriff Robert Bezotte pointed out. The Internet has made it easier than ever before to learn how to create these malicious, and relatively low-cost, types of devices, he added. "People can self-educate themselves on the Internet; anything you could use to make a bomb with, it is all right there."

Bezotte said he has sent law enforcement officials as far away as Alabama and New Mexico for specialized training in dealing with explosive devices. "We are trying to be prepared," he added.

Hicks said that the 1 November training session focused primarily on the recognition of explosive devices. If officers discover either a device itself or the materials used to make devices, he said, the officers are instructed to contact experts immediately. In the case of Livingston County's own emergency personnel, he continued, they would contact the Michigan State Police bomb squad.

"Our first priority is the safety of our responders and the safety of the public," Hicks said, adding that responders are told not to take unnecessary risks in these types of situations. "We always call the experts."

In addition to training, Bezotte said that local law enforcement officials are working closely with the Federal Bureau of Investigation and other agencies to investigate possible IED-creating activity. Without revealing the specific nature of those cross-agency interactions, Bezotte said the Sheriff's Department keeps tabs on any type of suspicious activity that might indicate a possible link to the construction and/or use of IEDs and/or the materials used to make them.

Pennsylvania
Law-Enforcement Agencies Conduct 'Active Shooter' Exercise

More than 75 law-enforcement officials participated earlier this month in a training drill focused on a "gunman" on the loose in the halls of a school. The Pennsylvania State Police coordinated the drill, working in cooperation with Parkesburg (a borough of Chester County) and West Fallowfield police, the county Department of Emergency Services, and the Cochranville Fire Company.

The drill took place at the Octorara Area School District Building, with teachers as well as district administrators participating. Students were not in school that day and did not participate in the drill, said State Trooper Corey Monthei. "Our training was focused on a few different scenarios we created," he said, "and we were dealing with hostile subjects within the school setting, including an active shooter – somebody in the act of doing harm in the building."

The exercise was coordinated in such a way that emergency services officials can be "prepared for the worst," and was not in response to any particular incident in the county, Monthei said. The drill was "nothing other than maintaining our readiness," he added. "It is just something we like to do at every opportunity – try to exercise our people, exercise our troopers, and just refresh our tactics and our practices."

Among the key participants was Beau Crowding, deputy director for fire services in the Chester County Department of Emergency Services, who said that his department used two of its mobile units in the drill: the Comm-1 trailer, and the Incident Support Team Trailer. Comm-1 is a mobile communications station that also can host a roundtable conference at the scene of an incident. In addition, a 911 Center dispatcher is housed within Comm-1 so that law enforcement officials do not have to keep calling the center time after time. Having the trailer in place also allows the incident commander access to the Internet and to telephones.

Crowding said that the participants from the school district thought the exercise was realistic. "From listening to a lot of teachers and administrators, they said it was intense and as real as it could be," Crowding said. Crowding and Monthei both said they were very pleased with the results of the drill.

Crowding said the drill allowed the Department of Emergency Services to have a plan in place should a similar but "real-life" situation arise. In addition, it allowed law enforcement officials to become better acquainted with officials, and teachers, from the school district, and vice versa. "My overall … [goal] is getting to know the people for when the incident really occurs,"

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Crowding said. "We used that day to put a plan in process. When it does occur it's going to be seamless."

Monthei said he hopes that local police units are able to conduct similar exercises with other school districts, even though time and manpower constraints make it difficult to plan. "I would say … [the drill] was an overwhelming success," Monthei said. "It was mutually beneficial for us and for the law enforcement [agencies] involved. It allowed our commanders to get a feel for where we stand as far as training."

New Hampshire
Air National Guard Training Exercise Focuses on Anthrax Exposure

Annual flu shots helped approximately 1,000 Air National Guard members prepare for a large-scale toxic outbreak during a recent exercise on Saturday, 6 November. During the four-hour disaster drill – simulated to represent a real-life incident involving the inhalation of anthrax – Guard members practiced disaster responses and the role the group would play as a first responder unit.

A POD (Point of Dispensing) operations unit was set up early in the day on the grounds of the New Hampshire Air National Guard's Pease base as members were being processed through what would be a mass vaccination-dispensing scenario – during which approximately 800 members actually received their own early flu vaccinations.

"We plan it out and make it come to life," said Lt. Col. Paul Loiselle, commander of the 157th Medical Group. In an actual event, literally thousands of people probably would be vaccinated in one day. "Today," Loiselle said, "we're trying to compact the dispensing over a very short time frame. We are trying to get people done quickly because, in the event of a [real] disaster, the key ends up being speed. Time is of the essence. You are working against the clock."

The exercise, which also involved other units of the N.H. National Guard and eight of the state's 15 Public Health Regions, was designed to test the state's SNS (Strategic National Stockpile) and Cities Readiness Initiative capabilities as well as its Multi-Agency Coordinating Entity and Point of Dispensing plans. A similar response plan could be developed and applied to a national disaster or terrorist attack.

During an actual emergency, medications and other supplies and equipment would be shipped from the Strategic National Stockpile to local responders and hospitals. The stockpile was last used during Hurricane Katrina, and in some areas of the nation during the H1N1 pandemic flu outbreak. If similar major disasters occur in the foreseeable future, three Point of Dispensing units would be established throughout the state – along the seacoast and in both northern and central New Hampshire.

During the 6 November simulated event, National Guard members acted as first responders – who in the event of an anthrax outbreak would be the first to receive the anthrax vaccination so that they could then safely assist members of the general public.

The National Guard can be activated during a state or homeland emergency – but until recent years had not been called out to cope with "a significant event" in New Hampshire, Loiselle said. More recently, though, the N.H. Guard responded not only to flooding throughout the state but also to the December 2008 ice storm, he said, and to the nationwide effort to cope with Hurricane Katrina in New Orleans and other areas of the Gulf Coast.

"In that wake we wanted to make sure we are prepared [for future such disasters]," Loiselle said. "This [the 6 November drill] is to make sure we communicate well, get folks activated, and see that they [emergency units] have the right tools and staffing." Evaluators through the New Hampshire Department of Safety & Homeland Security and Emergency Management observed the "anthrax" drill, and are expected to provide a detailed review, and improvement plans, in about a month.

"The evaluators have experience with PODs and will find areas of improvement, where they can fill in gaps, and strengths," said Fallon Reed, SNS coordinator for the state's Department of Safety & Homeland Security and Emergency Management. "This [the 6 November drill] is being able to run through the process and iron out the bugs so that during an emergency it's a well oiled machine."

Adam McLaughlin currently serves as the Manager of Emergency Readiness, Office of Emergency Management, for the Port Authority of New York and New Jersey. His responsibilities include both the development and coordination of Port Authority interagency all-hazards plans and the design and development of emergency preparedness exercises. A Certified Emergency Manager (CEM), he is a former U.S. Army officer – and a veteran of the war in Afghanistan – and a member of the Faculty of Senior Fellows for the Long Island University's Homeland Security Management Institute.

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