

The CODE RED Solution—Biothreat Response Training for First Responders

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Abstract

The terrorist events of 2001 brought to light the need for a close working relationship between the first responder communities and the public health laboratories in New York State (NYS). Since 2002, the Wadsworth Center's Biodefense Laboratory (BDL) has been providing outreach training to first responders in New York, to enable them to respond safely, correctly, and confidently to biothreat events. A pocket trifold was developed, titled "CODE RED," which describes sampling protocols, risk analysis criteria, and important contact information for use during an emergency response to a potential bioterrorism situation. In addition, the BDL has provided training to more than 1,000 first responders in the basic knowledge of biothreat agents, routes of dissemination, sampling and decontamination methods, contamination control protocols, biothreat risk assessment, and legal chain of custody procedures. The training methods have been established for use by first responders wearing personal protective equipment (PPE). All states can benefit from highly trained first responders who are capable of efficient, safe, and effective biothreat response, resulting in increased safety of the first responders and laboratorians, as well as decreased turnaround times for laboratory results. The CODE RED trifold provides a working model for training first responders at the state and county levels for emergency biothreat response.

Background

Since 2002 the New York State Department of Health's Wadsworth Center Biodefense Laboratory (BDL) has been involved in outreach training of NYS first responders, to provide them with the knowledge and tools needed to respond safely, correctly, and confidently to biothreat events. The first biothreat sample was received at the Wadsworth Center in 1999. Although preliminary communication lines had been established between law enforcement and the laboratory, it quickly became apparent that the two groups' perspectives on sample collection and packaging differed significantly. The laboratory gave instructions that a triple containment system should be used during the collection and packaging of the suspect sample. Once the sample had been received by the laboratory, however, it became evident that the need to use three layers of easily removable, seal-

able Ziploc bags had not been stated clearly and the interpretation of the instructions by the responding sample collection team had been quite different: The sample that arrived was triply contained with layers of duct tape. Although this containment system did indeed meet the laboratory's stated requirement for three layers, and it did prevent any material from leaking out during transport, it also required the laboratorians to work strenuously for over four hours to open the package safely within the Biosafety Level 3 (BSL-3) laboratory. This first sample foreshadowed the events of 2001, when 906 samples were received by the Wadsworth Center following the intentional release of anthrax in the mail system; 24 of these samples tested positive for the weaponized bacterium. The laboratory staff expanded from three laboratorians to more than 20, through the redirection of experienced staff from other laboratories to assist with sample triage, receipt, processing, documentation, and testing.

Several other BSL-3 laboratories within the Wadsworth Center had their normal work suspended, so that teams of two laboratorians could process samples around-the-clock in order to meet the urgent demands of sample testing and reporting. It soon became apparent however, that these samples were only the beginning and this influx would not subside until 2002. The New York State Police Forensic Investigation Center became the triage site for all samples intended for processing at the laboratory, and the state police soon found themselves inundated with mostly noncredible samples. The ability of the state police to quickly determine threat level and to decide which samples required priority testing proved to be an invaluable asset, allowing the laboratory to focus only on priority samples and avoid dedicating resources and time to risk/threat assessments. However, the laboratory continued to receive credible samples that were improperly packaged for rapid high-priority testing.

These packaging problems proved to be time-consuming and cumbersome and at times posed a danger to personnel working in the BSL-3 laboratory. Improperly packaged samples can take two to three times longer to process and have the added danger of cross-contamination (i.e., contamination of the laboratory itself and of samples subsequently tested there), a factor that must be taken very seriously within a public health testing facility. The consequences of a contaminated laboratory are enormous; all testing within the larger facility may need to be suspended to ensure the safety of the personnel, as well as the integrity of the scientific testing. The

Wadsworth Center's laboratories worked meticulously and cautiously with each sample, regardless of packaging or credibility, to ensure that neither the laboratory nor the staff were compromised or contaminated during this event. But this impressive track record does not negate the stress on the laboratory staff or the additional time needed to process low-risk or improperly packaged samples.

In early 2002, as the influx of samples began to subside, it became clear that the laboratory had a new task beyond its ongoing response to and testing of biothreat samples—namely, the training of first responders in biothreat response. A mechanism was needed to inform all first responders of: 1) the potential risks associated with response to a biothreat situation; 2) the appropriate personal protective equipment (PPE) required; and 3) the importance of information-gathering for use in risk assessments. A concise and easy-to-use protocol needed to be devised and deployed, so that first responders in the state would know how to collect and package a biothreat sample in a manner that would not only protect the first responder from accidental infection or contamination but also would provide the testing laboratory with an appropriate sample that was safe and easy to process.

Integral to this information outreach protocol would be contact information available to the first responder community on a 24-hour, seven-day per week basis (CDC, 2006). In early 2003, the New York State Department of Health released the CODE RED trifold brochure to first responders and laboratories in the state; since then, approximately 5,000 CODE RED trifolds have been distributed. This initial trifold has since evolved into an extensive training course, tailored to each audience's specific level of expertise, and has been provided to more

than 1,000 first responders and law enforcement personnel throughout New York State.

The CODE RED Solution

The CODE RED Trifold

The CODE RED trifold (Figure 1) is a wallet-sized card that is divided into four basic sections—Section 1: Materials, PPE, and Contact Information (Figure 2); Section 2: CODE RED mnemonic (Figure 3); Section 3: Risk Assessment Criteria (Figure 4); and Section 4: Annotated Collection Procedure (Figure 5).

The CODE RED Training Program

To effectively communicate the information highlighted on the CODE RED trifold, a training module has been developed to give first responders basic knowledge of biothreat agents, routes of dissemination, sampling and decontamination methods, contamination control protocols, biothreat risk assessment, and legal chain of custody procedures. Additionally, these training methods have been established for use by first responders wearing PPE ranging from Level C to Level A.

The training module is offered in a range of formats depending on the specific requirements of the first responder team. The basic CODE RED training is a three-hour class that focuses on information on biothreat agents, followed by an overview of the CODE RED collection procedure and biothreat risk assessment training. An initial demonstration allows participants to see several simulated collections taking place; the demonstrators emphasize techniques that will protect the first responder and minimize the potential for cross-contamination. The

Figure 1

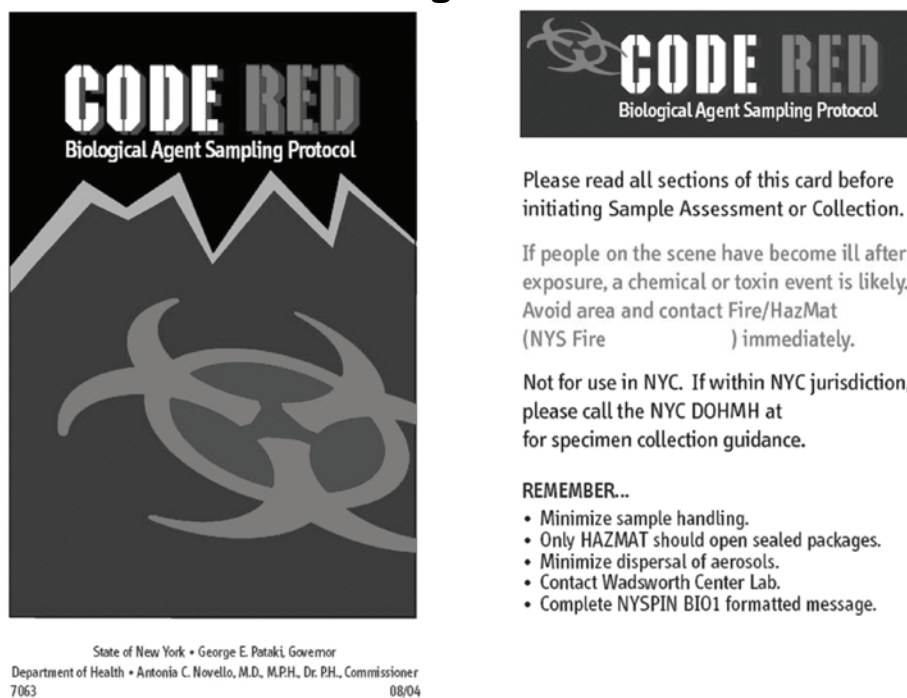


Figure 2

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| <p>COLLECTION MATERIALS (PER SAMPLE) 2 pair of protective gloves per person N95 (or better) respirator 2 Ziploc bags Fresh 10% bleach (decontamination solution) Documentation 1 hard-sided container or Tupperware Evidence tape</p> <p>SAMPLE SWIPE KIT One 2x2 inch, sterile, non-cotton gauze Small bottle sterile liquid (saline or water)</p> <p>TESTING LABS Wadsworth Center Lab: Erie County Lab: Westchester County Lab: NYSDOH After Hours Duty Officer:</p> <p>LAW ENFORCEMENT Albany FBI: Buffalo FBI: New York City FBI:</p> <p>Regional NYSP: _____ UNYRIC:</p> <p>Mandatory Notification: Alert Upstate New York Regional Intelligence Center (UNYRIC), via NYSPIN BIO1 Format Message: (type CTRL-A) BIO1 (XMIT)</p> <p>Local Health Dept: _____</p> |
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Figure 3

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| <p>BIOHAZARD SAMPLING SOP</p> <p>Control Scene Restrict access, contain area, minimize airflow around specimen, record names and contact information of people in area.</p> <p>Open Dialog Call appropriate law enforcement, Wadsworth Center, and local health (page 2).</p> <p>Determine Biohazard Credibility In collaboration with above groups, evaluate using Credible Biohazard Criteria (page 4).</p> <p>Employ Collection Protocol Gather Collection Material (page 2) and if necessary Sample Swipe Kit (page 2). Follow Annotated Collection Procedure (page 5)</p> <p>Remove Contamination Use 10% bleach for solid surfaces and outer package, remove personal protective equipment (PPE), wash hands.</p> <p>Enter Information Fill out BD Custody and BD Submission forms (available on CTN or HAN).</p> <p>Dispatch Specimen Coordinate transport, notify testing lab with ETA, dispatch specimen and documentation, launder clothes after shift.</p> |
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participants are then given a post-class test, in which they assess the risk in multiple mock biothreat events and participate in hands-on sample collection, providing them with the opportunity to become familiar with the specific roles described in the CODE RED collection procedure.

This basic training module is provided to first responders at the local level who are routinely involved in response to isolated, lower-credibility biothreat incidents. Approximately 800 local law enforcement, fire, Hazmat and emergency medical technicians have participated in this basic training module. By using a train-the-trainer format, local representatives are encouraged to return to their respective agencies and train additional first responders in their communities on the use of the CODE RED trifold in a biothreat event.

The CODE RED training module has also been expanded into a two-day training session with more in-depth background information and an intensive hands-on training session. Participants are involved in multiple collection scenarios designed to cover a wide array of possible situations. The second day of the in-depth course is a multi-scenario drill that incorporates the use of specific levels of PPE (from Level C to Level A), multiple sample collection types, personnel and sample decontamination procedures, situation briefing/debriefing and radio communications. This hands-on drill emphasizes the importance of using a two-person collection team, and allows participants to explore how to best incorporate this technique into their existing incident command framework.

The advanced CODE RED training module has been provided to state and Federal first responders because of their involvement in large-scale biothreat event response. Since 2005, this advanced training course has been provided to approximately 80 NYS Office of Fire Prevention and Control (OFPC) officers in order to ensure that OFPC personnel throughout the state have been adequately trained, and are familiar with using the CODE RED protocols while wearing Level A PPE.

Additionally, advanced training has also been provided to 22 members of the National Guard 2nd Civil Support Team and 80 members of the NYS Police Contaminated Crime Scene Emergency Response Team (CCSERT). In conjunction with the NYS OFPC, the NYS Centers for Environmental Health and the NYS Department of Environmental Conservation, the Wadsworth Center has begun to expand the CODE RED training module to include Chemical, Radiation and Unknown Hazard Response training in an effort to provide NYS with a comprehensive response plan to terrorist events (Markenson et al., 2005; U.S. Department of Homeland Security, 2006). Currently, however, the CODE RED trifold is not intended for use in the event of a chemical or mixed-agent release and all samples deemed a credible biothreat should be pre-screened in the field for explosive, chemical or radiological threats prior to being transported to the laboratory for testing.

The overall success of the CODE RED training program stems in part from the integration of key training

Figure 4

Evaluate biohazard threat using Criteria below.
Call Wadsworth Center Biodefense Laboratory at (518) _____ to help in assessment as Criteria may change after an event.

These questions are meant to HELP evaluators make decisions on-site. Evaluators should use their professional judgment to collect and submit samples for laboratory testing.

CREDIBLE BIOHAZARD CRITERIA

- 1) Was there a **THREAT**?
- 2) Was there **VISIBLE MATERIAL**?
- 3) Was there an **UNCERTAIN ORIGIN**?
- 4) Was there an **EXPOSURE**?

RESULT A: Answer is YES to Criteria 1 (regardless of others). **Potential crime.** Collect and treat sample as evidence for criminal prosecution. Discuss need for laboratory testing with Wadsworth Center.

RESULT B: Answer is YES to Criteria 1, 2, 3, 4. **Potential biohazard and crime.** Collect and treat sample as evidence for criminal prosecution. Submit to lab.

RESULT C: Sample does not meet Result A or B criteria. Treat as nuisance material. Collect and dispose of according to local SOP.

Figure 5

Annotated Collection Procedure (annotated from BD Environmental Sampling Protocol available on HAN and CTN)

1. Get Collection Materials.
2. Don appropriate PPE in clean area.
3. If sample (e.g., letter) will fit directly into Ziploc bag, do so and skip to Step 8, otherwise get Sample Swipe Kit and proceed to Step 4.
4. Open sterile gauze square.
5. Dampen gauze with sterile liquid (should NOT be dripping wet).
6. Take one open Ziploc bag and dampened gauze to collection site.
7. Touch wet gauze to powder or swipe surface (~ 10 inches X 10 inches) and place gauze in Ziploc bag.
8. Hand bag to second person wearing gloves to close (don't force air out of bag).
9. Remove gloves and place in second bag.
10. Have second person place bag containing sample in second bag (containing gloves from step 9) and seal.
11. Have second person spray outside of outer bag with 10% bleach.
12. Place decontaminated bags in hard-sided container and close.
13. Secure access to container with 2 inches of evidence tape.
14. Remove PPE and wash hands with soap and water for 3 minutes.
15. Proceed to Enter Information.

aspects, including the use competent instructors, well-developed course materials, extensive hands-on training, and easy accessibility to the program (Clizbe, 2004). Wadsworth Center personnel travel throughout New York State providing tailored CODE RED training to interested first responder communities free of charge. This system relieves local agencies of any financial burden associated with personnel travel or instructor costs, and ensures a high level of participation in the training session. Organizations interested in obtaining CODE RED training contact the Wadsworth Center BDL through their local Bioterrorism Coordinators, local law enforcement agencies or local health departments.

The CODE RED Collection Kit

To provide a consolidated approach to biothreat emergency response within NYS, a CODE RED Collection Kit was designed and has been made available, free of charge, to all first responder communities. The CODE RED Collection Kits include all materials needed to properly package and decontaminate two to three biothreat samples, and a hard-sided transport container that will ensure the safe transport of the samples to the laboratory.

A key component of the success of the collection kit has been the involvement of both the laboratory and the first responders in its design and implementation. The laboratory evaluated sample testing methods and prepared the first kit prototype to meet all the required laboratory safety standards. The kit was then evaluated by first

responders in varying levels of PPE, since it was critical both that the first responders are able to follow the protocol and that the kit components are easy to handle in all types of situations. The resulting kit is easy to store, and includes sterile, certified collection materials, a CODE RED trifold, an annotated CODE RED Sample Collection Procedure, and a Biothreat Risk Assessment Questionnaire. Most importantly, the state-wide deployment of the CODE RED Collection Kits ensures that all first responders are utilizing the same techniques, protocols, and materials, giving the laboratory added confidence in the integrity of the biothreat sample, and facilitating sample testing.

Overall Impact

The CODE RED solution has had a significant impact on the relationship between first responder/law enforcement communities and the state public health laboratory.

First Responders

First responders have gained confidence in dealing with biothreat situations by having a clearly defined protocol to follow. The hands-on training provided in addition to the CODE RED trifold gives law enforcement officers a basic understanding of the agents that are most likely to be used as bioweapons and bolsters their confidence for the implementation of the sampling protocols

during future events. The easy integration of the CODE RED sampling protocol into existing law enforcement protocols is an important factor in the general acceptance of these techniques within this non-laboratorian based community. The ability to make sound risk assessments during response to an event has decreased the level of anxiety in the first responder community as well as the amount of effort dedicated to the collection and submission of non-credible samples. Additionally, first responders have become aware of the willingness of the BDL to aid them in risk assessment analysis, collection/sampling approaches, and appropriate levels of emergency response.

The provision on the CODE RED card of 24/7 contact information has increased the communication between the laboratory and the first responders, further solidifying this invaluable working partnership (Werner, 2005). After-hours calls are received by a state-wide duty officer who in turns contacts the director of the BDL for communication with the agency involved in the biothreat event.

State Public Health Laboratory

In 2002, the number of samples submitted for biothreat testing decreased, reflecting a decrease in the nation's threat level. However, following the introduction of the CODE RED solution in 2003, the BDL staff immediately noticed two important changes in sample workload. First, the number of non-credible samples submitted decreased, due to more effective risk assessments taking place, which in turn further decreased the overall number of samples being submitted for testing. Second, as the CODE RED sampling protocol began to be implemented in the field, samples that came into the laboratory were properly packaged, and critical information needed for priority testing assessment was included. This led to a two- to three-fold decrease in sample processing times, greatly improved turnaround times (from sample processing, testing and final results reporting) and allowed the laboratory to restrict highly focused testing to only the higher-priority samples. Although improperly packaged samples still do, on occasion, arrive at the BDL, the CODE RED Training Solution has provided the laboratory with a feedback and training mechanism to ensure that the submitting agency becomes aware of, and its personnel properly trained in, the sample collection and submission requirements.

Limitations

The most significant limitation of the CODE RED solution is the large number of first responders who require training within New York State. Over 70,000 police officers alone could benefit from this training; however, with a training staff of three, the BDL is not capable of personally training each of these first responders in the CODE RED solution. Additionally, high staff turnover,

retirements, and loss of lives in 2001 pose a significant problem in maintaining the number of trained NYS first responders at a maximum. The use of the CODE RED trifold, along with a train-the-trainer format, helps to ensure that all first responders have access to critical information even if they do not directly participate in a CODE RED training module.

Conclusions

The CODE RED solution has helped to bridge the gap that previously existed between the first responder communities and the public health laboratory within New York State. The increased collaboration and information exchange between laboratorians and law enforcement has begun a shift in our community's response to not only biological, but also chemical and radiological, threat response. The integration of the two groups' priorities and limitations ensures that first responders are adequately trained and equipped to respond to a wider array of hazards, and that the laboratory is capable of testing the collected samples. The CODE RED solution has provided New York State with a mechanism to unify the various groups involved in public health emergencies, thereby strengthening the state-wide emergency response system.

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References

- Centers for Disease Control and Prevention (CDC). (2006). *Public Health Emergency Response Guide for State, Local, and Tribal Public Health Directors*. Atlanta: Centers for Disease Control and Prevention. Available at: www.bt.cdc.gov/planning/responseguide.asp. Accessed on November 6, 2006.
- Clizbe, J. A. (2004). Challenges in managing volunteers during bioterrorism response. *Biosecur. Bioterror.*, 2, 294-300.
- Markenson, D., Reilly, M. J., & DiMaggio, C. (2005). Public health department training of emergency medical technicians for bioterrorism and public health emergencies: Results of a national assessment. *J. Public Health Manag. Pract.*, (Suppl: S68-S74).
- U.S. Department of Homeland Security. (2006). *National Response Plan*. Washington, DC: U.S. Department of Homeland Security. Available at: www.dhs.gov/xprepresp/committees/editorial_0566.shtm. Accessed on November 6, 2006.
- Werner, D., Wright, K., Thomas, M., & Edgar, M. (2005). An innovation in partnership among first responders and public health: Bridging the gap. *Public Health Rep.*, 120(Suppl 1), 64-68.