

State Public Health Laboratory Bioterrorism Capacity

The past year brought significant challenges to public health laboratories; testing for possible biothreat agents, communications, workforce shortages, security, and many others. Along with these challenges come new opportunities to address critical state public health laboratory (SPHL) needs through **emergency supplemental funding for bioterrorism**.¹ **The funds, released in June 2002, provided \$146 million for state and local public health laboratory improvements.**

The Centers for Disease Control and Prevention (CDC) noted that these funds would “ensure that core diagnostic capabilities for bioterrorist agents are available at all state and major city/county public health laboratories.” CDC identified “Critical Capacities,” the core expertise and infrastructure to enable a public health system to prepare for and respond to bioterrorism. Activities supporting achievement of the Critical Capacities are to be completed August 30, 2003.²

APHL is hopeful that this support will provide critical opportunities for public health laboratories to enhance facilities, communication systems, biosecurity, equipment, supplies, staffing, information technology, training, and connectivity between public and private laboratories. **This survey is intended to identify SPHL needs for bioterrorism preparedness and develop strategies to assure adequate resources for the future.** It will help define the impact of the anthrax attacks of October 2001 on public health laboratories nationally and the performance of the Laboratory Response Network described below. A follow-up assessment will be conducted in December 2002 to determine if laboratories have been able to address deficiencies noted in the first assessment.

Laboratory Response Network for Bioterrorism

The Laboratory Response Network (LRN) is a national asset that coordinates laboratory resources for preparedness and response to biological terrorism. State and local public health laboratories, in cooperation with the CDC, form the core structure of the LRN. Any frontline laboratory identifying or suspecting a biological agent of terrorism refers samples to a secure LRN laboratory for confirmation. Assets available at this level include: standard reagents and protocols that meet all appropriate technical standards and forensic standards acceptable to the Justice Department, a 24/7 system for specimen triage, transport and sampling, and secure electronic communication among its authorized members.

Methods

In May 2002, APHL conducted a survey of 53 state and territorial³ public health laboratories to establish a baseline status of PHLs as of December 31, 2001, **prior to allocation of the emergency supplemental funds.**

Forty-eight responses (46 states, 1 territory, and the District of Columbia) were received, for an overall response rate of 92%. The survey was sent by email, and was available on APHL LabNet, a Web-based repository and survey tool designed for APHL members. Results were coded for entry into SPSS for Windows Version 11. Descriptive statistics were gathered for all of the variables. Results are grouped into the following categories:

- Personnel
- Facilities/Biosecurity
- Clinical laboratory connectivity
- Equipment/Supplies
- Transportation/Courier service
- Integrated Data Management
- Training



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PERSONNEL

A well trained laboratory workforce is essential for national security. Yet many states are not prepared to handle sophisticated bioterrorist attacks. Supplemental funding provides for hiring of a skilled laboratory workforce, but the needed workforce does not exist. Survey results show that states may only have one person trained appropriately. One person cannot maintain 24/7 testing. **The nationwide shortage of skilled laboratorians cannot be addressed through short-term funding support, but requires a long-term national strategy.**

Critical Capacities include having at least one state laboratory able to perform CDC-developed real-time polymerase chain reaction (PCR) and time-resolved fluorescence (TRF) rapid assays, as well as LRN-validated testing for anthrax, plague, tularemia, and protocols for other agents as they are approved.

Survey results show that prior to supplemental funding, many states did not have anyone trained in some of these areas.

- Ninety-eight percent needed staff overtime in October and November of 2001, and more than half reported that their overtime burden was "extreme." (See Fig. 1)
- Eight respondents noted significant delays in other testing, such as TB and STDs, due to inadequate staff and workspace.
- Almost half of respondents stated that they had NO PhD-level molecular scientists on staff.
- Only 9 respondents reported having more than one overall. Overall, 76 more are needed.
- About half of respondents stated that have no full-time Information Technology staff dedicated to developing/maintaining laboratory information systems. An additional 81 FTEs are needed.
- Two-thirds of respondents said they lacked adequate administrative staff to manage the anthrax events, and noted the need for additional staff to handle managerial, clerical, information, communications, training and worker safety activities.
- Ten respondents said they did not have any laboratorians trained to perform Real-time PCR assays for BT agents.
- Thirteen states reported having only one laboratorian trained to perform confirmatory testing for one or more Category A BT agents, including *B. anthracis* (anthrax), *Y. pestis* (plague), *F. tularensis* (tularemia) and *Brucella* sp. (Brucellosis).
- One territory reported having NO ONE able to perform confirmatory testing for one or more Category A BT agents.
- Overall, more than 150 additional staff are needed to meet this capacity.⁴

FIG. 1
Impact of Anthrax Events on SPHL Staff

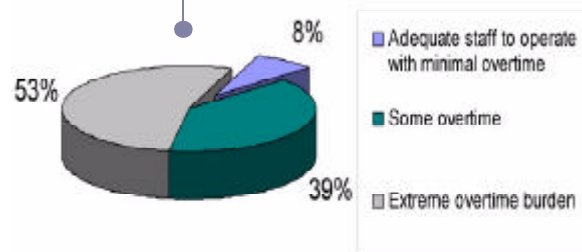
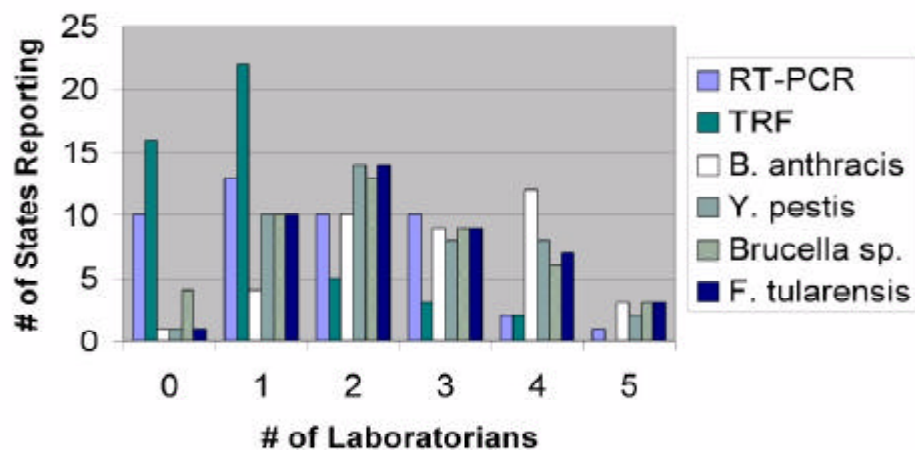


FIG. 2
Personnel Trained to Perform BT Testing



FACILITIES/BIOSECURITY

To respond to bioterrorist events, laboratory facilities must be equipped to provide testing capability, while assuring the safety of workers and the public, and the protection of the facility itself from theft and vandalism. **Ideally, laboratories should be equipped and staffed to handle the surge of testing in a bioterrorist event without shutting down other testing of public health importance.**

- Eighty-five percent reported that the need to perform BT testing during the anthrax events impacted routine work, including testing for tuberculosis, sexually-transmitted diseases, and other infectious diseases.
- Most respondents reported needing physical facility upgrades in multiple areas. (See Fig. 3)
- Costs for these upgrades were estimated at \$61 million nationwide.
- Ten respondents noted that they lacked BioSafety Level 3 (BSL-3) capability. Supplemental funding will deliver this capability in all states.
- The responding laboratories represent a total of 82 confirmatory Laboratory Response Network (LRN) laboratories nationwide.

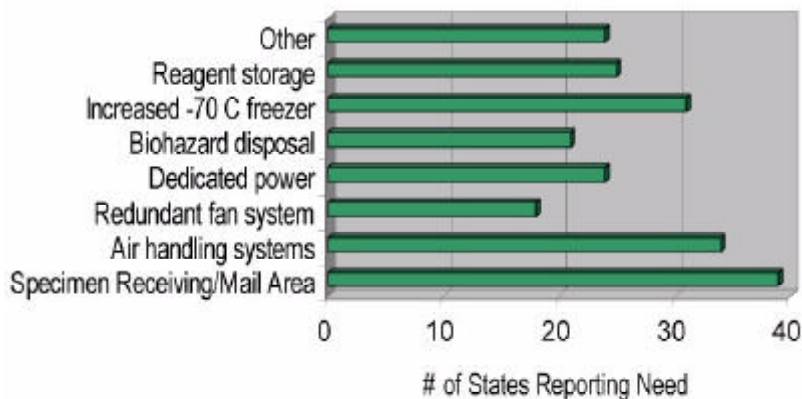


FIG. 3
Facilities Upgrades Needed

- Approximately three-fourths of respondents stated the need for a variety of biosecurity upgrades, including types of locks, electronic tracking of entries, and videosurveillance.
- These upgrades were estimated to cost \$3 million nationwide.

CLINICAL LABORATORY CONNECTIVITY

While public health laboratories provide confirmation, surge capacity, law enforcement support and pre-event planning for bioterrorist events, **the first detection of an event will occur in the thousands of clinical laboratories serving hospitals and physicians across the nation**, as it did with the anthrax attacks of 2001. Public health laboratories must be able to support clinical laboratories with appropriate training for screening and detection of agents, procedures to protect their workers and possibly the adjacent patient facilities in the event of an attack, protocols for packing and shipping samples to the public health laboratories, and a variety of other matters. Making strong connections between the public health and clinical laboratory communities was named as a Critical Benchmark for national laboratory readiness in the emergency supplemental funding.

- Thirty-nine respondents do not have a full-time liaison to the clinical laboratory community.
- Twenty respondents reported having rapid methods, such as blast-fax or e-mail, to send urgent messages to these laboratories. Sixteen respondents used these systems in the fall of 2001, but among those lacking this capability were six respondents affected by actual anthrax cases last fall.
- Approximately two-thirds of respondents stated that they maintained a database of all clinical laboratories in the state or territory.

EQUIPMENT/SUPPLIES

CDC guidance for supplemental funding urges states to, "ensure at least one public health laboratory in your jurisdiction has the appropriate instrumentation and appropriately trained staff to perform CDC-developed real-time polymerase chain reaction (PCR) and time-resolved fluorescence (TRF) rapid assays." **To match a terrorist's ability to develop sophisticated, genetically-altered pathogens, states must have modern detection equipment.** Unlike the skilled-workforce shortage, equipment needs can readily be addressed with supplemental funds.

- Seven respondents indicated that they do not have Real-time PCR capability.
- Twenty-four do not have time-resolved fluorescence (TRF) capability.

TRANSPORTATION/COURIER SERVICE

Rapid recognition of a terrorist event requires that samples coming from clinical laboratories be delivered to confirmatory public health laboratories without delay. Many of these will be negative for bioterrorism agents, but the screening function must be ongoing in order for a positive sample to be recognized quickly. Continuous sample referral and timely ground transportation are the keys to state readiness. **Many larger states cannot assure timely referral from more distant clinical laboratories within their jurisdictions.** Approximately half of respondents have intra-state courier systems, but most are not adequate to respond to a terrorist event.

- Approximately half of respondents have intra-state sample courier systems. However, only 6 respondents replied that their systems provided full-state coverage for all specimens.
- Twenty-five additional respondents felt that expanding courier services would enhance readiness.
- Some existing systems are threatened by state budget cuts.

INTEGRATED DATA MANAGEMENT⁵

It is estimated that the Laboratory Response Network processed more than one million potential anthrax specimens last fall. Meeting the needs of patients, physicians, epidemiologists and law enforcement officials requires meticulous tracking of samples and results, and the ability to share this information in meaningful ways across jurisdictions. Emergency supplemental funds were provided to states to develop modern, interoperable information management systems.

- 1/4 of state public health laboratories report not having integrated data management systems.
- For 10 states that have integrated systems, the systems are more than 7 years old.

TRAINING

Well-funded terrorists may have available to them the best and most sophisticated techniques. Public health laboratorians responding to this threat must be better-prepared. Continuing professional education is vital, as is outreach and training for front-line clinical laboratory workers. Training programs must take the safety of laboratory workers into consideration.

- Twenty-three respondents do not have a full-time laboratory training coordinator.
- More than three-fourths of respondents said they had sponsored some clinical laboratory training.
- All respondents were interested in more CDC-sponsored training of public health laboratorians for bioterrorism agents.

ENDNOTES:

1 Public Law 107 - 117.

2 Guidance for Notice of Cooperative Agreement Award Focus Area C: Laboratory Capacity – Biologic Agents, is available at: <http://www.bt.cdc.gov/planning/CoopAgreementAward/CDC5BTATTACHMENT-C-MASTER-2-19-2002-200pm.asp>

3 Only District of Columbia, Puerto Rico and Virgin Islands were included in the survey sample, as they are active members of APHL.

4 This figure includes totals for all categories, and as such is not mutually exclusive.

5 Data derived from results of the 2002 APHL Core Functions Survey.