ORIGINAL RESEARCH

Nonpharmaceutical Interventions for Pandemic Influenza: Communication, Training, and Guidance Needs of Public Health Officials

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ABSTRACT

Objectives: The aim of this study was to identify the needs of state, tribal, local, and territorial (STLT) public health officials in communicating, implementing, and monitoring nonpharmaceutical interventions (NPIs) during an influenza pandemic.

Methods: A Web-based survey collected data from a nonrandom sample of STLT health departments.

Results: A total of 267 of 346 public health officials responded (77.2% response rate). STLTs identified the general public, families, childcare programs, K-12 schools, and workplaces as their priority audiences for NPI communication. Training needs included NPI decision-making strategies, triggers for implementing NPIs, and communicating NPI recommendations to families and communities, as well as a more practical orientation and real-world examples of how to incorporate NPI guidance into preparedness and response activities. Information is needed on health messaging for various populations and settings and on the legal authority for implementing specific NPIs.

Conclusions: Future NPI recommendations by CDC should continue to be based on feedback solicited from STLT health departments. To fill identified gaps, CDC used these findings to create NPI guidance and materials to assist in prepandemic planning and preparedness for STLTs and various community settings.

Key Words: public health practice, emergency preparedness, human influenza, needs assessment, pandemics

Influenza pandemics are caused by new strains of novel influenza viruses to which humans have little or no immunity. Community preparedness is key to a successful pandemic response. Community preparedness is not only the ability of a community to prepare for a response, but also that community's ability to "withstand and recover, in both short and long terms, from public health incidents".[1] The most effective countermeasure to prevent disease and to reduce the overall public health impact of an influenza pandemic is a well-matched vaccine. However, an effective vaccine may not be available for up to 6 mo after the identification of a new virus, and may not be produced in sufficient quantities to immunize all risk groups.[2]

Nonpharmaceutical interventions (NPIs) are actions apart from getting vaccinated and taking antiviral medication that people and communities can implement to help slow the spread of influenza before and during a pandemic. NPIs also are known as community mitigation measures. As 1 study suggests, NPIs "play a critical role in mitigating the consequences of future severe influenza pandemics and should be considered for inclusion in contemporary planning efforts as companion measures to developing effective vaccines and medications for prophylaxis and treatment".[3] The Centers for Disease Control and Prevention (CDC) include community mitigation measures as part of their prepandemic response guidance to assist communities with their pandemic influenza planning.

NPIs encompass a range of actions that individuals and communities can implement during a pandemic. Examples include staying home when sick, temporarily closing schools, and limiting public gatherings. The timing of NPI implementation can vary from the onset of an influenza pandemic to a later stage. To be effective, NPIs should be strategically targeted, layered, and tailored to the pandemic severity. This means initiating NPIs early in a pandemic before local epidemics demonstrate exponential growth; targeting NPIs toward those at the nexus of transmission (in affected areas where the novel virus circulates); and layering NPIs together to reduce community transmission to the greatest extent possible.[4]

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BACKGROUND

Although NPI recommendations may be developed at the national level, implementation occurs at the state and local levels. In particular, local health departments play an integral role in promoting and implementing NPIs in addition to providing feedback and data (eg, influenza surveillance) to federal partners.[5] By "assuring that local health department employees receive role-appropriate knowledge and skills in advance of an outbreak … local health department leaders can support employees' ability to respond during an outbreak".[6] While the available literature provides some insight into the implementation, use, and perception of NPIs, our study was conducted to gain a better understanding of the information and tools needed by state, tribal, local, and territorial (STLT) public health officials in communicating, implementing, and monitoring NPIs during an influenza pandemic and to identify gaps and areas of improvement.

METHODS

A Web-based survey was designed to collect data from a nonrandom sample of STLT health departments. The survey was developed using SPSS Dimensions mrInterview.

Survey Audience

National public health organizations identified and helped recruit respondents from their member rolls. The respondent population included STLT public health officials with roles in preparing for or responding to an influenza pandemic. Organizations assisting in the recruitment included the Association of State and Territorial Health Officials (ASTHO), Council of State and Territorial Epidemiologists (CSTE), National Association of County and City Health Officials (NACCHO), and the National Public Health Information Coalition (NPHIC).

Survey Development

Key informant interviews were conducted to guide the development of the Web-based survey. Key informants represented ASTHO, CSTE, NACCHO, NPHIC, and the Society for Public Health Education (SOPHE). These public health organizations represent the key audiences that would be responsible for preparing for and responding to an influenza pandemic. Multiple areas of expertise specifically related to prepandemic planning and implementation for the 6 participating key informants included emergency preparedness and communications ($n = 4$), emergency preparedness and health education ($n = 1$), emergency preparedness and public health programs ($n = 1$), emergency preparedness only ($n = 1$), and epidemiology only ($n = 1$).

Based on the key informant interviews, the survey was constructed to include both quantitative and qualitative items. Screener questions were included in the Web-based survey to help ensure that only those who worked in health departments and had primary duties related to pandemic influenza or other emergency preparedness and response activities responded to the survey. Items were grouped into the following main categories: demographics, messages, materials and channels, trainings, guidance, and monitoring systems. Several items were to be ranked by importance to the respondents. There were approximately 21 questions. The total number of questions (multiple choice, open-ended, and ranking) varied based upon responses and designed skip patterns. The Web-based survey took approximately 25 min to complete. No personally identifiable information was collected. We obtained Office of Management and Budget (OMB) approval through the CDC OSTLTS Generic Information Collection Request Package (OMB No. 0920-0879).

Data Collection

The Web-based survey was launched on July 9, 2012, and closed on July 20, 2012. To recruit respondents, e-mails were sent to contacts at each organization (ASTHO, CSTE, NACCHO, and NPHIC) that agreed to distribute the survey to their members. Two reminder e-mails were sent to each organization on days 5 and 8 of the survey period to send to their members, reminding them of the survey and its closing date.

Data Analyses

Both quantitative and qualitative analytical techniques were used to analyze the data from the Web-based survey. Quantitative analysis (chi-square) was conducted using the statistical software package PASW® Statistics 18. Qualitative analysis was conducted for the open-ended questions as well as for the majority of quantitative questions that allowed for an "Other" open-ended response. Responses were compared iteratively, and categories were created based on similarities across 1 or 2 dimensions derived from and relevant to the survey questions (eg, activity level and source of monitoring data).

Ranked Items

Respondents were asked to identify and rank items for several questions. For each ranking question, respondents were (1) presented with a list of choices to select from (eg, different target audiences with which they prefer to communicate), (2) asked to identify *their* top 3 choices from the list, and (3) then asked to rank their top 3 choices where rank 1 was their top choice, rank 2 their second, and rank 3 their third. For analyses, rankings were weighted by multiplying the number of total responses, overall, to an item by its corresponding weight. Rankings were weighted as follows: Rank 1 = 3, Rank 2 = 2, and Rank 3 = 1. For example, if 200 respondents selected the audience "General public/families" as the No. 1 rank, this number ($n = 200$) was multiplied by the assigned weight, 3. Likewise, the number of respondents who ranked "General public/families" as No. 2 ($n = 45$) was multiplied

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TABLE 1

Top 3 Materials and Channels You Find Are Most Effective in Communicating NPI Guidance and Messages to Different Audiences (in Weighted Rank Order)*

Weighted Rank	General Public/ Families	Childcare Program/K-12 School Administrators	College/University/Higher Education Administrators	Business Owners/ Employers	Mass Gathering/ Public Event Planners and Organizers	Other STLTs
1	Broadcast media	Printed handouts	Social media	Printed handouts	Printed handouts	Websites
2	Social media	Websites	Websites	Websites	Broadcast media	Printed handouts
3	Websites	Functional items with messages	Printed handouts	Broadcast media	Websites	PowerPoint presentations

*Other responses included: PowerPoint presentations, print ads, mobile text messages, and applications

by its assigned weight, 2; and the number of respondents who ranked "General public/families" as No. 3 ($n = 37$) was multiplied by 1. The weighted total for each of the ranks for the given response option, in this case "General public/families," was then added to create the "Sum of Weighted Rank". This procedure was applied to each of the response options for the ranked items. Once rankings were obtained, responses were then stratified and analyzed by (1) type of health department: state/territorial, local/tribal; (2) primary duty of respondent: science, nonscience, communicator, noncommunicator; and (3) locale served: urban, suburban, rural.

RESULTS

Demographics

The total universe of potential respondents was comprised of 384 public health officials identified as having a key role in prepandemic planning. After the survey was launched, a total of 346 people were screened by role and were determined to be eligible for participation in the survey (only those who worked in health departments and had primary duties related to pandemic influenza or other emergency preparedness and response activities). A total of 267 respondents completed the entire survey (77.2% response rate). The majority of respondents (77.6%) worked for local health departments, followed by state (20.4%), tribal (1.1%), and territorial (0.9%) health departments. Respondents' primary duties related to pandemic influenza included health communication/education (24.9%), emergency preparedness/response (24.0%), and policy (16.8%). Respondents were able to choose more than 1 locale served. Locales served were primarily rural (64.5%), followed by urban (32.8%) and suburban (32.0%). Questions were not asked about the respondents' age, gender/sex, or race/ethnicity.

NPI Communication Needs

Messages

The majority of respondents (70.9%) reported general public/families as their No. 1 choice of audiences that would be most helpful for CDC to target in their NPI messages, followed by K-12 school administrators and business owners/employers. In an open-ended question, respondents were asked what CDC did well with NPI messages during the 2009 H1N1 influenza pandemic. Respondents replied that they believed CDC reinforced simple effective behaviors (17.7%) and coordinated/communicated with partners (12.3%) well. A second open-ended question asked for areas of improvement for future CDC NPI messages, which included the timeliness of messages (7.8%) and fewer mixed/multiple messages (5.4%).

Materials and Channels

Respondents were asked what materials or channels are most effective in communicating NPI guidance and messages to different audiences. Broadcast media was ranked as most effective for communicating NPI guidance and messages to the general public/families (66.3%). Printed handouts were commonly used. They were ranked as No. 1 for communicating to childcare program/K-12 school administrators (51.1%), business employers and owners (48.8%), and mass gathering/public event planners and organizers (38.0%). Social media was ranked as No. 1 for communicating with college/university/higher education administrators (44.8%). Websites were ranked as No. 1 for CDC to communicate guidance and messages to STLTs (49.2%). Weighted ranks are presented in Table 1. There were no significant differences when comparing type or locale of health department or primary duty of respondent.

NPI Guidance and Training Needs

Guidance

In 2007, CDC developed the *Interim Pre-Pandemic Planning Guidance: Community Strategy for Pandemic Influenza Mitigation in the United States–Early, Targeted, Layered Use of Nonpharmaceutical Interventions*, or the 2007 *Community Strategy*, which provided guidance for public health officials to help slow the spread of pandemic influenza through the use of recommended NPIs.[7] Approximately half of the respondents (48.9%) reported that they were aware of the 2007 *Community Strategy*, and the majority of them (72.9%) reported that they had used the guidance during the 2009 H1N1 pandemic response. For those who did not use the 2007 *Community Strategy*, respondents reported they would have been more likely to use it if the *Strategy* had provided more practical implementation guidance and instructions.

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TABLE 2

NPI Guidance Needs (in Weighted Rank Order)*

Top 3 Types of Pandemic Influenza NPI Guidance Information

	Weighted Rank
Triggers for implementing NPIs (eg, closing schools or canceling mass gatherings)	1
Health messaging for various populations and settings	2
Legal authority for implementing NPIs	3

*Other responses included: policy issues concerning the implementation of NPIs, STLT staff training on NPI implementation and messages, range of NPI recommendations when severity of conditions is uncertain.

Respondents also were asked to identify the top 3 types of pandemic influenza NPI guidance information that they or their agency would like from CDC. Fifty-nine percent of respondents ranked triggers for implementing NPIs as the No. 1 type of NPI guidance information needed (Table 2).

Respondents believed the most difficult NPI recommendation to *implement* was getting people to stay home when sick (72.4%). The most difficult to *communicate* were NPI recommendations for business owners and employers (42.3%), and 84.3% believed the most difficult to *monitor* was individual adoption of personal protective behaviors. Again, the top 3 choices were ordered into the top 3 selections according to their weighted ranks (Table 3).

Circumstances for Recommending Personal Protective Behaviors, Use of Face Masks, School or Workplace Closures, and Mass Gathering Cancellations

Personal protective behaviors (such as washing hands often) are always recommended, according to 44.2% of respondents. When asked about the use of face masks, 14.2% mentioned that they would recommend them during a pandemic, epidemic, or severe outbreak or when a person is ill or has symptoms. School closures tend to be based on absenteeism rates that are either already defined or not yet defined, according to 34.8% of respondents. Workplace closures are based on the number of absent/ill employees, said 22.1% of respondents. The circumstances for recommending mass gathering cancellations varied, with many respondents indicating that there was no public health authority for canceling a mass gathering event; therefore, many could only make recommendations.

Training

Respondents ranked NPI strategies and triggers for use as No. 1 (41.7%) for additional NPI information or training needed (Table 4). Rural health departments ranked NPI strategies and triggers for use higher than urban/suburban health departments. Using an open-ended response format, respondents also described what NPI training should include in terms of topics, length, special features, and other. Fifteen main categories of NPI topics were identified. The most frequently reported topics were communication strategies ($n = 93$), types and definitions of NPIs ($n = 63$), and trigger points ($n = 61$).

Monitoring Systems for NPI Implementation

Respondents were asked about their health department's ability to monitor school closings, school absenteeism, influenza-like illness (ILI)-related absenteeism in schools, workplace closings, workplace absenteeism, and mass gathering cancellations. Approximately two-thirds (67.4%) of respondents reported their health department has the ability to monitor school absenteeism; 62.5% can monitor ILI-related absenteeism in schools; and 61.8% can monitor school closings. However, 97.8% of respondents reported their health department does *not* have the ability to monitor workplace absenteeism. Ninety-four percent of health departments cannot monitor workplace closings. Also, 81.3% reported that their health department cannot monitor mass gathering cancellations.

DISCUSSION

Future NPI planning, decision-making, and recommendations by CDC should continue to be based on feedback solicited from STLT health departments. "The potential impact of a severe influenza pandemic underscores the continued need for advances in pandemic countermeasures".[8] This survey showed that general public/families, childcare programs and K-12 schools, and workplaces are priority audiences for health departments. There should be a focus on developing NPI messages and materials for these audiences. Broadcast media and printed materials were found to be the preferred methods for reaching identified audiences. However, it is important to consider the cost implications of these methods for health departments that may need to purchase air time or fund large printing jobs.

For NPI training activities, respondents believed there is a need for training on NPI decision-making strategies, triggers for implementing NPIs, and communicating NPI recommendations to families and communities. These findings are similar to several studies conducted after the 2009 H1N1 pandemic, which found that state and local health departments need continued information, training, and assistance to effectively communicate, implement, and monitor NPIs during an influenza pandemic.[9-12] Findings from our study also demonstrated that STLT health departments need: (1) a more practical orientation of how to incorporate NPI guidance into their preparedness and response activities, (2) information on triggers for implementing NPIs (eg, at what point during a pandemic should certain NPI measures be implemented), (3) examples of possible early influenza surveillance indicators that states and localities might use as potential activation triggers for NPI implementation (eg, increased patient visits to healthcare

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TABLE 3

Top 3 NPI Recommendations That Are Difficult for You/Your Agency to Implement/Communicate/Monitor in Community Settings (in Weighted Rank Order)*

Weighted Rank	Implement	Communicate	Monitor
1	Getting people to stay home when sick	NPI recommendations for business owners and employers (eg, business continuity options, policies)	Individual adoption of personal protective behaviors
2	Business closings	NPI recommendations across jurisdictions	Real-time business closings
3	Alternative childcare arrangements	NPI recommendations for mass gathering planners (eg, cancellations)	Cancellation of mass gatherings

*Other responses included: school closures, canceling or postponing mass gatherings and public events, flexible leave policies.

TABLE 4

NPI Training Needs (in Weighted Rank Order)*

Top 3 Areas You/Your Agency Would Like to Have Additional NPI Information and Training	Weighted Rank
Triggers for implementing NPIs	1
Communicating NPI recommendations to families and community setting audiences (eg, schools, businesses)	2
Decision-making strategies for NPI recommendations	3

*Other responses included: evidence for effectiveness of NPIs, lessons learned from past influenza pandemics about the use of NPIs, epidemiology of influenza pandemics, and the role of NPIs.

providers for ILI; increased ILI activity within a school[4]), (4) health messaging for various populations and settings (eg, targeting individuals and school administrators), and (5) legal authority for implementing NPIs (eg, closing schools or businesses). School monitoring capabilities in STLT health departments are high, but workplace and mass gathering monitoring capabilities are low and may be strengthened through training and education.

Limitations

The respondents represented a convenience sample of members pre-identified by 4 national public health organizations and, therefore, may not represent the views of all STLT officials. The majority of respondents were from local health departments. Additional analyses were conducted by type of health department, primary duty of respondent, and locale served. Lastly, although there were 7 respondents that were identified as working in a tribal or territorial health department, there was limited targeted outreach to tribal and territorial health departments to participate in the survey.

PUBLIC HEALTH IMPLICATIONS

STLT health departments play key roles in NPI implementation during an influenza pandemic. "Local health department employees are likely to be among the first to respond".[6] Effective prepandemic planning is important to community preparedness and a successful pandemic response. To fill identified gaps, CDC has used these findings to create NPI guidance and materials to assist in prepandemic planning and preparedness for STLTs and various community settings. In April 2017, CDC released an update to the 2007 *Community Strategy*, the *Community Mitigation Guidelines to Prevent Pandemic Influenza — United States, 2017*.[4] These updated guidelines provide a more practical orientation to prepandemic NPI planning, and include planning scenarios and an NPI evidence-based tool box. In addition, these findings helped support the development of a revamped CDC NPI website, NPI 101 Web-based training course, NPI communication and education materials, and NPI prepandemic planning guides and infographics.[13] Each of these resources can assist STLT health departments as they focus on community planning and preparedness before the next influenza pandemic.

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