All---hazards preparedness in an era of bioterrorism funding.

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Abstract:

Objectives: All-hazards preparedness was evaluated in North Carolina's 85 local health departments (LHDs).

Methods: In regional meetings, data were collected from LHD teams from North Carolina's LHDs using an instrument constructed from Centers for Disease Control and Prevention's preparedness indicators and from the Local Public Health Preparedness and Response Capacity Inventory.

Results and Conclusions: Levels of preparedness differ widely by disaster types. LHDs reported higher levels of preparedness for natural disasters, outbreaks, and bioterrorist events than for chemical, radiation, or mass trauma disasters. LHDs face challenges to achieving all-hazards preparedness since preparation for one type of disaster does not lead to preparedness for all types of disasters. LHDs in this survey were more prepared for disasters for which they were funded (bioterrorism) and for events they faced regularly (natural disasters, outbreaks) than they were for other types of disasters.

Keywords: hazard preparedness | all-hazards preparedness | public health preparedness | public health | local health departments | disaster preparedness

Article:

After 9/11/2001 and the anthrax attacks, it was clear that governmental public health agencies would be critical to the nation's response to terrorism,1 and public health funding for bioterrorism preparedness increased for all states. Some public health professionals argued that preparing for a bioterrorism event would develop critical local health department capacity that could be used to respond to any type of public health disaster 2 but there was disagreement in the

public health community 3,4 about the impact of bioterrorism preparedness funding on other types of preparedness. Many public health leaders argued that preparing for bioterrorism used critical public health funds for a very low probability event-bioterrorism.3,4 By 2004, the Centers for Disease Control and Prevention (CDC) began using the language of “all-hazards” or “full-use” preparedness and included it in federal grant guidance for fiscal year 2005 preparedness funds. However, disaster studies researchers from other disciplines cautioned that disasters differ widely in their impact upon the infrastructure, the environment, and communities.5 Depending upon the source of the disaster, different types of trained personnel, infrastructure, and equipment may be needed, thus, preparedness actions will be different. For example, in an outbreak, public health personnel will take the response lead, but HAZMAT and emergency management services are likely to take the immediate lead role in a chemical disaster. Public health will be involved in long-term recovery. Given the differences in disasters and their impact and the disagreement about whether preparedness for one type of hazard or disaster (eg, bioterrorism) improves preparedness for other disasters, it is important to examine all-hazards preparedness. This study examined North Carolina's local health departments' (LHDs') preparedness for a range of public health disasters during a time of categorical funding for bioterrorism and looked at whether preparing for one type of disaster seemed to result in preparedness for other types of disasters. In addition, the study examined preparedness by jurisdiction population, region, and funding.

Methods

Procedure

North Carolina's 100 counties are organized into 85 LHDs and 7 Public Health Regional Surveillance Team regions. The region team leaders organized daylong data collection meetings with LHD teams in summer 2004. Questionnaires were mailed to local health directors in advance to ask about (1) plans and exercises, (2) the health alert network/communications and information technology, and (3) public health laboratories.

Measures

In 2003, the CDC Public Health Preparedness Project began developing a new standard for local public health preparedness based on indicators of preparedness in nine functional areas: (1) planning and exercises; (2) surveillance and epidemiology; (3) 24/7 response capability; (4) health alert network/communications and information technology; (5) linkages with healthcare systems; (6) public health laboratories; (7) emergency and risk communications; (8) workforce capacity; and (9) mass interventions.6 Because the North Carolina Office of Public Health Preparedness and Response wanted an assessment of LHDs' preparedness in relation to proposed

indicators, we used the functional areas and the new indicators from the CDC to develop an instrument to assess local preparedness. In addition, we used items deemed critical for local public health preparedness from the previously validated Local Public Health Preparedness and Response Capacity Inventory 7 (Version 1.1).

Our instrument included three sections: (1) local health department context, (2) questions from the Local Public Health Preparedness and Response Capacity Inventory, and (3) preparedness questions based on the proposed CDC's Public Health Preparedness Project indicators. Section 2 of the instrument included measures for very specific aspects of preparedness within each of the nine functional areas. Participants were asked to answer these questions first. Answers to the items in Section 2 provided a basis for answering summary questions in Section 3 about preparedness levels for each functional area across all types of hazards or disasters. For example, participants were asked, “For each of the different types of public health disasters, how prepared [in the area of surveillance and epidemiology] is your local health department?” This question was followed by a list of six types of public health events: (1) bioterrorism events, (2) chemical events, (3) natural disasters, (4) radiation emergencies, (5) outbreaks, and (6) mass trauma. Respondents used a 4-point scale from 1 = “not prepared” to 4 = “completely prepared.” LHDs were asked to base their answers on these items on their overall responses to the criteria within each functional area in the items in Section 2 of the instrument. To determine LHDs' preparedness levels for each disaster type, we calculated five mutually exclusive levels of preparedness: (1) completely prepared (4 on all 7 indicators, excluding health alert network [HAN] and laboratories); (2) prepared (3 or 4 on all 7 indicators); (3) moderately prepared (4 on 4–6 indicators); (4) modestly prepared (3 or 4 on 4–6 indicators); and (5) not yet prepared/just beginning (all others). Five mutually exclusive levels of preparedness were calculated for HAN and public health laboratories: (1) completely prepared (4 for all 6 disasters); (2) prepared (3 or 4 for all 6 disasters); (3) moderately prepared (4 on 4–5 disasters); (4) modestly prepared (3 or 4 on 4–5 disasters); and (5) not yet prepared/just beginning (all others).

We created disaster preparedness scales by summing the responses about the perceived level of preparedness for each indicator (except HAN and public health laboratories) for that disaster. Thus, the bioterrorism preparedness scale described preparedness for bioterrorism in terms of planning, surveillance, and epidemiology, 24/7 response capacity, healthcare system linkages, crisis and risk communication, workforce capacity, and mass interventions. We created separate scales for the HAN (a statewide computerized notification system for public health alerts) and public health laboratories since these are infrastructures that are largely independent of other types of preparedness. Cronbach coefficient [alpha]'s for all scales ranged from .82 (public health

laboratories) to .93 (radiation disasters). We calculated Pearson correlation coefficients and used one-way analysis of variance to determine the relationships between the preparedness levels for different disasters, public health infrastructure, and departmental context (LHD bioterrorism funding, total agency budget, jurisdiction size, and region).

Results

Eighty-four of the 85 LHDs, representing 99 of 100 North Carolina counties, completed most of or all of the self-assessment. Table 1 shows the percentages of LHDs rating their department as prepared for the different types of disasters in terms of the seven indicators (or functional areas). LHDs were most prepared for natural disasters, outbreaks, and bioterrorism events. More LHDs (n = 10) reported being completely prepared for natural disasters than for any other type of disaster. Thirty-five percent of LHDs reported being prepared for natural disasters, whereas 27 percent reported being prepared for outbreaks. Only one LHD reported complete preparedness for bioterrorism, but 17 (20%) were prepared and 29 (34%) were moderately prepared. Few LHDs were prepared for chemical disasters, radiation disasters, or mass trauma. Table 2 shows that LHDs reported more HAN preparedness than preparedness for most disaster types. Many of the LHDs did not have laboratory preparedness for all disaster types.

Table 3 shows the bivariate correlations between preparedness scales for different types of disasters, HAN and laboratory preparedness, and the context variables. The greater the amount of preparedness funds, the more prepared were LHDs for bioterrorism, outbreaks, radiation disasters, and mass trauma. Total LHD budget was not associated with preparedness for bioterrorism or natural disasters, but was associated with preparedness for the other types of disasters. There were no significant differences in preparedness for different types of disasters by region except for natural disasters ($F = 5.573$, $P <= .001$) and radiation disasters ($F = 5.020$, $P <= .001$). Coastal regions reported better preparation for natural disasters and a piedmont region close to a nuclear power plant reported higher preparedness for radiation disasters.

Discussion and Implications

Taken together, the findings suggest that LHDs face challenges to achieving all-hazards preparedness in an age of focused funding. Preparedness differed widely by disaster type. LHDs reported that they were more prepared for events that they more regularly address (eg, natural disasters and outbreaks) or for which they were funded (bioterrorism) than they were for radiation disasters, chemical events, and mass trauma. More than three quarters of LHDs reported that they were not prepared for the latter events. It makes sense that LHDs would focus

their efforts elsewhere since these types of events are less traditional areas of LHD responsibility. However, predictions that a chemical disaster may be a likely type of terrorism raises concern about the lack of preparedness by these LHDs. The state of North Carolina used the information in this study and made significant efforts to enhance LHDs' awareness of and preparation for chemical disasters.

Preparedness for the HAN was more complete than preparedness for any of the disaster types, reflecting the importance of previous efforts to enhance the public health infrastructure. Although laboratory preparedness was not complete in many LHDs, this reflects a regional, as opposed to a local, approach to supporting laboratory development. Finally, larger LHDs with larger budgets in more populous jurisdictions reported being more completely prepared for outbreaks, radiation disasters, and mass trauma than smaller LHDs. Yet, smaller LHDs are not protected from outbreaks or mass trauma. With major highways in many small counties, LHDs with few full-time equivalents may need to respond to either infectious disease outbreaks or mass trauma from highway injuries. Thus, a regional approach to planning and preparedness could make sense.

The finding that levels of preparedness differed according to disaster types suggests that instruments to evaluate or assess preparedness need to be specific to the type of disaster. The study did not examine actual performance differences. Performance could only be assessed in the event of a disaster. For example, an LHD may have the capacity to receive calls 24/7/365 (ie, the LHD may have the technology); however, if someone (or a pager) is not there to receive calls, the capacity is hollow. Most measures in the instrument were those of capacity, or the potential for addressing threatening events, rather than performance. Because the study was a self-assessment, individual respondents could have been motivated to overreport preparedness (to look good) or to underreport it (to obtain more resources). Because the measures were so stringent, it is possible that few LHDs felt that they were really prepared even if they had much in place. As one health director said, “It depends on how many people are affected, over what time period, and on the severity of the problem. It is difficult to assess our preparedness in the absence of this information.” In spite of these potential limitations, the study provides a snapshot of North Carolina local public health preparedness and, because of the variability shown in resources and hazards, suggests conclusions that may be generalizable to other states.

First, given limited resources and the evidence here that preparedness for bioterrorism has not resulted in all-hazards preparedness, LHDs may need to base their preparedness efforts on an assessment of the probability of specific disasters occurring in each jurisdiction. Further future research should determine whether variations in the level of preparedness for different threats are

justified. That is, were they based on an assessment of the probability of specific threats? We have some evidence that this occurred in regard to hurricanes and nuclear power plants. Still, hurricane Katrina taught us that LHDs outside the disaster area may be called on to respond to the needs of displaced persons from that area. Second, our conclusions suggest that regional approaches might be needed in an effort to share resources to respond to adverse events because some LHDs will inevitably have more experience, more resources, and greater preparedness for different disaster types. As Asch and his colleagues note, "the accountability and abilities of local health systems may also vary by the size of the communities they serve…. While every community may need access to a public health laboratory, larger communities might meet this need with their own facilities, while smaller communities may reasonably depend on a state lab."8(p540) Finally, it is clear from our results and from recent disasters that an interagency approach is needed. Coordination with other organizations will be needed for a comprehensive disaster response.

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