RESEARCH

Impact of Tabletop Exercises on Participants' Knowledge of and Confidence in Legal Authorities for Infectious Disease Emergencies

Elena Savoia, MD, MPH, Paul D. Biddinger, MD, Priscilla Fox, JD, Donna E. Levin, JD, Lisa Stone, MD, MPH, and Michael A. Stoto, PhD

ABSTRACT

Objective: Legal preparedness is a critical component of comprehensive public health preparedness for public health emergencies. The scope of this study was to assess the usefulness of combining didactic sessions with a tabletop exercise as educational tools in legal preparedness, to assess the impact of the exercise on the participants' level of confidence about the legal preparedness of a public health system, and to identify legal issue areas in need of further improvement.

Methods: The exercise scenario and the pre- and postexercise evaluation were designed to assess knowledge gained and level of confidence in declaration of emergencies, isolation and quarantine, restrictions (including curfew) on the movement of people, closure of public places, and mass prophylaxis, and to identify legal preparedness areas most in need of further improvement at the system level. Fisher exact test and paired *t* test were performed to compare pre- and postexercise results.

Results: Our analysis shows that a combination of didactic teaching and experiential learning through a tabletop exercise regarding legal preparedness for infectious disease emergencies can be effective in both imparting perceived knowledge to participants and gathering information about sufficiency of authorities and existence of gaps.

Conclusions: The exercise provided a valuable forum to judge the adequacy of legal authorities, policies, and procedures for dealing with pandemic influenza at the state and local levels in Massachusetts. In general, participants were more confident about the availability and sufficiency of legal authorities than they were about policies and procedures for implementing them. Participants were also more likely to report the need for improvement in authorities, policies, and procedures in the private sector and at the local level than at the state level. (*Disaster Med Public Health Preparedness.* 2009;3:104–110)

Key Words: legal preparedness, emergency preparedness, public health system

Legal preparedness has gained recognition as a critical component of comprehensive public health preparedness for public health emergencies triggered by infectious disease outbreaks, natural disasters, chemical and radioactive disasters, terrorism, and other causes.[1] Among the many components of legal preparedness for public health emergencies is the assurance that the public health workforce and the private sector are competent to use the law to facilitate the performance of essential public health services and functions. Public health practitioners, legal counsel, health care partners, and others need to be competent in the law and be aware of how the legal landscape may change during a public health emergency.[2]

During a summit convened by the Centers for Disease Control and Prevention in June 2007, the summit panel achieved consensus on practical steps that can be implemented to strengthen legal preparedness for all-hazards public health emergencies. The recommendations provided focused on each of the 4 core elements of legal preparedness: legal authorities to support necessary public health activities, competencies of public health professionals, coordination of the application of laws across jurisdictions (local, state, tribal, federal, and international) and across multiple sectors, and information and best practices in public health law.[3–6] In particular, responding to identified gaps in current legal preparedness competencies, the panelists proposed specific strategies to improve such competencies: expanding the range of sectors that should have competency in public health legal preparedness, improving competency specification, disseminating competency information to key target audiences, and improving measurement and evaluation of practice impacts. With regard to the latter activity, drills and exercises were suggested as an appropriate setting to assess legal practices.

Law-based social distancing measures are an important aspect of legal preparedness. Their implementation, however, may constitute a challenge to effective multisector coordination during an emergency.[4] Social distancing measures are defined as interventions that limit contact between unexposed people and those who either are infected with or have been exposed to an infectious disease.[7] The success of public health officials in implementing and enforcing social distancing measures can determine how successfully a communicable disease outbreak can be contained, especially if other countermeasures such as antibiotics or vaccines are absent.[7–12] Several public health and disaster-related legal issues have been identified during large-scale emergencies.[13–16] In particular, legal authorities on social distancing measures have been questioned and challenged in the legal system because they generally create significant inconveniences in society and may restrict civil liberties.[12,17] It is often not clear, however, whether the legal authorities available to public health officials are truly insufficient, or if it is public health workers' knowledge and comfort with those authorities that could be improved. Moreover, local law enforcement officials' knowledge of legal authorities, and therefore their willingness to implement social distancing measures, also may be an issue.

In a national effort to identify gaps and challenges in legal preparedness for infectious disease emergencies, specifically pandemic influenza, the Association of State and Territorial Health Officials, with support from the Centers for Disease Control and Prevention, has funded jurisdictions throughout the United States to identify and assess the sufficiency of their legal authorities to implement social distancing measures and issue blanket prescriptions (prescriptions that name no individual patient) in the event of a pandemic; to identify any gaps or uncertainties in those authorities; and to hold a 1-day tabletop exercise to work through a scenario incorporating and evaluating the legal challenges related to selected social distancing measures. As one of the participating jurisdictions, the Commonwealth of Massachusetts' Department of Public Health, together with the Executive Office of Public Safety, engaged the assistance of the Harvard School of Public Health Center for Public Health Preparedness (HSPH-CPHP) to design and implement a tabletop exercise to examine the following issue areas: declaration of emergencies, isolation and quarantine, curfew, closure of public places, restrictions on the movement of people, and mass prophylaxis readiness.

This analysis builds on that experience to assess the usefulness of a tabletop exercise combined with a didactic session as an educational tool in legal preparedness. In particular, we measured the impact of participating in an exercise on the participants' knowledge of and level of confidence in current legal authorities for infectious disease emergencies in the commonwealth. As a secondary aim, we also used the participants' experience to identify legal issue areas in need of further improvement.

METHODS

Exercise Purpose and Design

The primary objective of the exercise itself was to provide an opportunity for the state and local authorities to learn about and assess the presence of effective legal authorities needed to implement social distancing measures in the event of a pandemic, and to establish the level of competence and willingness of public health professionals to apply those laws. Using program guidance provided by the Association of State and Territorial Health Officials, the tabletop exercise was designed and led by faculty and staff of the HSPH-CPHP[19] and planned in conjunction with the Commonwealth of Massachusetts Department of Public Health and the Executive Office of Public Safety.

The exercise was preceded by expert presentations on pandemic influenza and the public health response and a review of relevant Massachusetts laws. Such presentations incorporated an overview of legal authorities in 2 types of declared public health emergencies (public health emergency and state of emergency) and legal authorities in the absence of declared emergency. Federal and state powers were examined as was the authority of local agencies and law enforcement. Examples referring to previous public health legal challenges such as the severe acute respiratory syndrome epidemic in 2003 were highlighted. The didactic material used during these presentation and the exercise scenario can be found on the HSPH-CPHP Web site.[19]

The exercise scenario was designed to provide opportunities to address issues such as respect for gatherings of religious obligations; the role of university, local, and state police officials in enforcing social distancing measures; distribution of food and medications; workplace safety; discrimination against residents of a specific ancestry; and assistance to special needs populations. The scenario also provided opportunities to explore conflicts that would test authorities at the state and local levels and in the private sector. In particular, universities and food manufacturing plants played a role in the scenario and the consequences of decisions made by business owners were discussed during the exercise.

To meet these objectives, the scenario opened with the announcement of the first suspected human case of avian influenza type A (H5N1) in New York, diagnosed in a businessman returning from a trip to eastern Europe, is where in our scenario more than 1000 cases had been reported in the previous months. Within 2 days, the first suspected cases were reported in Massachusetts: 2 students who lived on a university campus returning from a trip to New York. Consequently, the health department of the town where the university is located ordered the suspension of classes and the return of students to their family homes. The scenario spanned 15 days, and was designed to test the impact of social distancing measures on the economy of the communities affected by the epidemic in terms of roles and reactions of private and public entities to the outbreak. Within this time

frame, the exercise was divided into 3 separate modules focusing respectively on emergency declarations and authorities; isolation, quarantine, and mass prophylaxis; and restrictions of public gatherings and assembly. Although this specific scenario was not pilot tested before it was used, the exercise's design was based on more than 2 dozen other exercises that have been designed and implemented in Massachusetts and Maine in recent years.[20]

Participants included local-, regional-, and state-level professionals from a variety of disciplines such as public health, law, health care, public safety, and emergency management. In advance of the exercise, these participants were divided into groups of 8 to 10 individuals who convened around a table. The participants in each roundtable were chosen within regions and communities such that members of the same or neighboring communities were seated together. An expert who was knowledgeable about the public health infrastructure of the geographical area being tested facilitated the discussion within each group at each table.

Evaluation and Statistical Methods

To measure the impact of participating in an exercise on the participants' knowledge of and level of confidence in current legal authorities for infectious disease emergencies, participants were asked to complete a questionnaire that covered 6 issue areas: declaration of emergencies, isolation and quarantine, restrictions on the movement of people, curfew, closure of public places, and mass prophylaxis. For each area, participants were asked to rate the availability and sufficiency of both legal authorities and policies and procedures using a Likert scale ranging from 1 (not currently available) to 5 (available and sufficient). In addition to this generic evaluation, when appropriate, participants were asked to determine whether authorities needed to be strengthened at the local or state level and/or in the private sector. A "do not know" response option was available for all of the items. The initial questionnaire was collected before the exercise began and after the didactic sessions were completed. At the conclusion of the exercise, participants were asked to complete a second questionnaire with questions identical to the first. The questionnaires were administered in this way to focus the evaluation on the impact of participating in the exercise per se, but the authors recognize that this may have been influenced by the didactic presentations that preceded the exercise.

The questionnaire was anonymous, and pre- and postexercise forms were paired by means of a unique identifier. Job affiliation (local, state, and federal government; hospital and health care providers; nonprofit organization; and others) and profession (legal, public health, public safety and emergency management, health care providers, health care administrators, and others) were the only respondent characteristics identified. Survey implementation was approved by the Humans Subjects' Committee of the HSPH.

Data were analyzed to assess the impact of the event in terms of knowledge gained in the 5 issue areas and changes in the participants' level of confidence in the legal preparedness of the public health system. In addition, data were analyzed to identify areas most in need of further improvement. Subsequently, subjects were grouped by professional role to identify the differences in outcomes and perceptions between legal and nonlegal professionals.

To measure knowledge gained, we used the proportion of respondents reporting a substantive answer—that is, something other than "do not know"—before and after the exercise. To assess the level of confidence in the legal preparedness of the public health system, data from the Likert scale were analyzed in 2 ways: as a continuous variable and in terms of the proportion of respondents reporting that legal authorities, policies, and procedures are available and sufficient (Likert scale = 5). We regard changes in the participants' assessment of their confidence in legal authorities, whether positive or negative, as indirect evidence of knowledge gained through participating in the exercise.

Fisher exact test for count data and paired *t* test for continuous variables were performed to compare pre- and postexercise results. The level of significance was set at $\alpha = .05$. All statistical analyses were performed using STATA statistical software, version 9.0 (StataCorp, College Station, TX).

RESULTS

Respondents' Characteristics

Fifty-six subjects, equivalent to approximately 63% of the registered exercise participants, completed both the pre- and postexercise questionnaires. An additional 22 subjects completed the preexercise form only, and 2 completed the postexercise form only; these subjects were not included in the analysis. The 56 respondents with completed pre- and postexercise questionnaires form the basis for the results presented in this study. The nonresponse rate was 29%. Because the questionnaire was anonymous, we could not determine the characteristics of nonrespondents.

All of the respondents reported their profession: 43% were public health officials; 34% were legal professionals; and 23% included public safety, emergency management personnel, health care providers, and health care administrators. The rest reported a profession different from the above-mentioned categories. All of the subjects reported their job affiliation: 25% local government, 50% state government, 9% federal government, 5% hospital health care providers, 5% nonprofit organizations, 2% business and unions, and 4% other type of affiliation.

Knowledge Gained

After the exercise, participants were more likely to report a substantive answer (different from "do not know") for all of the items. Across all of the categories, the average increase in the proportion of questions answered was 25%. With regard to knowledge of policies and procedures, the improvement

https://doi.org/10.1097/DMP.0b013e3181a539bc Published online by Cambridge University Press

was statistically significant in all of the topic areas ($P < .05$), with the largest gains in curfew (36%) and restrictions on the movement of people (31%). Knowledge about the availability and sufficiency of legal authorities also increased by 30% on average, although the increase was statistically significant only for mass prophylaxis ($P = .002$). Participants also were more likely to be able to judge the need to improve authorities, policies, and procedures at the state and local level and in the private sector for all tested issues; however, statistical testing could not be performed due to the large number of zero cells. Table 1 provides a detailed description of these results.

Level of Confidence in Legal Authorities

As illustrated in Table 2, participants reported a higher level of confidence in the availability and sufficiency of the legal authorities in all issue areas after the event ($P < .05$). On average, there was an increase of 12% in the proportion of participants reporting that legal authorities are available and sufficient (5 on the Likert scale), with increases ranging from 10% for isolation and quarantine to 15% for mass prophylaxis. Analyzing the Likert scale data as a continuous variable, the mean value per topic area increased on average by 1.2 points, ranging from no increase in isolation and quarantine to 2.2 points in curfew, closure of public places, and mass prophylaxis. The improvement in the level of confidence was statistically significant in 4 of 6 areas: curfew ($P < .001$), closure of public places ($P < .001$), restrictions in the movement of people ($P = .02$), and mass prophylaxis ($P = .003$).

Level of Confidence in Policies and Procedures

The results in Table 2 show that the proportion of respondents reporting that policies and procedures were available and sufficient (5 on the Likert scale) did not significantly change for any of the topic areas. In analyzing the responses as a continuous variable, however, we were able to detect a significant improvement after the exercise in the average level of confidence regarding the availability and sufficiency of policies and procedures. Only for the topic area of isolation and quarantine was the change in the negative direction, that is, a decrease in the level of confidence ($P = .002$), after the exercise. A similar pattern was found for the topic area of declaration of emergencies, but in this case the decrease was not significant.

TABLE 1

Proportion of Participants Reporting a Substantive Answer Before and After the Exercise

Topic Area	Subtopic	Preexercise Survey n (%)	Postexercise Survey n (%)	Difference in Proportion, %	Fisher Exact *P*
Declaration of emergencies	Legal authorities n = 55	46 (83)	54 (98)	+15	.16
	Policies and procedures n = 53	43 (81)	51 (96)	+15	**.03**
	Local n = 54	46 (85)	54 (100)	+15	*
	State n = 53	43 (78)	53 (100)	+22	*
	Private n = 55	31 (56)	40 (73)	+17	**.001**
Isolation and quarantine	Legal authorities n = 55	41 (74)	54 (98)	+24	.25
	Policies and procedures n = 54	41 (76)	52 (96)	+20	**.05**
	Local n = 55	40 (73)	55 (100)	+27	*
	State n = 52	38 (73)	52 (100)	+27	*
	Private n = 55	28 (51)	41 (74)	+23	**.002**
Curfew	Legal authorities n = 54	33 (61)	53 (98)	+37	.38
	Policies and procedures n = 53	32 (60)	51 (96)	+36	.15
	Local n = 51	29 (57)	36 (70)	+13	.77
	State n = 51	30 (59)	51 (100)	+41	*
	Private n = 39	21 (54)	39 (100)	+46	*
Closure of public places	Legal authorities n = 54	37 (68)	53 (98)	+30	.31
	Policies and procedures n = 54	35 (65)	50 (92)	+27	**.01**
	Local n = 40	10 (25)	40 (100)	+75	*
	State n = 53	32 (60)	53 (100)	+40	*
	Private n = 52	24 (46)	41 (79)	+33	**<.001**
Restriction on the movement of people	Legal authorities n = 56	38 (68)	55 (98)	+30	.32
	Policies and procedures n = 56	36 (64)	53 (95)	+31	**.04**
	Local n = 52	33 (63)	52 (100)	+37	*
	State n = 53	33 (62)	53 (100)	+38	*
	Private n = 40	23 (57)	40 (100)	+43	*
Mass prophylaxis	Legal authorities n = 52	33 (63)	44 (85)	+22	**.002**
	Policies and procedures n = 51	31 (61)	42 (82)	+21	**.001**
	Local n = 43	30 (70)	43 (100)	+30	*
	State n = 43	32 (74)	43 (100)	+26	*
	Private n = 36	19 (53)	36 (100)	+47	*

*Statistical test not applicable because more than 2 cells equal zero.

https://doi.org/10.1097/DMP.0b013e3181a539bc Published online by Cambridge University Press

TABLE 2

Change in the Participants' Level of Confidence in the Availability and Sufficiency of Legal Authorities, Policies, and Procedures After Participation in the Tabletop Exercise

	Availability and Sufficiency of Legal Authorities				Availability and Sufficiency of Policies and Procedures			
Topic	Difference in Proportion Between Pre- and Posttests (n)	Fisher Exact *P*	Difference in Mean Value Between Pre- and Posttests (n)	*t* Test *P*	Difference in Proportion Between Pre- and Posttests (n)	Fisher Exact *P*	Difference in Mean Value Between Pre- and Posttests (n)	*t* Test *P*
Declaration of emergencies	+11 (46)	**.031**	+0.3 (14)	.09	+2 (43)	.259	-0.1	.61
Isolation and quarantine	+10 (41)	**.001**	0 (10)	.5	+5 (40)	**.036**	-0.6	**.002**
Curfew	+12 (33)	**.002**	+2.2 (18)	**.0002**	+6 (32)	.15	+1.6	**.007**
Closure of public places	+12 (37)	**.002**	+2.2 (18)	**.0005**	+8 (35)	.171	+1.8	**.005**
Restrictions on the movement of people	+13 (38)	**.013**	+0.3 (11)	**.02**	0 (36)	.11	+1.7	**.0007**
Mass prophylaxis	+15 (32)	**.011**	+2.2 (12)	**.003**	+7 (30)	.433	+2.2	**.002**

State and Local Levels and Private Sector

Overall, participants felt more comfortable after the exercise about the availability and sufficiency of legal authorities, policies, and procedures at the local and state levels and in the private sector. In particular, a significant increase in confidence was reported for the issue area of curfew, where confidence increased for both local ($P = .008$) and state ($P = .003$) authorities. Also, after the exercise, participants were more confident about authorities at the local level for enacting isolation and quarantine ($P = .006$) and at the state level for mandating restrictions in the movement of people ($P < .001$).

Identification of Legal Issue Areas in Need of Further Improvement

Based on the postexercise results, 33% (on average) of respondents felt confident about the availability and sufficiency of legal authorities. Only 14% (average of proportions), however, were confident about the policies and procedures to use those authorities. For the issue area of the restrictions on the movement of people, participants' opinions on the sufficiency of legal authorities were high, with 35% of the sample reporting that they are sufficient; at the same time, this issue area was judged the worst in terms of availability of policies and procedures, with only 5% of respondents reporting that they are sufficient. On the contrary, participants seemed to be more satisfied with the availability of policies and procedures in the areas of closure of public places, curfew, and mass prophylaxis with 20%, 19%, and 17% of participants, respectively, judging them as sufficient.

In addition, participants were asked to assess the necessity of strengthening legal authorities, policies, and procedures at the state and/or local levels. After the exercise, 79% of participants reported that authorities, policies, and procedures should be strengthened at the local level, and 71% of participants reported that they need to be strengthened at the state level. In addition, 90% of participants agreed that there is a need to strengthen authorities, policies, and procedures in the private sector.

Comparison of Results by Professional Role

The level of knowledge of legal and nonlegal professionals was compared based on the postexercise results. Only in the topic area of mass prophylaxis was self-reported knowledge for legal professionals higher than for nonlegal professionals (91% of responses different from "do not know" compared with 61%, $P = .04$).

Comparing postexercise results by professional category, nonlegal professionals were less confident than legal professionals on the availability of legal authorities, particularly in 2 areas: curfew (19% vs 13%, $P = .013$) and closure of public places (19% vs 17%, $P = .04$). For all other topics, responses were similar, and as a consequence the level of confidence reported by each of the 2 professional groups was identical.

DISCUSSION

Tabletop and other types of exercises have been used commonly for the purpose of raising awareness about public health emergencies as well as informing public health officials and others about a jurisdiction's response plans and their role in them. We recognize that measuring perceptions is difficult, and that perceived knowledge and competence in different professional groups may vary; however, we believe that aggregated scores collected from a specific organization or systems do provide data that can be used for comparative purposes. Exercises of this sort have also been used for the purpose of assessing the adequacy of a jurisdiction's response capabilities.[21–24] In this event, we combined a didactic session to provide a common knowledge base with a tabletop exercise that allowed participants to explore the facts presented in a practical context. We believe that both purposes, to raise awareness and test capabilities, can be achieved in a single experience.

Regarding the first purpose, we found that participating in the exercise and the preceding presentations helped to in-

form participants and others about legal issues associated with infectious disease emergencies. The proportion reporting a substantive answer after the exercise about both the availability and sufficiency of legal authorities as well as policies and procedures increased substantially and significantly for each of the 6 areas: declaration of emergencies, isolation and quarantine, closure of public places, restrictions on the movement of people, curfew, and mass prophylaxis. For all of the issue areas covered, participating in the exercise led to increased confidence in the availability and sufficiency of the commonwealth's legal authorities. The participants' level of confidence also increased for availability of policies and procedures in 4 of 6 areas: closure of public places, restrictions on the movement of people, curfew, and mass prophylaxis. For both declaration of emergencies and isolation and quarantine, however, the average level of confidence in policies and procedures did not increase. Because the only change between the preexercise and postexercise questionnaire was participating in the exercise itself, we regard this as indirect evidence of the educational impact of that participation.

Regarding the second purpose, the exercise provided a valuable forum to judge the adequacy of Massachusetts' legal authorities, policies, and procedures for dealing with pandemic influenza, and to identify areas in need of further improvement, by allowing key participants to explore a wide variety of hypothetical challenges. Across the board, participants were more confident about the availability and sufficiency of legal authorities (with 33% giving the highest score) than they were about policies and procedures (14% giving the highest score). Regarding restrictions on the movement of people, 35% of participants rated the legal authorities as sufficient, yet only 5% of respondents reported that related policies and procedures are sufficient. Participants seemed to be more satisfied with the availability and sufficiency of policies and procedures in the areas of closure of public places, curfew, and mass prophylaxis (>15%) than in the area of restrictions on the movement of people (5%). In addition, participants were more likely to report the need for improvement in authorities, policies, and procedures in the private sector (90%) and at the local level (79%) than at the state level (70%).

Our analysis has several limitations. First, being willing to rate the availability and sufficiency of authorities and determine whether they need to be strengthened presumes, but is only an indirect measure of, actual knowledge about those authorities. Second, there was a nonresponse rate of 29% and with the available data we could not compare the characteristics of nonrespondents to the respondents.

CONCLUSIONS

Our analysis shows that a combination of didactic teaching and experiential learning through a tabletop exercise regarding legal preparedness for infectious disease emergencies can be effective not only in imparting perceived knowledge to participants but also in gathering information about sufficiency of authorities and existence of gaps. Across all of the categories, the average increase in the proportion of questions that participants were able to answer, for instance, was 25%. Participants also were more likely to be able to judge the need to improve authorities, policies, and procedures at the state and local levels and in the private sector for all tested issues. Furthermore, there was also an increase of 12% on average in the proportion of participants reporting that legal authorities are available and sufficient, demonstrating increased knowledge.

The exercise provided a valuable forum to judge the adequacy of legal authorities, policies, and procedures for dealing with pandemic influenza at the state and local levels in Massachusetts. In general, participants were more confident about the availability and sufficiency of legal authorities than they were about policies and procedures for implementing them. Participants were also more likely to report the need for improvement in authorities, policies, and procedures in the private sector and at the local level than at the state level.

About the Authors

Dr Savoia is a scientist at the Harvard School of Public Health Center for Public Health Preparedness (HSPH-CPHP); Dr Stoto is Director of the Evaluation Core at HSPH-CPHP; Dr Biddinger is Associate Director at HSPH-CPHP; Dr Levin is General Counsel at the Massachusetts Department of Public Health (MDPH); Dr Fox is Deputy General Counsel at MDPH; and Dr Stone is Principal Technical Advisor for Pandemic Preparedness, at Management Sciences for Health.

Address correspondence and reprint requests to Dr Elena Savoia, Research Scientist, Division of Public Health Practice, Harvard School of Public Health, 677 Huntington Ave, Boston, MA 02115 (e-mail: esavoia@hsph.harvard.edu).

Received for publication March 7, 2008; accepted October 3, 2008.

The content of this article does not necessarily represent the official views of the CDC.

Authors' Disclosures

The authors report no conflicts of interest.

Acknowledgments

The Harvard School of Public Health Center for Public Health Preparedness is supported under a cooperative agreement from the Centers for Disease Control and Prevention, Grant no. U90/CCU124242-04.

ISSN: 1935-7893 © 2009 by the American Medical Association and Lippincott Williams & Wilkins.

DOI: 10.1097/DMP.0b013e3181a539bc

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