# The Novel Influenza A H1N1 Epidemic of Spring 2009

## National After Action Workshop on a Federal Public Health Emergency: 21–22 September 2009 Torrance, California

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**Keywords:** epidemic; H1N1; influenza; pandemic; public health; public health emergency; swine flu

**Abbreviations:**
CCT = Clinician Communication Center
CDC = (US) Centers for Disease Control and Prevention
CPHD = Center for Public Health and Disasters
DRC = Disaster Resource Center
EMS = emergency medical services
EMTALA = Emergency Medical Treatment and Active Labor Act
JIC = Joint Information Center
NIMS = National Information Management System
OSHA = Occupational Safety and Health Administration
PPE = personal protective equipment
SEMS = Standardized Emergency Management System
SNS = Strategic National Stockpile
UCLA = University of California-Los Angeles

**Web publication:**

**Abstract**
The introduction of a novel influenza virus into the human population during the spring of 2009 resulted in a series of unprecedented local, state, and federal responses in the United States. A wide variety of actions were taken to simultaneously define the communicability of the virus, conduct surveillance related to disease impact, and produce containment guidance for health departments, schools, businesses, and the general public even as the spread of this influenza continued to evolve. A two-day workshop was convened on 21–22 September 2009 by the University of California-Los Angeles Center for Public Health and Disasters to explore the actions and decisions taken during the early months of the pandemic. Ninety-one leaders from the (US) Centers for Disease Control and Prevention, state and local health departments, and other agencies engaged in two days of plenary panel presentations and facilitated discussions across four working groups: (1) epidemiology; (2) public health risk communication; (3) local public health actions; and (4) providing health care. Findings of the working groups were discussed in plenary sessions that included all workshop participants. Recommendations were derived from the synthesis of discussions.

**Dorian A, Rottman SJ, Shoaf K, Tharian B: The novel influenza A H1N1 epidemic of spring 2009. *Prehosp Disaster Med* 2009.**

### Introduction

In the spring of 2009, a new influenza catapulted health departments across the United States into aggressive surveillance and control activities. Media attention was widespread and the US Centers for Disease Control and Prevention (CDC) assumed a leading role in the national response. On 26 April 2009, the Department of Health and Human Services declared a *public health emergency* in the US This action enabled emergency use authorizations of drugs and devices, the release of the Strategic National Stockpile, and laboratory tests in conjunction with a rapidly evolving infectious disease outbreak. Local and state health departments responded with actions that included increased surveillance, laboratory specimen processing, handling of medications from the Strategic National Stockpile, implementing non-pharmaceutical interventions on mass gatherings and school activities, and critical risk communications advising their populations of the realities of this rapidly changing outbreak.

On 21–22 September 2009, the University of California-Los Angeles (UCLA) Center for Public Health and Disasters (CPHD) convened a two-day After-Action Workshop to explore actions taken in response to the Novel H1N1 A (swine) influenza pandemic of spring, 2009. Convened in the Los Angeles area, the workshop brought together 91 participants from 16 states, the District of Columbia, and Taiwan.

Leaders from the CDC, state and local health departments, and other agencies engaged in facilitated discussions to inform participants how decisions were made and the effects of the resulting actions. Participants also received updates on the current status of the Novel Influenza A H1N1, on

both the domestic and international fronts, and what to expect going into the 2009–2010 influenza season.

**Methods**

The structure of the Workshop included *Keynote and Plenary Presentations* and *After-Action Panels* that focused on four areas of the response: (1) epidemiology/surveillance; (2) risk communication; (3) local public health action; and (4) provision of health care. Based on their own professional interests and responsibilities, participants self-selected among four distinct working groups, each of which was structured to address one of these four key areas. These working groups attempted to identify key actions of the response that were effective, as well as those that could have been managed differently. Workshop participants had the unique opportunity to interact with colleagues from all levels of the response, as they worked to identify gaps that might need to be addressed both in the fall flu season as well as in future national disease outbreaks.

Each of the working groups was facilitated by a CPHD/UCLA School of Public Health faculty member, and two CPHD staff recorded detailed notes of the discussions. These notes were reviewed and collated to determine predominant themes across all four subject areas, as well as to identify those parameters that were specific to a given area (e.g., epidemiology or provision of health care).

All of the participants then reconvened in general session, at which a representative presented findings from each working group. Following clarifying questions from the floor, several predominant themes emerged that informed the ultimate recommendations of the proceedings. Additional *Plenary Presentations* provided the most up-to-date information available concerning the stability and communicability of the virus, the global impact of the pandemic, and strategies for containment and immunization for the 2009–2010 influenza season. The Workshop concluded with a presentation of targeted action steps and recommendations that were generated by the participants.

**Keynote and Plenary Presentations**

*Wilma Wooten, MD, MPH* presented the first plenary presentation, she provided a description of the first two confirmed cases of novel H1N1 in the United States, which occurred in Imperial and San Diego counties in southern California. Her presentation described the response activities of San Diego County, the communications strategies that were employed, and non-pharmaceutical and community mitigation interventions they had implemented. San Diego County was successful in utilizing press conferences and social marketing strategies to provide information to its community. Dr. Wooten also stated that San Diego County has been working continuously to monitor the outbreak and has developed a playbook for surveillance, community mitigation, response, and communication strategies to aid with the management of future pandemic flu emergencies.

*Captain Stephanie Zaza, MD, MPH* provided several presentations, that included an overview of the outbreak, covering the global situation of novel H1N1, and discussing the current and projected disease status and planning considerations. Dr. Zaza addressed the federal response to the novel H1N1 and reviewed the first 15 days of April and the response activities during that time. She also outlined the CDC's primary response goals, challenges, and recommendations for next steps. Dr. Zaza's presentation on the global situation of the outbreak included information about how the CDC tracks influenza trends abroad through six global surveillance platforms. The CDC also observes other countries' community mitigation activities. In the US, the CDC addresses H1N1 using an ecological approach to decrease exposure and increase immunity by focusing on three levels of outreach: (1) individuals; (2) social environment; and (3) community preparedness. This outreach is expected to decrease community transmission and while maintaining community functioning, should decrease morbidity. The CDC plans to incorporate these approaches into their various guidance documents. Dr. Zaza's final presentation on the current and projected disease status highlighted the novel H1N1 epidemiology in the US as well as the upcoming influenza season's response actions. For the upcoming flu season, the CDC will implement response activities focused around four pillars, including: (1) awareness; (2) mitigation; (3) vaccination; and (4) communication and plans to conduct epidemiological surveillance to track the severity of the virus.

*William Craig Vanderwagen, MD* spoke about public health's response to the novel H1N1 and its success in responding to the outbreak. Dr. Vanderwagen partly attributed this success to the fact that many groups had an established playbook for avian influenza that facilitated the H1N1 flu response process. He highlighted that the H1N1 outbreak projected public health to the forefront of the national scene, but for the future, public health must think holistically in its responses. On a national level, public health officials must strategize technically and operationally in consideration of the response needs at the local level. Dr. Vanderwagen also discussed how the public and media are unsure about the ramifications of the outbreak and that it is the responsibility of public health to provide guidance, dialogue, and direction in the emerging crisis. Some of the challenges public health faced during the H1N1 response were not having sufficient flexibility and adaptability in plans among leaders and experts, lack of established plans with the Department of Education for school closures, conducting surveillance, widespread use of incident command systems, and having to make tough decisions on allocating resources at the local level for care and vaccination.

*Shira Shafir, PhD, MPH* provided an epidemiological overview of the novel H1N1 and the disease-causing capability of the virus. She discussed the disease in the southern hemisphere and the similarities in epidemiology in the US. Dr. Shafir provided general details about flu viruses, how they affect the body, and how the virus mutates, which segued into a discussion about how the novel H1N1 evolved into what is seen today. She also described the clinical presentations of the disease, including transmission, infectious period, and secondary attack rates. Finally, Dr. Shafir discussed the impact of H1N1 on different age groups and how this virus affects those with underlying health condi-

tions more severely and provided examples of research that contains possible explanations for this particular phenomenon.

**After-Action Panels**

*Epidemiology—Howard Backer, MD, MPH; Kathryn C. Boylan, RN, MEd, CNAA; Captain Stephanie Zaza, MD, MPH*

Dr. Backer, Ms. Boylan, and Dr. Zaza addressed surveillance activities that their organizations conducted during the 2009 novel H1N1 outbreak. Dr. Backer spoke about H1N1 surveillance in California and its spike since June 2009, particularly in children's summer camps and correction facilities. The objectives of their surveillance were to monitor viral emergence, human-to-human transmission, and the impact on the population. Dr. Backer also mentioned what steps the California Department of Health and Human Services is taking to respond to H1N1 in the future.

Ms. Boylan presented the response activities of Elyria, Ohio Health District after it received information on the city's first case. For the most part, its response activities were successful, including working with the case family and coordination with schools, but they did have some challenges, such as initial laboratory testing of samples and other laboratory protocols. Activating Joint Command also received mixed results because traditional emergency responders were called to the Emergency Operations Center, but they did not have much of a role during the response.

Dr. Zaza described the CDC's surveillance activities working with 141 federal, military, and private laboratories and CDC's support for these laboratories with training, testing, and tools. She outlined the epidemiology of the virus in the US, including hospitalization and influenza-like illness rates that were present at that time. Dr. Zaza also presented some of the guidelines that were updated due to information received from field studies.

*Public Health Communication—Fidel J. Calvillo, LVN; Joanne Cox, MC; Al Lundeen, JD, MA*

The Public Health Communication panelists provided an overview of some of the risk communication activities conducted by their organizations. Mr. Calvillo spoke about the first death in the United States, which occurred in Cameron County, Texas and reported on some of their County's risk communication practices, including providing CDC data to the public and stakeholders, activating the Joint Information Center, and coordinating with schools and agencies to provide health education information to the public and media. Some challenges faced were in clarifying different practices in Mexico as compared with the US, and from policies that varied for schools and day care centers. Some of their achievements and strengths following the response included having improved relationships with stakeholders, reinforcing Cameron County Department of Health and Human Services's position as leaders in response and information for their county, and working with the media to calm the public.

Mr. Lundeen presented the communication activities conducted by the California Department of Public Health during the H1N1 outbreak. He highlighted that being available to the media was more important than the message and having a teleconference instead of waiting for an in-person press conference, was helpful to provide the most recent information. Some challenges they faced resulted from a conflict in the number of cases that were reported by different sources (which the media picked up on), and the changes in school closure policies. Some communication strategies that the CDPH wishes to employ or continue to employ in the future include being honest, admitting what they don't know, and being available to the media.

Ms. Cox described the Joint Information Center (JIC) at the CDC and some of the information and guidance documents that were disseminated through the JIC. The CDC developed 41 guidance documents during the spring outbreak, developed key messages for partners, and created materials such as fact sheets, public service announcements, information through Twitter, and translated materials. They also outreached to migrant farm workers and disabled populations. One of the main challenges they faced was trying to streamline all of the changing guidance and recommendations. Some lessons they learned were to have a content manager in place, highlight new information on their materials, collaborate more with community partners, and have toolkits ready for the future.

*Healthcare Coordination—Captain Dahna Batts, MD, FACEP; Kurt C. Kainsinger, MPH, EMT; David E. Persse, MD*

The healthcare coordination panelists presented some of the activities among their organizations and teams during the Spring 2009 H1N1 outbreak. Mr. Kainsinger provided an overview of the UCLA Health System and the coordination of its three hospitals to form a leadership group to review their pandemic flu plan, inventory and order additional supplies conduct surveillance, adopt treatment guidelines that were communicated to medical staff, and implement enhanced infection control strategies. Mr. Kainsinger also presented the Los Angeles County Disaster Resource Center (DRC) activities including the coordination of a series of conference calls with the DRC coordinators, distribution of the County stockpile of antivirals and personal protective equipment (PPE) to community clinics, and providing frequent communication from the public health workforce to hospitals and clinics.

Dr. Persse described Houston's response during the H1N1 outbreak, highlighting that its response was conducted under the Incident Command System, using Unified Command to coordinate the response among various agencies and entities. Some gaps that were raised included understanding policies that varied for different entities, such as the fire department versus police department, as well as knowing what the policies were for certain issues, such as sick leave and PPE for non-public safety employees.

Dr. Batts presented activities from the Emergency Communications Team and the Joint Information Center at the CDC, primarily focusing on the Clinician Communication Team (CCT). The CCT provides outreach to healthcare providers and they were able to survey partner organizations for feedback on coordination with clinicians during the H1N1 outbreak. Some lessons learned include understanding the importance of regular communication, having a common source for credible and accurate information, developing practical tools, such as algorithms,

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| **March** | |
| Mid-March | An unusually large number of La Gloria, Veracruz' population is sickened by respiratory illness |
| March 17 | Onset of illness of first confirmed case of H1N1 in Mexico |
| March 28 | Earliest known onset illness of a US case later confirmed as H1N1 in a 9-year-old girl in Imperial County |
| March 30 | Onset of illness of a 10-year-old boy in San Diego County. His case is eventually the first to be confirmed as H1N1. |
| **April** | |
| April 5 | MedISys reports a Mexican article about the epidemiological alert in La Gloria. |
| April 6 | Public health authorities in Mexico begin investigating unusual cases of pneumonia. |
| April 12 | First confirmed H1N1 fatality in a 39-year-old woman from San Luis Potosi in Mexico. |
| April 17 | A case of atypical pneumonia in Oaxaca prompts enhanced national surveillance. |
| April 21 | CDC publishes MMWR Dispatch on the two cases in Southern California. The Associated Press covers the alert – the first article in English language media. |
| April 23 | CDC holds first press briefing on H1N1. |
| April 25 | First school closure of entire school district in San Antonio, Texas. CDC issues first Health Alert Network (HAN) related to the outbreak. |
| April 26 | DHHS declares a public health emergency. CDC announces release of SNS materials. |
| April 27 | WHO raises pandemic alert level from Phase 3 to 4. CDC issues travel advisory to Mexico. CDC issues interim school closure guidance. |
| April 28 | CDC issues interim clinical guidance for children and pregnant women. California proclaims State of Emergency. |
| April 29 | WHO raises pandemic alert level from Phase 4 to Phase 5. Some states are capable of testing for H1N1. CDC plans to provide testing kits. |
| April 30 | DHHS purchases 13 million additional courses of antivirals. |
| **May** | |
| May 1 | Mexico begins 5 day shut down of most parts of county to fight spread of H1N1. CDC updates interim school guidance. |
| May 2 | US has >430 school closures in 18 states. |
| May 3 | Interim CDC Guidance: Documents on H1N1 Flu and Cardiovascular Disease, Use of Rapid Influenza Diagnostic Tests, and Protection of Cruise Ship Passengers and Crew. |
| May 4 | CDC has shipped test kits to all States (CDC still is conducting confirmatory testing). |
| May 5 | First US death of a 33-year-old woman in Texas. CDC revises school closure guidance. Development phase of vaccine is underway. |
| May 18 | CDC releases MMWR that includes information on patients with underlying health conditions. |
| May 21 | CDC releases MMWR regarding elderly and pre-existing antibodies against the new H1N1 strain. |
| May 22 | DHHS announces $1 billion for clinical studies of vaccines and potential ingredients for pre-pandemic stockpile. |
| May 27 | From May 6–27, CDC posted updated guidance and documents for various audiences. CDC has shipped candidate virus strains to various manufacturers. |
| **June** | |
| June 7–13 | There is higher ILI than usual for this time period, attributable to novel H1N1. Ongoing surveillance, guidance, and communication activities from federal, NACCHO, and state partners. |
| June 11 | WHO raises pandemic alert level to Phase 6. H1N1 outbreak is declared a pandemic. |



**Table 1**—Novel H1N1 A (swine) influenza timeline: March—June 2009 (CDC = US Centers for Disease Control and Prevention; DHH = Department of Health and Human Services; MMWR = *Morbidity and Mortality Weekly Report*; NACCHO = National Association of County and City Health Officials)

triage protocols, pocket guides, and patient education materials, as well as developing pre-existing relationships with partner organizations.

**Emerging Themes**

A review of the discussions that took place over the course of the entire two-day workshop identified several overall themes. Some of these were discussed by all of the groups, while others became predominant points of discussion within specific work groups. These themes were aggregated into the following topical areas: (1) Official Guidance and Recommendations; (2) Communication; and (3) Sustaining Capacity.

*Official Guidance and Recommendations*

There were a number of areas discussed that were related to official guidance and recommendations that came from the CDC as well as from state and local health departments. Participants stated that the CDC provided guidance, but it remains within each local health department's purview to enact programs based on interpretation of that guidance. Official language used in the CDC guidance included phrasing such as "should consider" for just this reason, providing the best available factual information from which any given health department can tailor this information according to its local situation and resources. This area of discussion highlighted the fact that some end-users of the CDC guidance were pleased with the ability to use it to guide their own policies. However, some individuals expressed a desire for a firmer stance. This was especially an issue when talking with elected officials about why a certain decision was made.

Another issue that was raised was that of the timeliness of the various guidance documents. Guidance was continuously updated as the event warranted. This was appreciated, but participants reported difficulty in rapidly determining what the pertinent changes were from one version to the next. One rural community stated that they would sometimes have two or three versions of the same guidance document and didn't know which was the most recent.

One of the concerns with the ever-changing guidance was the issue of school closure. In response to changing information, the CDC changed the guidance on school closure a number of times in a very short time period. This made it difficult for locals to be able to be in line with the latest guidance and created confusion with local school districts.

Some specific population settings, such as universities, relied on the CDC for recommendations concerning major spring activities such as commencement ceremonies or conferences. State and local health department representatives at the workshop felt that there was a need for more concrete CDC guidance. The CDC representatives referred to materials from the American College Health Association participants. These recommendations provided university organizers with information leading them not to cancel events, and to educate those attending them about prevention strategies (hand sanitizers, tissues) and to avoid these activities if ill. Other campuses incorporated recommendations from state health departments concerning clinic staffing, communications with students, and residence hall procedures. The issue of providing guidance for students living in off-campus housing or in dormitory facilities that do not have the spatial capacity to isolate ill students illustrated the local challenges inherent in applying broader guidance to specific situations.

There were comments on the need for additional clinical guidance such as the indications for use and dosing of oseltamivir (Tamiflu®) for children and the consideration of capitalizing on the epidemic to more widely administer pneumococcal vaccine as a preventive strategy. Additionally, there was a call for a stronger stance on definitions of confirmed/probable/suspected cases and uniform standards for specimen testing. This last item was reflective of the protocol variance found by some agencies in the way specimens were being collected and transported. There also were concerns about ensuring both an adequate supply of viral transport medium and that samples remained isolated after collection so as not to contaminate them with other non-collected pathogens.

Healthcare settings found the disparities between the guidance of various agencies problematic. An example is the disparity between CDC and Occupational Health and Safety Administration (OSHA) guidance concerning the use of N95 respirators by healthcare and emergency medical services (EMS) workers as part of their personal protective equipment, with one suggesting surgical masks and the other requiring N95 protection. Some suggested a tiered use for N95 versus surgical masks, perhaps based on availability or only in the case of confirmed or suspected cases. Participants were explicit in their call for clarification concerning the rationale for these differences and for guidance that integrates both types of masks for healthcare providers.

Another example of conflicting protocols and standards was identified by health providers who attempted to implement their surge plans utilizing tents and other non-licensed facilities. One hospital representative reported being cited by the fire marshal for an un-authorized healthcare facility and was forced to close their triage tents outside of the Emergency Department.

*Communication*

Overall, participants agreed that risk communication surrounding the outbreak was well done, with clear updates and explanations provided by the CDC. The primary concern had to do with the lack of crosswalking of information from one communication network to another. There was a recommendation to utilize the JIC to affect this crosswalk of information and ensure standardization of information.

*Communications Systems and Technology*—Advantages to possible increased use of technology were discussed as methods for sharing information and reports. For example, data collection could be facilitated by the use of laptop computers or personal digital assistants (PDAs) for field data collection in case tracking and interviewing. This could assist with data entry and the transfer of data for analysis. It was mentioned that use of this method also could serve to increase the standardization and sharing of information both within and between agencies. For example, having a SharePoint would make a standard set of data and visual aids available for all key personnel who must provide information to the media, the general public, or jurisdiction decision-makers.

*Communicating Information to the Public*—A primary concern was to provide information about the outbreak in terms that were easy for the public to understand. It was reported that there were challenges both with describing the outbreak in terminology that could be easily understood by the general public, as well as using phrasing that neither minimized nor sensationalized the event. For example, in some communities, the outbreak was reported as being a "mild flu". This may have discouraged the public from taking recommendations to limit spread seriously.

Furthermore, numbers were used inconsistently and without a good description of what those numbers meant. For example, the primary number used in many communities was the number of confirmed cases. However, not all communities conducted laboratory tests on the same types of cases. For example, San Diego stopped testing all but hospitalized cases early on. Therefore, their "confirmed" case numbers appeared to be considerably lower than they were for other surrounding communities that were testing more liberally. This is an issue of not knowing what the numerators mean in reference to the denominators and creates confusion in the public. It was clear that individuals from the health department who communicate with the public must describe clearly what numbers and terminology such as a "confirmed case" mean. It was pointed out that many of the people from health departments who were engaged in risk communication activities had no training in risk communication. Communicating response plans to the public depends upon making this information accessible, avoiding technical language, using easily understood comparisons, and considering the abilities of the target population to comply with recommendations.

Another problem that was encountered was in communicating the flexible or constantly changing nature of this emergency. One state representative said that they didn't realize early on that there would be a need to explain the changing nature of this emergency to the public and by the time that they did, they may already have generated some confusion and distrust.

The participants discussed the multiple channels that were used to communicate with the public. This included the growing use of media communication technologies such as Twitter, which could facilitate the rapid distribution of information. However, in general, this form of messaging did not heavily influence public opinion and most agencies used it only for one-way communication. Some health agencies established call lines with pre-recorded messages, but found that callers preferred direct, human contact. Participants felt that in addition to traditional media outlets, schools, faith-based and community-based organizations also would be important conduits for disseminating information to the public. A cost-effective strategy was proposed in which consistent, existing information is widely distributed using many different forms of media (web sites, blogs, posting of CDC guidance).

It was recognized that culture, language, and accessibility be taken into consideration when communicating to the public. A specific example cited was the Navajo Nation in Utah, in which community members are geographically dispersed and with limited education. Furthermore, certain spiritual beliefs led them to believe that they are "safe from the virus" regardless of the actions they take.

Border communities found it especially difficult to reconcile the variations in the situation on the two sides of the border, especially when the residents cross the border for work, etc. Additionally, it was mentioned that the CDC conducted outreach to the Spanish-speaking population through the Spanish-language media.

*Working with the Media*—Since the primary conduit to the public for information about the outbreak is through the mass media, health officials must pay particular attention to ensuring that explanations are well understood by those who will report them.

Considering the constraints of broadcast timetables and deadlines, being accessible to the news media is critical to ensuring the ability of health authorities to educate the media about the kinds of information that are necessary to report, provide clarity about technical information, and be forthright about what is known and not known in an evolving, dynamic, health emergency.

It was acknowledged that broadcast media seeks to deliver a headline story and, with that in mind, media coverage accelerated rapidly as the outbreak began. There was broad consensus that cultivating a strong relationship with media before a disaster is key to conveying information to the public during an emergency. To capitalize on media interest, headlines should be conveyed at the beginning of a media interview or press conference. It was noted that unavailability of health leaders leads media to fill the void with other speakers. Much discussion surrounded informing the public about pending vaccination programs and having media assist by helping to educate the public concerning priority groups for vaccination.

There was concern about the accuracy of media reporting and the trend to investigative-style reporting. Media monitoring was discussed to track the information being reported, identify gaps in information, and to identify inaccuracies that must be corrected. The process of media monitoring can be time consuming and costly, and to be complete, should to include monitoring of different forms and languages of media reports. A proactive suggestion was to establish relationships with health journalists or editorial directors at news media, to minimize the likelihood of dissemination of inaccurate information, and correcting errors when they occur.

*Inter-Agency Communication*—Many local health departments worked well with schools, universities, and faith- and community-based organizations. One community reported a unique relationship between a school of public health and local health department to help collect and map data from local schools. Others reported working with schools as a conduit for providing parents with information.

The ramifications of the outbreak on schools were described by several participants, including the impact of closing schools on other school employees (custodians, administrative staff), food service programs, parents who work, and the cancellation of school events. Similarly, keeping schools open placed increased demands on custodians and school nurses, as well as educating and encouraging compliance with such hygienic procedures as frequent hand washing.

From an incident management perspective, the rapid evolution of what was then an epidemic resulted in a large outpouring of information reflecting many perspectives from government agencies, hospitals, clinicians, and epidemiologists. It was noted by one California participant that in spite of the amount of training and emphasis placed on using National Incident Management System (NIMS), and (in California) Standardized Emergency Management System (SEMS), by public health over the last few years, it was not consistently used in this event. In many communities, the Emergency Operations Center may not have opened and communication efforts sometimes did not follow official pathways. In efforts to distribute and receive relevant information, participants noted the large numbers of conference calls and meetings that grew along with the outbreak. Suggested strategies to integrate information and make it available in a timely and efficient manner included posting meeting notes in a single, accessible area, using state JICs to synthesize critical points, and possible use of internet blogs rather than conference calls. The centralization of this process could ensure that information was cohesive and was conveying the latest updates of official guidance.

*Sustaining Capacity*

Participants identified several key factors that would be challenged in maintaining a prolonged community response to this outbreak. There was considerable discussion concerning the sustained ability to care for a large increase in the numbers of patients with influenza. There was general agreement that in recent years, there has been a decrease in hospital facilities and, therefore, a loss of bed capacity. To meet a surge in hospital visits under these circumstances, several suggestions were made including having patients use screening tools at home to help them determine the need to seek medical care, and the institution of nationally agreed upon alternative standards of care that could be applied in treating large numbers of influenza patients. One California representative suggested relaxing Emergency Medical Treatment and Active Labor Act (EMTALA) requirements stating, "EMTALA needs to be flexible so that patients can be discharged without a doctor's screening." This might have implications for licensing or hospital credentialing of non-physicians to perform these screening evaluations.

The ability to sustain health department incident management highlighted the need to reinforce personnel with replacements to ensure ongoing operations. Some health departments utilized their emergency plans and continuity of operations plans to staff the response. This means that there must to be enough staff in a department who are trained in emergency operations in order to fill these positions for a sustained response period. Regardless of the number of staff trained, few health departments would have sufficient personnel to maintain this high level of operations for the time period required by this event. One example of alternate sources of personnel for this operation was reported by one representative that the health department teamed up with the local school of public health for epidemiologic surge capacity.

The ability of hospitals to provide frontline care was linked to being able to establish triage areas outside of their emergency departments. If these areas are located on hospital property, however, healthcare workers other than physicians might need to be authorized either to screen patients or to discharge them from these settings. Should a substantial number of influenza patients require admission, this demographic shift in the kinds of admitted patients could have a significant impact not only on patients with non-influenza medical conditions, but also on the overall operating revenues of a hospital, particularly if care such as elective surgeries, had to be cancelled for a prolonged period of time. Regarding implementing health department immunization plans, an EMS provider asked, "Can paramedics vaccinate? [Can we use] private sector resources to vaccinate large segments of the workforce?"

An additional concern was the provision of respiratory protection for healthcare workers and the apparent disparity between recommendations for N95 and surgical masks, identified earlier in this After-Action Report (see the section, "Official Guidance and Recommendations"). In addition, a number of participants described difficulties in securing adequate supplies of N95 masks from their vendors, and that when masks were supplied from different manufacturers, this might require separate fit testing. Questions also arose regarding liability if employees became ill or if they would even report to work if it was perceived that there were insufficient supplies of respiratory PPE. Discussion included the re-use of masks or defaulting to surgical masks if supplies of N95 respirators were exhausted. One participant from a Southern California County posed the question, "What is Plan B? Logistically we can't fulfill the state's recommendations for PPE; we need guidance, but what is the fall back plan?"

*Strategic National Stockpile (SNS) Activation*—There was general agreement that the rapid distribution by the federal government of SNS inventory went very well, particularly since it was dispatched simultaneously across the country rather than to a specific locale. It was noted that the tracking of specific pharmaceuticals (oseltamivir) placed additional staff burdens on the receiving agencies.

Several participants commented that the stockpile was designed for immediate release and distribution, not for long-term storage at a receiving site. A hospital representative from a California border-county reported that their County "distributed their SNS supplies to the hospitals because there was no large-scale climate controlled facility at the county level." Others reported having to send materials back to the State because of a lack of storage capabilities. Thus, during the spring outbreak, local agencies may have been able to handle the SNS supply chain, insufficient storage led to the logistical issue of states having to re-distribute SNS resources should this become necessary during the fall-winter influenza season.

*Emergency Medical Service (EMS) Responders*—There was concern about the high-risk environment posed to EMS personnel by caring for patients in the close quarters of an ambulance. It was pointed out that EMS responders often are not notified of patients who they have transported who might later be found to have a communicable disease; better systems of tracking and notification were suggested.

Utilizing paramedics to assist with vaccination outreach to the population seemed to be a reasonable way to help with immunization programs, but vaccine administration would have to be incorporated into their scope of practice.

**Recommendations**

The following recommendations are based on the discussions during the Workshop and the expert opinions of the authors. These recommendations are not a complete list, but capture the main themes and issues highlighted by local, state, and national experts.

1. Official guidance published by the CDC must be dated and changes from the previous version should be highlighted.
2. Existing NIMS/SEMS lines of authority and communication should be utilized. Identify and clarify the existing lines of communication and adhere to them.
3. In terms of risk communication, remember the advice of Sam Donaldson, "In times of trouble, the media is a hungry bear. If you don't feed the bear, the bear will eat you". Be proactive in meeting the needs of the media.
4. Every person addressing the media during the event should be trained in risk communication. Even in the midst of the crisis, all leadership (Health Officers, epidemiologists, nurses, etc.) should take the time to receive spokesperson training.
5. Provide basic risk communication training for all epidemiology staff in regards to communicating complex mathematical, epidemiological information to the Public Information Officer and the public in simple, English language.
6. While conference calls are extremely helpful, they can be overwhelming to health department personnel. Each agency must determine its own need for getting information. A triage system for determining who needs what information first-hand should be developed. Make use of archived and/or synthesized information from the Nationall Association of County and City Health Officials (NACCHO) and others.
7. In order to meet the surge needs of the pandemic, federal and state requirements and guidelines, such as the Emergency Medical Treatment and Active Labor Act (EMTALA) and nursing ratios, may need to be relaxed or allow for flexibility in their application.
8. Healthcare facility licencing should be flexible to allow for expanded care on hospital property as needed during a pandemic.
9. Make use of other sources of personnel such as medical schools, schools of public health, nursing schools, etc., to provide surge capacity.
10. There must be a standard at the state (or preferably) the federal level as to who will be tested and what the tests results mean. For example, test all cases until the outbreak is confirmed in the community, and then only test hospitalized and fatal cases.

Since the conclusion of the two-day national workshop and the publication of this report, several recommendations made within this article were enacted. These include changes in the presentation of published CDC guidance, the merging of OSHA and CDC mask recommendations, and, through the President's National Emergency Declaration on H1N1, the relaxation of EMTALA and other federal requirements.

**Acknowledgements**

This After Action workshop was funded as part of UCLA's Centers for Disease Control Center for Public Health Preparedness Grant (fund number U90TP924253) and with supplemental support from the following organizations or agencies: The Center for Public Health Preparedness at Johns Hopkins Bloomberg School of Public Health; Los Angeles County EMS Agency through funding provided by ASPR Pandemic Influenza Healthcare Preparedness Improvement for States (Grant No. 1 U3REP090139-01-00); Pacific Public Health Training Center (D20HP00001); LiveProcess, Emergency Preparedness and Response Solutions.

Appendix 1A—Workshop Agenda, Day 1

## Workshop Agenda

**Day 1: Monday, September 21, 2009**

**Introduction to the Workshop After Action Process: H1N1 Timeline**
Steven J. Rottman, MD, FACEP, Director, UCLA Center for Public Health and Disasters; Adjunct Professor, UCLA School of Public Health and David Geffen School of Medicine and UCLA

**First Case Description – Southern California**
Wilma Wooten, MD, MPH, Health Officer, San Diego County Public Health Department

**Keynote Presentation 1: Novel H1N1 Influenza: Unraveling the Outbreak**
Captain Stephanie Zaza, MD, MPH, Coordinating Office for Terrorism Preparedness and Emergency Response, Centers for Disease Control and Prevention

**Keynote Presentation 2: Federal Public Health Decision Making**
William Craig Vanderwagen, MD, Rear Admiral, US Public Health Service; Assistant Surgeon General, US Department of Health and Human Services

The meeting will reconvene in plenary sessions for a series of three, 45 minute, thematic After Action Panels. Each panel will have representation from a small, large and national agency. Each presenter will be given 10 minutes to inform participants on how the developing outbreak affected their respective community/agency, actions that worked well and those that did not, leading to reflection on what might have been done differently based on information available at that time. At the end of each panel, time will be allowed for questions that will inform afternoon discussion groups.

**After Action Panel: Epidemiology**
Howard Backer, MD, MPH, Associate Secretary, Emergency Preparedness, California Health and Human Services Agency; Kathryn C. Boylan, RN, MEd, CNAA, Health Commissioner, Elyria Ohio, City Health District; Captain Stephanie Zaza, MD, MPH, Coordinating Office for Terrorism Preparedness and Emergency Response, Centers for Disease Control and Prevention

**After Action Panel: Public Health Communication**
Fidel J. Calvillo, LVN, Director of Public Health Response Program, Cameron County, Texas Department of Health and Human Services; Joanne Cox, MC, Deputy Chief, Emergency Risk Communication Branch, National Center for Health Marketing, Centers for Disease Control and Prevention; Al Lundeen, JD, MA, Deputy Director, Office of Public Affairs, California Department of Public Health

**After Action Panel: Health Care Coordination**
Captain Dahna Batts, MD, FACEP, US Public Health Service; Team Lead, Clinician Communication Team, National Center for Health Marketing/Emergency Communication System, Centers for Disease Control and Prevention; Kurt C. Kainsinger, MPH, EMT, Disaster Resource Center Manager, UCLA Health System, Office of Emergency Preparedness; David E. Persse, MD, Physician Director, City of Houston Emergency Medical Services

Four Working Groups will be convened, each addressing specific elements of the response. The goal of these groups will be to discuss in greater detail, the applicable issues raised in the morning sessions, and to prepare a 15 minute summary of the key points. These presentations will be presented at the plenary session on the morning of Day 2. Each group will be facilitated by a faculty member from the UCLA Center for Public Health and Disasters, with notes compiled by a recorder. An afternoon break will be provided.

**Targeted Working Group Sessions**
*Working Group I: Epidemiology*
Issues of case tracking, laboratory identification/surge, information technology

*Working Group II: Public Health Risk Communication*
Preparing public messages; standardizing information and timely updates; working with the media; informing the public

*Working Group III: Local Public Health Actions*
Non-pharmaceutical interventions; public gatherings; school closures

*Working Group IV: Providing Health Care*
Hospital surge capacity; use of Personal Protective Equipment; Strategic National Stockpile; implications for primary health care providers and EMS personnel

Appendix 1B—Workshop Agenda, Day 2

## Workshop Agenda

**Day 2: Tuesday, September 22, 2009**

**Working Group Reports**
Each group will report findings and recommendations for improvement planning, with time included for audience discussion.

**Disease-causing Capability of Novel H1N1 A Virus: Current State of this Virus**
Shira Shafir, PhD, MPH, Assistant Adjunct Professor, Department of Epidemiology and Center for Global and Immigrant Health, UCLA School of Public Health

**Global Situation: Current and Projected Status**
Captain Stephanie Zaza, MD, MPH, Coordinating Office for Terrorism Preparedness and Emergency Response, Centers for Disease Control and Prevention

During lunch, participants will be asked to sit in "Working Group" tables to develop no more than five (5) action steps within the context of the presentations from the Working Groups earlier this morning. These action steps will be collected, compiled, and presented prior to the close of this After Action Workshop.

**Status of Novel H1N1 Disease and Planning for the 2009-2010 Influenza Season**
Captain Stephanie Zaza, MD, MPH, Coordinating Office for Terrorism Preparedness and Emergency Response, Centers for Disease Control and Prevention

**Target Action Steps**
Presented by: UCLA Center for Public Health and Disasters Staff

**Closing Remarks**
Steven J. Rottman, MD, FACEP
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