Bioterrorism Response: A Case Study of One State's Preparedness

By

Megan McCormick
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Approved by

[Signatures]

William A. Sollecito, Dr.PH
Advisor

[Signatures]

Brian G. Blalock, MPH
Second Reader

[Signatures]

BRIAN G. BLALOCK, Capt, USAF, BSC, MPH
43 H3, Public Health Officer
ABSTRACT

Objectives: Bioterrorism events are actually a subset of disasters for which the public health community is responsible to be prepared, but they are also a new and unique problem requiring different and emerging planning for adequate response. This paper explores critical needs at our present national level of bioterrorism preparedness, identifies some steps to be taken, and addresses some issues currently being or still to be addressed by states. A case study of one state’s bioterrorism response initiatives is utilized as an example of successful integrated state-wide preparation, evaluated in the context of the CDC’s current guidelines, and is presented as a model for potential further application.

Research Methods: A search of multiple databases was utilized to identify relevant literature on critical needs for disaster preparedness and identify bioterrorism preparedness and response initiatives as was a reference review of pertinent articles for further useful information. Input for the case study was collected during a recent field practicum experience.

Louisiana Case Study: Louisiana’s bioterrorism response initiatives are explored under the categories of Organization/Planning, Education, Public Safety, and Health. Integrated organization of state bioterrorism response participants with a designated chain of command, broad scope educational efforts and utilization of exercising, communications improvements and health efforts and are presented as examples of successful responses to the CDC’s guidance on critical and enhanced capacities set forth as goals in bioterrorism preparedness for individual states’ action.

Conclusions/Lessons Learned: Concerted efforts to bring multiple levels of government and the public up to speed in bioterrorism awareness and preparedness is a successful approach to meet designated goals as set forth by the CDC. Planning and exercising developed plans are critical to achieving appropriate levels of bioterrorism preparedness as they establish patterns of successful action and build trust and a sense of teamwork, critical to efficient response efforts. The issue of how to prepare our nation, state by state, for a bioterrorism attack is extremely complex and rapidly changing, but the successes of Louisiana’s initiatives towards bioterrorism preparedness represent a model for continued improvement by medical and public health communities.
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INTRODUCTION

Disasters are defined as emergencies of significant severity and magnitude that the resulting deaths, injuries and damage to property or infrastructure cannot be effectively managed by the utilization of routine procedures or resources.\(^1\) Disasters have historically included natural occurrences such as floods, hurricanes, tornadoes, earthquakes, droughts, volcanic eruptions and epidemics, all of which pose their own unique set of risks that manifest in the form of negative impacts on the public’s health. Local, regional and national public health authorities have the responsibility for maintaining the health of a community following such disasters. Public health professionals bring multidisciplinary talents and perspectives to the effort, contributing to disaster planning and preparedness as well as disaster response, which are actually extensions of their normal activities in maintaining a community’s health. It is the role of public health officials to communicate with non-health members of the community including other response personnel and elected officials who may have little or no public health knowledge. Information such as health advisories prior to disasters and post event health assessments post is critical to appropriate planning activities and key to an adequate response. Resource problems following past U.S. disasters have occurred due to poor planning in the utilization or distribution of capabilities and supplies rather than from a lack of them and it is up to the public health world to ensure that appropriate input into the areas of planning, prevention, post-assessment and recovery to ensure that maximum preparedness, and thus responsive action, is achieved not just for previously known threats, but for emerging ones as well.\(^1\) In recent history we have had to modify our preparedness for familiar natural disasters to include manmade ones such as
chemical spills, nuclear leaks, and accidental release of biological agents. Most recently, we have added the purposeful release of biological agents or toxins as acts of terrorism which presents special challenges and concerns. In response to this threat, the list of public health roles is long, but includes developing protocols for collaboration between different levels of public health authorities, the health care system, and federal agencies. Other necessary tasks include establishing criteria for diagnosing and treating emerging infections, activating surveillance systems to quickly identify disease outbreaks potentially associated with bioterrorism attacks, implementing a Health Alert Network for rapid communication, expanding lab capacity for rapid detection and identification of potential pathogens, educating organizations and responders needed in the event of an attack, resolving legal issues related to public health authority in emergencies, and developing contingency plans for post-event response.¹

Anthrax is considered one of if not the most likely bioterrorism agent for a number of reasons including the relative ease of acquiring and producing it in sufficient quantities, its stability and potential for aerosol delivery. Anthrax has long been recognized as an occupational disease, usually acquired either by people working around natural animal reservoirs such as farmers and veterinarians or in workers otherwise exposed to products of animals such as textile or leather workers. With only a few exceptions, it has historically been a disease of relatively minor clinical and epidemiological importance, usually occurring in single cases or small clusters of the cutaneous form and only rarely inhalational (pulmonary) anthrax. It is now very uncommon in developed nations since the introduction of an acellular anthrax vaccine in the early 1960s and modern veterinary medicine has controlled the disease in livestock.²
This picture was dramatically and likely forever redrawn in October, 2001 with the intentional release of *Bacillus anthracis* in a bioterrorism event targeting publicly recognized media and political personalities—an experience with invaluable lessons which can be utilized to project what we may expect in the future. Unlike the shocking and very visual terrorist attacks of the prior month, this one gave few early indications of trouble, yet before the resultant outbreak was contained, 23 cases of anthrax were reported to the Centers for Disease Control and Prevention (CDC), including five deaths, and an estimated 32,000 potentially exposed victims had been prescribed prophylactic antibiotic therapy. Most cases and the vast majority of those treated prophylactically were assessed to have been exposed, though two cases were not clearly linked with specific exposures and risk factors were never confirmed which further complicates the picture as it means that even those without obvious sources of exposure may be at risk in such events.

The effects of the above intentional anthrax release incident were very different from those of a conventional crisis. For example, most of the patients were "concerned and potentially exposed," with few actually critically ill victims. Otherwise known as the "worried well," a rather misleading term, as, at least some of them had the potential to become ill. Nevertheless, they sought care in large numbers from the health-care system, looking for reassurance, information and intervention for prevention. But patients and the public were disturbed to discover that, in many instances, health-care providers were ill prepared to provide those services and the medical community was far from presenting a united front when it came to making recommendations. Unlike the emergency medical service’s guidelines and trauma protocols which drive other mass casualty scenarios, no
official protocols existed or were distributed to guide risk assessment for individuals with concerns regarding exposure. Messages broadcast by the media sometimes gave inaccurate or conflicting information. Unfortunately, there was no efficient, proactive, community-wide incident management system available to implement that could organize the varied response agencies into a coordinated system.4

Potential exposures to bioterrorism agents require a complete paradigm shift in the way we have typically approached disease surveillance and prevention interventions. Previously, with natural disease outbreaks or exposure, it was possible to scientifically approach risk assessment and respond as deemed necessary with interventions such as exposure control measures and prevention tools like pre-exposure vaccination for high risk individuals. With the advent of this new threat via various possible delivery methods in extremely unpredictable scenarios, we are left in an environment with a very high degree of uncertainty in which to protect those who may be at risk. For example, systematic risk assessment and routine monitoring for exposure of at-risk workers or the general public and therefore timely pre-exposure interventions may be realistically precluded by both cost and the logistics of such a task, not to mention the associated potential health risks. It is likely that the foreseeable future will involve post-exposure risk assessment and recommendations for interventions only after an outbreak has been identified, though in specific situations pre-exposure vaccination may be indicated.

Further complicating the situation is the fact that response can no longer be effectively confined to medical professionals such as epidemiologists, health care providers and occupational scientists, but instead has far-reaching societal implications. Mobilization from participants nationwide is required including the added involvement of law
enforcement personnel, criminal investigators and primary responder personnel, who will likely be dealing with potential occupational exposure themselves, perhaps with little training or experience at least until appropriate levels of preparedness can be achieved. There is also the concern of occupational risk in the form of adverse effects from interventions such as drug reactions to prophylactic antibiotics or vaccination. In addition to all these potential sources of confusion and stress is the required goal of protecting the general public from non-occupational exposures and preventing disruption of normal societal functioning, for example in the form of disrupting basic services such as transportation, mail delivery, or health care access if the system were to be overwhelmed. Appropriate planning and the development of coordinated effective responses to all of these considerations are necessary before we should consider ourselves prepared to meet this daunting challenge.

OBJECTIVES

Though the significant challenges presented by events of October, 2001 prompted a massive response from the U.S. public health system headed by the CDC in coordination with its federal, state and local health agency partners, the experience most importantly served to highlight the glaring gaps in our preparedness to prevent or control a repeat attack with anthrax or another bio-agent. It is our present level of preparedness and exploration of the steps which need to be taken and issues currently being or still to be addressed that will be examined in this paper. A case study of one state’s bioterrorism response initiatives will be utilized as an example of one successful approach to
integrated state-wide preparation. Preparedness initiatives will be evaluated in the context of the CDC's current guidelines and offered as models for application elsewhere.

The research methods used to identify literature relevant to this purpose were an Ovid search of the following databases: Medline (1966 to present), CINAHL, Premedline, all EMB databases and the Cochrane Database of Systemic Reviews utilizing the key phrases “anthrax exposure” and “bioterrorism response” to identify critical needs in disaster preparedness and identify bioterrorism preparedness and response initiatives. A reference review of pertinent articles also generated a variety of types of documents and sources for review and inclusion as pertinent. Input for the case study was gathered during field experience at the state of Louisiana’s Office of Public Health Bioterrorism Preparedness and Emergency Response.

CURRENT CAPABILITY
On October 4th, 2001, just days after the tragic events of September 11th, the CDC confirmed the first U.S. case of inhalational anthrax in 25 years and transitioned from an era of table-top bioterrorism exercises and usher in a new one of real world response. The complexity of the investigation and response following the attack proved challenging even for experienced field epidemiologists. At state and federal levels, “incident command” style management of the crisis was utilized to address the constant emergence of new information, oversee and direct multiple concurrent public health investigations and taskings, and to communicate effectively throughout. But despite utilization of this method, it proved to have growing pains and inefficiencies. There were distinct
integration issues and communication was not always coordinated between agencies or with the public. For example, this particular incident management process narrowly averted releasing three unintentionally conflicting sets of recommendations for discontinuing prophylaxis—from three different jurisdictional sources.\textsuperscript{4}

The major hurdle to this type of response in the public health and medical arenas comes not only from the multiple agencies involved, but also from their differing individual goals or roles, historic or perceived, and the consequential lack of operational coordination of common goals at appropriate levels. There is a wide range of for-profit, not-for-profit, local, state and federal medical organizations, which all need to be brought under the same umbrella to orchestrate a defined, seamless and efficient operational response. Unlike emergency service responses such as fire response or the military system (with imbedded medical assets) which have inherent line command authority (pre-designated legal “command and control”), the medical response system as a whole defies being commanded as many of the key players are non-governmental. Instead they must be managed and therefore motivated to participate in an incident management effort, complicated by such issues as the perceived competence of the system and the information it provides, assurance of appropriate compensation, and confidence that participation will result in an overall gain for the organization or network involved.\textsuperscript{4}

The key to efficient incident management is appropriate information management which incorporates information collection, analysis and dissemination. Executed properly, it is an active planning process permitting proactive development of response objectives, strategies, and priorities based on evolving incident data and information. This process relies on effective communication which is actually a subset of overall
Information management and involves the actual conveying of appropriate information in its various forms and levels to different populations needing it to direct their actions. Ideally, communication activities are directed by a well constructed plan taking into account technical capabilities.\textsuperscript{4}

But despite the growing pains experienced with the incident of October, 2001, it was still a far more coordinated effort that it might otherwise have been if some forward planning had not already been accomplished. Investigation into a series of anthrax-related threats and hoaxes in 1998 helped lay the groundwork for this response.\textsuperscript{5} Such contingency style operations date back to plans to mitigate bioterrorism related anthrax outbreaks generated from the August 1998, CDC-hosted “Workshop on Improving Public Health Response to Possible Acts of Bioterrorism.” This workshop brought together state and local health departments, the U.S. Departments of Defense and Justice and public health professional organizations to explore means of improving public health preparedness. Two significant investments came out of this effort which proved to be key components in the 2001 attack; the Laboratory Response Network (LRN) for Bioterrorism and the National Pharmaceutical Stockpile (NPS—now the Strategic National Stockpile). Both were in place prior to the 2001 outbreak.\textsuperscript{6}

The LRN was a recommendation of the 1998 workshop’s “Diagnosis Working Group” made up with members of the current Association for Public Health Laboratories and the CDC. It is made up of a tiered system of labs with categorized capacities ranging from the lowest tier, A, to the highest in the pyramid, D. Based on data gleaned from older methods, procedures for identification of \textit{B. anthracis} and other potential bioterrorism agents were either validated, developed or redeveloped and generated protocols were
incorporated into standard lab manuals. Testing reagents were also standardized, mass produced and distributed to labs and training on methods was conducted. Enhanced capabilities for specialized or confirmatory sample testing were established at the CDC and other select advanced labs. Serological testing capability was developed for diagnostic purposes. In the acute phase of the 2001 outbreak alone, LRN labs tested over 121,700 specimens for anthrax, most from environmental sampling. Without this immense demonstrated surge capability, the outcome of response is likely to have been much less successful than it proved to be. The other post-workshop investment, the National Pharmaceutical Stockpile, proved its worth as well. During the 2001 outbreak, the NPS team delivered antibiotics (over 3.75 million tablets), vaccine, clinical and environmental samples and anthrax isolates and also transported epidemiologists, laboratory scientists, pathologists and specialized research teams. 6

But the groundwork laid after the 1998 “false alarms” did not stop with the formation of the LRN and NPS. Guidelines for risk assessment and postexposure prophylaxis were developed and coordination with first responders and law enforcement was emphasized. Efforts were launched to revise immunization recommendations including the use of vaccine for postexposure prophylaxis. The events of 2001 brought additional guidelines on investigating and responding to anthrax exposures including the issues of clinical testing, use of prophylactic antibiotics, closing of potentially contaminated buildings and postexposure treatment options and the expansion of vaccination recommendations to include guidance on immunizing at-risk populations. 5

This last issue has generated rather significant controversy particularly with regard to the immunization of large numbers of military personnel in preparation for potential
bioterrorism attacks in a forward deployed setting. Critics argue that such practice is not based on truly assessed individual risk as it is military policy to vaccinate prior to any deployment rather than in response to any specifically identified threat. They further charge that the Department of Defense’s use is “off-label” as the currently licensed vaccine is not approved for protection against inhalation anthrax (the most likely and dangerous transmission route in a biological attack) since the original field trials conducted for the vaccine’s approval did not have sufficient cases of inhalation anthrax to assess efficacy against this form of the disease. Critics claim that such use puts military members at unnecessary risk, that is not only involuntary, but carries undetermined rates and types of adverse effects, and may well provide no protection from disease. They believe that the mandatory use of anthrax vaccine by the armed forces should be suspended until further research is conducted as it represents a double standard in regards to recommendations that run counter to those for other potentially at-risk groups.

Military members themselves have expressed concern over the potential adverse effects and uncertain efficacy of the anthrax vaccine. While noncompliance is minimized (as compared to those who must take it voluntarily) in this particular population due to the high degree of authority placed over it by its employer(s), the issue of non-adherence in general is by no means a trivial one. Anthrax vaccination is not currently recommended for pre-exposure prophylaxis in first responders, but similar recommendations for vaccination against smallpox have encountered some very vocal opposition. The California Nurses Association has publicly announced its position that California hospitals should not participate in the smallpox program due to member and patient safety concerns as well as concerns for compensation in the event of consequences from
adverse effects. Other healthcare workers throughout the country are refusing the smallpox vaccine for similar reasons, citing concerns over compensation if work is missed and the perception that an attack is very unlikely. These examples should serve to remind us that such recommendations need to be carefully thought out before release so that the public health community is pre-prepared to answer questions and concerns with well articulated risk assessment information and logical thought processes to defend their decisions when interfacing with populations at risk; otherwise the effectiveness of prevention efforts may fall far short of success and waste valuable resources in the process. And the need to provide timely, accurate information is not restricted to those exposed occupationally, who may well have greater levels of understanding of medical issues as compared to the public. The public itself will need to be brought “into the fold” in an atmosphere of trust and complete disclosure to earn and maintain their confidence and cooperation in the face of bioterrorism response efforts, particularly if that involves community vaccination campaigns. Assessment of the September 11th 2001 incident and the subsequent anthrax release indicate that the public may well be capable of effective participation in both decision-making and prevention campaigns provided they are entrusted with adequate information, though reactions were complex and results were far from conclusive.

Post-exposure prophylaxis is another area desperately in need of further information to answer key decision-making questions. Though not all bioterrorism agents can be combated with this method, it is applicable to anthrax which has been repeatedly assessed as the one of if not the most likely agent to be utilized for bioterrorism attacks. As the 2001 anthrax event evolved and the possible risk to postal workers became evident, the
U.S. Postmaster General, in consultation with the CDC, recommended initiating anthrax prophylaxis at mail distribution centers from which contaminated letters were delivered in the District of Columbia, New Jersey and New York City. The effort was coordinated by the U.S. Health and Human Services' Office of Emergency Preparedness and involved the mobilization of five disaster medial assistance teams, the U.S. Public Health Service and CDC personnel to evaluate 7,076 patients over a 68 hour period.\textsuperscript{12} Despite this massive effort, it is still unclear what specific risks were faced by these employees and what consequences would have resulted if intervention had not been initiated as no real evidence exists attesting to the efficacy of this intervention. Adherence to post-exposure prophylactic regimes is another complicated issue. At follow-up one week after this antibiotic campaign, a convenience sample of 1,500 patients indicated that only 15\% of all employees acknowledged taking the initial 10-day course of antibiotics provided.\textsuperscript{12} The use of these drugs is also not without risk of adverse effects. In a similar antibiotic distribution campaign during the 2001 outbreak, of the 5,343 people taking at least one dose of prescribed antibiotic, 57\% reported adverse effects within the first 60 days of use and little information is available on the long-term use of these medications.\textsuperscript{13}

**FUTURE CAPABILITY**

Despite the enhancement of capabilities following the 1998 brainstorming session, in the 2001 outbreak, the risk to employees of the Washington D.C. Brentwood postal facility from contaminated envelopes in transit was not recognized in time to prevent illness in four employees, two of whom died as a result. The previous decision-making
on the part of the CDC was subsequently criticized by many, but it can be used as a constructive example to illustrate the huge degree of uncertainty faced not only in this outbreak, but what will likely be faced in any future scenarios. Decisions regarding the Brentwood facility were based on epidemiological observations made in Florida and New York where no disease occurred in postal workers. Speculation has suggested that the differential risk can be explained by varying formulations and aerosolization potentials of anthrax powders in different mailings. This variation is a significant factor in bioterrorism response; in naturally occurring disease, once risk is determined, it tends to remain stable, but with a bioterrorism attack, risk may well be not only inconsistent, but manipulated by the perpetrator or affected by other factors such as the environment.

While the 2001 anthrax outbreak provided an invaluable experience, enabling us to better prepare for, recognize and respond to possible future attacks, it also served to highlight that much more work needs to be done and that we simply cannot afford to be complacent. The attack was relatively small, did not involve multiple agents or modes of delivery, a drug resistant organism, animal or global transmission. The surge capacity of the health care system was not truly tested and unlike some of the other potential bioterrorism agents, anthrax is easily isolated in clinical labs and neither person-to-person nor vector-borne transmission posed a risk. Many questions remain and further research is needed to determine the lowest infectious dose and the risk associated with exposure to low levels of anthrax-containing aerosols, define what constitutes an exposure for which antibiotic prophylaxis is warranted (especially considering potential adverse drug effects), and determine the degree to which spores create a residual environmental risk after initial contamination. It is also urgently necessary that we seek
to develop improved rapid environmental testing methods and identify optimal
decontamination means for a variety of contaminated settings.\textsuperscript{5}

After these lessons learned during the 2001 outbreak investigation, several areas
requiring additional research to improve public health response had been identified, but
still required refinement. The disciplines represented and their specific associated
expertises are very diverse and encompass multiple agencies and levels of government.
To address these issues, identify priorities and focus research efforts, the CDC convened
a meeting in December, 2001, consisting of two sessions and attended by representatives
from the CDC, the FDA, NIH, the EPA, the Departments of Defense and Justice, the U.S.
Postal Service, state health departments and others. After background presentations,
working groups met to develop future top three priorities on specific anthrax topics.\textsuperscript{15}

For evaluation of \textit{B. anthracis} containing powders or substances, top priorities were
identified as 1) rapid analysis to assess particle size distribution and matrix characteristics
2) measurements of different anthrax powders' ability to reaerosolize and 3) development
of an in vitro human cell culture model to study cutaneous anthrax. For the topic of
epidemiologic investigation, they generated the priorities 1) analysis of individual host
infection factors 2) exposure reconstruction and risk characterization and 3) review of
unexamined or previously unavailable (e.g. classified) animal data related to dose
response. Under environmental assessment, top priorities were 1) validation and
standardization of sampling and sample analysis techniques, 2) evaluation of disease risk
in contaminated environments and 3) determination of risk of reaerosolization. For
anthrax surveillance, they were 1) expanded veterinary surveillance, 2) use of alternate
data sources for surveillance in bioterrorism events and 3) design and validation of
surveillance systems to detect complex contamination or release scenarios. Diagnosis priorities were 1) identification of the earliest detectable event in the range from exposure to disease via use of animal models 2) evaluation of antigen detection assays and 3) development of a catalog of anthrax subtypes. Treatment priorities were 1) investigate the role of immune and anti-toxin regimens 2) investigate further antibiotic therapies in animal models and 3) develop animal models. Postexposure prophylaxis priorities were 1) evaluation of adherence and barriers to it, plus adverse events associated with long term antimicrobial use 2) pediatric vaccine safety and immunogenicity studies and 3) animal challenge studies to optimize human postexposure prophylaxis. Lastly, for remediation, the top priorities were 1) evaluation of remediation agents 2) development of risk-based decision trees for sampling and remediation and 3) reaerosolization studies and agent- and space-specific scenarios. Together these priorities begin to define a framework for additional research efforts to improve our public health readiness posture.¹⁵

The investigation launched in North Carolina in an attempt to rule out exposure there in the first inhalation anthrax case in the 2001 event revealed opportunities for improvement of field operations. Case definitions, surveillance methods, data collection forms and educational/informational material had to be developed ad hoc. These deficiencies resulted in delays in surveillance, uncertainties as to the effectiveness of and person-hours required by case-finding methods and data collection inefficiencies. Agencies and investigators had not previously worked together in many cases and there was much unfamiliarity regarding partners' capabilities. Lastly, much time was spent educating health care providers and public health personnel about the epidemiology and
clinical presentation of anthrax. All of these findings indicate that, had the system been faced with many cases, it may have rapidly been overwhelmed. In response, North Carolina and other states, in response to lessons learned and guidance provided by the CDC, are in the process of taking steps to better prepare for future bioterrorism attacks. Efforts include the development of standard protocols, data collection instruments, informational documents adaptable to various scenarios to speed response and prevent omissions, the establishment of state and regional teams trained for bioterrorism response and the development of statewide Health Alert Networks to rapidly communicate, via multiple electronic means, health alerts to hospitals, health care providers, public health and law enforcement officials. Educational efforts are also being directed toward health professionals to improve their knowledge of potential biological agents. Additionally, states are in the process of ensuring that antibiotic distribution centers are designated and operational plans put into place. Designs for the operational management of such centers are being evaluated to determine what performance levels can be anticipated and which staffing arrangements are most efficient to maintain long term delivery capability.

Cutting edge technology in the form of discrete event simulation modeling is being utilized to help assess how best to design such public health infrastructure. This tool has also been applied to calculate the effects of various biological agent attacks, estimating such parameters as average incubation period, mortality rates with and without planned interventions, secondary transmission rates with and without interventions and the mean duration of illness.

Such forward thinking and continued research on the national level is the kind of proactive response that needs to be part of our evolving preparedness to ensure we are
capable to meet whatever challenge the future holds. These efforts are a partial list, but
represent an array of the multiple levels and arenas which may be in the process of
further development or research. The CDC’s role is to oversee these research efforts on a
national level, then take the resulting information as it becomes available and incorporate
it into evolving specific focus areas or recommended protocols, for example, which are
subsequently pushed down to individual states for action. Using one state’s efforts to
meet their recommendations for preparedness can be instructive to not only highlight
successful efforts, but also identify lessons learned and potential areas to be improved.
The following input for case study was collected during a recent field practicum
experience and is not all inclusive of Louisiana’s preparedness efforts.

CASE STUDY: Louisiana’s Bioterrorism Preparedness Initiatives

Following the events of September and October, 2001, the bioterrorism response
function in Louisiana was transitioned from a “subunit” or responsibility of the
Epidemiology Department to a freestanding Bioterrorism Response and Disaster
Preparedness office reporting directly to the Louisiana State Health Director with a
current annual operating budget of approximately $20 million including both state and
federal funds, matched and otherwise. This step resulted in a capability that permits
“one-stop” shopping for other agencies or functions seeking services, reporting or
coordination on bioterrorism preparedness or emergency response issues and provides an
invaluable streamlined means to establish advance working relationships. Efforts in
preparedness for emergency response have been aggressive, rapid, multi-focal and can be
organized into the following categories for presentation; organization/planning, education, public safety and health.

**Organization/Planning**

The multidisciplinary team approach is the model set forth as the way of the future by bringing a varied array of skill sets and expertise together to maximize a response to an unpredictable threat. This approach has shown promise in many health care arenas in this age of rapid change and it has shown early signs of success in the area of bioterrorism preparedness as well. A visionary multidisciplinary team formulated by Louisiana for Bioterrorism Response and Disaster Preparedness, is lead by an MPH with prior military experience in public health and bioterrorism preparedness and made up of an emergency room nurse assigned to strategic national stockpile issues, two law enforcement personnel in the deputy director position and in charge of plans and operations. This core of key personnel is augmented with a public relations staff member dedicated to the office, an education and training representative, computer systems support (also responsible for maintaining and expanding the Health Alert Network and recall systems), a dedicated budget and grant management person, and a national guard liaison. Other expertise is achieved through the creative and financially efficient use of intern positions with training and experience in environmental issues and management. This purposefully mixed palette of personnel with their sometimes vastly different experiences, perspectives and training has, nevertheless, pulled itself together to form a cohesive team with a distinct esprit de corps and sense of single purpose.
Also contributing to a delineated “chain of command” in Louisiana which is relatively rare, if not unique, is the organization of the state into public health regions (vs. parish or county health departments) which fall directly under the state health jurisdiction (legal authority). Many states have somewhat autonomous county health networks which fall under their respective states’ jurisdiction only under certain circumstances or for specific requirements, somewhat complicating a coordinated response. Louisiana’s location in a high hurricane threat area and a resulting need for a strong disaster preparedness response including public health assets was perhaps the impetus for this organization, but whatever the reason, this organization is poised for what is likely to be a more efficient bioterrorism response. Military operations have long shown success with a clear cut chain of command where authority is pre-designated and recognized by all participants. Ironing out differences of opinions between independent jurisdictions in the midst of crisis does not lend itself to efficient decision making or response action.

In addition to a delineated command structure, a well defined “joint” or unified incident command system is necessary to ensure a coordinated response from multiple agencies such as emergency management, law enforcement, public health authorities, EMS, medical facilities, fire departments, or HAZMAT response. Louisiana has taken significant steps toward this end by breaking out of a traditional emergency management paradigm to establish response regions with standardized organization and operations and has thereby built an extended network. While other states have strived or continue to be in transition toward a statewide unified command structure that supports the CDC’s goal of interagency collaboration and “total force response capacity,”19 Louisiana has succeeded in achieving this goal by taking several critical actions. The state Office of
Emergency Management is organizationally placed under the Louisiana Army National Guard and, as such, falls under the command of the Adjutant General and therefore within a military chain of command. The state police system is similar, being a paramilitary organization with its own clearly recognizable command structure. Lastly, the Public Health Assistant Secretary has advocated and endorsed a chain of command that mirrors the above major players in incident response. While it does not utilize a formal “rank structure,” it nevertheless recognizes the Regional Public Health Medical Director as a direct counterpart to the state police troop commander and the regional National Guard commander. State healthcare facilities and the EMS have followed suit by designating regional coordinators to complete a response infrastructure, absolutely critical to a strong, efficient and coordinated local response. By designating specific lead agents for each piece of the response puzzle in each region, all of them a recognizable counterpart and “equals on the playing field,” the way is paved for an efficient team response. Additionally, in the event a significantly expanded scope of response is required, such as one encompassing several regions or even statewide, the operating and reporting procedures are already in place, standardized, and familiar to all players. The resulting response team may increase in size (multiple regional players) and overall direction may shift to the state level, but overall operational actions remain unchanged. Once a cultural shift is made from more traditional emergency response infrastructure and plans, challenging though this process can be, the benefits of a coordinated joint response are well worth the effort. If alternative forms of organization in other states prove to be a hindrance to response or preparedness activities, it might well be advantageous to explore Louisiana’s example of success for utilization elsewhere.
Lastly, Louisiana has chosen to utilize standardized public health contingency response plans incorporating both templates and expertise borrowed from military and law enforcement fields each with a long history of primary response planning. Interface with team members who bring a military medical planning background to the table helped to fill in the experience gaps of a law enforcement contingency planner charged with drafting plans for public health emergency operations; yet another example of capitalizing on the immense benefits of having a multidisciplinary team. The state public health plan was designed with the flexibility to alter the team makeup as dictated by the specific circumstances of the contingency. These detailed contingency plans were also disseminated to regional and parish levels to serve as templates for local response planning.

**Education**

Until the recent media blitz surrounding the anthrax attack, the term bioterrorism was far from a household word recognized by and concerning the average citizen. Bioterrorism issues have historically dwelled in the realm of military planners with concerns of attacks on overseas battlefields until the unfolding of recent events put the nation on a steep learning curve in efforts to prevent or be prepared for future events. Education of multiple levels of responders, elected officials, public health officials and the public is critical to maximum preparedness. The CDC’s Focus Area G, Education and Training outline requirements to “ensure that state and local health agencies have the capacity to (a) assess the training needs of key public health professionals, infectious disease specialists, emergency department personnel, and other healthcare (including
mental health) providers in preparedness for and response to bioterrorism, other outbreaks of infectious disease, and other public health threats and emergencies, and (b) ensure effective provision of needed education and training to key target audiences through multiple channels, including Centers for Public Health Preparedness, other schools of public health, schools of medicine, other academic institutions, healthcare professionals, CDC, HRSA and other sources. 19 Louisiana has tackled this goal through multiple efforts aimed at health care providers, law enforcement personnel, public health team members and the public. They have evaluated multiple commercially offered education packages for state health care workers designed for on-line skills training with an incorporated tracking system for completed learning units. The system(s) offers multiple training levels of information for various responders; awareness, operational, and technical. Funds have been allocated and contracts are in the process of being negotiated to provide an organized means to offer and track appropriate training for the large number of health care responders throughout the state. It is a first large step only, however, as availability of training alone does not ensure its completion; as that requires a commitment at local and regional levels to set aside the necessary time and enforce the requirements to complete training.

In the arena of law enforcement training, Louisiana has launched a joint training initiative aimed at providing bioterrorism awareness to law enforcement personnel from throughout the state. They have capitalized on multidisciplinary assets to deliver a comprehensive, level-appropriate training program aimed at bringing bioterrorism awareness to operational/responder level (vs. administrative) police officers from around the state. Expertise was utilized from multiple sources including bioterrorism
preparedness personnel for strategic national (pharmaceutical) stockpile program information, the state epidemiologist for bioterrorism agents, diseases and basic medical response principles and national guard personnel for disaster contingency operations concepts. The information was well received by law enforcement officers and feedback from participating students indicated that they felt the information presented had greatly increased their knowledge on a subject which had previously been quite lacking. They felt much more prepared for a potential bioterrorism incident, in which they would likely be required to actively participate if it occurred locally in their area and they expressed confidence that they had a solid grasp of appropriate command and control concepts and of other agencies or individuals to contact for information or notification if necessary.

Louisiana has made significant inroads into testing current contingency plans by systematically planning for, funding and executing both tabletop and field exercises to test interactions and response from the key response arenas of public health, law enforcement, disaster preparedness and the local or regional medical community. Training has been delivered via a contracted service which set up the scenario, facilitated exercise operations, then delivered and received feedback via a group after-action round table as well as in a written report format which outlined strengths and lessons learned. The process resulted in a positive learning experience with good participation and an expressed sense of urgency from players. Ultimately as different parishes and regions are brought up to speed with such exercises, a state-wide field exercise is envisioned to test large scale activity which would tie up many more resources and perhaps test the independence of different parishes or regions as state or neighboring resources previously relied upon are rationed or utilized elsewhere. The state is moving toward becoming
competent in responding to either large or small scale incidents and bringing all of their individual parishes and regions to a comfortable level of preparedness via encouraging the development and testing of local and regional plans, mirroring those being put into place at the state level.

Lastly, Louisiana has chosen to launch a public awareness media campaign utilizing purchased newspaper and magazine advertising space as well as billboard advertising and pamphlet distribution. It was with careful consideration toward the public piece of the education effort (as well as preparedness for incident response) that Louisiana’s Bioterrorism office included a dedicated public relations staff member in its ranks.

Public Safety

The CDC’s Focus Area E, Health Alert Network/Communications and Information Technology, requires that systems be put into place that “enable state and local public health agencies to establish and maintain a network that will (a) support exchange of key information and training over the Internet by linking public health and private partners on a 24/7 basis; (b) provide for rapid dissemination of public health advisories to the news media and the public at large; (c) ensure secure electronic data exchange between public health partners’ computer systems; and (d) ensure protection of data, information, and systems, with adequate backup, organizational, and surge capacity to respond to bioterrorism and other public health threats and emergencies.” A system to accomplish all of these requirements is far from simple and requires significant coordination and resources to implement. Health alerts are currently released as needed for network dissemination and utilize blocks of email addressees which are challenging and time-
consuming to maintain as current. Recall rosters and checklists are incorporated into contingency plans and are utilized in the notification process for bioterrorism exercises or incidents, but the all-encompassing interactive and secure computer capability outlined by the CDC as ideal is not yet a reality. However, Louisiana has taken steps toward these goals through several efforts. The first is the pursuance of an active recall system of response personnel statewide in multiple arenas (vs. passive push of emails which may or may not be received in a timely manner)—law enforcement, military, disaster preparedness, medical and public health. Different systems are being evaluated which not only contact numbers entered into its system (repeatedly as necessary until success is achieved) but also record time of contact, so there is a record of whom has been contacted and when it occurred. Services are available to contract or purchase and options are being explored to determine which best meet communications needs of the state in a cost effective manner.

Another critical piece of this focus area is that of more traditional communications capability during disaster response which may also include loss of such services as traditional phone lines and cellular phone technology (both of which are also unreliable for purposes of secure communications). It was identified during the events surrounding September 11, 2001, that communications between different response departments in New York City hindered efficient rescue efforts. This is by no means a unique situation between services in other states or even different branches of the military. This identified problem has been addressed by Louisiana with the allocation of funds and purchase of compatible statewide communications including contingency cell phones and tactical satellite communications systems and specially outfitted response vehicles and the
distribution of these resources to the different regions for training and rapid access as needed. Sufficient assets have been purchased for disaster preparedness, law enforcement, medical and public health teams, so that all essential players have access to compatible communications which also offer the required secure capability. Taking the communications concept even further was the establishment of a state public health emergency operations center (EOC) for efficient command and control, complete with a full in-place secure computer LAN and audiovisual support including secure communications capability and entry control, plus GIS capability for real-time case mapping and tracking. This truly state-of-the-art operations center, reminiscent of military "battlestaff centers" is poised to deliver not only the technical capability for communications dissemination, but also puts the appropriate personnel together in one location for efficient decision making and during-incident response and planning. This EOC is now operational and regional personnel are being familiarized with its capabilities and functions. This template has also been offered to the state's regions along with available funding if their plans meet state approval.

Health

The CDC's Focus Area A, Preparedness, Planning and Readiness Assessment directs states to "establish strategic leadership, direction, assessment, and coordination of activities (including Strategic National Stockpile (SNS) response) to ensure statewide readiness, interagency collaboration, local and regional preparedness (both intrastate and interstate) for bioterrorism, other outbreaks of infectious disease, and other public health threats and emergencies." Though certain aspects of this focus area were introduced
under other headings, it is worth looking at Louisiana’s preparedness in the area of SNS. The planning effort required significant coordination with regional and local public health and medical personnel to set up the state receiving, staging and repackaging and distribution site, plus the regional points of distribution and local dispensing and treatment sites. The effort also required the formulation and training of response teams for those sites, the drafting of input to public health emergency operations plans including plans for incident inventory management and the maintenance of facilities, and the exercise and testing of team proficiency in carrying out developed plans. The system was then tested via a statewide exercise of mass vaccination clinics in which over 28,000 childhood immunizations were administered in three days, achieving non-simulated success in the face of a significant challenge. Maintaining high levels of preparedness for this program will continue to take significant effort and Louisiana’s bioterrorism office has one staff member assigned to oversee this critical program, but it takes the efforts of many team members across the state to continue to make inroads and keep abreast of the rapidly evolving status of this program at all levels.20

The CDC’s Focus Area B, Surveillance and Epidemiology Capacity, requires that states “enable state and local health departments to enhance, design, and/or develop systems for rapid detection of unusual outbreaks of illness that may be the results of bioterrorism, other outbreaks of infectious disease, and other public health threats and emergencies. Assist the state and local health departments in establishing expanded epidemiologic capacity to investigate and mitigate such outbreaks of illness.”19 Public Health’s role as “medical intelligence” gatherers is critical for the rapid detection and identification of a bioterrorism attack as a solid, pro-active disease surveillance system is
likely to be the first sign of such an attack--the earlier an attack is detected, the better a response is likely to be. Louisiana's integrated bioterrorism preparedness infrastructure with its multi-functional staff has the expertise to tap into and interpret emerging epidemiologic data and make sound decisions based on that information—another key factor for a successful response.

This case study of Louisiana's initiatives showcases their strong position for continued success, but there may still be a long way to go with no end in sight, as the "target" of preparedness is likely to be a moving one for the foreseeable future. Nevertheless, this case study can serve as a model to build on for future improvement by other states, municipalities, agencies, or civilian institutions which may be facing similar challenges. Having access to solutions that have previously proven successful saves not only financial resources, but also valuable time and effort.

LESSONS LEARNED/CONCLUSION

The CDC has delivered, and continues to update, a framework of guidance for states to utilize in their efforts toward maximum bioterrorism preparedness as well as providing funding means which can be applied for by individual states in the form of grants. It establishes critical capabilities to be achieved and lays out specific elements of them broken down into two categories, critical and enhanced. An interpretation of these guidelines is as follows: critical items represent minimum required goals to strive toward and should be first priority for resources and efforts, while enhanced capabilities are
those to be funded or established only when the critical requirements have been met. But, the CDC does not dictate how states should go about establishing bioterrorism preparedness capabilities, leaving states are free to develop means which best suit their individual needs or infrastructure. The success of Louisiana’s efforts represents examples for other states to follow, but those efforts have also generated some lessons learned and key concepts for application in not only other states or at an organizational level, but internationally as well:

**Multi-level Collaborative Response**

Concerted efforts to bring multiple levels of government (local, regional, state and national) and the public up to speed in bioterrorism awareness and preparedness can be successful with appropriate efforts and resources diverted to meeting designated goals as set forth by the CDC and priorities of the individual state, though they may require getting past significant “growing pains” and establishing multi-level “buy in” on the part of different agencies or regions before a true change in established culture is achieved.

**Delineated Command/Joint Incident Response**

The concepts of a delineated command structure and a joint incident command system were key factors in Louisiana’s success in putting infrastructure into place that poises them for an efficient and coordinated bioterrorism response. In times of emergency, an indisputable and recognized chain of command is crucial for a streamlined decision-making process. A multi-functional joint or “unified” incidence response system is critical for a coordinated response locally—counterparts from different agencies need to
recognize each other as equal team players and learn to work together effectively prior to an actual incident via practice exercises of developed integrated response plans.

**Train as Planning to Execute**

A major advantage of planning, preparing and exercising involves familiarity with procedures as well as team functioning. Not at all inconsequential, the concept of “train like you will execute” has a long history of success and is one recognized as critical by response planners because it establishes a set, familiar pattern of behavior for personnel, which becomes the default in times of real-world stress and confusion. Merely knowing the names and faces of your contacts or ideally trusting them, plus being familiar with what they know, their strengths, weaknesses and capabilities are a huge step forward in preparing for a contingency. Having recall rosters and numbers at close hand save huge amounts of time and effort and are critical to efficient response. The building of a sense of “team” goes a very, very long way to breaking down barriers to response and feelings of territorialism—building a sense of trust makes working together much more efficient in a real event.

**Critical Exercises**

Exercising developed plans is absolutely critical. The CDC has designated the following as an enhanced capability under its Focus Area G, Education and Training: “to provide directly or through other organizations, the ongoing systematic evaluation of the effectiveness of training, and the incorporation of lessons learned from performance during bioterrorism drills, simulations, other exercises, events, and evaluations of those
While this capability does not specifically mandate states to exercise, there are no realistic substitutes for this invaluable tool which provides a means to train as a team, assess the “real-world” implementation of written plans, and generate lessons learned and, therefore, a method to track performance progress.

**Communications**

Strong communications capability is critical. Not only must compatible communications systems be acquired, distributed and utilized by various response agencies for effective incident communications (to include secure capability), but the innovative utilization of an emergency operations center to operate as a “nerve center” for public health response (mirroring similar centers for other responses such as law enforcement, national guard, etc.) makes Louisiana’s program a stand out.

**Redundant Assets**

Discussion generated in Louisiana’s planning processes has identified that there is a possibility that when numerous assets are relied upon in disaster/contingency response plans, that the planned list of targeted personnel need to be carefully evaluated. There is a potential, if reserve or national guard personnel are counted upon for response activities (many response personnel have been identified as also holding guard or reserve positions), that an inadequate response will result in the event of a large scale military reserve/guard call-up such as seen in the recent Gulf region campaign. After assessment, it may be appropriate to build some redundant personnel assets into contingency plans or explore potential back-up alternatives.
The issue of how to prepare our nation, state by state, for a bioterrorism attack is extremely complex and rapidly changing as new information becomes available. It represents a unique and one of the most significant challenges ever faced by our society in its efforts to ensure everyone has a safe environment in which to live and work. It involves attempting to protect a vast and diverse population of those who could potentially be exposed. Recent hoax and real intentional releases of anthrax have resulted in drastic improvements to the response capability of our public health, medical and disaster response communities, the public and our nation as a whole, but we still have very far to go before beginning to back off efforts, if ever, because the threat also continues to evolve.

The case study of Louisiana’s response initiatives represents an invaluable model for others to emulate, but it is also merely a starting point. Further analyses of existing efforts in planning and exercising need to be pursued by our public health and medical communities at both government and civilian levels in order to ensure continued improvement in bioterrorism preparedness and emergency response capabilities.
REFERENCES

10. Ault A. Smallpox vaccine refusers cite compensation concern, low threat of anthrax. *MD Consult.* 2003.

Chancellor Moeser:

Attached is a memorandum summarizing findings from a report of the National League of Nursing (NLN) addressing the reaccreditation of the Public Health Nursing curriculum in the School of Public Health. The Public Health Nursing curriculum includes two components, Public Health Nursing and Occupational Health Nursing. Both have been important parts of the history of service to the state and the nation that the School of Public Health is known for. There is a very strong alumni base from these programs and US News and World Report has recently ranked us as the third highest Public Health Nursing Program in the nation.

In 1997, the Masters of Public Health (MPH) degree in the Public Health Nursing curriculum was reformatted into the MPH in Public Health Leadership and was located within the newly formed, interdisciplinary, Public Health Leadership Program (PHLP) that encompasses four different concentrations at the masters and doctoral level. The public health nursing curriculum was expanded through the inclusion of separate concentrations and tracks for the various subspecialties now included in PHLP. The goal of all of these components is to emphasize leadership development for medical care and public health practitioners, including public health nurses. The program has grown substantially since 1997 by offering both residential and distance options to meet the demand for leadership training in many segments of the public health community and especially among physicians. It has enjoyed much success, as evidenced by high application and graduation rates. Ongoing evaluation of the program also supports this
finding. The feedback from our students, indicates that the current curriculum and
administration has met the needs of the nurses and other public health practitioners who
have graduated from PHLP over the past six years.

However, while the overall PHLP enrollment has grown, we have not seen increased
enrollment in the public health nursing and occupational health nursing segment, except
for a brief growth spurt, which occurred when we first introduced a distance format
several years ago. We have maintained the integrity and quality of the nursing
components of the program and have continued to include a core Public Health Nursing
faculty, who also has expertise in public health practice and leadership. Efficiency has
been optimized through the sharing of faculty and courses across various concentrations
within the PHLP. Salary support for nursing faculty is drawn primarily from non-state
sources, including federal grant funds from the National Institute for Occupational Safety
and Health.

We are pleased that NLN has awarded us five years reaccreditation. After reviewing the
areas for improvement in the NLN site visit report, the nursing faculty of PHLP have
made four recommendations, including the recommendation to recruit a full time head of
the nursing program, who is a doctorally prepared Nurse Administrator. Since the NLN
site visit PHLP has addressed this through the reappointment of a semi-retired faculty
member as a part time (40%) manager of the Public Health Nursing track, and through
the continued appointment of a tenured associate professor who serves as Director of the
Occupational Health Nursing concentration (please see the attached organizational
structure). Given the recent budget cuts and the shrinking nursing enrollment, coupled with the increasing interdisciplinary needs of the Public Health Leadership Program, it is felt that these appointments are sufficient to meet the needs of nursing students and the intent of the NLN recommendations. No further administrative appointments in Public Health Nursing or Occupational Health nursing are planned at this time. Thus, I forward this letter as an addendum to the attached recommendations, from the NLN and the Public Health Nursing faculty, to describe the background of these issues and to clarify the decision that no further hiring will be considered at this time. Please let me know if you would like further information on this matter.