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TECHNICAL
REPORT



Enhancing Public Health Preparedness: Exercises, Exemplary Practices, and Lessons Learned

Assessing the Adequacy of Extant
Exercises for Addressing Local and
State Readiness for Public Health
Emergencies

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Prepared for the
Office of the Assistant Secretary for Public Health Emergency Preparedness

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EXECUTIVE SUMMARY

The use of emergency preparedness exercises is now widespread throughout the public health and responder communities. Exercises vary considerably in complexity and may be designed to meet one or more of a variety of objectives, including training, gap analysis, planning, and team building. Ideally, as with any quality improvement cycle, preparedness exercises are used to identify areas where improvement is needed; to inform the process of developing plans and procedures to improve performance; and finally to enable repeat testing once improvements have been made. This process is critical to achieving the long-term goal of conducting preparedness exercises in public health: to mitigate the morbidity, mortality, psychosocial stress, and social consequences of a terrorist attack or other public health emergency.

Task 4 of the project entitled *Enhancing Public Health Preparedness: Exercises, Exemplary Practices and Lessons Learned* requires that the RAND team identify and compile information regarding existing preparedness exercises and provide a preliminary critique of their design. These exercises focus on assessing and improving the readiness of local and state public health departments to respond to public health emergencies, including bioterrorism. The Task 4 results have produced tools (criteria) that can be used by DHHS and others, including state and local public health officials, to evaluate current and future exercises. DHHS requested that the criteria be broadly applicable, clearly defined, measurable, and designed to evaluate both substance and procedure. This document presents the results of our large-scale application of the final criteria to exercises suitable for evaluation (exercises that met minimum documentation requirements). From this evaluation, we provide information about the utility of the criteria for evaluating these and future exercises and the appropriateness of exercise design.

The specific questions addressed in this report are:

1. What is the feasibility of these criteria?
 - a. To what extent are data available to rate the exercises?

- b. Are ratings of the criteria sufficiently variable to distinguish among exercises?
2. What is the reliability of these criteria?
 - a. To what degree do evaluators agree on their rating of each criterion?
 - b. Are the criteria internally consistent?
 - i. Is there sufficient internal consistency to justify an overall score?
 - ii. Is there sufficient internal consistency to justify scores for each criterion domain?
3. What is the validity of these criteria?
 - a. Is there a relationship between criteria performance and type of exercise?
 - b. Is there a relationship between criteria performance and number of documents available for evaluation?
 - c. Is there a relationship between criteria performance and the type of documents available for evaluation?
4. How well designed are the exercises we reviewed?

An initial set of 20 criteria were developed and tested in an iterative process. Criteria fall into five separate domains: (1) Goals and Objectives; (2) Scenario; (3) Participation; (4) Materials; and (5) Execution and Feedback. Revisions were made to the criteria, scoring instructions, and guidance, reducing the list of criteria from 20 to 14. We obtained information describing 100 exercises, simulations and drills. Exercises ranged from tabletop to full-scale field exercises. Exercises that did not include a minimum amount of documentation (an after-action report or an exercise plan, plus at least one other document) were excluded from review, leaving 37 exercises appropriate for evaluation. Four to six evaluators rated the 37 exercises, using only the written materials available to the RAND project team. No exercise sponsors, participants, or developers were interviewed or otherwise contacted during this evaluation.

Criteria were evaluated for feasibility, reliability, and validity. Feasibility is a measure of whether there are enough data to rate the exercise and to distinguish among exercises. We found that the criteria we developed are reasonably feasible, with good dispersion across possible response categories and only a modest effect from missing information (i.e., the documentation was incomplete). Two criteria (#7 and 14) did not

demonstrate sufficient variability across response categories. However, overall, we found that there is sufficient variation across response categories, thereby enabling us to distinguish among exercises.

Additionally, the criteria are reliable and internally consistent, with an overall Cronbach's alpha (a widely used measure of internal consistency) of 0.87 (alpha > 0.80 is considered good internal consistency) and domain-specific Cronbach's alphas ranging from 0.82 to 0.85. The inter-rater reliability (i.e., the extent to which the various evaluators agreed with each other) for most criteria was reasonable; no criterion had an inter-rater reliability score greater than 0.29 (a score of zero reflects perfect agreement). However, criteria with three to four ordinal response categories were not as reliable as those with a simple Yes/No response. Feedback from reviewers indicates that there was high variability in the quality of the documentation provided by the exercise developer or state, county, or other locality that used the exercise.

Based on expert review, the criteria have good face validity. There was no relationship between criteria performance and type of exercise, or the number or type of documents available for evaluation. Similarly, the type of exercise, the number of documents available for review and the types of documents available for review are not significantly related to reviewer evaluations, strengthening our conclusion that these criteria are reasonable and valid. We cannot test the validity of the criteria against external standards, because, as of yet, there are no "gold standard" measures on which to base a comparison.

There is substantial variation in the scores for the 37 exercises. In fact, there is a threefold difference in the performance scores of the exercises. The variability across exercises within a domain was even greater. Generally, exercises that scored in the highest tertile overall also scored high across the individual domains; conversely, those that scored in the lowest tertile overall generally scored low in all the domains.

As we have discussed with DHHS, it is intended that the exercise criteria and a menu of vetted exercises be made available to state and local public health officials and others in the preparedness community. However, the individuals who supplied the exercise materials to us asked that we maintain confidentiality. Accordingly, for purposes of this report, the exercises have been de-identified.