Bioterror Defense and Its Impact on the Clinical Laboratory

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Top government and public health officials have reported that the United States' investment of $20 billion in bioterrorism preparedness since 2001 has left the US dolefully unprepared to respond to a bioterrorism attack. Critics such as Irwin Redlener from the National Center for Disaster Preparedness at Columbia University contend that bioterrorism preparedness programs are not operated in an effective manner, thus wasting billions of dollars.

Bioterrorism preparedness is the primary responsibility of the Department of Health and Human Services (DHHS). The department's responsibilities include stocking antibiotics, sharing information among laboratories and hospitals, and assisting communities in response in the event of an emergency. This is an overwhelming responsibility even for the federal government. While the government has made advances in addressing this responsibility, problems exist with some of these efforts. For example, a national stockpile of medical equipment and supplies has been amassed and can be delivered to any city within 12 hours of an attack. Unfortunately, once the cities receive the supplies they have not developed the infrastructure to deliver these supplies to their citizens in a time frame that would save lives. While the location and exact contents of the stockpile are secret, DHHS reports that there is enough smallpox vaccine for every US resident and enough antibiotics to treat 60 million people who might be exposed the most viral form of anthrax.

In 2003 President Bush announced an initiative titled Project BioShield. The project is a $5.6 billion research effort intended to spur the development of vaccines and antidotes over a ten year period by pharmaceutical companies. The intent is to encourage these pharmaceutical companies to develop new drugs and antidotes of which the government would purchase most of the drugs if they meet specified standards. Despite the availability of a large pot of funding, pharmaceutical companies have not shown much interest due to liability concerns.

In 2004 a 21 city program titled Cities Readiness Initiative was launched by DHHS aimed at encouraging officials in the targeted 21 cities to develop plans for deploying supplies received from the national stockpile (Figure 1). As of yet no city has developed a workable plan that would get supplies to the public in time to counter the effects of the bioterrorism agent. A proposal to use the US Postal Service to distribute supplies from the airport to the community has been put forth. This would have to be agreed to by both the postal service and its workers and numerous issues remain unresolved.

Table 1. The 21 cities included in the Cities Readiness Initiative and amounts allocated

City	$ in millions
Atlanta	0.74
Boston	0.84
Chicago	2.15
Cleveland	0.77
Dallas	1.19
Denver	0.82
Detroit	1.03
Houston	1.65
Las Vegas	0.79
Los Angeles	2.67
Miami	0.71
Minneapolis	0.71
New York	5.10
Philadelphia	1.35
Phoenix	1.28
Pittsburgh	0.69
St. Louis	0.69
San Diego	1.22
San Francisco	0.94
Seattle	0.83
Washington, DC	0.83

Cities are to develop plans to distribute vaccines and antibiotics in the event of a bioterrorism attack. Distribution of funds is based on population and geography.

The role of the clinical laboratory in bioterrorism has received no attention, yet the laboratory is a pivotal point in the preparedness strategy. In the event of an attack and before supplies arrive, physicians and nurses will be faced with massive numbers (hundreds to thousands) of patients presenting with various symptoms, which will require supportive therapy. It is reasonable to expect exposed patients to experience vomiting, diarrhea, dehydration, and numerous other symptoms depending on the toxin they have been exposed to. Treatment providers will require substantial laboratory work to appropriately treat patients. Tests such as electrolytes, basic chemistries (glucose, renal, and liver function tests), CBCs, and cultures are minimal essentials needed to make objective medical decisions. After treatment supplies arrive from the federal government, and patients are treated, these same basic tests will be required plus other tests necessary to monitor patients.

Examining the critical elements in the bioterrorism response process, the question begs: is the laboratory prepared to handle possibly thousands of requests in a 12 to 72 hour period? For example, can the laboratory find staffing to handle the tremendous volume that accompanies an attack of this magnitude? Will the laboratory have the equipment necessary to yield the throughput required? Will the laboratory have the reagents and other supplies required for these analyses? What will treatment providers do if laboratory services are available for only a few patients? How will laboratory services be rationed? These are extremely important questions if patient lives are to be saved, yet little to no attention has been paid to them. It is easy to envision that frustration and chaos may result in hospitals and clinics if laboratory services are limited.

As in so many other situations, the laboratory is overlooked or simply forgotten in planning for a response to bioterrorism. Yet it is clear that this could be a major barrier to a successful bioterrorism response. Laboratory directors and managers must consider these potential scenarios and begin working with city officials to assure laboratory preparedness in the event of a bioterrorism attack.

Opinions expressed herein are solely those of the author.

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