



# H5N1: The Global Enemy

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## EDITOR'S NOTES

By James D. Hessman, Editor-in-Chief



As is customary at this time of year, the U.S. Congress, the various departments, offices, and agencies of the executive branch of government, the stock exchange, and tens of thousands of businesses are writing their annual reports and finalizing their operational as well as financial plans for the year to come. So are millions of private citizens.

Many if not all records of previous accomplishments tend to be a bit exaggerated, of course, and the exciting new "breakthrough" projects planned for next year are frequently more ambitious than they should be. Nonetheless, for the individual citizen as well as for the nation as a whole, periodic review-and-preview breaks from business as usual are not only educational (almost always) and illuminating (frequently) but also productive (sometimes, but only when the lessons learned from such reviews are translated into meaningful action).

A case in point developed earlier this week with the disclosure (in an Associated Press report by Andrew Taylor) that the Department of Defense is planning to ask the incoming Congress to appropriate an additional \$99.7 billion to fight the wars in Iraq and Afghanistan during the coming year. The added funds, according to Taylor's article, would bring to \$170 billion the overall warfighting costs for the fiscal year that started on 1 October 2006. That total may be adjusted up or down by quite a few billion dollars before the president submits his fiscal year 2008 budget plan to Congress in early February.

Dealing with the DOD budget request will be one of the most important (but relatively underpublicized) challenges facing the new Congress, now controlled by Democrats – who may well find themselves forced to choose between "backing the troops" (as they promised during the 2006 election campaign) and "winding down the war in Iraq" (as they also promised). Many Republican members of Congress made more or less the same promises, so the issue is not as partisan as it may sound.

Unfortunately – not only for the members of Congress but for the American people as a whole – next year's budget battles, specifically including what may be a particularly acrimonious fight over the homeland-defense budget, will be only the tip of the iceberg. Of much greater importance will be the policy decisions that should but probably will not be made first. Those who want to "bring the troops home" (almost all Americans) must ask themselves, for example, if a complete U.S. withdrawal from Iraq will bring peace to that country. Or will it lead to an even more violent full-scale civil war, political and economic chaos, a new dictatorship perhaps, and an entire region of the world (the Mideast) more hostile to the United States than it is now?

Another question (of many that might reasonably be asked) relates not only to the U.S. situation in Iraq but also to America's relationships with many other countries around the world: Would U.S. withdrawal from Iraq end the global war on terrorism? Or, as seems more likely, would it give Al Qaeda and other terrorist organizations renewed hope for the future – one in which the Great Satan (the United States) would no longer play a meaningful role?

President Bush and his advisors have been criticized for embarking on an open-ended war without an "exit strategy" in place beforehand. There is at least some justification for that criticism. The point of the preceding is that choosing the *wrong* exit strategy – one that leaves not only Iraq but the United States as well, and its remaining allies, in a more dangerous position, both militarily and politically, than before the war may be considerably worse than having no exit strategy at all. ▼

**Cover Photo** (by James Gathany): Dr. Terrence Tumpey, a CDC (Centers for Disease Control and Prevention) staff microbiologist, examines a reconstructed 1918 Pandemic Influenza Virus – one of the deadliest in recorded history – in a Biosafety Level 3-enhanced setting designed to ensure the safety of researchers involved in the long-term CDC effort to develop new vaccines to protect U.S. citizens infected in future pandemic-flu outbreaks.

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## Imperatives for the Training of Medical Staff

By Michael Allswede, Public Health



Medical facilities are not civic services and do not receive funds for disaster training – and have few standards under which they *should* train – yet they are expected to respond in coordination with civic services, particularly first-responder agencies, in the event of a major disaster. In fact, medical facilities are among the few private businesses that are expected to *increase* their capacity in times of crisis. In these circumstances, the general lack of training and of the development of critical capabilities for medical staff working in the nation's medical centers represents a glaring oversight in disaster planning, particularly in the field of homeland security.

Although a great deal of legitimate focus and effort has gone into developing more and better response capabilities for firemen, policemen, and emergency medical services (EMS) personnel, the same cannot be said for medical facilities. In fact, the lack of a similar focus and effort for medical systems may be creating a first-responder “bridge to nowhere.” Investments in the development of pre-hospital medical-care capability are useful only if there is a medical facility to which a victim can be delivered. But without a prepared medical facility in reasonable proximity to the site of a mass-casualty event or incident, investments in the pre-hospital extrication and stabilization of victims may be a waste of money. However, before considering ways to create a viable medical disaster-response system, it would be useful first to explore some of the key barriers in the way, discuss a proposed methodology for improvement, and only then attempt to make a case for greater investments in medical training.

### Existing Barriers to CBRNE Training

The key barriers to training medical staff, and developing medical facilities, to deal with chemical, biological, radiological, nuclear, or explosive (CBRNE) disasters are:

- Current financial and regulatory constraints on the *business* of healthcare;

- The complexities of building, maintaining, and operating high-overhead/high-volume medical facilities;
- The lack of established benchmarks to which training can be directed; and
- The realities posed by the necessities of using both transient staff and part-time staff, compounded by the need to meet many other facility obligations.

The most significant fact to remember in this context is that almost all U.S. medical facilities are *private businesses* that are financially compensated for providing medical care – *not* for investing in disaster preparedness. In addition, the most important reality of the medical care business as a *business* is that disaster training, equipment, planning, and personnel, considered as a whole, represent a largely unfunded mandate.

Another important point to keep in mind is that private-sector medical facilities also are among the nation's most regulated businesses. Hospital food service, nuclear and other sophisticated medical equipment systems and medicines, various clinical laboratories, electronic medical records, blood banks, complicated (and expensive) medical procedures, and a large and variable human resources element are some but not all of the complex components of a modern health care system that itself requires a multitude of specialists to regulate.

### The Cost of Doing Medical Business

The establishment and enforcement of disaster or CBRNE competence benchmarks and/or training standards represent yet another significant financial and workload burden imposed on the nation's private-sector medical facilities. That workload will increase significantly as the desired benchmarks become another feature of health care upon which the facilities must be evaluated, regulated, and surveyed. In that context, it should be kept in mind that, although medical facilities are and should be

regulated on their ability to carry out their core missions, the cost of preparing to cope with major disasters – on short or no notice – must in most cases be derived primarily by diverting reimbursements for healthcare that otherwise could and should be re-invested in the facility's healthcare delivery system. For most if not all of the nation's medical facilities, therefore, disaster preparedness translates into longer waits, and fewer appointments available, for current patients.

For practical purposes, the current high-overhead/high-volume business model for hospitals and other medical facilities means that the hospital (or facility) must always be at or near capacity in order to pay not only for the high cost of medical equipment – as well as the salaries of doctors, nurses, and technicians of various types – but also for the increasingly expensive medicines, medical procedures, and advanced treatments developed in recent years. Numerous studies and surveys show that U.S. medical facilities must be and remain at or above 95 percent occupied, on average, to be financially solvent. To reach and maintain that average requires, in turn, that almost all of the hospital or facility's medical personnel either be at work, on the job, or off shift – but in many if not all cases in an on-call status. In other words, there is little if any down time in a modern medical facility, and very few idle hands.

Not incidentally, the same business model also dictates that a significant portion of the theoretically “disposable” time that medical personnel do have must be spent working on continuing education credits to remain current with ever-advancing medical knowledge and techniques. In that context, the fact that the majority of today's medical providers have little or no CBRNE knowledge and/or practical disaster-response skills translates into a general need to retrain many key personnel.

## ***A Perfect Storm of Natural And Manmade Difficulties***

Each of these several realities of modern medicine represents a major barrier to the creation of medical facilities, and the training of medical staff, to the levels needed to cope with a major mass-casualty disaster – natural or manmade. Considered in

combination, they form a “perfect storm” in which there is little if any financial incentive to develop CBRNE skills and/or disaster consequence-management capabilities.

The inevitable result is that there are now very few medical personnel with the knowledge or skills needed to cope with major disasters, and fewer still who would be willing or able to participate in the difficult training required to obtain that knowledge and hone those skills.

***For most if not all of the nation's medical facilities, disaster preparedness translates into longer waits, and fewer appointments available***

It seems obvious that the current strategy of using disaster drills as medical staff training is woefully inadequate both as an instructional tool as well as an attempt to capture and train a significant number of staff personnel. One or two disaster drills per year will train at most one shift of doctors and nurses – some of whom will be residents, while others will be part-time employees (who in many but not all cases are selected for drill duty while concurrent medical care is delivered by others). In short, the self-selection of drill personnel, combined with the infrequency of drills, makes the development of a useful number of trained staff not just unlikely but almost impossible.

## ***A Single-Problem Focus, A Partial Solution Proposed***

To further complicate matters, most drills focus primarily on a single problem. This is perhaps inevitable, because the terrorism threat that now faces the nation ranges from bombs, to dirty bombs, to infectious diseases, to other types of CBRNE disasters. But even

the best-run drill can cover only a single potential disaster, or perhaps two – but no more than that. For these and other reasons, it should be recognized that the current disaster training methodology for medical systems has created, at best, a false illusion of medical preparedness.

Although hospital disaster drills are too few and too infrequent for the development of real knowledge and/or new skills for all of the personnel participating, there are at least some partial answers that might be solved through the innovative use of today's advanced technology. New medicines are being developed, new medical advances are being introduced, and new techniques are being acquired on a nearly constant basis throughout the nation's medical system by the development and use of advanced training modules that are tailored to the individual learner. The training of personnel in disaster preparedness can be carried out in a similar tailored or “non-contiguous” fashion.

The creation of knowledge modules, available on the web, that allow medical personnel to learn at their individual convenience is a particularly promising methodology that should be examined. Skills can be developed either in seminars or through a “drop-in” training room concept. The ability already exists to build physiologically accurate mannequins that could simulate the disease and/or injury features characteristic of many CBRNE victims. The training key here would be the translation of established benchmarks into readily accessible knowledge-skill combinations. By investing more funds in knowledge technology, rather than in additional drills, more individuals may be trained for less money. Drills still would have their place – an important one, in fact – but primarily as measurements of system-wide capabilities, rather than in the learning of individual knowledge and skills.

## ***Is the Cost Worth the Investment?***

Despite the clear and urgent need to retrain medical personnel, it is still possible – and perhaps likely – that well-intended critical capability benchmarks and training standards will be established and enforced without the provision of additional training funds, in which case the costs of retraining staff

## Decontamination Considerations During A Chemical Agent Mass-Casualty Incident

By Theodore Jarboe, Fire/HazMat



Decontamination is a common activity at hazardous materials (hazmat) incidents of all types. Ideally, members of well trained hazmat response teams routinely set up, manage, and coordinate decontamination operations – and in most situations it is only the members of the hazmat response team themselves who need decontamination. But the release of a chemical agent in a

populated area can quickly create a mass-casualty incident that requires a much larger-scale operation – involving, in most if not all cases, the decontamination of not only the hazmat team members and other emergency responders but also hundreds or possibly thousands of other people. Such operations almost always need more resources than those dispatched after the first alarm.

will necessarily be borne by the existing financial structure. This added cost would of course further diminish the funds available that might otherwise be used to update equipment, hire additional staff, and/or expand capabilities in other critical areas. The net effect, therefore, might well be to degrade current medical care, not improve it.

The cost of retrofitting a medical system to cope with CBRNE threats would still be necessary, though, because *without* the CBRNE knowledge and skills needed, not only would the immediate victims of a CBRNE event be lost, but there would be other adverse consequences as well. Hospital personnel would be contaminated and sickened, for example, and patients already ill would be further endangered, and perhaps die. Obviously, a contaminated medical facility is of little or no use in the midst of a crisis.

By taking into consideration the usually ignored financial realities facing private-sector medical facilities today, and determining the key skills needed by staff members, advanced educational materials can be created and used to the extent needed to ensure that all medical staff are educated and skilled in disaster preparedness. Using a “raise all the boats” strategy to expand and improve current medical facility preparedness is necessary in any case, if only because the best and most available surge capacity for a medical facility will come from its off-duty staff. Without a medical facility prepared to receive disaster victims, the investment in first-responder capability will have been lost. The responsibility for solving this problem lies with medical leaders, but they can accomplish their important mission only by working in close cooperation with other leaders of the greater homeland-security community.

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A major challenge facing emergency responders is to quickly find out which and how many casualties need immediate decontamination. Ideally, all casualties should be prioritized for decontamination in accordance with certain well-defined guidelines (discussed below). However, when there are large numbers of victims who may have been contaminated, the challenge becomes much more difficult – so much so that it is frequently impossible for firefighters to prioritize them in a timely way. Nonetheless, decontamination is still needed for those who have been exposed to a chemical-agent aerosol or liquid and/or who show symptoms of exposure. That is the most pressing current decontamination issue, regardless of other factors, including the number of firefighters available at the scene of the incident.

Time is crucial to the success of decontamination operations. The shorter the time is between casualties' exposure to a chemical agent aerosol or liquid and the time when they have been decontaminated, the more successful the decontamination should be. Depending on the chemical

agent involved – for example, the nerve agent Sarin, which can be lethal after only a short exposure – the decontamination efforts by firefighters may serve primarily, or only, to remove residual liquid and to prevent secondary contamination.

A cautionary note: Although most people who are in the exposure area may not have had direct or even indirect physical contact with the chemical agent, they still should be considered for decontamination, if only as a precautionary measure.

## **Training, Exercises, And Protective Equipment**

Preparatory training, combined with tabletop drills and full-scale exercises, for a mass-casualty decontamination operation will help firefighters develop a better understanding of and appreciation for the physical resources and logistics planning needed, along with the close coordination also required, to decontaminate large numbers of victims. The success of these exercises depends on, among other factors, the realism of the scenarios, the number and interest of participants, and the setting

of reasonable goals for the exercise. As a rule of thumb it is safe to assume that the more artificiality that is added to the exercises the less unrealistic the outcome will be.

As firefighters know, their customary turnout gear does not give them the same or as much personal protection as that provided by protective ensembles specifically designed for use in chemical-agent environments. When the latter (i.e., the protective ensembles) are not available, the incident commander must decide – taking into consideration the conditions at the scene of the incident and, if possible, input from the hazmat team commander – whether firefighters should participate in the rescue operations needed to remove casualties from the contaminated area. Except in rare situations, it usually would be impractical for hazmat team members wearing encapsulating protective ensembles to engage in the rescue and decontamination of scores or hundreds of casualties.

## **Dealing With Decontamination Water**

Although water runoff from decontamination operations (deconwater) can have harmful



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environmental consequences, firefighters should not delay the decontamination of casualties simply to control runoff. In 2000, the U.S. Environmental Protection Agency dealt with this matter by issuing a Chemical Safety Alert titled *First Responders' Environmental Liability Due to Mass Decontamination Runoff*. Following is an excerpt from that report: "During a hazardous materials incident (including a chemical/biological agent terrorist event), first responders should undertake any necessary emergency actions to save lives and protect the public and themselves. Once any imminent threats to human health and lives are addressed, first responders should immediately take all reasonable efforts to contain the contamination and avoid or mitigate environmental consequences."

## Decontamination Prioritization

According to another report – *Guidelines for Mass Casualty Decontamination During a Terrorist Chemical Agent Incident*, prepared by the U.S. Army Soldier and Biological Chemical Command – decontamination operations should be carried out in accordance with a pre-established level of priorities, as follows:

1. The highest priority for ambulatory decontamination is reserved for those casualties who were closest to the point of release and report that they were exposed to an aerosol or mist, who have some evidence of liquid deposition on their clothing or skin, and/or who have serious medical symptoms (for example, shortness of breath, chest tightness, etc).
2. The next priority is ambulatory casualties who were not as close to the point of release, and who may not have evidence of liquid deposition on clothing or skin, but are clinically symptomatic.
3. Casualties suffering from conventional injuries, especially open wounds, should be the third priority.
4. The lowest decontamination priority is reserved for ambulatory casualties who were some distance away from the point of release and who are asymptomatic.

Here, another cautionary note: Although a prioritization of the decontamination process

is always desired, it may not always be finished quickly enough to justify the benefits achieved. The critical factor here is the number of casualties at the scene of the incident compared with the number of first responders immediately available to triage

***The shorter the time between casualties' exposure and the time when they have been decontaminated, the more successful the decontamination should be.***

and prioritize them. The greater the number of casualties identified for decontamination, the greater will be the workload for the firefighters assigned to carry out the decontamination. In addition, of course, the longer the time between chemical agent exposure and decontamination, the less beneficial decontamination is likely to be. However, to totally ignore decontamination is not a viable option.

Another rule to remember is that firefighters should not transport casualties who need medical attention to a hospital or other medical facility without first decontaminating them. This rule is required not only for the safety of the casualties themselves but also for the safety of emergency medical technicians and hospital personnel as well.

The various recommendations mentioned above (and in the references below) are intended not only to stimulate interest but also, and of greater importance, to evoke *action* by firefighters, and incident commanders, to develop and disseminate written guidelines for the decontamination of casualties as soon as possible after a chemical agent mass-casualty incident has occurred. The decontamination of a relative handful of casualties is not considered by

most fire departments to be a particularly difficult task – but the decontamination of hundreds of casualties could and would be a major challenge to even the largest and best equipped municipal and county fire departments.

Prioritizing casualties for decontamination, protecting firefighters, selecting the most efficient methods of decontamination, and addressing the problems caused by deconwater runoff are only some of the key issues that need attention when planning for and managing a terrorist chemical agent mass-casualty incident. Without a comprehensive mass-casualty incident management plan in place *ahead of time*, the nation's firefighters are likely to dissipate much of their time in on-scene remedial operations that fall far short of the real goal – namely, the timely and efficient decontamination of a large number of casualties.

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*Fire chiefs are encouraged to read the following report: Risk Assessment of Using Firefighter Protective Ensemble (FFPE) with Self-Contained Breathing Apparatus (SCBA) for Rescue Operations During a Terrorist Chemical Agent Incident. – ([http://www.ecbc.army.mil/downloads/cwirp/ECBC\\_ffpe\\_scba\\_rescue\\_ops.pdf](http://www.ecbc.army.mil/downloads/cwirp/ECBC_ffpe_scba_rescue_ops.pdf))*

*The following reports are recommended for additional information:*

*Guidelines for Mass Casualty Decontamination During a Terrorist Chemical Agent Incident (January 2000) – ([www.ecbc.army.mil/downloads/cwirp/ECBC\\_cwirp\\_gls\\_mass\\_casualty\\_decon.pdf](http://www.ecbc.army.mil/downloads/cwirp/ECBC_cwirp_gls_mass_casualty_decon.pdf))*

*Guidelines for Cold Weather Mass Decontamination During a Terrorist Chemical Agent Incident (January 2002, revision 1, August 2003) – ([www.ecbc.army.mil/downloads/cwirp/ECBC\\_cwirp\\_cold\\_weather\\_mass\\_decon.pdf](http://www.ecbc.army.mil/downloads/cwirp/ECBC_cwirp_cold_weather_mass_decon.pdf))*

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## Behind the Mask: EMS, Influenza, And Respiratory Protection

By James Mason, EMS

Respiratory protection is of paramount concern when discussing pandemic influenza, avian influenza, and the start of the seasonal flu period, particularly in the Northeastern part of the United States. For most practical purposes there are four kinds of respiratory-protection devices used by U.S. first responders: the self-contained breathing apparatus (SCBA); the powered-air purifying respirator, or PAPR; high-efficiency masks; and procedure masks.

The last-named, procedure masks, serve basically as filters that fit over the mouth and nose and catch most droplets. According to the federal Centers for Disease Control and Prevention (CDC) publication *Interim Guidance for the Use of Masks to Control Influenza Transmission*, the procedure masks provide the effective level of protection needed for most medical contacts (described as being within three feet) with influenza patients.

High-efficiency masks such as what is called the N95 are used in health care to protect against staph infections when working with patients who are ill with a respiratory-transmissible disease. These masks differ from procedure masks in that they are form-fitting (to reduce

air leaks around the filter) and have been rated for their ability to filter out droplets the size of those expelled when a person coughs.

A PAPR is a filtration mask that is equipped with a fan to draw ambient air through the filter, thus overcoming the physical limitations of the user's lungs. An SCBA provides a clean air supply from a tank that feeds into a full face mask.

### The EMS (Emergency Medical Services) Role

The scene of an emergency is often both chaotic and uncontrolled, with hazards that do not exist in the clinical setting. An ambulance, although generally more controlled, is also a confined environment. Many ambulances do not have sufficient space for a patient to be more than three feet away from the care provider.

To further complicate the situation, patients in an ambulance often have not been diagnosed to the degree necessary to make the respiratory-protection decisions that are needed. Because of these multiple unknowns, EMS personnel should be using the *most conservative protection practical*; there is no way *after* a diagnosis has

been made to go back in time and upgrade the protection used.

Both the SCBA and the PAPR are poorly suited for use by EMS staff. Any tight-fitting mask requires not only training but also fit testing. The latter is not normally provided to EMS staff for the SCBA or PAPR, but it is typically provided for N95 masks. Moreover, the bulkiness and inconvenience of these devices may lead some wearers to forgo these respirators in favor of an N95 or procedure mask, making outlays for training and fit testing wasted.

According to the Occupational Health and Safety Administration (OSHA) guidance update on Protecting Employees from Avian Influenza, N95 is the desired standard for protection; however, it is likely that there will be shortages of these devices during a pandemic. Unfortunately, the same tight face seal that makes the N95 so desirable also makes it almost impossible to fashion, even if a suitable filter material is available.

Researchers at the University of Pittsburgh have suggested that, in an emergency, an effective procedure mask can be fashioned from a cotton tee-shirt. Relying on that option may sound extreme, of course. But the reality is that, in an environment where there are no better options, something – almost anything, really – is better than nothing.

Links for Additional Research

<http://www.pandemicflu.gov/>

CDC Guidance - <http://www.cdc.gov/flu/professionals/infectioncontrol/maskguidance.htm>

OSHA Avian Flu Respiratory page (including guidance) - <http://www.osha.gov/dsg/guidance/avian-flu.html>

NIOSH Respirator page - <http://www.cdc.gov/niosh/npptl/topics/respirators/>

Homemade surgical-mask instructions - <http://www.cdc.gov/ncidod/eid/vol12no06/05-1468.htm>

NIOSH-approved suppliers of N95 masks - [http://www.cdc.gov/niosh/npptl/topics/respirators/disp\\_part/n95list1.html](http://www.cdc.gov/niosh/npptl/topics/respirators/disp_part/n95list1.html)

*James Mason is a pen name used by an EMS professional with over 25 years of service; he has worked as an EMT and paramedic in three of the 100 largest EMS systems in the United States as well as several that operate a single unit. In addition he has served as a medic on a transport aircraft and DMAT team, and in both an emergency room and in a hyperbaric chamber. He has been an instructor at NYC\*EMS Academy, the Philadelphia Fire Academy, and in other world-class training programs.*



## Audio Interview

**Michael Fraser, PhD, Deputy Executive Director, National Association of County and City Health Officials (NACCHO)**



The NACCHO deputy executive director's views on, among other topics, the association's relationships with and support for local health departments, with a special focus on advanced practice centers and the Medical Reserve Corps. He also comments on NACCHO's work in bioterrorism, the plans being developed for a pandemic flu outbreak, and the need for communications upgrades across the board.

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# Pandemic Flu Vaccine – Still No Silver Bullet

By Jerry Mothershead, Public Health



Experts have estimated that the next influenza pandemic could cause as many as 200,000 deaths and 750,000 hospitalizations in the United States. In addition, tens of millions of other victims might require outpatient treatment. The economic cost – from the increased public health and medical requirements alone – could approach \$200 billion.

At present, there are only three weapons that can be used against pandemic influenza: pharmaceuticals; non-pharmacological public health interventions; and vaccinations. The latter would likely be the most widely used “weapon,” but also would be the weapon of last resort, if only because the current state of vaccine technology, combined with the costly and complex

logistical processes involved, makes it very unlikely that – in the near term, at least – vaccinations will become the “silver bullet” that would fell this formidable threat.

Identifying the pandemic virus is the first obstacle that has to be overcome. Although the current medical focus is on the H5N1 Avian Influenza virus, a different avian virus could be the real culprit. Influenza viruses are very unreliable replicators, and routinely mutate in totally unexpected ways. Moreover, the transformation from a relatively benign virus to a pandemic one is not likely to be an instantaneous transition. This means that vaccines developed from viruses isolated early in a pandemic may be less effective than vaccines developed from viruses collected at a later stage. Unfortunately,

delay also is an enemy. It can be taken for granted, in fact, that any delay, no matter what the cause, will translate into more deaths and additional disabilities.

## Fatal Delays and The Swine Flu Precedent

The most important steps in preparing a harvested virus for vaccine development involve first, purifying the virus, and then incorporating the modifications needed to best induce the protective immune response. Newer technologies have allowed both of these processes to be streamlined to some extent, but each might still require a minimum of two or three weeks, and perhaps longer. Again, though: More delay equals more deaths.

Ensuring the safety of vaccines is both necessary and prudent – but produces additional delays. Here it should be

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Dr. Taronna Maines, a microbiologist in the Influenza Branch of the Center for Disease Control and Prevention (CDC), works on an avian-flu experiment inside a biological safety cabinet (BSC) within the CDC's Biosafety Level 3-enhanced laboratory. During the experiment, Dr. Maines inoculated 10-day old embryonated hen's eggs with a specimen containing an H5N1 avian influenza virus. The experiment was part of a study designed to investigate the pathogenicity and transmissibility of newly emerging H5N1 viruses. The information gained from the CDC study could be of major importance in the national effort to prepare for an avian flu pandemic. (CDC photo by Greg Knobloch)

remembered that the fallout several years ago from the possible linkage between the Swine Flu vaccine and a neurological disease known as Guillain-Barre Syndrome essentially ensured that a vaccine that has *not* been fully tested will not be permitted on the market in this country.

The current lack of manufacturing capacity also will cause delays. There simply are not enough factories – not just in the United States, but anywhere in the world – that have the ability to mass-produce the vaccines likely to be needed in a true pandemic. Moreover, most existing plants are outside the United States – in a number of other countries, each of which will have its own needs, priorities, and political as well as medical agendas.

In addition, even if more plants could be built, there still would be issues of substrate – i.e., the growth medium – that would have to be addressed. Conventional vaccine production uses embryonated eggs – one egg for each dose of vaccine. To produce 100 million doses of killed influenza virus vaccine would require, therefore, 100 million embryonated eggs.

In previous pandemics, two doses may have been required to provide the protection needed. Again, however, advances are possible. Moreover, recent research into adjuvant (augmentation) therapy looks promising, and the use of such adjuvants may significantly stretch the supply of vaccines that would or could be produced in a reasonable period of time.

It should be recognized, though, that production is not an all-or-nothing phenomenon. Once mass production begins, supplies will undoubtedly increase, but what is available on “Day One” of a pandemic will be substantially less than the quantity likely to be available three months later.

### **Political Factors And Other Complications**

There is an important political dimension to the problem that also will come into play. National and state plans have to address – *in advance* – how the initial allotments of vaccine will be distributed and dispensed. At the national level, this may require some type of geographic triage. In addition, numerous difficult and emotional as well

as political questions would be raised. One example: Is New York City, with its crucial economic role, of greater value than Houston, or Los Angeles?

However, because it is likely that most regions of the country will be affected at least to some degree by the time an effective vaccine becomes widely available, perhaps distribution should be based on the demographics of the disease, with areas that have more susceptible populations receiving larger quantities of the vaccine – but how the susceptibility factor could or would be measured is far from clear.

National vaccine distribution plans will likely have a cascading effect. One common assumption is that first responders and healthcare workers should and will receive first priority. An argument could be made, however, that those groups would have only intermittent exposure to the disease, and also would have greater access to personal protective equipment.

There remain many other unanswered questions. One example: Should states be allowed to determine their own priorities? At present there seems to be only one certainty: An open dialogue with the public leading to the answers to these and many other questions sure to be asked would not only be advisable but also would be most beneficial if the questions are asked, and answered, well before the *start* of a pandemic.

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*Dr. Jerry Mothershead is the physician advisor to the Medical Readiness and Response Group of Battelle Memorial Institute. An emergency medicine physician, he also is adjunct faculty at the Uniformed Services University of the Health Sciences in Bethesda, Md.*

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## New Mexico, California, New Jersey, and Mississippi

By Adam McLaughlin, State Homeland News



### New Mexico **University Supports Emergency Responders Through Antiterrorism Research Program**

With terrorists adopting new and increasingly lethal means of spreading fear, a New Mexico university finds itself at the epicenter of antiterrorism research in the hope of giving emergency responders the tools they need to save lives and providing investigators with leads that will be followed with apprehensions and convictions.

Studying explosives and explosions is nothing new at the New Mexico Institute of Mining and Technology in Socorro, where explosives have been used for centuries to extract ore from the ground. What is relatively new is the school's focus on preparing emergency responders for what they may face in the immediate wake of a terrorist act.

Visitors to New Mexico Tech "are amazed once they come here," said Van Romero, vice president at the institute. "They get a real appreciation for the destructive power of explosives."

Each week, Tech gives dozens of emergency responders the opportunity to witness the destructive results of explosive devices ranging in size from a letter bomb containing just one ounce of explosives to a van packed with 500 pounds of ammonium nitrate. "It just boggles your mind that such damage can be caused by such a little piece of material," said Pennsylvania firefighter Patrick Barnes after witnessing the destructive effects caused by a small letter bomb.

The training that responders receive gives them valuable insights into the nature of explosions and enables them to more effectively analyze terrorism scenes and collect vital evidence. Romero points out that a car packed with ammonium nitrate and then detonated leaves little for investigators to examine – except, perhaps, for the engine block. "They [the engine blocks] have ... vehicle identification numbers on them," he

noted, "and people investigating a crime can come and find out exactly what vehicle it was, look at the registration, and trace it back to see what the history of the car is, and maybe get a clue as to what happened."

As of late November, Tech officials said, thousands of emergency responders from every U.S. state and territory already had trained at the institute, and there is expected to be no drop in attendance in the foreseeable future.

### California **Receives Real-Life Test for Tsunami Warning System**


California's fledgling tsunami warning system was tested in real time last month when the state was suddenly hit by a Pacific tsunami that unleashed waves as high as six feet and caused hundreds of thousands of dollars worth of property damage in Crescent City, located in Del Norte County.

Del Norte officials had received a timely warning in the early morning of 15 November that a tsunami had occurred, but took only

minor precautions in the belief that the tsunami was unlikely to hit the county's own coastal waters and, even if it did, would cause relatively little damage.


However, they failed to receive a later warning, issued after a follow-up analysis, which showed that the wave caused by the tsunami was headed directly toward Crescent City and conceivably could be high enough to cause serious damage. "There are bugs that ... [have] to be worked out," said Allen Winogradov, emergency services coordinator for Del Norte County, whose coastal community of Crescent City suffered the most damage from the tsunami.

Here is how the system is designed to work: Seismometers in Alaska monitor earthquakes in the Pacific basin that might trigger dangerous tsunamis. When a tsunami is detected by the West Coast and Alaska Tsunami Warning Center in Palmer, Alaska, the center – run by the National Oceanic and Atmospheric Administration – issues alerts that fan out to a variety of federal, state, and local government authorities, including the California Office



## Audio Interview

**Scott J. Becker, Executive Director**  
**Association of Public Health Laboratories (APHL)**





Executive Director Becker points out the ways in which APHL's Laboratory Response Network links with local and national laboratories in times of major health emergencies. He also focuses on, among other topics, the association's role as a national integrator, its emphasis on disease-testing capabilities, its working relationships with DHS and DHHS, and the upgrades of its training program to deal with bioterrorism events.

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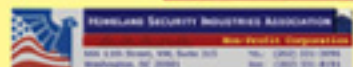
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of Emergency Services (OES) in Sacramento, which then issues its own alerts to state and local municipalities in California.

The California OES began upgrading its tsunami-warning network after the devastating Indonesian earthquake-tsunami in 2004. However, it is left to local community officials to decide how to handle the information provided by the state – whether to trigger community sirens, for example, or to call for evacuations.

Coincidentally, Del Norte County is where one of the most dangerous tsunami events of modern American history occurred; the deadly tsunami that hit the area in 1964 after the Great Alaska Earthquake was the only tsunami ever recorded that took lives within the continental United States.

## ***New Jersey NJIT Offers New Homeland-Security Courses***

For 125 years, business leaders and government officials throughout New Jersey have benefited from the educational offerings of the Newark campus of the New Jersey Institute of Technology (NJIT). NJIT has now expanded its curriculum by establishing new graduate-certificate programs in Homeland Security designed both to help its students grow professionally and to provide the state's private and public sectors with highly capable staff by taking educational excellence on the road.

The new certificate offerings consist of three programs related to homeland security and counter-terrorism: a graduate certificate in network security and information assurance; a graduate program in emergency management; and an undergraduate program in physical and digital counter-terrorism.

Dr. Michael Chumer, special lecturer in information systems and director of the graduate programs, says that the Institute is uniquely qualified to offer such instruction. "NJIT has been designated as a Center of Academic Excellence in Information Assurance Education (<http://www.nsa.gov/releases/rea00051.cfm>) by the National Security Agency," he points out, "... [and by] New Jersey's Homeland Security Technology Systems Center. We are also the only New Jersey College in the University and Agency

Partnership initiative sponsored by the U.S. Department of Homeland Security and the Naval Postgraduate School to advance homeland-security education."

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The graduate certificate in network security and information assurance covers such topics as cryptography, network management and security, computer crime, and information assurance auditing. The emergency-management program focuses on the design of emergency-management information systems as well as improvisation in crisis situations; courses also are available in infrastructure planning, command and control, hazardous-waste operations, and toxicology. Both certificate programs can be applied to a Master of Science degree in information systems or in interdisciplinary studies with an emergency-management concentration.

The undergraduate physical and digital counter-terrorism certificate program is designed specifically to meet the needs of law-enforcement and corporate-security personnel. The credits obtained can be applied to a Bachelor of Science degree either in information technology or in information systems.

## ***Mississippi MSU Engineers Work to Thwart Inland Waterways Threat***

Mississippi State University engineers are working on an innovative homeland-security project aimed at thwarting terrorist threats on and along the nation's inland waterways. A joint research project between the university and the Oak Ridge National Laboratory seeks to develop a computer tracking and monitoring model that will be able to identify, in real time, riverine barges

and other vessels plying the U.S. inland waterways that may be carrying potentially dangerous cargoes.

"The proposed system will alert decision-makers to possible security threats by identifying strange carriers, strange destinations, and deviations from pre-trip plans, including schedules and routes," said Ming Zhou Jin, assistant professor of the university's industrial systems engineering department and principal investigator for the two-year project.

The project "is expected to provide early warnings of terrorism related to barge-carried cargoes designated as dangerous by DHS," Jin added, "and share the warnings with state, regional, and local leaders for better decision-making in disaster prevention and response."

Responding to the increase in potential terrorist threats arising from the movement of hazardous materials throughout the nation's inland waterways, towing vessel operators and fleet area managers at specified reporting points already are required to notify the U.S. Coast Guard's Inland River Vessel Movement Center when they are moving barges carrying certain dangerous cargoes.


Among the cargoes targeted are certain types of explosives, blasting agents, poisonous gas, oxidizing materials, potentially dangerous liquids, radioactive or fissile materials, bulk liquefied chlorine gas, and other flammable or toxic materials that have been designated by the Department of Homeland Security (DHS) as "threatening" substances.

"An information-fusion system also will analyze real-time data to identify potential security threats," Jin said, "and [will] share that information with other government agencies such as state departments of transportation and the U.S. Army Corps of Engineers."

A major MSU task during the first year of the project will be to review the flows of dangerous cargo through the Mississippi and Tennessee-Tombigbee river systems to determine possible field-test sites.

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*Adam McLaughlin is Preparedness Manager of Training and Exercises, Operations, and Emergency Management for the Port Authority of N.Y. & N.J. He develops and implements agency-wide emergency response and recovery plans, business continuity plans, and training and exercise programs.*



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