

BIOTERRORISM WATCH

Preparing for and responding to biological,
chemical and nuclear disasters

THOMSON
AMERICAN HEALTH
CONSULTANTS

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Nation's labs rising to biological threat, still lag on chemical agents

Surge capacity improved since anthrax madness

The nation's laboratory capacity and ability to detect biological agents has increased dramatically in recent years, but continues to play "catch up" on chemical and radiological preparedness. While something of a work in progress, the Laboratory Response Network (LRN) is the key to rapid identification and response should terrorists strike with either biological, chemical, or radiological weapons.

"Both the chemical and bio sides of the LRN are designed so that positive results from rapid test procedures are able to initiate a public health response," says Mike Miller, MD, PhD, chief of the laboratory response branch at the Centers for Disease Control and Prevention. "They are actionable. If you get a positive, somebody needs to do something quickly."

However, upgrading laboratory capability and capacity to detect chemical agents remains problematic. While Congress has provided funding to support the surveillance and control of infectious bioterrorism agents since the early 1990s, federal funding for laboratory response to chemical terrorism has only been available since 2003. As a result, laboratory preparedness for chemical terrorism trails considerably in comparison to bioterrorism preparedness, the Association of Public Health Laboratories (APHL) reports.¹ (See related story, p. 27.)

While problems remain, chemical lab resources are incrementally increasing. The LRN currently has 62 state, territorial, and metropolitan public health laboratories that are members of its chemical component. "Within the LRN, there is extensive and elaborate testing capacity for chemical agents — nerve agents, all types of chemicals, blisters agents, etc.," Miller says. "I think right now some of the core labs, the main labs certainly at CDC and at four other sites around the country can detect about 150 different chemical agents."

Progress in the biological response area has come at no small price. Laboratorians and hospital clinicians alike ruefully recall those maddening months in 2001, when the still-unsolved anthrax mailings set off a wave of hoaxes and false powders. Given the tenor of the times, everything had to be taken seriously and just about everything was.

Never have so many lab workers spent so much time and energy to identify a panoply of powders including baking, talcum, salt, and other benign substances. Geared to respond to human specimens, the LRN was nearly swamped under the tsunami of environmental samples. "A small group of public health laboratory leaders literally worked around the clock to devise a standard protocol to test such items," the APHL reports.²

But through that trial by fire, the nation's laboratory system has come out stronger than ever. There now are 150 biological LRN reference labs, with at least one in every state. In 2001, there were only 91 participating labs. The LRN is now completely interlinked to handle surge capacity, Miller explains.

"We are miles ahead of where we were," he tells *Bioterrorism Watch*. "Every laboratory in each state may — because of its size — have a different

overall capacity, but by being a member of the LRN they work under a single integrated operational plan. The states have agreements with each other and other laboratories so that during a surge [threat] or a real event other labs could help them with their testing. That was clearly illustrated during Katrina, when New Orleans had to use that plan. The specimens that would normally have gone to laboratories in New Orleans were [routed] to other labs that had agreements with them. That occurred within hours of a phone call."

Rapid molecular testing is now standard in many labs, meaning the ability to identify the Category A and B bioterrorism threat agents has increased significantly. "The molecular testing platforms that we have developed have been distributed throughout the LRN," he says. "They are capable of detecting virtually any of the agents of bioterrorism and [many] chemicals."

For example, the number of labs able to identify three key bioterrorism agents increased from 2004 to 2005 as follows: anthrax from 84 labs to 95 labs; ricin, 51 labs to 71 labs, and plague, 83 labs to 93 labs. "Every state in the United States [now] has at least one LRN laboratory," Miller says.

BSL labs increasing as H5N1 looms

The number of Bio-Safety Level 3 Labs — which are needed to work with avian influenza A (H5N1) and other high level infectious agents — has increased to 139. Only 69 BSL 3 labs were in operation in 2001. "Those are critical in terms of safety to the laboratorians that have to manipulate those organisms," he says. "By being able to work in a BSL 3 lab, there are safety measures that are in place to protect the workers from risk of getting infection because of accidents. It reduces the risk of accidents very significantly."

Still, the APHL reports that 36 of 51 labs (71%) responding to a recently published survey said they did not have a BSL-3-enhanced laboratory and therefore cannot culture the avian influenza A virus (H5N1). "These [labs] are allowed only to screen specimens for the presence of the virus using the real-time reverse transcriptase PCR assay provided by CDC," the APHL found. "Testing of samples where live virus confirmation is required will need to be referred to CDC or other federal or agricultural laboratories, which may delay confirmation."

Similarly, strides have been made in the ability to detect smallpox virus, but blind spots remain in

(Continued on page 28)

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Editor: **Gary Evans**, (706) 310-1727.

Vice President/Group Publisher: **Brenda Mooney**, (404) 262-5403, (brenda.mooney@thomson.com).

Editorial Group Head: **Coles McKagen**, (404) 262-5420, (coles.mckagen@thomson.com).

Senior Production Editor: **Nancy McCreary**.

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Editorial Questions

For questions or comments, call Gary Evans at (706) 310-1727.

Labs struggle to meet chem weapons threat

Few ready for radiological attack

Though many gains have been made in chemical and radiological terrorism preparedness, significant gaps continue to pose obstacles to the nation's overall response, the Association of Public Health Laboratories (APHL) reports.¹

"Inadequate funding, environmental and radiological testing gaps and laboratory work force shortages identified in this assessment provide a snapshot of the disparities that exist in present-day chemical terrorism laboratory preparedness in the states," the APHL reported in a recently published survey and analysis. "Nationwide emergency preparedness needs cannot be met by focusing solely on bioterrorism preparedness activities."

The majority of labs perform chemical terrorism testing for metals, pesticides, organic chemicals, and PCBs using validated methods and traditional environmental tests. However, far fewer test for agents specific to chemical terrorism such as vesicants, choking agents, blood agents, and incapacitating agents, the APHL reported.

"Despite the fact that standardized environmental sampling protocols and test methods are unavailable, several states are still accepting and, to a lesser degree, analyzing environmental samples for chemical warfare agents," the APHL found. "No federal agencies currently provide training to states for environmental testing of chemical warfare agents. Therefore, any minimal training for the environmental testing of chemical warfare agents is being received through industry/vendors, in-house training, and academia, among others."

In November and December of 2005, APHL conducted a survey of public health labs in the 50 states and the District of Columbia (DC). Fifty-one responses were received, representing all states and DC. The APHL survey found that only a handful of labs are equipped and have experience with analyzing clinical and environmental samples for radiochemicals and radiological contaminants.

"In the event of a large radiation exposure, monitoring the population and investigating or confirming radiation sickness or chromosomal mutations would be challenges that most [labs] are still incapable of addressing," the APHL warned.

Most states possess the most basic screening and testing instruments for detecting radiological contaminants in samples, such as Geiger counters and liquid scintillation counters, which 81% and 56% of states reported having in the laboratory,

respectively. However, in terms of the more sophisticated screening and testing technologies, states are largely deficient:

- Two states (4%) have radon counters or alpha spectrometers to be used for screening purposes.
- Two states (4%) possess accession area radiological monitors for testing.
- No states possess area monitors or Primalert technology for radiological testing.
- No states have whole body counters to use for screening purposes.

Overall, the APHL reported that all 62 state, territorial, and metropolitan public health laboratories in the chemical laboratory response network (LRN) have Level 3 characterization. The responsibilities and functions of Level 3 laboratories include:

- working with hospitals in their jurisdiction;
- knowing how to properly collect and ship clinical (blood, urine, saliva) samples;
- ensuring that specimens which could constitute forensic evidence are handled properly and that chain-of-custody procedures are followed;
- familiarity with chemical agents and their associated health effects;
- training on anticipated clinical sample flow and shipping regulations;
- working to develop a coordinated response plan for their respective state and jurisdictions.

In addition, 37 out of the 62 labs have Level 2 ratings, which mean they are capable of detecting exposure to a limited number of toxic chemical agents in human blood or urine such as analysis of cyanide and toxic metals in human samples is an example of an activity conducted by Level 2 chemical LRN laboratories. However, only 10 laboratories in the nation are characterized as Level 1 laboratories within the chemical LRN. These laboratories are capable of detecting an expanded number of chemical agents in human blood or urine, including all Level 2 laboratory analyses plus analysis for mustard agents, nerve agents, and other toxic chemicals. The 10 Level 1 laboratories are in California, Michigan, New Mexico, New York, Virginia, Florida, Massachusetts, Minnesota, South Carolina, and Wisconsin.

"These Level 1 laboratories function to provide the CDC with much-needed surge capacity for handling samples in a chemical event," the APHL reported.

Reference

1. Association of Public Health Laboratories. *Ready, Set, Respond: Chemical Terrorism Preparedness in the Nation's State Public Health Laboratories*. March 2006. On the web at https://www.aphl.org/docs/chem_t_final.pdf. ■

the system. The APHL survey found that 49 of 51 (96%) responding labs have validated polymerase chain reaction (PCR) and direct fluorescent assays for the detection of varicella zoster virus, the causative agent for chicken pox, the disease most likely to be confused with smallpox. However, only 22 of 51 labs (43%) have a validated PCR assay for smallpox, though 20 others expressed an interest in developing smallpox-specific testing capability. "Due to the strict criteria for biocontainment of the smallpox virus, CDC continues to evaluate the feasibility of expanding smallpox testing capability," the APHL reported.

On a positive note, the APHL survey found ample evidence of ongoing lab upgrades in specimen and mail receiving areas, air handling systems, HEPA filtration systems, redundant fan systems, dedicated power/generator systems, biohazard disposal processes, subzero freezer capacity and reagent storage facilities. However, concerning the latter, the LRN is struggling to maintain testing supplies and reagents needed to identify specimens.

"State and local LRN reference laboratories

typically respond to bioterrorism threats and hoaxes several times a week," the APHL reported. "To meet these ongoing public health and law enforcement testing needs and assure adequate capacity to respond to an actual outbreak situation, [labs] must continually replenish stores of testing supplies and standardized LRN reagents."

Early this year, APHL released data from a current assessment of LRN laboratory reagent needs showing that 51 of 83 state and local LRN reference laboratories (61%) have experienced delays receiving CDC-supplied LRN reagents for detection of potential agents of biological terrorism.

References

1. Association of Public Health Laboratories. *Ready, Set, Respond: Chemical Terrorism Preparedness in the Nation's State Public Health Laboratories*. March 2006. On the web at https://www.aphl.org/docs/chem_t_final.pdf.

2. Association of Public Health Laboratories. *Public Health Laboratory Issues in Brief: Bioterrorism Capacity*. May 2006. On the web at https://www.aphl.org/docs/2006_bioterrorism_capacity_final.pdf. ■

IOM, homeland security cite lack of readiness

EDs already beset by overcrowding, pt diversions

Two comprehensive national reports released recently within days of each other reach the same disturbing conclusion: the United States remains woefully unprepared to respond to terrorist attacks and natural disasters.

A major part of the preparedness problem can be found at the routinely crowded emergency department (ED) in any given city in America. The nation's emergency medical system as a whole is overburdened, underfunded, and highly fragmented, reports the Institute of Medicine (IOM). As a result, ambulances are turned away from emergency departments once every minute on average, and patients in many areas may wait hours or even days for a hospital bed. A chronic problem could turn into catastrophe should needed surge capacity not be available in the wake of a terrorist strike or natural catastrophe. The ED situation is akin to a dam at the bursting point awaiting the next flood.

"Most of us need emergency services only rarely, but we assume that the system will be able to provide us rapid, skilled care when we do," said

Gail L. Warden, MHA, who chaired the IOM report committee and is president emeritus of the Henry Ford Health System in Detroit. "Unfortunately, the system's capacity is not keeping pace with the increasing demands being placed on it."

On the heels of the IOM report, the U.S. Department of Homeland Security (DHS) completed a nationwide preparedness review that found significant problems in such areas as evacuation, attention to populations with special needs, command structure, and resource management.

The IOM report recommended that Congress allocate funds to ensure that EDs, trauma centers, and medical first responders are fully equipped and ready to provide prompt and appropriate care. The IOM also called for actions to reduce crowding of emergency department, boost the number of specialists involved in emergency care, and get all emergency medical services in an area to work collaboratively to steer patients to the most appropriate facilities. The DHS concluded that planning products, processes, tools, and technologies should be developed to facilitate "a common nationwide approach to catastrophic planning."

IOM: Ambulances on the road to decline

Since federal funds for emergency medical response services declined abruptly in the early

1980s, first responder services have been left to develop haphazardly across the country, the IOM report stated. Many ambulance services use antiquated communications equipment and do not have adequate means to coordinate with hospitals and other first responders in their areas. In 2003, EDs received nearly 114 million patients — a 26% increase in volume over the previous decade — but the country experienced a net loss of 703 hospitals and 425 EDs during the same 10-year period, the IOM reported.

Hospital EDs provide a growing amount of safety net care for uninsured patients, a significant proportion of which goes uncompensated. They also must play key roles in disaster response, although they have received scant funding for these efforts, the committee found. For example, emergency medical services received only 4% of the \$3.3 billion distributed by the DHS for emergency preparedness in 2002 and 2003.

To address these deficiencies, Congress should establish a pool of at least \$50 million to reimburse hospitals for uncompensated emergency and trauma care, the reports conclude. Lawmakers also should significantly increase funding to provide hospitals with resources needed to handle disaster situations, the IOM urged. In addition, Congress should allocate \$88 million to be disbursed as grants over five years for projects designed to test ways to promote greater coordination and regionalization of emergency care. Citing deficiencies in pediatric emergency care, the IOM called for a \$37.5 million appropriation annually for the next five years to the Emergency Medical Services for Children Program. Even though children make up more than a quarter of all ED and trauma patients, according to one survey, only 6% of hospital EDs have all of the supplies deemed essential for managing pediatric emergencies, the IOM found.

The IOM cited the well publicized patient flow problems that beset EDs, saying diverting ambulances and “boarding” patients in hallways is becoming increasingly common. According to the IOM, ambulances were diverted 501,000 times in 2003 because of overcrowding in EDs. Federal programs should revise their reimbursement policies to reward hospitals that appropriately manage patient flow and penalize those that fail to do so, the report says. The committee also recommended that the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) reinstate strong guidelines to reduce crowding, boarding, and diversion, and called on the Centers for Medicare and Medicaid Services to convene a working group to develop

standards to address these problems.

Regionalization of emergency care services — in which patients are directed not just to the nearest hospital, but to the nearest facility with the best resources to handle his or her particular needs — can improve health outcomes, mitigate overcrowding, and reduce costs, the IOM reported. The committee urged federal agencies to develop criteria to classify all emergency medical services and EDs in each community on the basis of their capabilities. Regional collaboration also would mean that not every hospital has to maintain on-call services for every specialty, which would help address shortages caused by the dwindling number of specialists willing to take emergency calls.

DHS: Response system ‘partially sufficient’

Responding to directives from President Bush and the Congress following Hurricane Katrina, the DHS did a nationwide review to determine if existing emergency operations plans for states and urban areas are sufficient for managing a catastrophic event. The review was conducted in all 50 states and six territories, and 75 urban areas over a six-month period. Reviewers examined nearly 2,800 emergency operations plans and related documents with participation from more than 1,000 emergency managers and homeland security officials. To provide an overall picture, plan components were assessed on a scale of “sufficient,” “partially sufficient,” or “not sufficient” to manage a catastrophic event. The majority of components assessed fell into the “partially sufficient” category.

“The findings of the nationwide plan review unequivocally support the need to modernize planning processes, products, and tools,” said **George Foresman**, DHS undersecretary for preparedness. “It is a natural evolution towards working together as a nation to implement the lessons from seminal events such as the Sept. 11 attacks and Hurricane Katrina.”

The findings of the DHS report included:

- The majority of the nation’s current emergency operations plans and planning processes cannot be characterized as fully sufficient to manage catastrophic events as defined in the national response plan (NRP).
- States and urban areas are not conducting adequate collaborative planning as a part of “steady state” preparedness.
- Assumptions in basic plans do not adequately address catastrophic events.

- Basic plans do not adequately address continuity of operations and continuity of government.

- The most common deficiency among state and urban area direction and control annexes is the absence of a clearly defined command structure.

- Many states and urban areas need to improve systems and procedures for communications among all operational components.

- All functional annexes did not adequately address special needs populations.

- States should designate a specific state agency that is responsible for providing oversight and ensuring accountability for including people with disabilities in the shelter operations process.

- Timely warnings requiring emergency actions are not adequately disseminated to custodial institutions, appropriate government officials, and the public.

- The ability to give the public accurate, timely, and useful information and instructions through the emergency period should be strengthened.

- Significant weaknesses in evacuation planning are an area of profound concern.

- Capabilities to manage reception and care for large numbers of evacuees are inadequate.

- Capabilities to track patients under emergency or disaster conditions and license of out-of-state medical personnel are limited.

- Resource management is the “Achilles heel” of emergency planning. Resource management annexes do not adequately describe in detail the means, organization, and process by which states and urban areas will find, obtain, allocate, track, and distribute resources to meet operational needs.

(Editor’s note: More information on the IOM emergency care reports can be found on the web at www.iom.edu/CMS/3809/16107/35007.aspx. The DHS nationwide plan review is on the web at www.dhs.gov/interweb/assetlibrary/Prep_NationwidePlanReview.pdf.) ■

Thompson: Food safer, but more work necessary

Response to Katrina was a ‘screw up’

The United States food supply still is vulnerable to terrorism, but heightened inspections and other counterterrorism measures make it considerably safer than it was a few years ago, former U.S. Secretary of Health **Tommy Thompson** said.

Thompson caused quite a stir when he issued a

blunt warning about the food supply as he stepped down from his post in December 2004. “I, for the life of me, cannot understand why the terrorists have not attacked our food supply because it is so easy to do,” he said at a farewell press conference. “And we are importing a lot of food from the Middle East, and it would be easy to tamper with that.”

Thompson was asked to revisit those comments at a June 11 press conference in Tampa, FL, after delivering the key note address at the annual conference of the Association for Professionals in Infection Control and Epidemiology.

“We have come a long way in improving it but I am still not satisfied,” he told *Bioterrorism Watch*. “I am very concerned about the possibility of tampering with our food.”

In terms of overall all-hazards preparedness, Hurricane Katrina was a shocking wake-up call, he said. “What surprised me was that America is so unprepared and how much more we have to do,” Thompson said. “And I am not being critical of the administration, homeland security, FEMA or anybody else. But the truth of the matter is, we screwed up after Katrina. Allowing a situation where dead bodies are chained to a stop sign so they don’t float away. To me, that is absolutely ridiculous in this great county called America. We should not be allowing that to happen.”

While speaking with the bluntness of one who has been freed of the political constraints of a cabinet position, Thompson went beyond criticism to offer solutions.

“We have got to put fast response teams together that are educated and trained,” he said. “We have to be able to have surge capacity. We did not have surge capacity for Katrina. We do not have surge capacity for H5N1 [avian influenza] if it starts becoming transmissible from human to human. We don’t have enough hospital beds to do that. What are we going to do with those individuals? We don’t have enough respirators. We have 105,000 respirators in this country today and 90,000 are being used. Are we going to take a respirator away from somebody that is dependent upon it to live and give it to someone else? Absolutely not.”

FDA responding to food concerns

During his four years as secretary of the Department of Health and Human Services Thompson pushed through several measures to increase food inspections and implement other tampering safeguards.

"We are investing a lot more money [into food safety] from what I inherited," he said. "We almost doubled the budget — 100% in four years — for inspections. We need to get more employees at FDA to inspect our food. When I got there, we were inspecting about one-half of 1% of the food that is coming into America. We are up to almost 5% now, but that is still a small amount."

In addition to more manpower, more technology needs to be applied to the problem in terms of monitoring and testing devices.

"We have to bring in more technology to be able to monitor the foods and run tests of samples from all the ships and airplanes that are coming in," he says, "and we need to request better surveillance from countries that are exporting food into the United States. These are the kinds of things I was working on when I left and I would like to see more efforts put into these areas."

Thompson's concerns — and the publicity that ensued — have clearly resonated at the Food and Drug Administration. **Andrew Von Eschenbach**, MD, acting FDA commissioner, came before Congress earlier this year requesting a \$20 million allocation for food defense in the fiscal year 2007 budget.

Part of the money would be used to expand the Food Emergency Response Network (FERN), a group of federal and state laboratories designed to aid in the rapid identification and response to an attack on the food system.

"The result of this investment will be a more robust and more geographically diverse capability to provide the essential surge capacity to test contaminated food samples and allow us to warn the public about threats to the food supply," Von Eschenbach testified.

The FDA is seeking funding to strengthen other aspects of food counterterrorism, including strengthening its Emergency Operations Network to allow more sophisticated incident tracking for food-related emergencies. The agency wants to target more "potentially high-risk" imported foods through Prior Notice Import Security Reviews based on intelligence, FDA inspection reports, discrepancies in prior notice reporting and sample collection and analysis, he reported. ■

CE/CME questions

13. Due to recent increases in lab capacity and testing capability, more labs in the laboratory response network (LRN) can now identify which of the following bioterrorism agents?
 - A. Anthrax
 - B. Ricin
 - C. Plague
 - D. All of the above
14. The Institute of Medicine (IOM) reported that most emergency departments have scant supplies for this patient group even though they comprise a quarter of all ED and trauma patients:
 - A. Geriatrics
 - B. Diabetics
 - C. Pediatrics
 - D. Special needs
15. Former U.S. Secretary of Health Tommy Thompson said only about 0.5% of food supplies were being inspected when he came into office, but that percentage has reached approximately:
 - A. 5%
 - B. 10%
 - C. 15%
 - D. 20%
16. According to a report by the Center for American Progress in Washington, DC, only 15 states and/or cities have the capability to administer stockpiled vaccines and other drugs on a large scale.
 - A. True
 - B. False

Answer Key: 13. D; 14. C; 15. A; 16. A.

CE/CME instructions

Physicians and nurses participate in this CE/CME program by reading the issue, using the provided references for further research, and studying the questions. To take the CE/CME test on-line, go to <http://subscribers.cmeweb.com/>. Each issue will test separately. If you have questions, please call customer service at (800) 688-2421. ■

COMING IN FUTURE MONTHS

■ Using flu vaccination to test bioterror readiness

■ Teaching strategies for bioterror agents

■ Tested by Katrina: How did mobile hospitals fare?

■ Calming the storm: Preventing outbreaks in evacuees

States lack plans to deal with dead and wounded

Only 2 states proactive about keeping HCWs on job

More than 50% of Americans today live in states that do not have plans to deal with a large number of casualties in the event of a bioterrorist attack, according to a report by the Center for American Progress in Washington, DC. Only two states have plans to encourage medical personnel to report for work during an epidemic, the report found.

The report, "Biosecurity: A Comprehensive Action Plan," proposes several methods for alleviating the ineffectiveness of the current operating procedure for a flu pandemic or other catastrophic event at the local, state, and federal levels.

Only 15 states and/or cities have capacity

Currently, only 15 states and/or cities have the capability to administer stockpiled vaccines and other drugs on a large scale. However, many of these communities do not have adequate stockpiles of vaccines to disseminate to their citizens. States that do not have such safeguards in place are vulnerable to personnel shortages such as those experienced along the Gulf Coast after Hurricane Katrina. A survey cited in the report found practicing physicians would misdiagnose anthrax, botulism, plague, and smallpox — all potential bioterrorist threats — an average of 47% of the time.

Since 9/11, the United States has spent more than \$30 billion to counter the twin threats of biological weapons and natural emerging infections, such as pandemic influenza. Despite this investment, efforts do not add up to an effective biosecurity system for all Americans. The primary reason is a failure to connect the dots between plans on paper and the capabilities needed to implement them, the report concludes. Possible solutions cited in the paper include:

- Improve early warning systems for the detection of disease outbreaks and support advanced biomedical research to encourage the development of safe, cost-effective drugs capable of treating a broad spectrum of infectious diseases.

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CE/CME objectives

After reading each issue of *Bioterrorism Watch*, the infection control professional will be able to do the following:

- identify the particular clinical, legal or educational issue related to bioterrorism;
- describe how the issue affects health care providers, hospitals, or the health care industry in general;
- cite solutions to the problems associated with bioterrorism, based on guidelines from the federal Centers for Disease Control and Prevention or other authorities, and/or based on independent recommendations from clinicians and bioterrorism experts. ■

- Revitalize global efforts to prevent the spread of biological weapons and promote strong international standards.
- Strengthen the capacities of international public health agencies, such as WHO, to identify and contain diseases before they evolve into global threats.
- Address critical deficiencies in the nation's public health infrastructure. Preventive measures must extend to all Americans, not only for reasons of fairness but to safeguard public health and national security.
- Develop an emergency vaccination campaign to contain an outbreak of a contagious disease. ■