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**LEVERAGING A STATEWIDE IMMUNIZATION  
REGISTRY TO SUPPORT BIOTERRORISM  
PREPAREDNESS PLANNING:  
A CASE EXAMPLE IN LOUISIANA**

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**Preface**

Immunization information systems have been a major initiative in the United States since the mid 90s. Many states have continued to evolve their capabilities to collect vaccination records from local and private providers, Medicaid, HMO and WIC programs. Registry projects focused on vaccine preventable diseases now include features to support smallpox vaccination initiatives. State and CDC funding to support immunization programs continues to be available; however, new funding targets integration of services and public health preparedness.

Immunization programming has served as the cornerstone of many emerging state technical infrastructures. This infrastructure is currently being expanded through CDC National Electronic Disease Surveillance System (NEDSS) and Public Health Integrated Network (PHIN) efforts<sup>1</sup>. As such, it is essential that immunization registries continue to expand. Key issues will be the ability of state immunization registry efforts to assist in overall public health preparedness activities and continued system evolution to support PHIN and bioterrorism related initiatives. One method of addressing these issues will be to collaborate with state homeland defense and NEDSS programs to add system functionality and secure funding to support these efforts.

**Background**

In response to the anthrax events of October 2001, the federal government appropriated significant funds to improve the national public health system. The immediate intent of this appropriation was to prepare for detection of, response to, and rapid recovery from acts of biological or chemical terrorism. The long-term goal of these funds was

the development and institutionalization of sound public health practices. Specifically, this funding was intended to increase capacity, enhance public health response in the case of a bioterrorism event and improve public health infrastructure<sup>2</sup>.

Between July 31 and August 2, 2003, the Louisiana Department of Health and Hospitals, Office of Public Health (DHH/OPH) conducted a drill to test the state's capacity to respond to a bioterrorism event. This drill was designed to evaluate the preparedness of state agencies in response to a specific outbreak<sup>3</sup>. In addition, the drill tested statewide distribution capacity in relation to the Strategic National Stockpile. In preparing for the drill, the state determined the possibility of leveraging Louisiana's immunization registry efforts to assist in the exercise. As such, the BT exercise was developed around an outbreak with a mass vaccination component.

The primary goal of the drill was to test preparedness and response as outlined in the seven focus areas of Louisiana's bioterrorism grant:

1. Preparedness planning and readiness assessment: Infrastructure to support public health response.
2. Surveillance and epidemiology capacity: Systems for rapid detection, investigation, and mitigation of disease outbreaks and other public health threats and emergencies.
3. Laboratory Capacity—Biological Agents: availability of core diagnostic capabilities

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<sup>1</sup> Public Health Information Network Functions and Specifications, version 1.2. Centers for Disease Control and Prevention, 2002.

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<sup>2</sup> Continuation Guidance for Cooperative Agreement on Public Health Preparedness and Response. Centers for Disease Control and Prevention. 2002.

<sup>3</sup> LA BT Drill Brief. Welch, Frank. Louisiana Office of Public Health, 2003.

for bioterrorist agents at all state and major city/county public health laboratories.

4. Laboratory Capacity – Chemical Agents.
5. Health Alert Network/Communications and Information Technology: Establish and maintain network for secure and rapid exchange of data over the Internet.
6. Communicating Health Risks and Health Information Dissemination: Capacity to effectively interact with the media and disseminate timely information to citizens during an emergency.
7. Education and Training: Method for assessing and providing education and training to emergency responders.

In addition, Louisiana recognized the drill as an opportunity to test the state's clinic staff in using the immunization registry and possibly raise the state's immunization rates through higher coverage levels. As such, the drill was structured around a mass vaccination effort.

In order to simulate a realistic scenario that included the public presenting themselves to clinics for vaccines, it was necessary to create demand during a specific/limited time period. This was accomplished by targeting parents of children in the 0-2 and 4-6 year old birth cohorts requiring immunizations by offering free immunization services over the course of the weekend selected for the exercise.

The state's registry played a key role in the planning and implementation of the exercise. Core immunization registry functions such as reminder notices, data collection, and assessment/reporting functions were utilized, along with other tools specific to mass vaccination clinics.

#### **BT Exercise Plan**

The drill to test bioterrorism preparedness and response was conducted between July 31 and August 2, 2003. Local Health Clinics were open for 19 hours during the three-day period as follows:

Thursday, July 31, 2003: 2:00 p.m. to 8:00 p.m.

Friday, August 1, 2003: 8:00 a.m. to 5:00 p.m.

Saturday, August 2, 2003: 9:00 a.m. to 1:00 p.m.

Activities were centered on a mass immunization effort initiated by distribution of reminder/recall notices to Louisiana's 0-2 and 4-6 year old birth cohorts. Although there were specific targets for

recall, all patients who presented for immunizations received service. The immunization goal was not only to raise immunization coverage but also to reduce the volume of patients returning for back-to-school shots later in the month.

#### **Objectives**

The primary objective in conducting the drill was to measure the state's capacity to prepare for and respond to a bioterrorism event. The secondary objective was to raise the state's immunization coverage levels.

#### **Use of Immunization Registry Data System**

The Louisiana Immunization Network for Kids Statewide (LINKS), a centralized immunization registry, was the primary tool used to support planning, implementation, and evaluation activities throughout the drill. The LINKS system is a statewide, population-based registry that was deployed in February 2000. In early 2003, two additional modules were implemented to support the recent smallpox campaign, the First Responder Module and the Mass Immunization Module (web-based and stand alone). The Mass Immunization stand alone module was utilized as a contingency system. The data collected through LINKS was used to define the target cohort, identify under-immunized children, and generate reminder/recall notices to notify parents that their children might be due for vaccinations. LINKS was used for collecting immunization information at the time of service for all patients presenting during the drill. Finally, pre- and post-drill coverage level assessments were determined from data stored in LINKS.

#### **Methodology and Budget**

A budget of \$1 million, funded through a CDC bioterrorism grant, was allocated to fund the cost of drill preparation, staffing, facility costs, supplies and media coverage.

#### **Preparation for Drill**

In order to prepare for an event of this magnitude, a great deal of planning took place prior to the event. These activities included the following:

- ◆ Identification of clinics to participate
- ◆ Communication with key stakeholders
- ◆ Selection of appropriate cohort to recall
- ◆ Identification of targeted cohort population through demographic data

- ◆ Preparation of marketing and notification media (postcards, posters, flyers, radio and TV Public Service Announcements)
- ◆ Allocation of staffing resources to ensure sufficient coverage at clinics
- ◆ Assessment of clinic hardware to ensure maximum efficiency during clinics
- ◆ Evaluation of system infrastructure to maximize performance
- ◆ Establishment of an Emergency Operations Center at the state's capital and a Command and Control Center located at the Immunization program headquarters
- ◆ Modifications to LINKS to streamline clinic efforts specific to the drill
- ◆ Analysis of pre- and post-drill data to measure impact

Meetings were held with key stakeholders to ensure complete participation for the event. Public health units across the state were kept informed on a regular basis and provided with important information for ensuring maximum preparedness for the event. Partnerships were established with several departments within the Louisiana Office of Public Health (LOPH), including:

- ◆ Emergency Operations Center (EOC)
- ◆ Bioterrorism Strategic National Stockpile
- ◆ Office of the Assistant Secretary
- ◆ Infectious Disease
- ◆ Medicaid
- ◆ Vital Records
- ◆ Laboratory
- ◆ Immunization Program
- ◆ Pharmacy
- ◆ Environmental
- ◆ Nursing
- ◆ Emergency Management Services (EMS)
- ◆ Information Technology
- ◆ Finance

In addition, LOPH worked with the Louisiana Department of Health and Hospitals (LDHH) Legal and Communications department, as well as the Centers for Disease Control and Prevention (CDC), Scientific Technologies Corporation (STC), City of New Orleans, Medicaid, Health Resources and Services Administration (HRSA), Rotary International, American Red Cross, and the Greater New Orleans Immunization Network (GNOIN).

Roles and responsibilities were outlined for each participating organization. Following is a summary of responsibilities:

### **Louisiana Office of Public Health**

#### **Eighty-Eight (88) Louisiana Office of Public Health (LOPH) Units**

Each clinic:

- ◆ Exercised their regional Strategic National Stockpile (SNS) plan for mass distribution of vaccine/medication
- ◆ Focused on Louisiana's under-immunized children as drill subjects
- ◆ Tested clinic flow patterns for mass vaccination
- ◆ Exercised regional and local chain of command for emergency situations
- ◆ Tested hourly reporting of vital information to the Emergency Operations Center (EOC) in Baton Rouge
- ◆ Tested regional and local inventory control and management during an emergency using the Louisiana Immunization Network for Kids Statewide (LINKS) system
- ◆ Tested emergency supply utilization
- ◆ Tested parking, security, and traffic emergency plans
- ◆ Tested plans for medical emergencies during mass clinics

### **Partnerships**

#### *LOPH EOC*

- ◆ Employed the administrative and operational structure of the Louisiana Office of Public Health Emergency Operations Center (EOC)
- ◆ Executed the functional operation of the EOC, including hourly reporting of personnel, volunteers, and clients by 800MHz radio, which was tested statewide as the primary emergency communication tool and backup system

#### *LOPH Bioterrorism Strategic National Stockpile*

- ◆ Exercised administrative structure at EOC
- ◆ Included participation by CDC representative
- ◆ Tested regional distribution plan
- ◆ Tested local distribution to client

#### *Scientific Technologies Corporation (STC)*

- ◆ Supported and modified LINKS application, which was used and tested as emergency distribution software
- ◆ Collaborated with Immunization Department, DHH Communications and external partners on reminder/recall and barcoding projects
- ◆ Assisted in statewide pre-drill evaluation, including:
  - Identification of under-immunized children, collaboration with Vital Records and Medicaid to obtain and import data into LINKS, and work with DHH/OPH Information Technology partnerships
- ◆ Conducted post-drill evaluation of the LINKS system, network capacity and performance, drill outcomes, and multiple other processes
- ◆ Provided 5 contract employees for on-site technical assistance during the drill

#### *LDHH Communications*

- ◆ Developed a statewide communication strategy/plan/package to inform public of the immunization campaign
- ◆ Utilized television, radio, and newspaper media to disseminate message
- ◆ Distributed marketing posters and flyers statewide
- ◆ Participated in development and production of reminder/recall postcard that was sent to 240,000 children needing vaccinations statewide
- ◆ Participated in on-site evaluation of communication strategies as integral members of the LOPH EOC
- ◆ Provided EOC live communication updates to DHH administration and to the public during the drill

#### *LOPH Pharmacy*

- ◆ Tested 800 MHz radios for pharmacy communications
- ◆ Tested distribution process software
- ◆ Tested ResponseNET inventory control capability using Region 6 as a pilot site
- ◆ Used real-time LINKS data to populate inventory control and distribution software programs

#### *City of New Orleans*

- ◆ Opened distribution clinics at three (3) locations in New Orleans
- ◆ Upgraded city health department equipment based on findings from pre-drill evaluation

- ◆ Developed mass clinic flow processes that were compliant with CDC recommendations
- ◆ Developed staffing patterns appropriate for mass clinics
- ◆ Implemented the LINKS system and barcode scanners at multiple stations in each participating location

#### *Parish of Plaquemines*

- ◆ Upgraded the Parish of Plaquemines equipment based on findings from pre-drill evaluation
- ◆ Developed mass clinic flow processes that were compliant with CDC recommendations
- ◆ Developed staffing patterns appropriate for mass clinics
- ◆ Implemented the LINKS system and barcode scanners at multiple stations in each participating location

#### *LOPH Nursing Services*

- ◆ Conducted OPH nurse training for mass clinic operations
- ◆ Trained nurses statewide in clinic flow processes
- ◆ Conducted statewide LINKS training for nurses and clerks
- ◆ Enlisted professional nurse associations to recruit volunteers for drill clinics
- ◆ Trained non-OPH volunteer nurses to participate in mass clinics

#### *DHH Medicaid*

- ◆ Executed timely data sharing for reminder/recall activities
- ◆ Developed plan to provide immunization information to primary care providers about drill participants

#### *HRSA*

- ◆ Trained numerous private hospital nurses to participate in mass vaccine clinics—many stayed and performed vaccination related activities during drill
- ◆ More than fifteen (15<sup>+</sup>) hospitals sent nurses from around the State
- ◆ More than forty (40<sup>+</sup>) private hospital nurses volunteered during the drill

#### *DHH EMS*

- ◆ EMS personnel participated in drill and performed essential emergency response activities:
  - Crash cart evaluation
  - Emergency situation evaluation and response

- Participated and responded through the State LOPH EOC

#### *Greater New Orleans Immunization Network*

- ◆ Ran mobile van all three (3) days of drill at five (5) locations

#### *LOPH Departments*

- ◆ Conducted prioritization of essential activities that had to continue during the drill:
  - TB active treatment
  - Routine epidemiologic disease surveillance
  - Death certificate issuance

#### *Volunteer Organizations*

- ◆ Numerous volunteer organizations across the state sent volunteers to participate in the mass immunization drill. Information about these volunteers is being collected and summarized.

#### **Allocation of Staff**

Roles and responsibilities for each clinic participant were defined prior to the drill. Clinic stations were structured around a distribution plan previously identified by LA OPH. This distribution plan specified setup of stations for parent/patient greeting, registration, triage, education, vaccine administration, post-vaccination counseling, and discharge/paperwork. In addition, logistics were established for parking, building security, and use of nurse volunteers. Clearly defined roles helped to promote efficient clinic flow throughout the drill.

#### **Technical Preparation for Event**

Several partners were included in the assessment of technical preparation for this event. STC worked with LA DHH and OPH IT representatives, as well as IT representatives from parish health units across the state.

Before the event, all parish health units were given documentation to help them prepare. Parish health units were asked to:

- ◆ Identify all participating LINKS users, i.e., those who would be editing patient records, running reminder/recall, etc.
- ◆ Ensure that the identified participants would have minimal interruptions with other activities.
- ◆ Verify that all of the identified users had valid logins. In earlier observations, STC found that some users were using the password for the login from the saved password selection.

This created a security concern and caused login problems resulting in a call to the Help Desk.

- ◆ Ensure that all users were properly trained in using LINKS.
- ◆ Identify the PCs that would be used and verified the following:
  - The LINKS Intranet URL would be used, NOT the Internet URL. Use of the proper URL from internal OPH employees helped to increase system efficiency.
  - The PC had been tested for LINKS access.
  - The PC was tuned for optimal performance (Internet cache files, adequate disk space, etc.).
  - The proper installation and operation of barcode scanners with the PC.
  - The PC would be available during the time of the drill.
- ◆ Minimize other network applications required to be in use during the drill.
- ◆ Eliminate unnecessary network activity that may reduce the available bandwidth - this may include employees "surfing" on breaks or lunch periods, unnecessary file downloads, streaming media, etc.
- ◆ Ensure that the Contingency Plans were understood and the following tasks had been completed:
  - Contingency Plan "B" – PCI-2000 (local database with Windows application) was installed and tested.
    - Participants were trained in the use of the Mass Immunizations application.
  - Contingency Plan "C" - The paper form for recording demographic, vaccination and vaccine inventory information was available and the participants were familiar with the form. It was recommended that the current consent form, with modification to capture lot number/manufacture, be used for this function.

#### **Modifications to LINKS**

In preparation for the drill, modifications were made to the LINKS application to streamline clinic operations. A barcode that represented the patient's State Immunization Information System (SIIS) ID was added to the reminder/recall postcard. This allowed clinic staff to search efficiently for patients presenting with postcards and reduced data entry. Additionally, printable

screens were added to assist clerks in quickly printing an immunization history for nurses to review.

**Implementation of Barcode Scanners**

To promote use of the barcodes to search for patients, clinics were supplied with barcode scanners. These scanners simplified patient searches by allowing clinic staff to scan the postcard to retrieve the patient record rather than entering in first name, last name, and/or birth date.

**Contingency Plans for Tracking**

**Immunizations**

STC assisted clinic participants in preparing for an unscheduled outage of the LINKS system. The preferred contingency plan was the use of PCI-2000, a stand-alone version of LINKS. Clinics were provided PCI-2000 software and documentation for installation, as well as a CD that contained a snapshot view of the LINKS registry data. Due to time constraints, each clinic limited the PCI-2000 installation to a single workstation.

The secondary contingency plan was to have clinics return to paper processes used before the implementation of LINKS in case PCI-2000 was unavailable.

During the brief LINKS outages, most clinics utilized PCI-2000 to query for immunization

records and paper reporting to track vaccines administered. Administered vaccinations were then entered into LINKS when outages were over.

**Drill Results**

During the three (3) day period, over 11,000 patients received nearly 25,000 vaccinations. In addition to the patients who received needed immunizations, nearly 9,000 more provided complete immunization histories that were not previously available in LINKS. Over 100,000 historical vaccinations were added to the system.

Specifically, ninety-three (93) locations were open across the state to offer immunizations to children identified as under-immunized. In nineteen (19) scheduled hours the following activities occurred:

- ◆ 11,320 participants received immunizations
- ◆ Over 24,000 vaccinations were delivered
- ◆ Over 1,000 LOPH staff participated
- ◆ Over 40 professional hospital nurse volunteers assisted
- ◆ Over 75 community volunteers participated

Table 1 below summarizes the volume of immunizations provided as well as the amount of historical data that was collected during the event.

**Table 1: Summary of Immunizations Provided**

	Patients Receiving Immunizations	Vaccinations Administered	Total Patients w/ Shots Entered into LINKS	Total Vaccinations Added in LINKS	Patients with only Historical Shots Added into LINKS	Total Historical Vaccinations Added
Thurs, 7/31	4,140	9,072	5,598	51,833	2,458	42,761
Fri, 8/1	4,068	8,581	6,947	48,559	2,879	39,978
Sat, 8/2	3,112	6,976	6,631	25,776	3,519	18,800
<b>Total</b>	<b>11,320</b>	<b>24,629</b>	<b>19,176</b>	<b>126,168</b>	<b>8,856</b>	<b>101,539</b>

**Impact on Immunization Coverage Levels**

An assessment of pre- and post-event immunization coverage levels was conducted using the CDC's Clinic Assessment Software Application (CASA). Children 19-35 months of

age in all parish health units across the state were included.

Despite the substantial number of vaccinations administered during the three-day drill, series completion rates among 2 year olds did not show the anticipated increases. The result may have

been attributed to several factors. First, many of the sites had initially low immunization coverage (range: 17.2% to 79.7%, median: 52%), with presumably many children requiring more than one shot or one set of shots to complete the 4:3:1 series. Thus, while many children received shots during the drill, additional follow up visits will be required to complete the childhood immunization series. The population of children attending health units has been greatly in flux due to Louisiana's conversion to Community Care. The result of this conversion is a shift of patients from parish health units to private provider offices. Furthermore, only 23.5% of patients receiving vaccinations during the drill were three years or less (3-) of age. A true test of the effects of the drill will be seen in future National Immunization Surveys (NIS), conducted by CDC.

immunizations. A more accurate depiction of the effects of the drill is demonstrated in Table 2, which shows the percent change of total number of patients in the registry aged 10 and under, as well as the change in the number and percent of under-immunized children before and after the drill. For every cohort in LINKS analyzed, the number of total patient records increased. The number of under-immunized patients also increased for several of the cohorts. This is most likely due to the fact that many of the children presenting for immunizations were very far behind and were entered into LINKS for the first time. By attending the clinic, they did not complete the immunizations series, but were immunized for all doses due on the days of the clinic. The overall percent of under-immunized, decreased for every cohort, with a percentage change ranging from 0.1% to as high as 10.1%.

The largest cohort receiving immunizations was the 4 to 6 year old group needing back-to-school

**Table 3: Vaccination Data Summary**

	Age	Series	Total Patients	Number Under-Immunized	Percent Under-Immunized
Pre Drill (July 28)	1 month	2HepB	937	912	97.3%
	2 months	1DTaP, 1IPV, 1Hib, 1PCV7, 2HepB	1,171	885	75.6%
	3-5 months	2DTaP, 2IPV, 2Hib, 2PCV7, 2HepB	4,829	4,113	85.2%
	6-11 months	3DTaP, 3IPV, 3Hib, 3PCV7, 3HepB	22,065	20,602	93.4%
	12-35 months	4DTaP, 3IPV, 1MMR, 4Hib, 3PCV7, 3HepB, 1Var	130,383	127,559	97.8%
	3 years	4DTaP, 3IPV, 1MMR, 4Hib, 4PCV7, 3HepB, 1Var	70,048	69,405	99.1%
	4-6 years	5DTaP, 4IPV, 2MMR, 3HepB, 1Var	204,638	177,301	86.6%
	7-10 years	5DTaP, 4IPV, 2MMR, 3HepB	111,429	81,617	73.2%
Post Drill (Aug. 2)	1 month	2HepB	992	935	94.3%
	2 months	1DTaP, 1IPV, 1Hib, 1PCV7, 2HepB	1,314	861	65.5%
	3-5 months	2DTaP, 2IPV, 2Hib, 2PCV7, 2HepB	4,947	4,061	82.1%
	6-11 months	3DTaP, 3IPV, 3Hib, 3PCV7, 3HepB	22,261	20,643	92.7%
	12-35 months	4DTaP, 3IPV, 1MMR, 4Hib, 3PCV7, 3HepB, 1Var	131,086	127,990	97.6%
	3 years	4DTaP, 3IPV, 1MMR, 4Hib, 4PCV7, 3HepB, 1Var	70,408	69,692	99.0%
	4-6 years	5DTaP, 4IPV, 2MMR, 3HepB, 1Var	211,743	175,868	83.1%
	7-10 years	5DTaP, 4IPV, 2MMR, 3HepB	111,882	81,553	72.9%
Change	1 month	2HepB	55	23	3.1%
	2 months	1DTaP, 1IPV, 1Hib, 1PCV7, 2HepB	143	(24)	10.1%
	3-5 months	2DTaP, 2IPV, 2Hib, 2PCV7, 2HepB	118	(52)	3.1%
	6-11 months	3DTaP, 3IPV, 3Hib, 3PCV7, 3HepB	196	41	0.6%
	12-35 months	4DTaP, 3IPV, 1MMR, 4Hib, 3PCV7, 3HepB, 1Var	703	431	0.2%
	3 years	4DTaP, 3IPV, 1MMR, 4Hib, 4PCV7, 3HepB, 1Var	360	287	0.1%
	4-6 years	5DTaP, 4IPV, 2MMR, 3HepB, 1Var	7,105	(1,433)	3.6%
	7-10 years	5DTaP, 4IPV, 2MMR, 3HepB	453	(64)	0.4%

Although CASA rates for 19-35 month old children did not increase dramatically as explained

above, Table 3 shows that reminder/recall efforts and media assisted in bringing in key age groups.

**Table 4: Impact of Reminder/Recall Effort on Targeted Age Groups**

	0-2 yrs	3 yrs	4-6 yrs	7-18 yrs	Over 18	Total
Vaccine Family	# of Vaccinations	# of Vaccinations	# of Vaccinations	# of Vaccinations	# of Vaccinations	# of Vaccinations
DTaP/DT/Td*	1,196	172	2,781	2,736	1,849	<b>8,734</b>
HEP-A	4	2	35	60	4	<b>105</b>
HEP-B 3 DOSE**	706	70	234	2,812	97	<b>3,919</b>
HIB	1,030	101	131	9	-	<b>1,271</b>
MMR	506	106	2,169	575	564	<b>3,920</b>
PNEUMO (PCV7)	1,053	93	235	6	-	<b>1,387</b>
POLIO	797	78	2,203	197	2	<b>3,277</b>
VARICELLA	505	115	655	700	18	<b>1,993</b>
OTHER	-	1	-	1	21	<b>23</b>
<b>TOTAL</b>	<b>5,797</b>	<b>738</b>	<b>8,443</b>	<b>7,096</b>	<b>2,555</b>	<b>24,629</b>
<b>% OF TOTAL</b>	<b>24%</b>	<b>3%</b>	<b>34%</b>	<b>29%</b>	<b>10%</b>	

The impact of the drill may be understated because patients were directed to either go to their local parish health unit or visit their private provider for needed immunizations. Since private providers did not participate in the drill, those who visited their provider in response to the reminder/recall postcard could not be measured.

**Immunization Registry Performance**

LA OPH staff monitored performance of LINKS and took hourly metrics of vaccination data to monitor progress. On average, between 350 and 400 users accessed LINKS simultaneously during the drill. During the peak period, approximately 550 users were online querying for patient immunization data. Over the course of the drill, LINKS functioned adequately for clinic participants. There was some downtime throughout the drill as follows:

Thursday: 1.5 hours  
 Friday: 20-30 minutes  
 Saturday: 20-30 minutes

During these times, most clinic staff utilized a contingency plan for data collection. Of those who relied on a contingency plan, most used PCI-2000 to obtain vaccination histories and paper reporting to record administered vaccines. Data was then entered into LINKS when the system returned. Most users believed that contingency plans

worked well during the brief outages. Those who did not use a back up plan during the outages cited that the system was not down long enough to implement the back up system.

**Impact of Reminder/Recall Postcards**

Approximately 240,000 postcards were sent out across the state notifying parents that their child might be due for immunizations. Parents were instructed to visit the parish health units during the drill or to visit their private provider to determine what shots were needed. Under-immunized children were identified by data in LINKS.

Several circumstances contributed to delays in the distribution of the reminder/recall postcards. Some of the reasons included:

- ◆ Technical difficulties associated with Medicaid and Vital Records imports – LA OPH wanted as much data in the system as possible before reminder/recall postcards were generated. Problems with data provided, as well as technical issues occurring when importing data, slowed down population of the database, thereby delaying postcard generation.
- ◆ Finalization of clinic addresses for use in postcards.
- ◆ Time-consuming process of producing and distributing 240,000 postcards.

Many parents did not receive notification that their children were in need of immunizations until the drill was already in process. Feedback from clinic staff surveys suggested that the delayed notification to parents reduced clinic attendance. As a result, LA OPH approved the continued waiving of immunization administration fees for the entire month of August to accommodate those who were not able to attend clinics due to late notice. Clinic attendance remained high throughout the month of August encouraging LA OPH to waive fees throughout the rest of 2003.

Of the 11,320 who presented at a clinic for immunizations, 5,365 (47.3%) were there as a direct result of the reminder/recall postcard. Of the 5,365 who presented, 3,278 received immunizations—the remaining 2,087 provided historical immunization data, completing their record in LINKS.

#### **Staff Satisfaction**

Clinic staff participants were surveyed to determine overall satisfaction with drill results and clinic processes. Participants were asked to identify successes and challenges of the drill and to rate the different components of their clinic's distribution plan. 437 clinic participants responded to the survey, which was offered on the Internet. A summary of results is shown.

Frequently identified areas of success in rank order of importance:

- ◆ Number of children immunized, including ability to provide school immunizations
- ◆ Clinic flow
- ◆ Staff, including amount of staff allocated to each clinic and teamwork among clinic participants
- ◆ Collaboration with other agencies
- ◆ Communication from OPH to clinic staff
- ◆ Use of effective media to promote immunization event
- ◆ Easy access to clinics for parents/patients
- ◆ Use of LINKS
- ◆ Ability to test preparedness

Other successes cited included ability of staff to earn overtime pay, helping local communities, educating staff on current immunization schedule and use of LINKS, increasing immunization rates, providing needed adult immunizations, and amount of data collected.

In addition to successes, staff were also asked to identify challenges occurring during the drill. Below is a summary of responses:

- ◆ LINKS (network speed /performance)
- ◆ Building problems (plumbing, temperature, space, parking)
- ◆ Lack of patient participation
- ◆ Clinic flow
- ◆ Obtaining immunization histories not available in LINKS
- ◆ Late arrival of reminder/recall postcards
- ◆ Lack of local media activities

Additional responses included long hours worked, radio communication problems, hourly reporting burden, difficulty in projecting clinic demand, and equipment problems.

Although users recognized problems with network performance, they were satisfied with the LINKS application. Participants were surveyed on their level of satisfaction--53% were satisfied or very satisfied, 19% were neutral, and 28% were unsatisfied or very unsatisfied.

Additional comments were gathered regarding satisfaction with LINKS. Many respondents believed that LINKS was extremely useful and far more valuable than previously used systems; however, the majority of respondents were frustrated with network slowness and outages during busy clinic times.

Staff were also surveyed on their level of satisfaction regarding various aspects of clinic flow as identified in the distribution plan. Below is a summary of results.

- ◆ Contingency Plan: During the drill, the LINKS system experienced outages. During these times, 88% of respondents used a contingency plan for data collection. Of those who reported the type of contingency plan used, 91% used paper, 7% used PCI-2000, and 2% did not specify. Almost 75% reported that the plan worked well or very well, and only 1% reported that it did not work at all. The majority (84%) of those who did not use a back up plan during the outages cited that the system was not down long enough to implement the back up system.
- ◆ Clinic Station: 93% used the clinic station setup that was in their distribution plan, 85% were satisfied with the clinic station they used.

- ◆ Greeting Station: 90% were satisfied or very satisfied with the greeting station.
- ◆ Registration: 93% were satisfied or very satisfied with registration process.
- ◆ Triage: 90% were satisfied or very satisfied with triage process.
- ◆ Education station: 89% were satisfied or very satisfied.
- ◆ Vaccine administration station performance: 95% were satisfied or very satisfied.
- ◆ Post vaccine counseling station performance: 91% were satisfied or very satisfied.
- ◆ Discharge/paperwork station: 89% were satisfied or very satisfied.
- ◆ Parking situation: 80% were satisfied or very satisfied.
- ◆ Building security: 87% were satisfied or very satisfied.
- ◆ Nurse Volunteers: Of 294 respondents who reported using nurse volunteers, 70% were satisfied or very satisfied, 1% was very unsatisfied, remaining 29% were neutral.

**Assessment of Media Used for Event**

Several methods of media were used to market the event to parents and patients, including television, radio, newspaper, posters, flyers and reminder/recall postcards. A survey of all client participants was conducted to determine the most effective media methods for advertising the immunization event.

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Data was collected by region across the state and the results were similar. Over 55% of respondents identified "Other" media as their primary means of notification for the event. LA OPH believes that the "Other" responses represent those patients that were informed of the event through the newspaper, which was not listed as an option on the survey.

While some regions complained about the delay in sending reminder/recall postcards, the percent of respondents indicating postcards as their means of notification remained high—ranging from 11.5% to 29.7%. Radio, television, and poster/flyer produced the lowest percentage of responses. Several comments from the staff satisfaction

survey indicated that local media was not adequate in their region. Lack of regional media in these categories is the likely reason for the minimized response.

Region	Media Available					Total
	Radio	TV	Poster/ Flyer	Postcard	Other	
1	6	44	6	90	185	331
2	20	15	80	110	145	370
3	n/a	n/a	n/a	n/a	n/a	n/a
4	64	211	210	380	1,023	1,888
5	41	46	49	102	400	638
6	166	227	125	155	410	1,083
7	57	45	77	119	736	1,034
8	32	22	13	60	259	386
9	20	15	125	160	420	386
<b>Total</b>	<b>406</b>	<b>625</b>	<b>685</b>	<b>1,176</b>	<b>3,578</b>	<b>6,116</b>

**Conclusion**

As stated earlier, the purpose of the drill was two fold – to test the capacity and preparedness to respond to a BT event and to increase immunization rates throughout the state of Louisiana. The results of the drill have led to a consensus among the DHH/OPH leadership that the drill was a resounding success.

The capacity of Louisiana to respond to a BT event has been adequately tested and the impact of the drill on the immunization rates lead to the decision to continue the free shot campaign and preserve the momentum generated through the end of the year. The decision to integrate the immunization focus within the drill was made in mid June leaving approximately 1.5 months to plan, prepare and coordinate all efforts. The amount of collaboration between the many immunization program stakeholders was tremendous. The success of the drill was a testament to the large impact the immunization program and the immunization registry have on the state’s capacity to responding to a BT event.

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<sup>4</sup> Presentation for the Concept for an Integrated Bio-Intelligence Network model, Scientific Technologies Corporation Research Agenda, July 2003.

<sup>5</sup> New Hampshire Department of Health and Human Services OTC Syndromic Surveillance Project 2003, Fiedler, Reno and Zhang, Xiahou Scientific Technologies Corporation and Miller, Stephanie New Hampshire Department of Health and Human Services.

<sup>6</sup> University of Washington, Emergency Room Surveillance Report.

<sup>7</sup> New Hampshire ED Syndromic Surveillance Assessments 2002-2003

<sup>8</sup> City of Mesa Fire and Rescue, Use of EMS Run Data to Support Syndromic Surveillance - Final Report 2002, Scientific Technologies Corporation,

<sup>9</sup> North Dakota Ask a Nurse Program Plan

<sup>10</sup> Annotated Bibliography for Syndromic Surveillance. CDC, EPO, PHSI (Rev. 8-13-03)

<sup>11</sup> CDC NEDSS Logical Data Model,

<sup>12</sup> Epidemiologic Response System, New York City, ESRI and STC Development Project.

<sup>13</sup> Draft Framework for Evaluating Syndromic Surveillance Systems for Bioterrorism Preparedness. CDC, EPO, PHSI (2003)