

Promoting Community Preparedness: Lessons Learned From the Implementation of a Chemical Disaster Tabletop Exercise

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Abstract:

Health educators are frequently called on to facilitate community preparedness planning. One planning tool is community-wide tabletop exercises. Tabletop exercises can improve the preparedness of public health system agencies to address disaster by bringing together individuals representing organizations with different roles and perspectives in specific disasters. Thus, they have the opportunity to identify each other's roles, capabilities, and limitations and to problem-solve about how to address the gaps and overlaps in a low-threat collaborative setting. In 2005, the North Carolina Office of Public Health Preparedness and Response developed a series of exercises to test the preparedness for chemical disasters in a metropolitan region in the southeastern United States. A tabletop exercise allowed agency heads to meet in an environment promoting inter- and intraagency public—private coordination and cooperation. The evaluation results reported here suggest ways in which any tabletop exercise can be enhanced through recruitment, planning, and implementation.

Keywords: health education | health educator roles | public health | public health preparedness | community preparedness | health promotion

Article:

Responding to public health disasters is a cornerstone of public health preparedness (Hughes & Gerberding, 2002; Lurie, Wasserman, & Nelson, 2006; U.S. Department of Homeland Security [USDHS], 2003). The Society for Public Health Education (SOPHE) recently initiated some training programs to prepare health educators for an active role in disaster response and preparation, particularly in crisis and emergency risk communication (SOPHE, 2007a, 2007b). Health communication theory concepts, which are used to change awareness and health behavior within populations, provide valuable lessons for crisis and emergency risk communication (Glick, 2007). Seen as having expertise in health communications, health educators may be

called on to serve as crisis and emergency risk communicators. In addition, health educators typically have expertise in program planning, implementation, evaluation, training, and community building and, as a result, they may also be called on to serve as community conveners, community-wide and interagency planners or facilitators of planning, trainers, and evaluators. All these roles are consistent with the health educator responsibilities and competencies defined by the National Health Educator Competencies Update Project (National Commission for Health Education Credentialing, Inc, 2006).

This article provides recommendations for health educators who are involved in designing and implementing one form of preparedness planning and training—tabletop exercises. Tabletop exercises address the need for coordinated responses of multiple agencies. The recommendations here are based on the evaluation of a recent chemical disaster tabletop exercise in the southeastern United States from its planning phase through its implementation. Many of our recommendations are applicable to both discussion-based (e.g., tabletop) and functional exercises (i.e., realistic and real-time exercises that test specific functions or subfunctions and simulate the movement of equipment and personnel) and can serve as guidelines for health educators involved in disaster preparedness efforts.

INTRODUCTION

Public health disasters such as bioterrorism, chemical disasters, and natural disasters require a nonroutine response from public health agencies. Agencies must work with different people and organizations, carry out different tasks, and use different resources (Butler, Cohen, Friedman, Scripp, & Watz, 2002; Hoffman & Norton, 2000; Lurie et al., 2006; U.S. General Accounting Office, 2003; Wise & Nader, 2002). Efforts to increase public health disaster preparedness call for participation by a full array of the partners who would participate in an actual emergency and a conscious effort by all to gain a clearer, deeper understanding of the other partners' roles, capabilities, and limitations (Richter et al, 2005; USDHS, 2007a). In different types of disasters (e.g., hurricanes, chemical spills), partners' roles will vary because of the disasters' specific impacts on the infrastructure, the environment, and the community (Kroll-Smith & Couch, 1991; Kroll-Smith & Murphy, 2006). Interagency collaboration around preparedness and response is challenging because of differences in culture, work style, and mission (Lurie et al., 2006). For example, public health departments typically have a culture of planning and implementation based on consensus compared with the rapid-response, hierarchical culture of emergency preparedness and response and of law enforcement agencies. As a result, public health agency personnel are sometimes uncomfortable with the hierarchical command structure used in disaster management. In addition, hospitals and emergency preparedness and response agencies may be wary about public health agencies' roles in disaster preparedness and response as public health has been perceived as a latecomer to preparedness (Lurie et al., 2006).

It is often difficult to know whether agencies and communities are prepared for disasters because, first, it involves assessing how they will address situations that rarely occur (e.g.,

bioterrorism) and these situations will vary significantly in scope, severity, and numbers of people affected. Second, there are no clear recognized standards for assessment (Asch et al., 2005; Biddinger et al., 2008; Costich & Scutchfield, 2004; Lurie et al., 2006; Nelson, Lurie, & Wasserman, 2007; Seid et al., 2007). Preparedness assessment usually takes one of two forms: (a) assessment of capacity (i.e., the structural elements of preparedness such as the quality of plans and infrastructure—usually assessed through paper assessments) or (b) assessment of processes (e.g., exercises designed to test performance based on realistic scenarios or actual performance during events such as infectious disease outbreaks; Lurie et al., 2006). The latter process measures such as exercises have been found to be more accurate in assessing preparedness and can also serve planning and training functions. That is, not only do agencies learn more about their capabilities, they also build them as they learn about the gaps and deficiencies.

The USDHS recommends that preparedness training events escalate in complexity to build public health and emergency response system capacity. In increasing levels of complexity, preparedness training may include seminars, workshops, tabletop exercises, games, drills, functional exercises, and full-scale exercises (USDHS, 2007b). Exercises simulating emergencies can improve preparedness by educating individual personnel about disaster plans and procedures and by critiquing individuals' actions and, at the systems level, by identifying gaps in resources and interagency coordination that would be visible only when an event really occurs (Biddinger et al., 2008; Dausey, Buehler, & Lurie, 2007; Lurie et al., 2006). Exercises are without threat unlike actual events and allow community partners to work through details of disaster preparedness and response. In particular, tabletop exercises provide important opportunities for public and private partners to come together in a low-threat collaborative environment to network with each other, to learn about each other's perspectives, to discuss what needs to be done in a specific type of disaster, and to problem-solve around issues that are identified (Biddinger et al., 2008; Dausey et al., 2007; Lurie et al., 2006; Nelson et al., 2007; Richter et al., 2006; Sarpy, Warren, Kaplan, Bradley, & Howe, 2005; Seid et al., 2007). Thus, exercises can be instrumental in developing and improving relationships needed to prepare for and respond to disasters.

The tabletop exercise described here was part of a series of exercises designed to test preparedness for chemical disasters in a metropolitan region in the southeastern United States. The series consisted of four events: two discussion-based exercises (a senior leadership seminar and a tabletop exercise) and two operations-based exercises (a functional exercise, which is designed to test specific functions such as command centers or multiple functions and which simulates the movement of equipment and personnel, and a full-scale exercise in the community). The senior leadership seminar was designed to engage top organizational leaders in a discussion of the policy issues inherent in chemical disasters (Sarpy et al., 2006) and to get leaders to commit organizational personnel to participate in the rest of the series (North Carolina Office of Public Health Preparedness, 2004). The tabletop exercise was designed to “allow

functional heads of agencies and organizations that would be involved in or affected by a release of toxic chemical agents to practice established plans and procedures in an environment that promotes interagency, intra-agency and public-private cooperation and coordination” (North Carolina Office of Public Health Preparedness, 2005). Immediately following the tabletop exercise, an incident command system (ICS) exercise was undertaken that was designed to allow responsible personnel at hospital, county, and state operational centers to practice the steps they would go through to respond to a chemical disaster. The ICS is a standardized organizational structure designed to help manage communications and resources in the event of a disaster. The ICS generally occupies a secure physical location, with communications equipment, facilities, and a seat for each participating agency (Federal Emergency Management Agency, 2005). The field exercise, the last of the series, simulated a chemical disaster in the community. In the field exercise, individuals representing all levels of response, for example, senior leaders, upper management, command and control (i.e., those in the hierarchical command structure who are designated as commanders over personnel, equipment, communications, facilities, and procedures in the event of a disaster), and technical response personnel, worked together to neutralize a chemical threat.

The exercise series was consistent with the standards of the Homeland Security Exercise and Evaluation Program (USDHS, 2003, 2007a) and the National Incident Management System. The exercise series focused on a response to a specific public health threat, was realistic, included multidisciplinary representation, was regional, and was structured to assess and improve performance. For a more detailed description of how to design and evaluate exercises, interested readers could consult the Homeland Security Exercise and Evaluation Program at https://hseep.dhs.gov/pages/1001_HSEEP7.aspx.

PLANNING FOR AND IMPLEMENTING THE TABLETOP EXERCISE

Planning

The tabletop exercise was initiated by the North Carolina Office of Public Health Preparedness and Response. An organization with expertise in exercise development was contracted to design the series of four workshops. This organization worked with an exercise planning team to identify the scope of the exercise, decide on needed participants, and develop exercise scenarios. Planning team members included representatives of the funding agency, the contracted organization, external partner organizations (e.g., Emergency Management [EM], the State Laboratory of Public Health, the Department of Environmental and Natural Resources, the Federal Bureau of Investigation), and two members of the evaluation team.

The tabletop exercise was planned during the course of 3 months. In an initial meeting, the purpose and goals were formulated and decisions were made about which organizations and key players to involve. In early meetings, planning team members presented ideas for the scenarios based on the jurisdiction’s needs and members’ expertise as subject matter experts. In later

meetings, tabletop exercise materials like multimedia presentations, handbooks for participants, and the scenario and discussion questions were reviewed by the planning team, who provided recommendations on how these could be improved. Meetings were held intermittently between the funding agency and the contracting agency to keep the former abreast of the progress made and issues that arose.

Scenario

The final tabletop scenario focused on a chemical release in a large convention facility during an international genetics conference. The scenario was in three modules and focused discussion on three critical points in the event: the immediate response (from the release up to 1½ hr after the event), the response from 1½ hr after the event through 8 hr after the event, and the recovery. In the first module, participants would learn that approximately 13,000 people, including the U.S. Secretary of State and her Chinese and English counterparts, were attending a genetics conference. During the first day of the conference, 2,000 attendees were listening to the keynote address in the convention center while 1,000 attendees browsed the exhibits. A tear gas grenade was hurled into a mass of protestors outside the convention center while two foreign adversary agents released a toxic agent into the ventilation system within the convention center. People became immediately symptomatic and within minutes, 490 were dead, 53 were in critical condition, and 202 were exposed or symptomatic. Discussion questions centered on detecting and monitoring the exposure, handling the exposed and nonexposed, incident reporting and communication systems, and information dissemination to the public.

In the second module, county emergency medical services had notified county EM, and the county emergency operations center was activated. EM notified public health, and the public health command center was activated. The HAZMAT (hazardous material) team and local Rapid Response Team started evaluating the scene of the event and got those who were still alive out of the building. The toxic agent was identified as a GB nerve agent, that is, sarin. Sarin is among the most toxic and rapidly acting of the chemical warfare agents and operates within the body by preventing the operation of the chemical that serves as the body's "off switch" for muscular and glandular action (Centers for Disease Control and Prevention, 2004). Sarin is best known by its use in an attack on the Tokyo subway system in 1995 in which 12 people died and 6,000 were injured. In the tabletop exercise, public health responded to the identification of the nerve agent by requesting Chempack materials from the Strategic National Stockpile (SNS), the national repository of pharmaceutical and medical supplies reserved for national emergencies, and notifying the State Bureau of Investigation (SBI), which subsequently notified the FBI. The Chempack, a large in-place cache of drugs, contained nerve agent antidotes. Media coverage of the event had begun; phone lines were jammed. At this time, 612 were dead, 84 were in a critical condition, and almost 200 were reporting to local hospitals. Discussion questions were related to detection and monitoring; incident reporting and communication; deploying SNS Chempacks; procedures for mass decontamination, dealing with mass casualties, and securing the area;

working with the media; and attending to the mental health of the victims, the responders, and others.

The third module focused on ongoing response and investigation on Day 2 after the event. Hospitals were gaining control of the situation. Shelters were established, and the state Joint Incident Command was giving hourly press releases. The Governor had declared an emergency. Federal agencies activated the federal response system. Dispersal devices were located and the foreign agent's apartment was located and searched. Assistance teams, including mental health professionals, began helping the public deal with stress and fear: 665 were dead, 21 were in critical condition, 268 who were exposed and symptomatic had been treated and released, and almost 4,000 were self-referring to area hospitals. Questions focused on decontamination, dealing with mass casualties and fatalities, site monitoring to determine time for safe reentry, tracking short and long-term physical and mental health effects among responders, and working with the mass media.

Implementation of the Tabletop Exercise

The tabletop exercise was held for a full day in early 2005. Invitees included a mix of senior and functional leaders from a variety of response organizations, including public health, emergency management, law enforcement, environmental health, agriculture, pharmacies, and hospitals. The goals for the exercise (North Carolina Office of Public Health Preparedness, 2005) were to

- involve functional leaders, that is, those who would actually direct the organization's response, in the consideration of a chemical agent mass casualty event;
- exercise a response combining the efforts of public and private organizations;
- consider the organizations and events needed from the local level to the state and federal levels; and
- exercise with maximum realism and minimum artificiality.

Participants were given a handbook that included the scenario, discussion questions, and additional resources. They were assigned to one of five multiagency tables with other participants at similar organizational levels. Three tables were designated for state players only and two for local or county players only. Discussions at each table were facilitated by a representative of the contractor or the sponsoring organization and notes were taken by a trained data collector.

Twenty-five minutes were allotted for the presentation of each module and 30 minutes for the discussion of the module. Participants were encouraged to go to other tables to ask questions when they were unsure about what needed to happen. At the end of each module, each table reported to the entire group. After the tabletop exercise was completed, facilitators, data collectors, the contractors, and the sponsoring organization's staff debriefed the tabletop exercise.

Evaluation

The evaluation was designed to address three overarching questions. These issues and the questions for each are:

1. Were the goals for the exercise met (outcomes)?

- Were functional leaders who would actually direct the organization's response involved?
- Was the combined public-private response exercised?
- Did the response invoke local, state, and federal resources?
- Was the scenario realistic?

2. What did the participants learn (outcomes)?

- What did participants learn about working with other response agencies?
- What actions did participants plan to take as a result of the exercise?
- How could the tabletop exercise be improved (process)?
- Did the needed mix of organizations and organizational levels participate in the tabletop exercise?
- Did implementation facilitate meeting the goals above?

To evaluate outcomes, we (a) analyzed the mix of agencies involved by reviewing the attendance roster, (b) administered and analyzed a postexercise survey, and (c) observed the debriefing at the end of the exercise. Survey questions were drafted based on Questions 1 and 2 above. The draft questionnaire was reviewed by the initiating agency, the North Carolina Office of Public Health Preparedness and Response, and suggested revisions were made.

To evaluate processes, we examined sign-in sheets and table assignments to determine the composition of each table with respect to agency type and level (local, state, or federal); observed planning team meetings, the training session for tabletop note takers, the tabletop exercise, and the debriefing hot-wash. We also examined the results of the postexercise survey.

EVALUATION FINDINGS

Outcomes

1. Were goals for the exercise met?

Forty-three percent of participants described themselves as functional or operational leaders and 11% said that they were ground-level response personnel. Fortyone percent reported that they had executive or administrative duties only. Thus, more than half of the participants would be involved directly in the ground response should an event occur. Forty-one percent of participants reported that both private and public agencies were represented at the tables. But only two of the five tables included private (hospital) as well as public representatives. The scenario and the discussion questions called for considering local, state, and federal resources. There were

problems in the articulation between local and state and federal law enforcement. Because the tables were organized to include primarily state or local personnel, there was not enough expertise at each table to clearly address what would happen at each level and how agencies would work together. Finally, 88% of participants described the scenario as realistic.

2. What did participants learn?

Just over half (55%) of participants reported after the exercise that they were somewhat more certain or much more certain about how public and private sectors would interact; 59% were somewhat or much more certain of how the local level would interact with state agencies in this situation; and 51% were somewhat or much more certain about how the state-level agencies would interact with federal agencies. About a third (28% to 35%) of participants reported an unchanged understanding of these relationships and 6% to 11% left with less certainty.

Participants also learned about gaps in the response process. Participants said communication technologies needed improvement and there needed to be better ways of communicating with responders who would come into the area from surrounding jurisdictions. A number of responders were unclear how the Incident Command Structure would work.

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Table 1 shows the actions that participants thought the organizations they represented might need to take and the likelihood of taking those actions. Although 71% felt they needed to make immediate plans to address gaps and overlaps, only 38% of participants reported that the organizations would do this. About half thought the organizations they represented needed to evaluate plans, policies, or procedures for use of the Chempack materials provided by the SNS. More than half of the participants thought that their organization would evaluate the Chempack plans, policies, and procedures. Although 86% thought that their organization needed to advocate for training of additional personnel, only half of these thought that they would do this. As a result of their participation in the exercise, 91% of participants thought that their organization needed to make adjustments to existing plans, policies, and procedures to enhance preparedness; 68% of these thought they would definitely do this.

Processes

As shown in Table 2, participants represented hospitals, public health and mental health organizations, citizens' services, emergency medical services, fire/HAZMAT, emergency management, crime control and public safety, law enforcement support agencies (FBI, SBI, Sheriff's Office), State Medical Examiners Office, Board of Pharmacy, and Agriculture. Although public health was well represented (n = 19), emergency medical services, emergency management, fire/HAZMAT, law enforcement, and mental health services were underrepresented. This was in part a function of recruitment. Policy leaders were invited to a senior leadership seminar prior to the tabletop exercise, primarily to get these leaders to commit

the organizations they represented to participation in subsequent phases. Of the 24 organizations represented at the senior leadership seminar, 16 organizations (66%) participated in the tabletop exercise. The planning team consisted of multiple constituents who could bring specific organizations' perspectives to the table and these representatives were invited to take part in the exercise. However, not all stakeholders could attend all of the meetings; thus they had less knowledge of the exercise to convey to home organizations. Finally, recruitment was done through mailed invitations.

Although discussion was animated and participants were able to address many important issues, participants at most tables lacked the time to get to or adequately address all of the questions posed for each module. Furthermore, because most agencies did not bring the organization's emergency preparedness plans to the workshop, individuals could not look up answers they did not know. Finally some of the discussion questions were too broad; for example, "How will the various law enforcement agencies coordinate their response activities?"

RECOMMENDATIONS

On the basis of our evaluation, we propose the following recommendations for planning and conducting such exercises.

Recruitment

1. Initiate and develop relationships with key political authorities. Elected officials are an important part of a successful response. Public officials' decision-making authority and public presence in disasters make it critical that they understand what might happen. With involvement in tabletop exercises, elected officials could become more aware of the requisite public health and emergency response partners and would be more prepared to contribute constructively in a disaster.
2. Seek private involvement. In the recovery stages of a chemical event, private agencies with cleanup capabilities are a valuable resource. If one wants to exercise a full combined public-private response, more of this type of private involvement is needed.
3. Recruit functional and operational leaders. Some discussions were not at the action or procedural level because of the organizational level of the participants. Individuals who know the plans, policies, and procedures of the organization they represent and can speak at an action level need to be present.
4. Recruit in multiple ways to obtain diverse perspectives. Use phone, personal contacts, e-mail, mail, and political contacts and work with leaders of other organizations. Response to disasters is necessarily inter-organizational. Do what it takes to ensure that the response organizations are on board from the start.

5. Consider ways to involve media presence. Although several discussions in the exercise involved working with the media, representatives of the media were not present and many would argue that this is necessary. Involvement of the media in crisis communication efforts is critical (Glick, 2007), and having media to help work through the issues involved in the tabletop exercise may have stimulated important partnerships and planning for clear communications in the event of a real disaster. Because tabletop exercises are intended to create a low-threat environment so that agencies can reveal gaps in their planning, confidentiality among all parties is critical. Having the media involved is controversial for many exercise participants. The unique position that media occupy in informing the public may necessitate creative ways to include the media's presence without being physically in the room. For example, one could incorporate media's comments on the scenario through videotape or actors could be used to portray a realistic media presence.

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Scenario Design

6. Make sure the discussion questions promote action-based decisions. Many of the tabletop discussions were not action-based. If discussions are to identify gaps and overlaps, it is important to know exactly what each agency would do in a specific event. For example, the scenario could include the question "A law enforcement officer was the first to arrive on the scene and suspects that this may be an act of terrorism. What would the officer do first? Next? Who would the officer call?"

7. Adjust the discussions to promote both lateral and vertical interactions. Tabletop exercises will be more successful if everyone can interact with both lateral and vertical partners and if inconsistencies in table discussions are reduced. One suggestion follows. Using the breakout method, state and local representatives with similar functions could first discuss the scenario and their plans and responsibilities. Then, they could form inter-organizational groups that discuss the scenario. This would facilitate responses based on full knowledge of the functional response at different levels of government.

8. Require participants to bring organizational preparedness plans. Actual plans can be used to provide supporting evidence during the discussion or be used to develop conclusions on how a response would actually occur. Furthermore, participants could make notes in plans of how necessary interactions with other agencies are.

9. Allow adequate time for in-depth discussion of the scenarios. Without adequate time, participants are likely to discuss the scenarios at a surface level and not identify the gaps and overlaps in community preparedness.

Planning for Follow-Up

10. Promote the development of action plans during the tabletop exercise. Provide time at the end of each module or at the end of the day for participants to discuss problems that arose. It may be helpful to give participants sheets of paper on which they can chart out the problem they recognized and make a list of the people they need to contact in their own and in other agencies to correct the problem. Allow time for a small action plan to be developed by these agencies.

11. Disseminate the after-action report to agencies and participants involved in the exercise. A review of this report could trigger a realization of issues that need to be addressed and facilitate the development of action plans if the plans have not already been formulated. Many after-action reports are shelved and this limits the link between exercises and action.

CONCLUSION

Tabletop exercises are an effective way to identify gaps, overlaps, and unforeseen issues that arise in the case of a disaster. As seen in the tabletop exercise described here, more than half of the participants felt more certain about how their agency would interact with other agencies in the event of a chemical disaster. Although some participants (6% to 11%) left with less certainty than they came with, this outcome is not necessarily negative. Research suggests that as individuals develop a more complex understanding of preparedness, as might develop during a tabletop exercise, individuals may also develop a more realistic assessment of what they do not know and of their organization's limitations (Nelson et al., 2007). If this was the case in the tabletop exercise described here, it would be a positive outcome. Such an outcome could lead participants to take concrete actions to clarify areas of uncertainty and develop a more effective plan for dealing with such a disaster if it were to occur.

Future work should focus on identifying next steps. When organization members identify actions that the agency they represent needs to take, what skills do they need to move their organization in that direction? What players need to be involved? What accounts for the gap between the knowledge of what needs to be done and getting those actions accomplished? What other organizations or types of organizations need to be involved? Health educators can facilitate these steps as well as ongoing conversations about preparedness within and among agencies.

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