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TECHNICAL REPORT

Exemplary Practices in Public Health Preparedness

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Prepared for the U.S. Department of Health and Human Services Office of the
Assistant Secretary for Public Health Emergency Preparedness



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PREFACE

Over the past three years, the Department of Health and Human Services (DHHS) has made significant investments in state and local public health in an effort to enhance public health emergency preparedness. The RAND Corporation was contracted to work with the U.S. Department of Health and Human Services Office of the Assistant Secretary for Public Health Emergency Preparedness (OASPHEP) to develop resources and to prepare analyses to help describe and enhance key aspects of state and local public health emergency preparedness. As part of this contract, RAND was asked to compile a repository of exemplary practices in public health preparedness that could be made available on the DHHS/OASPHEP website. This repository would serve as a resource to state and local public health departments who are working to improve their own preparedness in each of the CDC seven focus areas for public health preparedness. This report provides an overview of the methods and criteria used to select and nominate candidate practices, and provides brief descriptions of the practices that have been selected and approved by the sponsor as exemplary practices. This work was carried out during the period beginning in October 2003 through September 2004.

This report was prepared specifically for the Office of the Assistant Secretary for Public Health Emergency Preparedness, but it should be of interest to individuals working in public health preparedness at the federal, state, and local levels. Comments or inquiries should be sent to the RAND Principal Investigators Nicole Lurie (Nicole_Lurie@rand.org) and Jeffrey Wasserman (Jeffrey_Wasserman@rand.org) or addressed to the first author of this report, Terri Tanielian (territ@rand.org).

This work was sponsored by the U.S. Department of Health and Human Services Office of the Assistant Secretary for Public Health Emergency Preparedness (OASPHEP) and carried out under the auspices of the Center for Domestic and International Health Security, a RAND Health Center. For more information about the RAND Center for Domestic and International Health Security, please visit <http://www.rand.org/health/healthsecurity/>. The mailing address is RAND Corporation, 1200 South Hayes Street, Arlington, VA 22202. More information about RAND is available at <http://www.rand.org>.

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SUMMARY

Overview: Over the past three years, state and local health departments throughout the United States have undertaken a variety of activities and initiatives to improve their level of preparedness for bioterrorism and other public health emergencies. Under a contract with the Department of Health and Human Services (DHHS), RAND was asked to develop a repository of practices for public health emergency and bioterrorism preparedness at the state and local levels that can serve as exemplars of preparedness for responding to bioterrorism and other public health emergencies. The selection of exemplary practices is one of several tasks in RAND's work for DHHS. This report describes RAND's approach and methods for identifying and evaluating practices and describes the individual practices nominated as exemplary.

The selection of exemplary practices involved several steps, including: establishing definitions of key terms; determining initial selection criteria; collecting preliminary data on public health practices; identifying initial candidate practices; collecting additional data on a set of identified candidate practices; and selecting final exemplary practices.

Definitions: In consultation with DHHS, we defined a **practice** broadly as “any activity that a state or local health department engages in that enhances the achievement of critical capacities and/or benchmarks. Our starting assumption was that an **exemplary** practice should be “technically sound, effective, replicable and sustainable.” As we began to review practices, however, we realized that many of the practices had only recently been implemented, and that there was scant evidence of their effectiveness as an individual practice of preparedness, and in some cases, lack of evidence of effectiveness for a whole category or practices (e.g., syndromic surveillance). Where no formal evidence was available, we used our best professional judgment, guided by a set of developed criteria, to assess whether a practice was exemplary. We encountered some challenges in attempting to rigorously apply these criteria consistently across all CDC focus areas and practice descriptions. As such, these criteria served to guide our evaluation efforts; however, our final recommended practices were also informed by professional judgment and opinion based on our prior experience and feedback received from DHHS. Thus, we also considered whether the practice allowed for flexibility, continuous quality improvement, and multiple use/applicability.

Selection criteria and data collection: We developed a set of criteria that would be used to select initial candidate exemplary practices for review. The primary goal of these initial criteria was to ensure, to the extent practical, that the selection of practices was (1) primarily aimed at one of the focus areas in the Centers for Disease Control and Prevention (CDC) funding guidance and (2) balanced with regard to characteristics of the populations served, type/size of public health department, and geographic region. To ensure that all CDC Focus Areas were represented, RAND focus area leaders were assigned to identify candidate practices in a specific area.

The initial search for candidates took place between January and April 2004. In order to compare the candidate practices and assess which should be considered for the final list, a one-page summary was created for each practice, based primarily on information that was available without contacting the health department responsible for the practice. After incorporating DHHS feedback on our initial list of candidate practices, we conducted telephone interviews for the subset of identified practices within their assigned areas. The interviewee varied by practice, but was most often the contact person for the individual practice identified in the source literature or a public health department representative. Following the supplemental data collection, the RAND team then reapplied the predetermined criteria to select the final list of exemplary practices from among the candidates. Each practice was reviewed and critiqued by the entire team. The intent of this process was to ensure consistency across focus areas by vetting the practices in a group forum, as well as to ensure that the information presented demonstrated that the practice met the criteria outlined above.

At each stage of the process outlined above, summary descriptive information on the practices identified, reviewed, and selected was reviewed and approved by the DHHS Project Officers.

Results: Following initial review of 73 candidate practices with our project officers, 27 were selected for further evaluation (representing 15 states, 12 different state Public Health Departments and 5 local public health departments). Based upon our further data collection and review according to the criteria for exemplariness (see Chapter 2) augmented by professional judgment and critique of the RAND team, 13 practices were selected and nominated as exemplary to DHHS. The 12 selected practices represent practices from 8 different states plus the District of Columbia. Table S.1 provides a listing of the practices nominated as exemplary.

Table S.1 List of Exemplary Practices

Name of Practice	CDC Focus Area Addressed						
	A	B	C	D	E	F	G
Computer-Assisted Emergency Notification System “Citywatch”	X					X	
Real-Time Outbreak and Disease Surveillance (RODS)		X					
North Carolina Public Health Regional Surveillance Teams		X					
Hospital Emergency Response Data System (HERDS)	X	X			X		
New York City Syndromic Surveillance System		X					
Increasing Laboratory Capacity to Respond to Bioterrorism Agents—Mobile BSL-3 Lab			X	X			
Maintaining Connectivity with Sentinel Labs			X	X			
Medical Operations Center					X		
Hospital Mutual Aid Radio System					X		
Risk Communication Needs Assessment	X					X	
University of Illinois - Chicago Learning Management System							X
Epidemiology Intelligence Service		X					

Conclusions: The 12 practices presented in this report were selected as exemplars in public health preparedness based upon a review of available information. These practices form the basis for an initial repository of practices for public health emergency and bioterrorism preparedness at the state and local levels. With modifications tailored to local needs and circumstances, these practices can be adopted by many jurisdictions. It should be noted, however, that our summary descriptions provide only a brief overview of the practices and interested individuals are encouraged to contact the listed points of contact for additional information.

We recommend that DHHS continue to review and evaluate these efforts as a means of updating this repository over time and to maintain relevance with the evolving needs of public health departments.

Limitations and Caveats: A few limitations and caveats require noting. First, the objective of this process was to develop a repository of practices for public health emergency and bioterrorism preparedness that can serve as an initial repository of exemplars for state and local health departments. Our goal was to identify potential exemplars based on the information that was available to us at the time of our review.

Second, because our methodology relied heavily on the literature and the state progress reports, our final list of practices reflects only those documented in these sources. Third, when we describe a practice as having been implemented in a given state, that does not mean that the state was the only health department or other healthcare-related organization to have undertaken such activity or that the state or organization's efforts were any more effective than another's efforts in the same regard.

Fourth, some focus areas lend themselves toward an objective evaluation using existing criteria better than others. For example, much work has been done to document what makes a good surveillance system, what constitutes a better training program, and so on. For other areas, criteria have yet to be developed. In addition, the minimum level of acceptable criteria necessary to designate a practice as exemplary also varied by focus area.

Finally, while we overcame several challenges in our review of potential practices, we offer caution with regard to interpreting our nominated exemplary practices without full consideration of the limitations of this study, which include those imposed by our methodology, the lack of available external objective criteria for evaluating these practices, and, in some cases, the lack of evidence of effectiveness for preparedness activities within the public health field more generally.

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LIST OF ACRONYMS

<u>Symbol</u>	<u>Definition</u>
AAHC	American Association of Academic Health Centers
AHRQ	Agency for Healthcare Research and Quality
APHA	American Public Health Association
ASP	Application Services Provider
ASTHO	Association of State and Territorial Health Officials
BSL	Bio Safety Level
CDC	Centers for Disease Control and Prevention
DARPA	Defense Advanced Research Projects Agency
DHHS	Department of Health and Human Services
DOH	Department of Health
ED	Emergency Department
EIS	Epidemiology Intelligence Service
EMS	Emergency Medical Services
GIS	Geographic Information System
HAN	Health Alert Network
HERDS	Hospital Emergency Response Data System
HIPAA	Health Insurance Portability Authorization Act
HMARS	Hospital Mutual Aid Radio System
HRSA	Health Resources and Services Administration
MMWR	Mortality and Morbidity Weekly Report
NACCHO	National Association of County and City Health Officials
NEDSS	National Electronic Disease Surveillance System
NRDM	National Retail Data Monitor
NSF	National Science Foundation
NYS	New York State
OASPHEP	Office of the Assistant Secretary for Public Health Emergency Preparedness
PC	Personal Computer

PDA	Personal Digital Assistant
PHIN	Public Health Information Network
PHRST	Public Health Response Surveillance Team
RODS	Real-Time Outbreak and Surveillance System

1. INTRODUCTION

Over the past three years, state and local health departments throughout the United States have undertaken a variety of activities and initiatives to improve their level of preparedness for bioterrorism and other public health emergencies. Many of these activities are funded by the Centers for Disease Control and Prevention (CDC) or the Health Resources and Services Administration (HRSA), and the resulting practices are intended to meet the critical capacities and benchmarks specified by those agencies for public health preparedness.

Under a contract with the Department of Health and Human Services (DHHS), RAND was asked to develop a repository of practices for public health emergency and bioterrorism preparedness at the state and local levels that can serve as exemplars of preparedness for responding to bioterrorism and other public health emergencies. By identifying exemplars that could be adopted by other jurisdictions, with modifications tailored to local needs and circumstances, this repository could serve as a resource to state and local public health departments as they work to improve their own preparedness. This report summarizes RAND's approach to identifying appropriate exemplary practices for this repository.

The selection of exemplary practices is one of several tasks in RAND's work for DHHS. Work on this task proceeded in tandem with other tasks, which included working with state and local health officials to develop or enhance preparedness exercises, provide guidelines for selecting and using exercises effectively, and learning about practical experiences in responding to public health emergencies. It also included helping DHHS improve its support of state and local readiness efforts.

As we began this work, we were asked to focus on practices that were designed by public health organizations to improve preparedness or that had been implemented by states or local jurisdictions to meet the critical capacities and benchmarks as outlined by the FY2003 funding guidance for each of the seven focus areas; these areas are listed below. For a quick summary of those focus areas go to <http://www.phpreparedness.info/help/FocusAreas.doc>.

- A. Preparedness planning and readiness assessment: assessment of legal authorities, development and testing of response plans.

- B. Public health surveillance and detection activities: assessment of completeness and timeliness of mandatory disease reporting, epidemiological response capability.
- C. Laboratory capacity—biological agents: capacities of computerized laboratory management system to securely transmit data among laboratories and with public health officials.
- D. Laboratory capacity—chemical agents: (not applicable in FY 2003).
- E. Health Alert Network/communications and information technology: procedures and communications technology to facilitate communication among healthcare providers, public health agencies, and others during a public health emergency.
- F. Risk communication and health information dissemination (public information and communication): preparation of pre-approved risk communication messages; prior identification of community groups to aid in dissemination of information to hard-to-reach groups.
- G. Education and training: development of effective distance learning approaches for training of local health department personnel; use of drills and/or exercises to evaluate readiness of state and local health officials.

This report describes RAND's approach and methods for identifying and evaluating practices and describes the individual practices nominated as exemplary. Finally, we provide some concluding remarks about lessons learned throughout this task and challenges associated with identifying exemplary public health practices.

2. METHODS

The selection of exemplary practices involved several steps, including:

- Establishing definitions of key terms
- Determining initial selection criteria
- Collecting preliminary data on public health practices
- Identifying initial candidate practices
- Collecting additional data on a set of identified candidate practices
- Selecting final exemplary practices.

Each is briefly described below. The final list of exemplary practices appears in the following section. This final list includes 10 exemplary practices and 3 notable examples. Appendix A presents our initial selection criteria, and Appendix B is a table summarizing the final list of exemplary practices and notable examples.

ESTABLISHING DEFINITIONS

The initial challenge we faced was to define the term **practice**. With guidance from the DHHS Project Officers and in an effort to cast a very wide net, we decided to define a “practice” broadly as “any activity that a state or local health department engages in that enhances the achievement of critical capacities and/or benchmarks.” As such, “practice” may refer to a state or local health department’s efforts to develop and/or implement:

- A plan, protocol, procedure, or policy;
- An education and/or training program or exercise;
- A new or enhanced disease surveillance/reporting system;
- A new or enhanced risk assessment system;
- A new or enhanced communication system/strategy;
- A new or enhanced information technology system;
- A new or enhanced laboratory capability; or
- An organizational strategy.

In addition, we use “practice” to encompass efforts aimed at:

- Initiating new relationships and/or enhancing existing relationships;
- Improving infrastructure; and/or
- Formally developing or designating teams of individuals to work together toward preparedness goals.

Our starting assumption was that an **exemplary** practice should be “technically sound, effective, replicable and sustainable.” As we began to review practices, however, we realized that many of the practices had only recently been implemented, and that there was scant evidence of their effectiveness as an individual practice of preparedness, and in some cases, lack of evidence of effectiveness for a whole category or practices (e.g., syndromic surveillance). Where no formal evidence was available, we used our best professional judgment, guided by the following criteria, to assess whether a practice was exemplary. In determining whether a practice is exemplary, we aimed to identify whether the practice met any of the following criteria:

- The practice was evidence-based; that is, there was a body of research that supports its effectiveness. The standards of evidence to determine such characteristics are based, to the extent possible, on the standards developed for the DHHS Guide to Community Preventive Services (Briss et. al., 2000), on evaluation guidelines such as the Draft Framework for Evaluating Syndromic Surveillance Systems for Bioterrorism Preparedness (Sosin et. al., 2003), and similar standards in related fields.
- The practice met the guidelines for that practice set out by an "expert" agency. For example, if the Centers for Disease Control and Prevention released guidelines on what should be included in training, one would choose only those practices that adhered to those guidelines. The application of this criterion is dependent on availability of such expert guidelines for the particular focus area.
- The practice had been replicated successfully in one or more locales.
- The practice demonstrated innovative—either novel or creative—use of resources, skills, or equipment.

We encountered some challenges in attempting to rigorously apply these criteria consistently across all CDC focus areas and practice descriptions. These challenges (e.g., lack of expert guidelines in many areas, lack of evidence base) are outlined below. It should be noted that while these criteria served to guide our evaluation efforts, our final recommended practices were also informed by professional judgment and opinion based on our prior experience and feedback received from DHHS. As such, we also considered whether the practice allowed for flexibility, continuous quality improvement and multiple use/applicability.

DETERMINING INITIAL SELECTION CRITERIA

We developed a set of criteria that would be used to select initial candidate exemplary practices for review. The primary goal of these initial criteria was to ensure, to the extent practicable, that the selection of practices was (1) primarily aimed at one of the focus areas in the CDC funding guidance and (2) balanced with regard to characteristics of the populations served, type/size of public health department, and geographic region. The final selection criteria were used to ensure a balance of the following factors:

1. CDC Focus Area and HRSA Priority Area addressed by the practice. We aimed to select and organize the candidate practices from the complete spectrum of CDC Focus Areas to ensure that practices are selected and reviewed within each area. To the extent possible, we also identified and reviewed practices that addressed more than one area.
2. The Essential Public Health Services (Public Health Functions Steering Committee, 1994) addressed by the practice (as applicable to the public health response).
3. If applicable, the characteristics of the health department that developed the practice, including the relationship between local and state health departments in the site (the relationships between state and local health departments in a state can be categorized into four types—shared, mixed, decentralized, and centralized);¹ essential public health services provided by state and local health

¹ See: NACCHO, *NACCHO Survey Examines State/Local Health Department Relationships*, Research Brief, October 1998, No. 2. Available at

departments; the importance of the health department as a safety net provider; public health workforce composition, background, and experience; the availability of relevant emergency public health authorities; size and sophistication of the health department (including scientific and technological capabilities and borrowed personnel from CDC); the level of federal and state funding; and other factors deemed to be relevant. We identified and reviewed practices across the spectrum of these characteristics, so that potential consumers can see the relevance to their particular circumstances.

4. Characteristics of the population served by the health department derived from U.S. census data, including total numbers; urban/rural composition; and racial, ethnic and socioeconomic diversity.
5. Geographical distribution throughout the United States, including metropolitan regions that cross state lines. We attempted to include metropolitan areas that cross international borders—e.g., Los Angeles/San Diego and Mexico.

COLLECTING DATA ON PUBLIC HEALTH PREPAREDNESS

To ensure that all CDC Focus Areas were represented, RAND focus area leaders were assigned to identify candidate practices in a specific area. The areas include: preparedness planning and readiness assessment (Focus Area A); public health surveillance and detection (Focus Area B); laboratory capacity—biological or chemical (Focus Areas C/D); health alert network/communications and information technology (Focus Area E); risk communication and health information dissemination (Focus Area F); and training and education (Focus Area G). In addition, a leader was assigned to the HRSA Priority Areas; however, considering that the HRSA Priority Areas are extensive and refer primarily to hospital practices, it was decided, in conjunction with the Project Officers, to limit our focus to those practices that intersect with the CDC focus areas. As such, we gave primary attention to those practices that were aimed at one of the CDC

http://archive.naccho.org/documents/Research_Brief_2.pdf (as of March 30, 2004). NACCHO defined these as follows: “In a centralized system the local health department is operated by the state health agency or board of health and the LHD functions directly under the state agency’s authority. In decentralized systems, local governments have direct authority over LHDs, with or without a board of health. Mixed systems include states where local health services are provided by a combination of the state agency, local government, boards of health or health departments in other jurisdictions. In shared systems, the LHD operated under the shared authority of the state health agency, local government and board of health.”

focus areas. However, in summarizing the practices, if they also addressed a HRSA Priority Area, it is so noted in our summary.

Considering the broad definition of “practice,” we found it necessary to search a wide range of sources for potential candidate practices. Sources reviewed by the focus area leaders included:

- The scientific and gray literature (e.g., unpublished reports);
- Conference proceedings, especially of the American Public Health Association (APHA 2003 Annual Meeting);
- The Internet, especially CDC websites (including CDC Centers for Public Health Preparedness) and the websites of state and local health departments;
- State annual reports to CDC (including the Milne & Associates, LLC consulting report on practices of note, which was based on state annual reports);
- Suggestions and information received directly from the Project Officers;
- Information from professional associations such as the Association of State and Territorial Health Officials (ASTHO), the National Association of County and City Health Officials (NACCHO)—including the NACCHO database of model practices, and the American Association of Academic Health Centers (AAHC);
- News releases; and
- Personal interviews with individuals in positions related to public health preparedness.

Each focus area leader was responsible for conducting the initial search in his/her area, identifying potential candidate practices, and selecting between 10 and 30 practices that met the initial selection criteria. This initial search took place between January and April 2004. In order to compare the candidate practices and assess which should be considered for the final list, a one-page summary was created for each practice, based primarily on information that was available without contacting the health department responsible for the practice.

IDENTIFYING INITIAL CANDIDATE PRACTICES

We developed a preliminary group of candidate exemplary practices. Because we relied primarily upon existing literature and information already available about state public health efforts through written reports of their activities, the quantity and quality of

information gleaned from each source varied greatly. For example, proceedings of the APHA annual meetings and summaries prepared by ASTHO provided more relevant detail than did sources such as news releases. The report of Milne & Associates, LLC, which was contracted by the CDC to review all state progress reports and identify model practices, was also very helpful for some focus areas. The full state progress reports to CDC were an even richer source of data, but we had access only to the states slated for site visits in other tasks. Discussions with individuals within organizations working on public health preparedness, such as the District of Columbia Hospital Association, were also very helpful in providing some insight and information for us to investigate further, particularly with regard to hospital preparedness and public health interactions. As a result of the considerable variation in the quantity and quality of data available from each source, some candidate practices were more fully described at this stage than others.

COLLECTION OF ADDITIONAL DATA ON PRACTICES

Once candidate practices were identified, the next step was to gather any additional information available to update and complete the summary of each candidate practice. A data abstraction tool was prepared (available from authors upon request), and was used as a discussion guide for conducting telephone and in-person interviews to collect additional data on the candidate practices. Creating a common abstraction tool facilitated the development of consistent summary information for each candidate practice. In addition, to ensure that key data elements were collected, the tool was designed to map to the initial selection criteria outlined. “Modules” specific to each focus area were added to allow for additional specificity for relevant CDC focus areas. This abstraction tool was used to collect information about a particular practice from a variety of sources. Focus area leaders submitted their summaries and recommendations to the Project/Task Leaders. Following a preliminary review of the practices to ensure they responded to the initial selection criteria and provided enough information for review, the list was provided to DHHS as “candidate practices” in May 2004 for DHHS review and initial feedback.

After incorporating DHHS feedback on our initial list of candidate practices, focus area leaders conducted telephone interviews for the subset of identified practices within their assigned areas. For the most part, interviews were conducted between June and August 2004. The interviewees varied by practice, but were most often the contact persons for the individual practices identified in the source literature or public health department representatives. These interviews enabled us to collect information we were

unable to obtain in the initial abstraction and helped us determine what, if any, unique qualities or characteristics render a particular practice “exemplary.” The abstraction tool served as the discussion guide for telephone interviews but was individually tailored depending upon the focus area and the data required (e.g., applying modules for each applicable focus area). Although some questions that appeared in the tool attempted to assess how exemplary a particular practice was, the main purpose of the tool was to ensure that the appropriate information and details were collected in a consistent fashion.

SELECTING FINAL EXEMPLARY PRACTICES

Following the supplemental data collection, focus area leaders revised and updated summaries for the candidate practices based on information obtained in the interviews and through other available materials from DHHS (e.g., extracts from most recent CDC/DHHS progress reports). Working as a group, the RAND team then aimed to reapply the predetermined criteria to select the final list of exemplary practices from among the candidates. In this approach, focus area leaders presented updated summaries for practices in their areas, including a short description of the rationale for inclusion and nomination as exemplary, to the entire project team. Each practice was reviewed and critiqued by the team. The intent of this process was to ensure consistency across focus areas by vetting the practices in a group forum, as well as to ensure that the information presented demonstrated that the practice met the criteria outlined above.

At each stage of the process outlined above, summary descriptive information on the practices identified, reviewed, and selected was reviewed and approved by the DHHS Project Officers. Upon final selection and approval from the Project Officers, the summaries of each practice were refined and sent to the jurisdiction’s point of contact (for that particular practice) for purposes of verifying accuracy of the information contained therein.

We identified a number of challenges in applying the criteria for exemplariness to information available about the practices. As we gathered information about individual practices and looked to the available scientific and professional literature, we found a general lack of information and evidence to guide our evaluation of exemplariness. While we believe our standards for exemplariness are appropriate, we found that given the paucity of information and evidence on public health preparedness (lack of expert

guidelines, and an evidence base for effectiveness) in several areas, we needed to be a bit more flexible in using professional judgment and opinion.

3. RESULTS

IDENTIFIED PRACTICES

As might be expected, searches in some focus areas produced more results than others. One reason for this variation may be the amount of market attention to the area and “newsworthiness” of related activities. For example, surveillance and detection technology is heavily marketed by private industry; thus, there is more information available in the open literature on that area than on the area of risk communication.

As a result of our initial literature search and data collection, a total of 73 practices were identified. These 73 practices reflected practices from 29 states, the District of Columbia, and two cities receiving independent funding (Chicago and New York City). As noted in Chapter 2, information about these 73 initial practices was submitted to the Project Officers for review and in order to select a subset of practices for further evaluation by RAND. The Project Officers reviewed the full list of candidates and selected a sub-set of candidates for further evaluation. The purpose of their review was to help narrow down the list for further data collection by selecting those practices among the list that they believed to be innovative, creative, or interesting uses of resources. They also aimed to select those practices that were directly aimed at one of the CDC focus areas.

PRACTICES EVALUATED AND SELECTED

Following initial review of these 73 practices with our project officers, 27 were selected for further evaluation (representing 15 states, 12 different state Public Health Departments and 5 local public health departments). Based upon our further data collection and review according to the criteria for exemplariness (see Chapter 2) augmented by professional judgment and critique of the RAND team, 12 practices were selected and nominated as exemplary to DHHS. The 12 selected practices represent practices from 8 different states plus the District of Columbia.

In the following series of tables, we provide some summary statistics as a brief overview of how the practices at each stage of review reflect our initial criteria as outlined in Chapter 2.

TABLE 3.1 Practices by Type of Organization

	73 Identified	27 Reviewed	12 Selected
Public Health Departments	41 (56%)	18 (67%)	8 (67%)
Other Government Agencies	13 (18%)	6 (22%)	0
Other Public Organizations (non-government)	7 (10%)	2 (7%)	2 (17%)
Academic	8 (11%)	1 (4%)	2 (17%)
Hospital	1 (1%)	0	0
Other	3 (4%)	0	0

TABLE 3.2 Practices by Type of State Health Organization

	Identified	Reviewed	Selected
Shared	2 (9.5%)	1 (6.5%)	0
Mixed	4 (19%)	4 (27%)	1 (14%)
Decentralized	15 (71.5%)	9 (60%)	5 (71%)
Centralized	0	1 (6.5%)	1 (14%)

NOTE: Does not include practices that were not developed by public health agencies; states are only represented one time.

TABLE 3.3 Practices by CDC Focus Area

	Identified	Reviewed	Selected
Preparedness Planning and Readiness Assessment	19 (26%)	8 (30%)	3 (25%)
Surveillance and Detection Activities	29 (40%)	7 (26%)	5 (42%)
Laboratory Capacity	11 (15%)	4 (15%)	2 (17%)
Health Alert Network/Communications and IT	16 (22%)	6 (22%)	3 (25%)
Risk Communication and Health Information Dissemination	10 (14%)	5 (18%)	2 (17%)
Education and Training	9 (12%)	4 (15%)	2 (17%)

NOTE: One practice can address more than one focus area simultaneously.

It is also important to note that among our predetermined criteria for whether a practice is exemplary, the most commonly cited was that the practice was innovative—either novel or creative—and, to a lesser extent, that the practice had been replicated in one or more locales. As a result, most of the statements in this report about what makes the selected practices exemplary are elaborations on these criteria.

What is glaringly missing in the field is evidence that the practices are effective. We anticipated that such evidence could come from either research or evaluation studies or adherence to established guidelines, but as we have found in our other

research for this project and others, such evidence is difficult to find. Indeed, the lack of such evidence—despite our efforts to find it—more than three years after 9/11 is a telling statement about the state of the field of public health preparedness. As has been speculated elsewhere (Asch et al., in press), this gap may be attributed in part to the difficulties of evaluating large-scale population-based interventions (e.g., inability to randomize patients to treatment) and the absence of clear standards of practice. A lack of consensus in the field about what “preparedness” actually means and how to measure it is also likely to be partly responsible.

We present brief descriptions and rationale for nominating each of the practices as “exemplary” (n=13) below. For organizational purposes, these practices are presented under the sub-heading for the primary CDC Focus Area that they aim to address. It should be noted, however, that several practices address more than one CDC focus area but are summarized only once. For each practice, we provide a short description, followed by a statement about its benefits, more detail about the practice, and why we believe it is an exemplary practice. This rationale includes whether it meets our defined criteria and also lists other reasons for why it was nominated (e.g., multiple applications/dual use, flexibility, etc.).

CDC Focus Area A: Preparedness Planning and Readiness Assessment, Including Development and Testing of Response Plans

Computer-Assisted Emergency Notification and Testing System “CityWatch,” Illinois Department of Health

Short Description: A sophisticated computer-assisted emergency notification system that alerts multiple organizations and individuals about public health emergencies at one time via telephones, pagers, email, fax, PDAs, TDD-TTY, and other devices.

Benefits: The system enables the simultaneous notification of all organizations and individuals involved in emergency response, including the health department, law enforcement, and other agencies. The system also allows the Illinois Department of Health to regularly monitor the performance of local health departments in responding to case reports 24 hours a day, 7 days a week.

Details: This computer-based notification system uses a computer software package called "Citywatch." The system is run by the Illinois Department of Health, which has the authority to initiate an alert when health officials find it appropriate. The system can incorporate GIS mapping software, which can be used to target messages to different geographic regions, and it can select specific groups of individuals or organizations depending on the size and scope of the emergency. (Note: The GIS component must be purchased as an additional package feature and is not currently being used in Illinois).

The system works by sequentially trying numerous ways to contact people. For example, to contact the health director, the system would first call the individual's work telephone; if the director could not be reached there, the system would leave a message and then call the director's mobile phone; if again the person could not be reached, the system would leave a message and then send a text message to the director's PDA; if still unsuccessful, the system would try the director's home phone, and so on. The system can be accessed from any PC or laptop with an internet connection or via telephone if needed. All information (including documents and other materials) is then posted on a secure web portal.

Although not connected to the local 911 system, the Illinois Department of Health uses the system to regularly test the responses of all local health departments to telephoned alerts at any time of day or night. During monthly drills, the Department sends messages to 95 local health departments statewide and attempts to contact public health directors, epidemiologists, doctors, and nurses. The messages say, in essence, "This is a test. Call us back immediately." The Department records and tracks response times to measure performance and find ways to improve it.

What Makes This Practice Exemplary? CityWatch uses innovative technology to establish a coordinated notification system for responding to public health emergencies. The system offers capabilities well beyond those of most other health departments:

- It can be tested regularly.
- It accurately determines how quickly emergency personnel can respond to potential emergencies.

- It sends different types of alert messages by exploiting all of the available communications technology.
- It can be used to respond to a broad range of public health threats.
- It improves coordination across agencies and organizations.
- It overcomes a serious gap in public health preparedness.

CDC Focus Area B: Public Health Surveillance and Detection Activities

Real-Time Outbreak and Disease Surveillance System (RODS), University of Pittsburgh Medical Center

Short Description: The University of Pittsburgh Medical Center, Real-Time Outbreak Detection System (RODS) Laboratory, with funding from multiple sources, including the Agency for Healthcare Research and Quality (AHRQ), CDC, the Defense Advanced Research Projects Agency (DARPA), the National Science Foundation (NSF), and the Pennsylvania Department of Health, created an electronic syndromic surveillance system that collects data such as emergency room registration data and lab results from existing computer systems in hospitals and other settings on a real-time basis so that it can be analyzed to detect emerging public health concerns.

Benefits: RODS allows health departments to monitor the number of patients with symptoms of flu, respiratory illnesses, diarrhea, skin rashes, and other conditions. This ability has been thought by some to enable possible early warning of medium- to large-scale disease outbreaks or bioterrorist attacks.

Details: Originally created for use during the 2002 Winter Olympics in Utah, the RODS system is now used by state public health officials in many states (including Pennsylvania and Utah, as well as parts of Ohio, New Jersey, Michigan, California, and Texas) as a principal detector of potential outbreaks. It is a real-time automated biosurveillance system developed by the University of Pittsburgh that collects data from hospitals (emergency room visits), classifies each patient according to chief complaint into one of seven syndrome categories, and looks for significant increases in the aggregate number of patients with syndromes that may signal the outbreak of an infectious disease. This information is transmitted via an easy-to-use web interface that displays information on the cases to the pertinent health officials in real time with graphical representations as well as geographic information about the patients. Health

officials and researchers can readily analyze the data by type and geographic region to identify trends and emerging public health conditions in specific locations.

In addition to monitoring clinical data, the RODS system collects data on over-the-counter medication sales. Collaborating with pharmacies nationwide, these sales are also compiled before being transmitted electronically to the National Retail Data Monitor (NRDM) database—again, to detect any significant purchasing pattern suggestive of illnesses that could possibly result in an outbreak.

The computer-based program of RODS is easy to use and readily available from the RODS Laboratory website, making it accessible to health departments, hospitals, medical centers, and other organizations that are involved in the fields of syndromic surveillance and/or healthcare response.

What Makes This Practice Exemplary? RODS represents an innovative collaboration between public health organizations and other industries to collect information on national public health conditions. It is exemplary for several reasons:

- It increases the capacity for rapid detection by enabling the ongoing surveillance of public health conditions through the monitoring of clinical data and over-the-counter drug sales.
- The system is easy to access and health departments may use it for a minimal charge.
- The automated system collects data in near-real time, with no need for manual data entry on the part of hospitals or health departments.
- Baseline data are incorporated into sophisticated outbreak algorithms, which are included in the system.
- The system allows various agencies to interpret current information simultaneously, ensuring a universal understanding in the public health realm of up-to-date trends and information.

North Carolina Public Health Regional Surveillance Teams, North Carolina Division of Public Health

Short Description: The North Carolina State Department of Health and Human Services, Division of Public Health, used state funds to develop regional response teams of public health practitioners who assist local public health departments with disease outbreak preparedness and response.

Benefits: The Public Health Regional Surveillance Teams (PHRSTs) collaborate with local health organizations and first responders to prepare for and respond to disease outbreaks. By doing so, they promote community preparedness and build shared expertise in readiness and response.

Details: The state of North Carolina has 7 PHRSTs that are co-located with the state's Regional Response Teams (i.e., hazmat teams). Each PHRST serves between 6 and 26 counties and includes an epidemiologist, industrial hygienist, nurse consultant, and administrative specialist. The teams augment the counties' public health response rather than replacing the existing county health services.

The teams are hosted by and located with one county health department within a designated region. All team members are regular health department employees. As PHRST members, they assist with public health surveillance and preparedness for bioterrorism or natural disease outbreaks. Each team has a designated leader and a clear relationship to the state public health department. The relationships are designed to encourage working links between state and local health departments.

To date, PHRSTs have helped local health departments by providing continuing education on numerous critical topics including disease outbreak identification and investigation, bioterrorism agents, emerging infectious diseases, decontamination procedures, risk communication, and building laboratory capacity. PHRSTs helped design and implement smallpox vaccination programs in county health departments and hospitals. They have also assisted in the development of Strategic National Stockpile plans for counties.

What Makes This Practice Exemplary? PHRSTs are an exemplary practice because they provide numerous valuable capabilities:

- They provide an innovative on-call consultancy to enhance local outbreak readiness.
- They build the capacity for public health surveillance by coordinating epidemiologic response activities and providing resources to the county health departments within their region for disease detection.

- The specifications for team composition provide a framework that can be easily replicated.

Hospital Emergency Response Data System (HERDS), New York Department of Health, Greater NY Hospital Association, and others

Short Description: The New York State Health Department—with collaboration and input and direction from the Greater New York Hospital Association, hospitals, and other healthcare provider organizations and local health departments statewide—has developed a secure statewide web-based system that provides real-time sharing of information among state and local health departments, healthcare facilities, laboratories, pharmacies, and other entities involved in emergency response.

Benefits: The system facilitates ongoing surveillance, rapid emergency response and resource monitoring by enabling the real-time exchange of data on emergency department admissions, available hospital beds, medical supplies, personnel, number and needs of ill or injured persons, and other urgent information.

Details: After the September 2001 attacks on the World Trade Center, the New York State Department of Health (NYSDOH) partnered with the Greater New York Hospital Association to develop a system to link healthcare providers with the Department of Health and facilitate planning and preparedness for public health events. They designed a system to support the incident command process and enable information exchange among key local, regional, and state health responders. In May 2003, the system was expanded to include all of New York State. It offers several key capabilities:

- **Surveys.** Administrators at any of the linked organizations can use the system to deploy surveys to collect information on the availability of critical resources, such as medications, vaccines, power, and food supplies.
- **Emergency incident reporting.** The system allows for the speedy creation and deployment of web-based emergency reporting forms to health facilities.
- **Ongoing surveillance.** It facilitates weekly surveys on key health data, including emergency department admissions, pediatric influenza-related cases and unusual disease clusters.

- **Facility asset tracking.** The system tracks the capacities of hospital specialty units, equipment availability, and health facility surge capacity. The data can also be used during emergencies for hospital selection and patient triage.
- **Patient locator.** During a public health incident, hospitals can enter patient information into the system, which members of the public can search for information on missing loved ones.
- **Secure discussion capability.** In case of an emergency, the system allows incident command to communicate with linked facilities securely to discuss incident information and resource allocation.
- **Automated alerts.** In a public health emergency, the system automatically notifies key hospital and county health department personnel of the incident and required actions via phone, email, or fax.

What Makes This Practice Exemplary? HERDS provides an integrated set of capabilities for information exchange beyond what most state/local health departments and health facilities now have in place. It has several noteworthy characteristics:

- It was developed through a partnership between the NYSDOH and the healthcare community.
- It establishes a formal, standardized process through which state and local health departments and healthcare providers can securely exchange information during emergency events.
- It provides a clear sequence for collecting and reporting emergency information and minimizes the potential of competing or contradictory reports.
- It can function as an early warning broadcast system for public health and healthcare providers.
- It provides real-time maps and statistical reports to facilitate resource planning and resource allocation during emergencies.
- It strengthens communication among hospitals, health departments, and emergency medical services.
- It is based on open computer standards and is provided at no charge to the participating organizations.

New York City Syndromic Surveillance System, New York City Department of Health and Mental Hygiene

Short Description: The New York City Department of Health and Mental Hygiene used CDC and HRSA bioterrorism funds to develop a collection of citywide surveillance systems designed to provide early warning of infectious disease outbreaks, whether natural or due to bioterrorism, or other public health emergencies by monitoring data on symptoms rather than confirmed diagnoses.

Benefits: Data from a variety of sources (including previously untapped sources) are collected on an ongoing basis and routinely analyzed to provide early warning of possible public health emergencies, thereby allowing prompt response and containment actions. The system has proven to be useful for monitoring citywide disease trends. It is relatively flexible and well accepted by the health community. In addition to its primary goal of improved surveillance, the system is also contributing towards a secondary goal: strengthening the communication and coordination among various agencies operating within the public health system. Operational strengths include ease of initial set-up and relatively low cost of maintenance.

Details: The Emergency Department (ED) system collects data from 46 (72%) of New York City's 66 hospital EDs and captures 85% of ED visits citywide. Data are also collected from ambulance dispatches and drug sales (both prescription and over-the-counter). There are plans to explore other routinely collected electronic data including outpatient physician visits, and work and school absenteeism.

The participating EDs report a total of approximately 8,000 emergency department visits daily. Routinely collected chief complaint information is transmitted electronically to the health department, coded automatically into syndrome categories, and analyzed for temporal and spatial aberrations. Respiratory ailments, fever, diarrhea, and vomiting are the key syndromes analyzed. These data are integrated with data from ambulance dispatches and drug sales. The number and size of incorporated resources are impressive.

The system has the operational, response, and research components integrated within the health department. The staff members who analyze data also work closely with those who perform signal investigations. Knowledge of the data and the system's operations facilitates both understanding of the signals and follow-up with emergency departments.

What Makes This Practice Exemplary? While still experimental, the New York City Syndromic Surveillance System has several innovative characteristics:

- The system provides a standardized, active, citywide surveillance capability for monitoring the health of the population in real time and possibly detecting disease outbreaks.
- It integrates the operations, response, and research within a health department so that those who analyze data work closely with those who perform signal investigations. This approach facilitates understanding of the signals and follow-up with emergency departments.
- The system is easy to set up and has relatively low maintenance costs. Direct health department costs of the emergency department system are estimated at \$150,000 annually for 46 hospitals and a population greater than 8 million.
- It enhances the city's ability to detect outbreaks early and consistently monitor disease trends.
- It strengthens the communication and coordination among public health agencies, including the health department, hospitals, emergency services, and other healthcare providers.

CDC Focus Areas C/D: Laboratory Capacity for Biological and Chemical Agents
Increasing Laboratory Capacity to Respond to Bioterrorism Agents—Building a Mobile Bioterrorism Response Lab Command Center, South Dakota Department of Health

Short Description: The South Dakota Department of Health used its CDC bioterrorism funds to create a fully functional, mobile bio-safety level 3 (BSL-3) laboratory built into a semi-tractor trailer that can travel anywhere in the state within 24 hours of an incident.

Benefits: The mobile laboratory increases the state's ability to respond to bioterrorism agents and enhances BSL-3 capabilities across the entire state. The mobility of the lab could serve to minimize delays due to moving specimens (by shipping or courier) from the site of an event to a centralized, fixed lab location, and assist in providing available BSL-3 laboratory expertise in other regions for training and consultation (particularly during a crisis).

Details: The South Dakota Department of Health's mobile public health laboratory is a fully functional BSL-3 laboratory with 2 biological hoods and counter workstations for 3–4 people. It occupies 35 feet of a 53-foot semi-tractor trailer. The truck that pulls it has a generator, which can supply all of the power needs of the laboratory for about 10 days before needing a diesel fuel refill. The truck requires a driver with a commercial driver's license.

The laboratory includes the equipment needed to respond to a bioterrorism or other public health emergency. It contains an autoclave, –70° F freezer, incubators, and a glove box for working with potentially hazardous materials. It has two 250-gallon tanks, one each for potable and grey water, as well as storage containers for deionized water. It is stocked with basic supplies and can be loaded with high-value equipment and perishable supplies immediately before deployment. It cost about \$500,000 to build, and its annual maintenance is estimated at \$25,000.

The South Dakota Department of Health also plans to use the mobile laboratory for purposes other than bioterrorism emergencies. It will serve as a mobile training facility for laboratory technicians at the 43 sentinel laboratories² throughout the state. It will also be used to perform clinical, environmental, and forensic responsibilities, such as performing water testing during flood emergencies.

What Makes This Practice Exemplary? The mobile BSL-3 laboratory is an innovative method to ensure bioterrorism response capabilities across an entire state. It was selected as exemplary for several reasons:

- It provides mobile BSL-3 capabilities across a large, rural state.
- It will improve the training capabilities at sentinel laboratories.
- It will support other state agencies and serve both emergency and non-emergency functions.
- It can also serve neighboring states if an emergency response is required.

² The term *sentinel labs* refers to the thousands of private, commercial and hospital-based labs that have direct contact with patients. They were previously referred to as level A labs. <http://www.bt.cdc.gov/lrn/faq.asp>.

Maintaining Connectivity with Sentinel Labs, Minnesota Department of Health

Short Description: The Minnesota Department of Health used CDC bioterrorism funds to create a program to coordinate activities between the sentinel public and private clinical laboratories, the state public health laboratories, and the agricultural and veterinary laboratories.

Benefits: Improved communication between sentinel laboratories and public health laboratories integrates sentinel laboratories more effectively into the public health system.

Details: The Minnesota Public Health Laboratory hired a full-time "Lab Program Advisor" to coordinate activities among the sentinel public and private clinical laboratories, the state public health laboratories, and the agricultural and veterinary laboratories. The position began as part of a demonstration project funded by the CDC and the Association of Public Health Laboratories, and it has been retained through bioterrorism funding.

The Program Advisor, who has 12 years of clinical lab experience, acts as a liaison between the public health and clinical laboratories. She is responsible for developing programs that support and maintain interaction between public health laboratories throughout the state. The Laboratory Program Advisor has developed numerous new programs for Minnesota. Noteworthy projects include the following:

- Created a database of capabilities for all 125 clinical laboratories in the state. Collected data through a phone survey and an ongoing in-person site-visit survey.
- Set up a computerized broadcast system that contacts all clinical laboratories. It is modeled after the Health Alert Network, which links local public health departments to the state health department.
- Developed challenge exercises in which 95% of laboratories have participated. The exercises serve as an educational tool to determine training needs.
- Developed a web site for the Minnesota Laboratory System (www.health.state.mn.us/mls) that posts training opportunities for laboratory clinicians, alerts, disease-specific information, and links to other public health web sites.

- Maintain a listserv that facilitates communication among all public health laboratories.

What Makes This Practice Exemplary? The Lab Program Advisor position provides a robust mechanism to integrate the sentinel and public health laboratories. As of June 2004, the Program Advisor had developed numerous communication and training programs that strengthen public health preparedness.

CDC Focus Area E/F: Health Alert Networks, Communications and Information Technology, Risk Communication, and Health Information Dissemination

Medical Operations Center, Dallas–Fort Worth Hospital Council

Short Description: The Dallas–Fort Worth Hospital Council used its own funding and state bioterrorism funds to create a medical operations center that links the region surrounding the cities of Dallas and Fort Worth to enable communication and information-sharing in the event of a public emergency.

Benefits: Improved communication between the neighboring cities enhances each city's surge capacity in the event of a public health emergency.

Details: The Medical Operations Center was established in the 1970s through the Dallas–Fort Worth Hospital Council. It links all hospitals and emergency rooms to their regional operations center 24/7 through email, phone, fax, and shortwave radio, and it provides a single point of contact through which county emergency centers can track hospital resources and capacity during public health emergencies.

The Center is staffed by hospital representatives who manage the daily operations, which include monitoring hospital capacity and transferring patients between hospitals when necessary. If an emergency occurs, the staff has the authority to assign specific roles to hospitals, eliminating the need to consult with multiple hospital executives.

What Makes This Practice Exemplary? The Medical Operations Center is exemplary for three reasons:

- It increases the response capacity of two large, adjacent cities by allowing the region to pool its hospital resources.
- It fills a community need for hospital coordination on a daily basis and simultaneously increases emergency capacity for both cities.
- Founded by a private organization and funded by public financing, it is a good example of a public-private partnership to strengthen public health services.

Hospital Mutual Aid Radio System, District of Columbia Hospital Association

Short Description: The District of Columbia Hospital Association used its own funding to create HMARS, a private radio frequency system that provides a direct emergency-department-to-emergency-department link among DC area hospitals. The system also includes other health organizations in the District of Columbia and has been expanded to include Maryland and Virginia.

Benefits: The system allows immediate consultation among physicians, nurses, and other healthcare providers. It has proven effective in several emergencies. It allows for prompt dissemination of information and inter-hospital coordination, including management of surge capacity. Additionally, it is the communications foundation for implementation of the Hospital Mutual Aid Memorandum of Agreement that facilitates the sharing of equipment, personnel, and bed capacity in times of crisis. The system builds on an existing infrastructure, and therefore requires few resources to set up and maintain.

Details: The District of Columbia Health Association has owned and operated the Hospital Mutual Aid Radio System (HMARS), a privately licensed radio frequency system, for approximately 20 years. It allows for direct hospital-to-hospital communication between emergency departments. Each participating hospital is responsible for maintaining the radio and ensuring that a trained individual capable of operating the radio system is available on every shift. Daily communication checks and monthly bed counts are conducted. Additionally, the HMARS system can be an integral part of disaster preparedness exercise planning with a connection to the District of Columbia Emergency Management Agency. The clearinghouse for the system is based at Children's National Medical Center.

The system has been expanded and enhanced several times. After the 1995 Oklahoma City bombing, HMARS was upgraded. Following 9/11, the District of Columbia Hospital Association made a concerted effort to expand the reach of HMARS. HMARS communication has subsequently been established with all the psychiatric hospitals in the District of Columbia, the Medical Society of the District of Columbia, Southern Maryland Hospital, the Northern Virginia Hospital Alliance's thirteen hospitals through linkage with Inova Fairfax Hospital, the Maryland Incident Emergency Management System in Baltimore, and the office of the Attending Physician for Congress. Additionally, communication linkages with the White House, Suburban Hospital in Maryland, and all of the hospitals in Prince Georges County, Maryland, are pending the establishment of direct connections to the system. It also has linkages with the Army, Navy, Air Force, and Veterans Administration hospitals in the region, which provide communication with the Joint Force Headquarters and can facilitate access to federal emergency resources.

What Makes This Practice Exemplary? HMARS serves as an example of how to facilitate communication among hospital emergency departments within a state or region.

- The system uses existing infrastructure to fulfill the need to facilitate communications during an emergency, enabling physicians and nurses to consult and coordinate with one another.
- The system has been tested in a number of real-life situations. It was used during Hurricane Isabel to provide information about generators for hospital emergency use. Following the 9/11 attack on the Pentagon, the system was the primary means of communication regarding information about emergency department and hospital bed capacity. It also was used to set up daily conference calls during the anthrax bioterrorism attacks, during the ricin event on Capitol Hill, and during numerous disaster exercises.

Risk Communication Needs Assessment, Pennsylvania Department of Health

Short Description: The Pennsylvania Department of Health used state funding, provided by federal bioterrorism funds, to develop a statewide needs assessment focused on communication practices by local health departments in public health emergencies.

Benefits: The statewide assessment of resources and needs allowed the state to coordinate risk communication procedures locally, regionally, and statewide and create a communication plan for public health emergencies.

Details: The Pennsylvania Department of Health conducted a needs assessment for emergency communication practices among community health districts. The goal was to evaluate the state's emergency communication and assess how local needs differ across the state. The needs assessment involved interviews with officials from county, district, and municipal departments of health. It uncovered the fact that each of the 6 county and 4 municipal health departments, as well as the 6 district health department offices, had developed an independent communication plan, but there were no coordinated plans between counties and districts.

The needs assessment enabled the Department of Health to coordinate risk communication procedures locally, regionally, and statewide by creating a plan that integrates the protocols already in place with the anticipated communication needs for an emergency. The plan empowers local health officials to engage the public and the media, and it provides training and materials to support these interactions. It also includes protocols for the chain of communication in case of an emergency and how and when to escalate concerns to the Pennsylvania Department of Health. The state is currently evaluating the effects of the plans and related training to identify remaining needs.

What Makes This Practice Exemplary? The Pennsylvania risk communication needs assessment is exemplary because it comprehensively addresses emergency communication requirements at the local, regional, and state levels.

- The state followed the recommended practice of assessing its own needs for risk communication.
- The results of the needs assessment informed the design of a strategy for improving emergency communications statewide.
- The state developed training programs and materials to support the new procedures.

- The program evaluates risk communication capabilities after implementation to identify areas for further improvement.

CDC Focus Area G: Education and Training

University of Illinois–Chicago Learning Management System, University of Illinois at Chicago

Short Description: The University of Illinois at Chicago (UIC) Center for Public Health Preparedness used CDC funds, through its Centers for Public Health Preparedness Program, to create a comprehensive internet-based learning management system for public health workers and public health agencies.

Benefits: The learning management system helps public health workers to attain and maintain competencies that strengthen preparedness and public health practice.

Details: In collaboration with the Illinois, Indiana, and Chicago health departments, the Illinois Center for Public Health Preparedness at the University of Illinois at Chicago (UIC) developed a comprehensive internet-based learning management system for public health workers and public health agencies. The system includes activities to assess and enhance competency in public health practice. It includes courses for all levels of public health workers along with a customizable needs-assessment tool that allows users to assess their competency in each of the focal areas of public health preparedness. In 2003, the system offered 61 distance-learning courses related to emergency preparedness and general public health practice.

What Makes This Practice Exemplary? The UIC learning management system is exemplary for several reasons:

- The system is particularly user-friendly, practical, and comprehensive, and it has received favorable feedback from local health departments.
- Its content corresponds to the widely accepted competencies for public health workers developed by the Columbia University Center for Public Health Preparedness.
- The courses are linked to certification for public health administrators and emergency managers.

- The training programs are tailored to each user's competency level.
- The system can track each user's progress using online resources, thereby eliminating the need for record-keeping in public health department offices.
- The system provides links to additional resources that promote further learning and reference tools for use during public health emergencies.

Epidemiology Intelligence Service, Florida State Department of Health

Short Description: The Florida State Department of Health used state and CDC bioterrorism funds to create a fellowship program that places individuals with public health expertise into epidemiologist roles in local health departments to enhance epidemiologic and emergency response capacity at the local level. The Florida Epidemiology Intelligence Services (EIS) was modeled after the Center for Disease Control's EIS program.

Benefits: This program identifies promising early-career epidemiologists and places them in mentored fellowships in local health departments. The program builds the pool of formally trained epidemiologists and therefore enhances epidemiologic and emergency response capacity at the local level.

Details: The Florida EIS was launched through executive order in December 2001, following the Palm Beach anthrax attacks, which highlighted the need for enhanced epidemiology capacity in the state. The program recruits individuals from throughout the United States to receive on-the-job training over a two-year fellowship term.

EIS fellows must complete a series of eight core activities for learning during their terms. The required activities are the following: field investigation; analysis of data set; evaluation of surveillance system; authoring a scientific manuscript; submission to Florida Epi Update or MMWR; presentation at a conference; presentation at Epi grand rounds; and responding to inquiries from the public and media. Throughout the program, they receive mentoring from a staff member of the department in which they are placed.

The first class of six fellows began work in April 2002. Six more were added in 2003 and another six in 2004. The fellows contribute to a broad range of investigations

locally and at the state level. They also assist in designing the epidemiology component of emergency preparedness plans.

What Makes This Practice Exemplary? The Florida EIS fellowship program has several key attributes:

- It applies the CDC's national model to the state level.
- It addresses the substantial shortage of epidemiologists nationwide.
- It enhances epidemiologic capacity throughout the state while also providing on-the-job training to future epidemiologists who will enhance capacity in Florida and elsewhere.
- It provides specific goals for fellows along with methods of assessment.

4. CONCLUSIONS

The 13 practices presented in this report were selected as exemplars in public health preparedness based upon a review of available information. These practices form the basis for an initial repository of practices for public health emergency and bioterrorism preparedness at the state and local levels. With modifications tailored to local needs and circumstances, these practices can be adopted by many jurisdictions. As such, this initial repository can serve as a resource to state and local public health departments who are working to improve their own preparedness. It should be noted, however, that our summary descriptions provide only a brief overview of the practices, and interested individuals are encouraged to contact the listed points of contact for additional information.

With the continuation of the funding for public health preparedness, it is anticipated that state and local public health departments will continue to develop new practices and refine existing ones, in an effort to meet the critical benchmarks and capacities outlined in the funding guidance. We recommend that DHHS continue to review and evaluate these efforts as a means of updating this repository over time and maintaining relevance with the evolving needs of public health departments. However, to most effectively aid this process, work is critically needed to develop and expand the evidence base for public health preparedness more generally. This includes continued work to define and implement measures and metrics of preparedness, and research and evaluations to determine efficacy and effectiveness of individual as well as categories of practices.

LIMITATIONS AND CAVEATS

A few limitations and caveats require noting. First, the objective of this process was to develop a repository of practices for public health emergency and bioterrorism preparedness that can serve as an initial repository of exemplars for state and local health departments. Our goal was to identify potential exemplars based on the information that was available to us at the time of our review. The purpose of our review was *not* to identify the most effective practices. The selection criteria were developed in part to ensure that the selection of practices was (1) primarily focused on the CDC focus areas and (2) balanced with regard to characteristics of the populations served, type/size of public health department, and geographic region.

Because our methodology relied heavily on the literature and the state progress reports, our final list of practices reflects only those documented in these sources. A more formal or extensive data collection process might have yielded more practices; however, we believe that we located a sufficient number of practices for our initial consideration. A process based on “nominations” from the field or by external experts might have generated a more diverse and richer set of practices to evaluate and should be considered for the future.

When we describe a practice as having been implemented in a given state, that does not mean that the state was the only health department or other healthcare-related organization to have undertaken such activity or that the state or organization’s efforts were any more effective than another’s efforts in the same regard. In addition, while we sought to gain additional detail from relevant points of contact for these practices as well as individuals within the public health community that they intend to serve, we did not implement a full-scale evaluation of the practices (e.g., to verify all the details about system connectedness or about how the practices were perceived by state and local public health departments). As such, no statements of comparative exemplariness or about public health department endorsements of particular practices should be inferred from our report.

We also note that some focus areas lend themselves to an objective evaluation using existing criteria better than others. For example, much work has been done to document what makes a good surveillance system, what constitutes a better training program, and so on. For other areas, criteria have yet to be developed. In addition, the minimum level of acceptable criteria necessary to designate a practice as exemplary also varied by focus area.

As indicated, we have overcome several challenges in our review of potential practices, beginning with initial definitions and potential sources of information. We offer caution with regard to interpreting our nominated exemplary practices without full consideration of the limitations of this study, which include those imposed by our methodology, the lack of available external objective criteria for evaluating these practices, and, in some cases, the lack of evidence of effectiveness for preparedness activities within the public health field more generally.

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APPENDIX A: DESCRIPTION OF CDC FOCUS AREAS, HRSA PRIORITY AREAS AND ESSENTIAL PUBLIC HEALTH FUNCTIONS

CDC Focus Areas:

- Focus Area A: Preparedness planning and readiness assessment: assessment of legal authorities, development and testing of response plans.
- Focus Area B: Public health surveillance and detection activities: assessment of completeness and timeliness of mandatory disease reporting, epidemiological response capability.
- Focus Area C: Laboratory capacity—biological agents: capacities of computerized laboratory management system to securely transmit data among laboratories and with public health officials.
- Focus Area D: Laboratory capacity—chemical agents: (NA in FY 2003).
- Focus Area E: Health Alert Network/communications and information technology: procedures and communications technology to facilitate communication among healthcare providers, public health agencies, and others during a public health emergency.
- Focus Area F: Risk communication and health information dissemination (public information and communication): preparation of pre-approved risk communication messages; prior identification of community groups to aid in dissemination of information to hard-to-reach groups.
- Focus Area G: Education and training: development of effective distance learning approaches for training of local health department personnel; use of drills and/or exercises to evaluate readiness of state and local health officials.

HRSA Priority Areas: The HRSA Priority Areas are as follows:

- Governance and administration, including program direction and financial accountability.
- Regional surge capacity for the care of adult and pediatric victims of terrorism, which addresses hospital bed capacity, isolation capacity, healthcare personnel, pharmaceutical caches, personal protection and decontamination, mental health, trauma and burn care capacity, and communications and information technology.
- Emergency medical services.

- Linkages to public health departments, including hospital laboratories, surveillance, and patient tracking.
- Education and preparedness training.
- Terrorism preparedness exercises.

Essential Public Health Services: The 10 Essential Public Health Services (Public Health Functions Steering Committee, 1994) are as follows:

- Monitor health status to identify community health problems.
- Diagnose and investigate health problems and health hazards in the community.
- Inform, educate, and empower people about health issues.
- Mobilize community partnerships to identify and solve health problems.
- Develop policies and plans that support individual and community health efforts.
- Enforce laws and regulations that protect health and ensure safety.
- Link people to needed personal health services and assure the provision of healthcare when otherwise unavailable.
- Assure a competent public health and personal healthcare workforce.
- Evaluate effectiveness, accessibility, and quality of personal and population-based health services.
- Research for new insights and innovative solutions to health problems.

APPENDIX B: SUMMARY TABLE OF PRACTICES SELECTED AS EXEMPLARY

Table B.1 Summary of Exemplary Practices

Name of Practice	CDC Focus Area Addressed							Hospital Preparedness	Developer		Geography		Population		
	A	B	C	D	E	F	G		Level of Org.	Type of Org.	State	Region	Size	Urban/Rural	Minority Population
Computer-Assisted Emergency Notification System “Citywatch”	X					X			State	Public Health	IL	MW	12.4 M	Mixed	<30%
Real-Time Outbreak and Disease Surveillance (RODS)		X							UPMC	Academic	PA	NE	12.2 M	Mixed	<20%
North Carolina Public Health Regional Surveillance Teams		X							State	Public Health	NC	S	8M	Mixed	<30%
Hospital Emergency Response Data System (HERDS)	X	X			X			X	State	Public Health	NY	NE	19M	Mixed	<29%
New York City Syndromic Surveillance System		X							Local	Public Health	NY	NE	8M	Urban	<60%
Increasing Laboratory Capacity to Respond to Bioterrorism Agents— Mobile BSL-3 Lab			X	X					State	Public Health	SD	MW	750K	Mostly rural	<10%
Maintaining Connectivity with Sentinel Labs			X	X					State	Public Health	MN	MW	5M	Mostly rural	<10%
Medical Operations Center					X			X	Local	Other public org.	TX	S	1.2M	Urban	<50%
Hospital Mutual Aid Radio System					X			X	State/local	Other public org.	DC	Mid-Atlantic	575K	Urban	<70%
Risk Communication Needs Assessment	X					X			State	Public Health	PA	NE	12M	Mixed	<15%
University of Illinois - Chicago Learning Management System							X		UIC	Academic	IL	MW	N/A	N/A	N/A
Florida Epidemiology Intelligence Service		X					X		Local	Public Health	FL	S	16M	Mixed	<35%