Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services

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Maine CDC 2009 H1N1 Influenza Pandemic After Action Summary December 2010

CONTENTS:

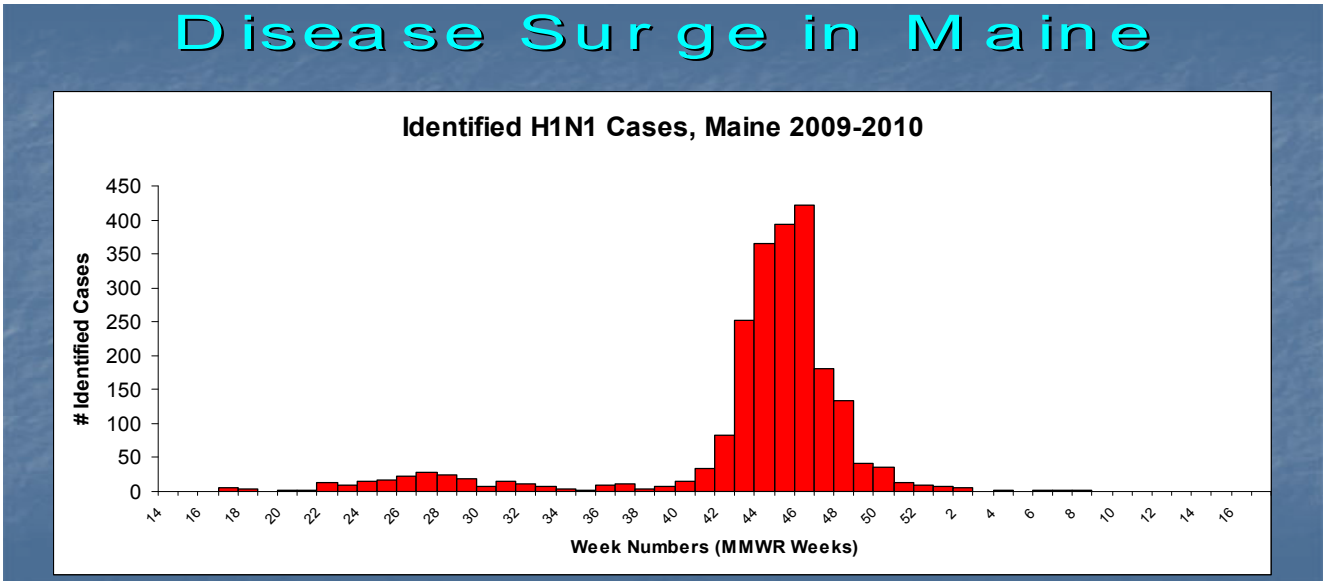
BACKGROUND

In late April 2009, a novel strain of Influenza A (H1N1), also known as 2009 H1N1 Influenza, emerged and was detected in the southern United States (US) and Mexico. Public health, emergency management, health care, and many partner agencies and organizations across the country quickly stood up to address this threat. The overall goals were to limit the burden of disease and to minimize social disruption.

Between April 2009 and February 2010, there were an estimated 59 million cases of H1N1 flu in the US. These cases resulted in approximately 265,000 hospitalizations and 12,000 deaths nationwide. About one-third of cases, one-third of hospitalizations, and about 10% of deaths nationwide occurred in children younger than 18 (compared with less than 1% of deaths during an average seasonal influenza year). About 90% of the deaths due to H1N1 were among those younger than 65, while about 90% of the deaths due to seasonal flu are among those 65 and older.

This novel strain of H1N1 influenza was first detected in Maine on April 29 in York and Kennebec Counties, resulting in the closure of an elementary school and two day care facilities. It was the week after school vacation, when a number of Mainers had traveled, including to the southern US and Mexico. This strain of H1N1 also spread extremely rapidly across the globe, likely because of its high transmissibility as well as widespread global travel, including during incubation periods.

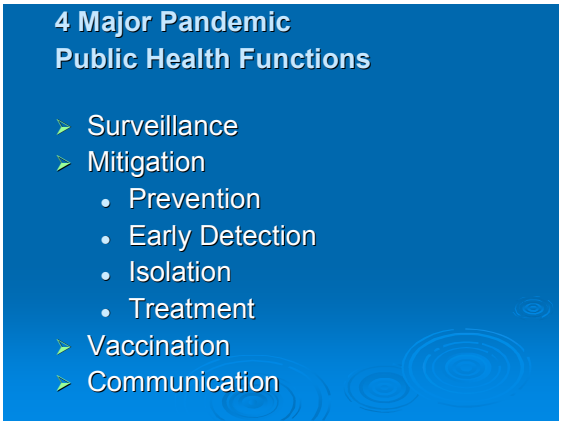
Eventually, thousands of Maine people became ill with symptoms of H1N1; 40 summer residential camps experienced outbreaks, some of them reporting repeated outbreaks when new camp sessions started; about 200 schools experienced outbreaks with high absentee rates (>15%) during the fall of 2009; almost 250 Mainers were hospitalized with the infection, the majority of them being children and young adults; and 21 adults died from the infection (August through January, though most were in November and December). Although the impact of this primarily pediatric and young adult pandemic was severe for a number of people, Maine was extremely fortunate to have experienced one of the mildest disease surges in the country. Maine was one of few states that did not report any H1N1-related deaths among children. The disease surge in Maine started in late October and lasted about 10 weeks to the end of December, with a peak during the days around Thanksgiving (see diagram below).



This diagram indicates that the peak weeks in Maine for identified (tested) cases of H1N1 were MMWR weeks 42 – 52, which were the last 10 weeks of the calendar year, from October 26 until December 31. The peak appeared to be week 47, which was Thanksgiving week. It should be noted that the vast majority of people with H1N1 did not require testing and therefore were not counted as part of this graph. However, other H1N1 data, such as hospitalizations and office visits, also indicate the peak was in this timeframe.

Early on, the US CDC identified four pillars for public health to organize around: disease surveillance, mitigation, vaccination, and communication. Starting in late April, Maine CDC used a modified incident command structure organized around these four major topic areas.

Although all four were important and are addressed in this report, the vaccine effort was the major focus of after action feedback, likely in part because that was the activity most stakeholders had been directly engaged in and/or were affected by.



During the summer of 2009, US Centers for Disease Control and Prevention (US CDC) released its priority populations for vaccine along with information about the vaccine and when it would be available. Representatives from the Department of Education and Maine Center for Disease Control and Prevention within the Maine Department of Health and Human Services (Maine CDC) had already been planning to pilot school-based vaccine clinics for seasonal flu prior to the emergence of this pandemic. Because children were among those at high risk for complications from this novel strain of H1N1, the pilot was quickly expanded to include all willing K-12 schools and to focus on vaccinating children against both H1N1 and seasonal flu. Virtually all schools in Maine offered free vaccine to all children, thanks to the thousands of school administrators and staff, volunteer health care providers, parents, and other volunteers.

By fall 2009, Maine was experiencing its disease surge when national delays in vaccine production meant little or no vaccine was available. Initial H1N1 vaccine shipments arrived in early October in the nasal spray form, which could not be administered to many people in the highly publicized prioritized groups, which were: pregnant women, all people ages six months through 24 years, people ages 25 through 64 with chronic health conditions, caregivers and close contacts of infants younger than 6 months old, and health care workers, including emergency medical services personnel.

Priorities were realigned based on vaccine supply and vaccine formulation available, which were often unpredictable and significantly less than the estimates previously provided by US CDC. This was also complicated by the fact that there were nine formulations available, and almost all had some sort of restriction related to the populations that could receive it. Often these restrictions did not match the populations most needing vaccine.

The first goal of the vaccine effort was to protect those at highest risk of severe disease, which was defined by US CDC as being pregnant women, very young children (6 months to 4 years-old), and older children and young adults (younger than 25 years old) with chronic conditions. Almost the entire supply of vaccine available the first few weeks (late September – October) was nasal spray, which was only indicated for otherwise healthy non-pregnant people ages 2 – 49.

Because the vaccine available did not fully match the groups at highest risk for severe disease and in order to provide optimal protection for those at highest risk, the initial doses of vaccine (all nasal spray) were distributed to hospitals for health care workers caring for highest risk patients – those working on maternity or pediatric wards, intensive care units, and emergency departments.

Vaccine (again, all nasal spray) was then distributed to pediatric health care providers for their preschool age eligible children as well as to schools. As injectible vaccine became available that was appropriate for others (late October and early November), it was distributed preferentially to health care providers (including hospitals) caring for pregnant women as well as schools and pediatric health care providers for all children 6 months and older.

Vaccine for maternity wards and obstetrical providers was also designated for household members and caregivers of newborns and infants younger than 6 months old. A number of vaccine clinics opened up in day care settings or in public settings for preschool aged children. In some cases, school clinics also allowed preschool aged children to be vaccinated. No matter the setting and defined target audience, if injectible vaccine was available, pregnant women were encouraged to be vaccinated.

As more formulations of the vaccine became available, and as more children and pregnant women were vaccinated, vaccine supplies were then distributed to others in US CDC's high priority groups (mainly adults with underlying conditions and other health care workers). Specialists caring for those with high-risk conditions were some of the first sites for vaccine distribution for those with chronic conditions, starting in early- to mid-November. This included pulmonologists, oncology practices, renal dialysis centers, cardiologists, and neurologists. Increasingly, public clinics became more available.

Priority Groups During Limited Supply
Maine October – December 2009

	Oct. 29	Nov. 5	Nov. 12	Dec. 4	Dec. 11	Dec. 17
Pregnant Women	X	X	X	X	X	X
6mos-18yr	X	X	X	X	X	X
HCW (inpatient)	X	X	X	X	X	x
Highest Risk Adults		X	X	X	X	X
18-64yr Underlying Conditions			X	X	X	X
Caregivers of <6mos			X	X	X	X
18-25yr				X	X	X
HCW (any patient contact)					X	X
All						X

Summarized from health alerts on maineflu.gov

The second goal of the vaccine effort was to offer and promote vaccine to all Mainers. In mid-December, there was sufficient vaccine available to offer it to anyone who wanted it in most areas of the state, especially through public clinics and at private provider offices. By this time, it also became widely distributed through worksites that had capacity to administer it or host a clinic.

Besides the school-located vaccine clinics, there were many examples of very successful vaccine efforts. A few are named here. Maine's large employers, such as Bath Iron Works (BIW) and L.L. Bean, offered the vaccine, at first to those employees at high risk, and as supplies became more plentiful, to their entire workforce and their family members. BIW and L.L. Bean each vaccinated 5,000 – 10,000 Mainers. Visiting nurses associations in some areas of the state provided ongoing clinics in numerous settings, especially for those populations that are hard to reach, such as people who are disabled or living in low-income housing projects. Some of these agencies vaccinated 20,000 people in just a few short weeks. Several health centers (one example being the Penobscot Community Health Center) and hospitals (one example being Franklin Memorial Hospital) advertised and opened their doors for anyone to receive vaccine during normal business hours. Bangor's immunization coalition and Portland's Maine Medical Center each held large one-day vaccine clinics, with between 3,000 and 10,000 receiving vaccine at each of these clinics each day. The two municipal health departments (Bangor and Portland) worked with many partners to offer vaccine and focused on making sure very vulnerable populations received vaccine, including people who are homeless, immigrants, and people with disabilities. Many clinics across the state included volunteer staff, many of whom were local EMS providers, retired nurses and physicians, and non-health care providers.

By late December and into early January, the vaccine supplies were finally sufficient in most areas of the state to meet the demand. By this time, the disease surge had subsided and demand also immediately declined. Outreach and promotion became more challenging. But, again, Maine's health community and many partners rose to the challenge. Vaccine was increasingly offered where people congregate, such as pharmacies, the February school vacation high school basketball tournaments, Portland Pirates hockey games, churches, shopping malls, and busy diners. Immediately before and after Christmas, vaccine was distributed to pharmacies, including those located in grocery stores, and vaccine clinics that could be located in malls in order to capture holiday shoppers.

The result of these many and varied efforts that brought together thousands of partners and volunteers were exemplary. Maine's H1N1 vaccination rates were among the highest in the nation in all population groups, as presented in the table below:

Population	Maine Rate and National Ranking	US Rate
US CDC priority groups	51% (tied for 1st)	33%
Children 6 months to 17 years	60% (tied for 2nd)	37%
People age 65 and older	40% (tied for 1st)	22%
All people age 6 months and older	37% (tied for 1st)	24%

These successes were due to numerous factors, the most important of which were the dedication and hard work by hospitals, health centers, visiting nursing associations, EMS, other health care

practices and providers, municipal health departments, emergency management agencies (county, state, and local), employers and businesses, numerous other agencies and organizations, as well as thousands of volunteers from across Maine communities. Everyone in Maine should be very proud of these tremendous efforts that exemplify our state's motto, Dirigo, or "I lead."

Evaluation and Review

Several efforts were undertaken to debrief the 2009 H1N1 pandemic response. Midcourse reviews were held with Maine CDC staff and partners. After action debriefings were held in each of the state's eight public health districts, in regional school nurse meetings, and in meetings with stakeholders involved in the response. Maine CDC developed an online after action survey, which was distributed through a variety of communication channels and received more than 400 responses. There were also informal channels for feedback, including meetings Maine CDC leadership (especially Drs. Mills and Smith) held with statewide medical and other associations, regional meetings of school superintendents, and meetings among Maine CDC staff.

In addition, there are two ongoing studies being conducted in collaboration with US CDC to evaluate the 2009-2010 vaccine campaign in Maine. The *Programmatic Evaluation of Maine SLVC Efforts* and *Vaccine Effectiveness Study* both have national implications and are expected to be released soon.

SUMMARY OF FINDINGS

Surveillance

At the beginning of the pandemic, surveillance staff received numerous requests from partners for very specific case-related data. In particular, local emergency management agencies (EMA) indicated that they needed much more detailed information to coordinate their response efforts. As the pandemic wore on, emergency management partners were given more detailed information on outbreaks in their communities – for example, the specific names of summer camps and residential schools – as these were more likely to require emergency management resources.

Information identifying individual people ill with H1N1 or their specific locations were not released in detail. All data were shared on a need-to-know basis, as determined by Maine CDC. However, a number of partners such as first responders expressed dissatisfaction with this approach, and wanted to know more information such as street addresses of those who were ill. This situation was also encountered in previous outbreaks such as that with SARS (severe acute respiratory syndrome).

As deaths were announced, data were masked as much as possible to avoid individual identification, for example using age ranges, announcing that the death had occurred within the

last week, the county of residence, and a general statement that the person had underlying health conditions rather than the specific underlying conditions.

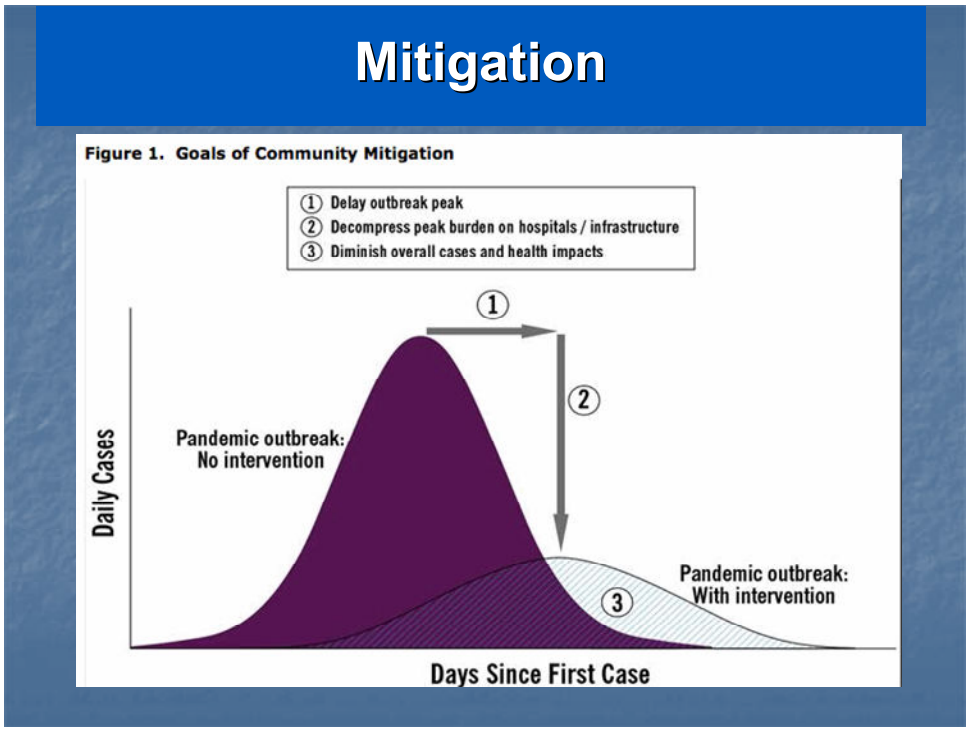
Public surveillance reports including breakdowns of individuals and outbreaks were released in conjunction with narrative situation update reports weekly or more often as needed. Surveillance and communications staff worked closely to answer questions from the public and deliver messages about disease risk and prevention.

Methods of surveillance (i.e. moving from individual case reports to outbreaks and hospitalizations) aligned with US CDC guidelines throughout the pandemic.

Many of the surveillance findings overlapped with communication. For example, concerns about privacy and educating partners as well as the public on the role of surveillance, in addition to the challenges of ensuring accurate information on the risks of disease in public and stakeholder communications.

In general, feedback related to surveillance indicated that surveillance data are important for planning and the presentation of flu data through the pandemic response was clear and useful.

Mitigation



Mitigation has several major subcategories, including: planning, prevention, early detection, treatment, and protection.

Debriefings revealed that partnerships were important to mitigation efforts and new opportunities for partnership developed as a result of the pandemic response.

Feedback from debriefings indicated that although pandemic flu planning helped, many partners noted that plans were not scalable enough. For instance, prior to 2009, pandemic plans assumed a high severity pandemic similar to that which was experienced in 1918. However, the 2009 H1N1 influenza strain was not as severe. The plans were difficult to scale down for a less severe pandemic. Therefore, planning for worst case scenario is not always adequate. It was also noted that businesses needed to develop better continuity of operations plans and that hospitals need better alternate care site plans with specific plans for implementation.

From the beginning of the pandemic, the message to stay home when sick was challenging. At times, people felt that guidance was not clear (stay home for a week versus 24 hours after fever), guidance was not applied consistently, sick leave policies interfered, and sick people showed up at doctor's offices, health centers, and hospitals even when advised not to do so.

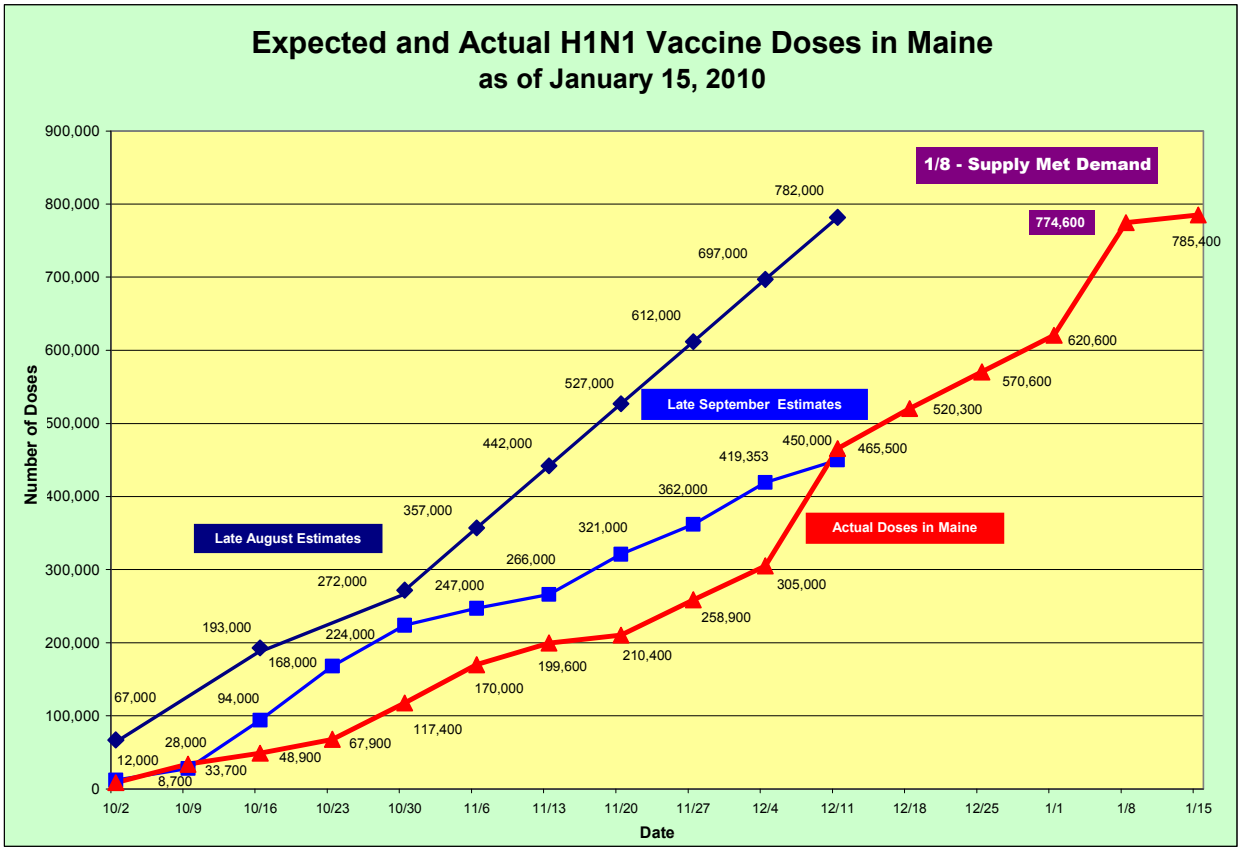
Deployment of anitivirals for uninsured/underinsured went smoothly, but there was a great deal of confusion about how to access the federal stockpile and communication about the availability and usage of antivirals was confusing to both the public and potential partners, including health care providers.

Federal guidance related to lab testing, infection control, and personal protective equipment (PPE) frequently changed, leading to confusion among partners.

A treatment triage hotline was established through a time-consuming contracting process and was therefore not available until the end of the disease surge. This hotline was not available to prescribe prophylactic antivirals, but could advise callers about seeking emergency medical attention or not.

Vaccination

Vaccination for 2009 H1N1 was unique in that large quantities of vaccine were coming to the state only through Maine CDC. Maine's approach to public vaccination was heavily dependent on the federal government, not just the state's pandemic flu plan. When vaccine became available, supply was very unpredictable and, at first, much less than the demand.



Navy line represents the number of H1N1 vaccine doses expected by week from estimates provided to Maine CDC by US CDC and pharmaceutical manufacturers in August. Royal blue line represents updated estimates as of late September. Red line shows the actual numbers of doses arriving in Maine per week. It is important to note that the red line does not indicate which formulations of vaccine were available. A total of 9 formulations of H1N1 vaccine existed, each with different restrictions for whom it could be used. The first 5 – 6 weeks, the vast majority of vaccine available was nasal spray, which could only be used for otherwise healthy non-pregnant people ages 2 – 49, which meant very few people at high risk for severe disease could obtain vaccine.

Maine CDC greatly expanded capacity within its Immunization Program and engaged continuity of operations plans to ensure critical functions were carried out as efforts were made to build on the established vaccine distribution infrastructure. Priority groups were targeted where they were most likely to be found – hospitals, OB/GYN offices, pediatric practices, specialty practices, K-12 schools, and pre-schools and daycares. The strength of the vaccine campaign can be seen in the high vaccination rates across all populations and reduced disease.

Partnerships with health care providers, schools, and other public health entities contributed to the successful campaign and became a valuable resource for future vaccine campaigns. Key partners included hospitals, health centers, school administrators and staff, school nurses, visiting nursing associations, EMS, other health care providers and practices, Public Health Nurses, Maine CDC Vaccine Coordinators assigned to each public health district, emergency

management agencies (county, state, municipal), municipal health departments, volunteers (including EMS and those who registered with Maine Responds), district coordinating councils for public health, Regional Resource Centers for Public Health Preparedness, the community, and other public health entities throughout the state.

The various vaccine formulations, delays, and shortages created substantial challenges for everyone. In addition, a number of logistical challenges arose, particularly related to maintaining vaccine cold chain and disposing of sharps (needles). Many large-scale vaccination clinics were purposely held in non-health care settings in an effort to relieve some of the burden on the health care system and to reduce barriers for people being vaccinated. However, this meant that many of these clinics were held in sites that did not have established methods and appropriate licensing for disposing of sharps.

Initially, US CDC informed Maine CDC that there would be a limited number of distribution sites. Although the number of distribution sites soon was greatly increased (latter half of September), most vaccine providers had already begun registering as a single site, regardless of the number of venues for vaccination, and had begun setting up an internal system for redistribution of vaccine. For example, one hospital might have a single distribution number (PIN) to receive vaccine for the hospital as well as its affiliated practices, the local schools and other public clinics it had committed to staff.

In these situations, sometimes vaccine was shipped to a location, such as a hospital pharmacy, where staff had not been involved in vaccine planning and coordination. Shipments were labeled according to the general population licensed to receive the vaccine – e.g. adults 18 and older, people 5 and older, etc. The specific information about where vaccine was meant to be distributed was included in regular updates from Maine CDC, but those were often being received by the institution's vaccine planning committee, and not the pharmacy where the vaccine itself was arriving. These factors in particular made it difficult for those receiving vaccine to determine the intended recipients for each shipment in terms of ultimate delivery site and prioritized population. Therefore, in large conglomerate sites, vaccine did not always trickle down to venues such as private practices as quickly as intended, leading to frustration among health care providers and perceived disparity, since other health care providers in the community who had set up as individual distribution sites often already had vaccine.

When vaccine was in limited supply, vaccinators often felt pressure from those in the larger priority groups who were not immediately prioritized. For example, many health care workers made compelling arguments for being vaccinated early as they were in one of the large priority groups. However, health care workers were prioritized primarily to keep them from spreading disease to patients. Therefore, only health care workers exposed to the highest risk patients were initially prioritized. These distinctions were difficult to communicate to the public as well as those delivering vaccine. People expressed concerns about the number of otherwise healthy health care workers and first responders receiving vaccine when they and their family members at high risk for complications from H1N1 could not access vaccine.

Recruitment and the use of volunteers for public clinics was problematic. Maine Responds was not fully operational through the early phases of the pandemic. Those who wished to volunteer

could submit information to the Maine Responds web site, but their credentials were verified manually before being put on the list maintained by Maine Emergency Management Agency (MEMA) that would extend liability coverage through the Governor's Declaration of Emergency. One of the biggest problems, though, was that organizations found it difficult to utilize volunteers from the list or depend on volunteers to show up. If volunteers did not have a prior relationship with the vaccinating organization, there seemed to be a higher likelihood of the volunteer not showing up to vaccinate.

School-located vaccine clinics (SLVC) were intended to be piloted in a small number of schools for seasonal flu vaccine prior to the emergence of pandemic H1N1. This new avenue for vaccinating children brought a host of concerns, primarily related to documentation and administrative paperwork; the availability of resources, including funding, equipment, supplies, and staff time as well as the difficulty – or perceived difficulty – in billing insurers; and organization and coordination issues, ranging from support from the school board/administration to challenges associated with working with outside partners to concerns about liability coverage.

An evaluation team from the US CDC National Center for Immunization and Respiratory Diseases (NCIRD) and Maine CDC is conducting a cost analysis of SLVC. A major goal of this study is to describe the characteristics of SLVC in Maine and examine the factors that may have contributed to successful clinics. An additional goal of this evaluation is a better understanding of the true economic cost of SLVC. A thorough understanding of the cost of SLVC could be very influential in creation of future public health policy. The economic evaluation is continuing through the 2010-2011 flu season.

A second group from the US CDC NCIRD, together with Maine CDC staff, is currently conducting a study to demonstrate the overall benefits of a school community highly vaccinated against influenza. Preliminary results have been promising and suggest some important findings:

- Students who were vaccinated benefited from a robust protection against laboratory-diagnosed H1N1 disease;
- Schools with higher vaccination rates had lower rates of absenteeism among students;
- The lower rate of absenteeism in schools with higher vaccination coverage was evident both for students who were vaccinated (direct effect) as well as for those who were not vaccinated (indirect effect);
- Daily average teacher absenteeism was lower in schools with high vaccination coverage, even though teachers themselves were not vaccinated at that time (indirect effect);
- On average, caregivers of school children with H1N1 disease lost more than three days of work per episode of illness.

Staffing was an area of considerable concern both in SLVC and other public clinics. Issues raised with staffing included: not having enough staff or administrative support to manage the work; not having the correct staff members at the correct time; not having access to reliable volunteers; and overall, having too much work.

Communication

At the beginning of the pandemic, communication messages to the public primarily focused on basic information and strategies for prevention. It quickly became clear that the incident was larger than Maine CDC's communications capacity. Although the larger Department of Health and Human Services has a Public Information Officer, Maine CDC had no staff specifically dedicated to communications. The State Epidemiologist retired early on in the response and the Deputy State Epidemiologist position was also vacant for the duration, significantly reducing the number of qualified individuals available to act as spokespeople for the agency. The majority of the Public Health District Liaisons were hired during the pandemic response and focused primarily on coordinating vaccination efforts in their districts as they established themselves in their new roles. In order to coordinate communication efforts through the pandemic response, several staff members were temporarily reassigned from their primary duties in both part- and full-time capacities.

During the summer of 2009, public messaging shifted from general prevention messages to ensuring awareness of priority groups and why those individuals should receive vaccine first. By fall 2009, messaging focused on explaining shifting priorities for vaccine – based on the presentations and formulations available – while continuing to promote prevention and anti-viral treatment for those at greatest risk of complications. When vaccine supply was sufficient to offer it to the general public in December, messages were realigned to explain that everyone should get the vaccine and highlighted where it was available and its safety.

In addition to the constant evaluation and realignment of messages, a variety of communications strategies were established and adjusted as dictated by the event itself. These strategies included:

- A toll-free information line that was staffed by Maine CDC from the April H1N1 onset until early December (when 211 took over the functions) and available at a minimum during weekday business hours, and when needed, over weekends and evenings;
- 211 information line contracted to take calls from 8 a.m. to 8 p.m. seven days a week, but available 24 hours per day with information provided by Maine CDC;
- a stakeholder summit in August 2009 attended by more than 1,500 people;
- federally-funded paid educational spots on television, radio, and online;
- contracted outreach and educational presentations to vulnerable populations;
- weekly printed updates that were circulated via e-mail, web site, and social media, and were accompanied by press briefings as needed;
- web chats and appearances on local news shows;
- letters to specific populations and stakeholder groups (any physician listed on a birth certificate, pediatricians, public and residential schools, childcare providers, MaineCare members);
- a public e-mail address for questions;
- a presence on Facebook, Twitter, MySpace, and a blog;
- a dedicated web site;
- posters, fact sheets, documents that answered frequently asked questions, and other informational materials;

- weekly conference calls targeting clinicians and/or other stakeholders and often a specific audience, such as day care providers;
- a searchable online vaccination clinic calendar; and
- advisories issued through the Health Alert Network (HAN).

Messages needed to change frequently and communication strategies evolved rapidly over the course of the pandemic response, including developing a routine of communications meetings with Maine CDC staff representing the four pillars of surveillance, mitigation, vaccination, and communication as well as e-mail updates among the H1N1 executive team and larger response team.

Much of the feedback from H1N1 response debriefings related to confusing messages, specifically related to vaccine availability, priority groups, and distribution. So much effort was put into establishing the broad groups prioritized for vaccine that it became confusing for practitioners and the general public when priorities needed to be revised based on vaccine shortages and formulations available. This feedback will be helpful in tailoring future messages, particularly when information is changing as rapidly as it was during the height of the disease surge and vaccine shortage of the 2009 H1N1 pandemic.

Other identified needs included:

- more segmented communication,
- more directive communication during emergency situations,
- outreach to ensure that more health care providers and pharmacists are included in the Health Alert Network,
- communications that are more concise and bulleted, and
- more unified communications across state agencies and partners.

RECOMMENDATIONS AND CURRENT PROGRESS

There are several overarching lessons for ongoing planning and future pandemics:

- Massive unpredictability is absolutely certain, maybe.
- The most predictable thing about influenza is its unpredictability.
- The most predictable thing about the influenza vaccine supply is its unpredictability.
- Things will change, so be creative and flexible.
- It takes a village to vaccinate. (And, it takes vaccine to vaccinate the village!)
- Be prepared to communicate messages that rapidly change – even in the same day.
- Strategies need to be implemented rapidly and need to be able to change rapidly.
- Committees are great for communication and planning, but do not make an incident management system.
- We must be able to scale down our plans as well as to scale up.
- Influenza epidemics are lived forward and understood backward.
- Relationships matter – we're all in this together.

Surveillance

Education about Infectious Disease Surveillance to Stakeholders: Maine CDC staff, such as the Infectious Disease Epidemiology staff, are increasing their efforts to describe surveillance, its purpose, and related privacy issues in order to address the gaps in knowledge about infectious disease surveillance that arose during H1N1. These efforts included a presentation during a statewide preparedness conference in 2010.

Ongoing Distribution of Influenza Surveillance Information: In order to continue education about influenza surveillance, Maine CDC is distributing influenza surveillance reports widely. For instance, surveillance data for influenza continue to be collected and reported to US CDC on a weekly basis; all reports are posted on the Maine CDC web site and are included in widely distributed regular Maine CDC updates and social media outlets.

Mitigation

Prevention: A number of after action participants commented that there is a need for an ongoing, or at least seasonal, prevention campaign that emphasizes behavior and cultural changes resulting in improved respiratory hygiene – i.e. hand washing, covering of coughs, and staying home when ill. While the funds for this do not exist, Maine CDC is working with numerous partners to continue these efforts using social marketing and educational strategies.

Early Detection: A number of partners, including health care providers, expressed confusion between the two main purposes of testing a patient for influenza – clinical management and population-based surveillance of disease spread. Maine CDC's Infectious Disease Division and Health and Environmental Testing Lab (HETL) should continue their educational efforts among health care providers on this issue.

Protection: During the 2009 H1N1 pandemic, there were challenges with the federal stockpile of personal protective equipment (PPE). The stockpile arrived in Maine with a variety of brands of PPE, each with different fitting and use requirements. Some also appeared to be of poor quality. Federal requirements resulted in lack of access to the stockpile by some, such as EMS. Guidelines for the use of PPE from different federal agencies (OSHA and CDC) conflicted. The

Director of Maine CDC raised these issues in federal DHHS meetings. These issues should continue to be addressed in state pandemic flu plans and raised at the federal level.

Treatment Hotlines: Prior state pandemic flu plans called for Maine CDC staff, such as Public Health Nurses, to operate a treatment hotline, in which patients or family members could call to receive treatment advice. Some local pandemic plans also called for community hospitals or others to conduct such hotlines. However, the 2009 H1N1 pandemic taught us that our staff are not adequate in numbers to provide this service for an extended period of time and are often needed to do other work, such as conduct critical vaccine clinics and continue urgent normal work demands (tuberculosis control, etc), some of which actually increased due to the pandemic. There are similar challenges faced by potential community triage lines, such as those run by hospitals or municipal health departments, as well as the added challenge of assuring the treatment and advice protocols are unified.

During the fall of 2009, Maine CDC worked with 211 Maine to set up a subcontract with a national nurse triage line that was also located in Maine. The line was operational in early December 2009. 211 remained the main entry portal for people to access the nurse triage line. The subcontract for this nurse treatment line has been maintained through the contract with 211 Maine to enable faster turnaround in response to another significant disease surge. This capacity should be maintained. The current subcontractor is located in Maine, uses many Maine nurses, but has locations around the country, which also provides surge capacity, since pandemics are unlikely to hit all areas at once.

Ongoing state pandemic planning should also address the ability for the nurse triage line to dispense prescriptions such as antiviral medicines, using a protocol developed by the Maine CDC and the triage line's Medical Director. In order to accomplish this, either state law would need to be changed or the Governor's Declaration of Emergency and Executive Orders would have to address the barrier of current law, which requires an established relationship between the prescriber and patient. Options should be explored and this issue should be addressed.

Ongoing planning efforts should also address the needed capacity for the nurse triage line to refer people to alternate care sites. State and local planning should also address the issue of when it would be appropriate to operationalize community triage lines, such as those operated by a hospital, and how they should be coordinated with any statewide triage line to assure homogenized treatment advice and protocols.

Alternate Care Sites: Hospitals need to work with their emergency response partners to have operational plans for alternate care sites that can be quickly implemented and coordinated. During the 2009 H1N1 pandemic, people noted that a number of hospitals had either impractical or outdated alternate care sites identified such as outdoor locations with no heating systems that would be impractical in cold weather or in school locations that had since closed, or plans that were not easy to implement. Additionally, some sites were noted not to have access to air conditioning, which would be a challenge in a future emergency if it were to occur during the summer months. Therefore, one priority for planning at the local level should be a review and update of alternate care site plans. District planning efforts should also review these sites

district-wide to assure they are appropriate. State planning should include an identification of prioritized criteria for alternate sites.

EMS Protocol: Maine EMS and its partners are refining a protocol to ensure those patients in the most need of EMS services are prioritized during major public health emergencies.

State Contracting and Hiring Processes: Although federal funds to help address H1N1 flowed into the state quite rapidly, and although many in Maine State Government helped Maine CDC a great deal to contract funds and hire needed staff, these processes were still very slow. For instance, it took almost 5 months for us to be able to hire the five remaining District Liaisons, who were critical to our ability to address H1N1. Fortunately, they were hired just in time for the fall surge and vaccine efforts. It also took more than a month to put into place a contract with a nurse triage line, though emergency contracting processes were used. There should be some planning in order to further expedite contracting and hiring processes during an emergency.

Incident Command Structure: Because of major staffing vacancies and other challenges, the Maine CDC used a modified incident command structure to address H1N1. This structure should be reviewed and Maine CDC's emergency plans should be updated accordingly. Having a senior MEMA staff person sit on Maine CDC's incident management team during future events was suggested (by the Maine CDC Director). Additionally, national incident management system training should be conducted routinely among Maine CDC senior staff and stakeholders.

Roles and Responsibilities of Maine CDC Staff and Partners: Ongoing state and local pandemic preparedness plans need to further define the roles and responsibilities of such entities as Maine CDC's District Liaisons, Maine CDC Regional Epidemiologists, Emergency Management, Regional Resource Centers for Public Health Emergency Preparedness, municipal and tribal health departments, Healthy Maine Partnerships, and others. Because Maine's public health infrastructure was in the process of being overhauled and implemented at the beginning of the 2009 H1N1 pandemic, roles and responsibilities need to be further clarified.

District Liaison Back Ups: Several sources of after action feedback noted that there is little surge capacity for Maine CDC District Liaisons. For instance, most cover more than one county, so there is a need for identified back up staff in case each county's emergency operations centers are activated or in case a District Liaison is unavailable. Over the past few months, plans have been developed to use other Maine CDC staff, such as Regional Epidemiologists, in place of District Liaisons during emergencies. These back up staff need to undergo NIMS training and become familiar with their county emergency management agencies.

Pandemic Plans: Maine CDC, emergency management agencies, hospitals, employers, and many other institutions need to update their pandemic plans, especially incorporating lessons learned from H1N1, including those in this document, as well as making sure the plans are more scalable than past plans and clarify the roles of major emergency management and public health stakeholders.

Maine CDC Office of Public Health Emergency Preparedness (OPHEP) should develop a template for organizations' plans, preferably in line with any federal templates that may soon be available and with the advice and feedback from stakeholders in Maine.

Vaccination

Ongoing Support for School-Located Vaccine Clinics (SLVC): The US CDC's Advisory Committee on Immunization Practices (ACIP) now recommends that all people older than 6 months receive flu vaccine each year. This recommendation represents a shift from previous ACIP recommendations, which had focused on the young, the elderly, pregnant women, and those with underlying illnesses. While adults can often receive influenza vaccine annually at their workplace, pharmacy, or community clinic, these settings are often not available to children. Following the successful SLVC campaign of 2009-2010, a more scaled-down and streamlined effort was made in 2010-2011 to meet the vaccination needs of children and relieve the burden on the health care system through support for SLVCs in those communities and school districts that were able and wanted to participate in this ongoing effort. Some of the ways Maine CDC has been providing support are described below.

Vaccine Clinic Supplies: To enable schools to host flu vaccine clinics in the 2010-2011 season and beyond, Maine CDC made available refrigerators, cold chain supply kits, and administrative supply kits to any school or health care provider working with a school to provide SLVCs. These purchases were made with one-time federal funds available to the state. This effort also allows schools to have vaccine distributed directly to them, which should help with any future pandemic, since the lack of direct distribution in 2009 caused a number of school clinic scheduling and vaccine supply problems. In addition, limited administrative supply kits are now available in each public health district to be borrowed for mass vaccination clinics.

Vaccine for All Maine Children: Public Law 595, An Act to Establish the Universal Childhood Immunization Program, was signed into law in April 2010. The law removes barriers to ensure that all children in Maine have access to vaccines and increases collaboration in the state's approach to childhood vaccination. One main strategy this law implements is to combine funds from federal, state, and private insurance sources to purchase all necessary vaccine for all Maine children.

Additionally, a combination of state tobacco settlement (Fund for a Healthy Maine) and federal funds enabled Maine CDC to purchase sufficient pediatric (thimerosal-free) influenza vaccine (thimerosal-free) for all children in Maine for the 2010-2011 season, and to distribute this vaccine to numerous providers and settings, including more than 350 schools, to assure universal availability.

Vaccine Distribution: Because vaccine could not be distributed to all pediatric settings in a community at the same time in 2009, there was a thorough attempt in 2010 to make sure vaccine was distributed to the pediatric health care practices at the same time as if not before distribution to schools. Future pandemic planning should include strategies to assure vaccine is distributed equally to similar providers in a community.

Vaccines for Other High Risk: For the 2010-2011 season, state tobacco settlement (Fund for a Healthy Maine) funds were used to purchase influenza vaccine for high risk and/or underserved patients. The first priority (besides children) was to distribute thimerosal-free vaccine to obstetrical providers for all pregnant women and their partners as well as the obstetrical providers themselves. Other distribution sites included the two municipal health departments (Bangor and Portland), tribal health centers, other sites serving the uninsured or underinsured, and nursing homes for their residents and employees. By continuing these distributions, Maine not only is providing vaccine for high-risk patients who often have challenges obtaining vaccine elsewhere but is also maintaining preparedness for offering vaccine to these vulnerable high-risk populations during a future pandemic.

ImmPact2 (Maine's web-based immunization registry): Because of a lack of time to conduct provider training and make necessary modifications to ImmPact, as well as a concern its use would slow the workflow through mass vaccine clinics, Maine CDC did not require the use of our web-based immunization registry during the H1N1 vaccine efforts of 2009. However, doing so would have provided much more detailed information about immunization rates, such as town vaccine rates and numbers, would have enabled health care providers to view immunization records of their patients, and would have made billing insurance companies much easier.

During the summer/fall of 2010, ImmPact2 was modified to allow those participating in mass immunization clinics to automatically bill MaineCare for administration fees. Maine CDC also provided trainings on its use to school nurses and others involved with mass clinics. ImmPact was then used successfully in many pediatric vaccine clinics such as SLVCs during the fall of 2010.

In a future pandemic, requiring ImmPact for use during mass vaccine clinics should be considered, though drawbacks would need to be considered, such as needs for provider training, access to a computer and the Internet at the clinic location, and possible slowing of clinic work.

Scheduling of Mass Vaccine Clinics: During the 2009 H1N1 pandemic, a number of mass clinic organizers, such as schools, did not want to schedule clinics until the vaccine was in hand. This approach of scheduling clinics after vaccine is obtained makes sense during normal seasonal flu clinics, which typically occur before influenza disease is detected. However, because in 2009 we were faced with a pandemic with an increasing disease surge, the main goal of the vaccine effort was to get vaccine into people as quickly as possible. Therefore, vaccine distribution preferentially went to organizations that were known to be ready with a scheduled clinic. Ongoing state and local pandemic preparedness planning efforts should address this issue.

Vaccine Redistribution: Some vaccine distribution sites served as self-selected major redistribution sites for their institution or city, and therefore were receiving vaccine and assumed to be immediately redistributing it. It was noted that some redistribution sites saved and stored incoming vaccine for large and/or future clinics, thereby resulting in vaccine being unavailable in their community to address immediate demands for days and even weeks. Feedback from some stakeholders indicated that these demands could have been partly addressed by immediate

redistribution or by direct distribution by Maine CDC of vaccine to a number of individual health care practices and/or ongoing daily vaccine clinics. The issue of how to work with institutions or organizations that want to serve as a major redistribution site for their community is one that should be addressed with ongoing preparedness planning. One idea that was suggested includes memoranda of agreements between Maine CDC and such organizations in order to assure the vaccine is used in a very timely manner. Another idea that arose is to build the capacity for local ongoing vaccine clinics for priority populations during emergency times in order to avoid vaccine stockpiling.

Standardized Clinic Documents: Maine CDC staff worked during the first half of 2010 to improve and standardize documentation and develop revised online toolkits for school and health care provider use. These forms should be routinely evaluated and updated with provider input and keeping translation concerns in mind.

Translation of Vaccine Documents: One barrier we faced during the pandemic of 2009 was the lack of quick ability to translate technical materials into many languages. US DHHS translated vaccine forms into various languages but with long delays. Having to translate these documents with in-state resources held up the ability to provide vaccine in some of our schools, especially those in the greater Portland and Lewiston/Auburn areas. State and local pandemic planning should address these issues, including working with US DHHS to make sure they identify translation resources in their planning, since this is an issue faced in every state.

Vaccine and Sharps Disposal: Maine CDC staff also worked on issues involving vaccine and sharps disposal for the 2010 SLVCs. This is an issue that needs to be included in future state and county/local pandemic preparedness plans since the volume of these supplies needing disposal is much larger than many had anticipated in 2009 and sometimes too large for local health care facilities to handle for free.

Governor's Emergency Declaration: Governor Baldacci first declared an emergency on April 29, 2009, which was renewed monthly. Maine CDC and others found this declaration very effective. It allowed us to mobilize any potentially necessary and available resources such as the National Guard. It also allowed us to expedite reductions in unnecessary barriers, such as assuring schools immunity from liability for providing school-located vaccine clinics and to allow registered verified volunteer clinicians to become temporary employees of the state, thus relieving provider agencies from the administrative and legal liabilities associated with hiring them directly. Ongoing pandemic preparedness planning should review the Governor's Declarations and make any revisions to have ready for future use. We recommend such an emergency declaration also be made very early on in any future pandemic.

Vaccinator Liability Insurance: The 2009-2010 response to pandemic H1N1 took place in the context of a declared public health emergency by Governor Baldacci that included state immunity from liability for vaccinators and schools hosting vaccine clinics. Because the 2009 H1N1 influenza virus was included in the 2010-2011 seasonal influenza vaccine, a new Executive Order signed in the fall of 2010 allowed registered volunteers to work in vaccination clinics during the fall of 2010 with state-provided liability protection as long as they were acting in response to the public health emergency and in good faith. Longer term, it is likely that

schools and other vaccinator organizations will need to make sure their insurance covers any unmet vaccine-related liability issues, or a legislative change will be necessary to provide coverage for future initiatives.

Financing of Mass Vaccine Efforts: In 2009, Maine CDC considered two main choices for distributing federal funds to finance mass vaccine clinics:

- Use an invoice method to all appropriate and willing partners; or
- Issue an expedited RFP in each of the eight Maine public health districts.

Because an RFP may result in only one agency receiving the funds and because of time constraints, Maine CDC used the first option, which spread the funds to many public health partners. These partners included hospitals, health centers, visiting nurse agencies, municipal and tribal health departments, and schools. As a result of the funds being distributed so widely, many said they did not receive sufficient funds and received them after the services were rendered, not before. An RFP would have limited funds to one main organization but would have made funds available more quickly (up front) and perhaps in a way that organizations would have perceived in the longer run to be fairer. Future pandemic preparedness planning at the local and state level should discuss financing issues and options.

Vaccine Clinic Workforce: During the 2009 H1N1 pandemic, Maine CDC needed a much larger strike force for providing vaccine clinics and expanding existing ones where insufficient community capacity existed. The needed resources included clinic coordinators, other clinic administrative staff as well as vaccinators and other clinicians. Public Health Nurses worked tirelessly to provide such capacity, but with only about 55 of them statewide who also had other urgent work they needed to do (tuberculosis control, etc), we could have used many more staff to assist in putting on vaccine clinics. We also had scarce resources to organize clinics. Additionally, in a number of communities, volunteer vaccinators were hard to find and/or often did not show up to vaccine clinics after signing up for them. Volunteer vaccinators who had a previous relationship and commitment with the clinic sponsoring organizations often were more reliable. Examples of these included the several existing medical response teams and EMS (Emergency Medical Services) teams.

For future pandemics, we recommend Maine CDC use emergency (likely federal) funds to hire vaccinators and clinic organizers in state project (temporary) position lines, enabling Maine CDC to have its own vaccinator strike teams to serve areas without existing community capacity. Future state pandemic planning efforts should address this.

Current efforts are underway to develop additional medical response teams in each area of the state, and this should help but not replace the need for temporary strike teams. Local planning should also seek out organizations and people who are willing to form an ongoing commitment for volunteer medical responses in emergencies.

Health and Other Workforce Vaccine: A number in the health care workforce and others considered part of a critical infrastructure (first responders, law enforcement, emergency management, transportation, energy and water utilities infrastructures, health care administration) expressed concerns that they were not on a highest priority list to receive

vaccine. We received a number of complaints that healthy children were receiving the vaccine before others. We heard of some in these professions approaching vaccinators demanding vaccine or some vaccinators who were not in high-risk groups refusing to vaccinate unless they themselves could also be vaccinated.

With such a severe vaccine shortage and with priority groups mainly defined by those who were more likely to die from the disease, Maine CDC felt the initial focus needed to be on pregnant women, children, and adults with severe underlying chronic illnesses. Consistent with this, the earliest shipments of vaccine were sent to hospital inpatient settings for health care workers who had frequent contact with pregnant women, children, and adults with severe conditions. This overall approach was also in line with guidance from US CDC.

Clearly, ongoing state and local pandemic planning needs to take into account these issues, and perhaps would benefit from discussions about when people working in critical infrastructures should get vaccine as a priority population and what constitutes a critical infrastructure.

One challenge about such discussions and planning efforts is that those in high-risk groups are often under-represented from them. One communication to Maine CDC's Director during the pandemic was especially poignant and points out the importance of making sure all voices are heard in these discussions. A mother of a young adult with cystic fibrosis expressed concerns about those in critical infrastructures publicly complaining they were not receiving vaccine. She said (paraphrasing), "Everyone is critical to someone, and my daughter is critical to me. She would likely die if she were to contract H1N1. She attends school and sits in crowded classrooms with people coughing and sneezing, often not covering their mouths. She has few ways to protect herself from others. I am extremely grateful she is getting vaccine as a member of a high priority group, and I hope the vaccine does not get diverted to those who are not at high risk from complications from the disease but who say they work in critical professions. My daughter is also critical to others." She then urged Maine CDC to continue the priority groups as they were defined.

Communication

Communication Capacity at Maine CDC: One of the staff members temporarily reassigned to help coordinate communication efforts through the H1N1 pandemic continues to coordinate Maine CDC-wide public health education efforts half-time. The State Epidemiologist and Deputy State Epidemiologist positions have both been filled, adding capacity as spokespeople for Maine CDC (as well as much needed capacity to address a future pandemic). Each of the state's eight public health districts as well as the tribal district are now represented by District Liaisons and a Tribal Liaison who are established in their roles and can act as spokespeople at the local level.

Several of the key communications channels created during the H1N1 pandemic response are now publicized, regularly maintained, and will serve as an integral part of future responses to public health emergencies. Some examples follow.

211 Maine: Maine CDC continues to publicize 211 Maine as the primary source for questions related to flu and maintains the flu.questions@maine.gov e-mail as well. Maine CDC staff regularly updates the Frequently Asked Questions documents for the public and staff of 211 Maine.

Routine Maine CDC Updates: Maine CDC-wide public health updates are issued every two weeks, or more frequently as necessary. Updates are formatted to be concise summaries of topics with hyperlinks to additional information. For ongoing topics, such as influenza, new and updated information is highlighted. When possible, information is segmented by audience and labeled to indicate the intended audience. Updates are posted to the Maine CDC web site with an RSS subscription available and to social media sites, and are also sent out via e-mail. These updates were identified as the most utilized communications tool in the online after action survey.

Social Network Communication: Per the encouragement of federal partners at CDC and US DHHS, Maine CDC continues to maintain and grow its following on Facebook and Twitter, establishing an open communications channel to the public, partners, and health care providers that will provide a fast and easy way to disseminate information in the event of future emergencies. Maine CDC's blog is updated as necessary and at least every two to three weeks, providing more in depth information. Content for these social media sites is solicited from all Maine CDC programs and partners.

HAN: Targeted outreach to health care providers and pharmacists has been conducted to enroll them in the statewide Health Alert Network. The primary audience for most Health Alerts continues to be health care practitioners. Links to them are cross-referenced on public health updates.

Crisis Communication Lessons for the Future: The following strategies were identified for future public health emergencies by our after action activities:

- Issue major announcements only at or in conjunction with press conferences, to help control the message (a Maine CDC press release issued on the evening of 12/14/09 announcing an expansion of vaccine eligibility was widely picked up by the media as meaning there was sufficient supply of vaccine, which was not yet the case).
- Ensure that communications issued by contracted partners and other state agencies are the same as or consistent with Maine CDC's communications. We received feedback that different communications from different partners added unnecessary confusion.
- Distribute a list of Maine CDC staff highly involved with the pandemic response, their functions, and contact information. Although having the information phone line operated by Maine CDC staff from late April until early December as a centralized communications portal was felt to be beneficial, it was also noted that it would have been helpful if Maine CDC had distributed a phone list of commonly needed staff and their numbers to stakeholders who were highly involved with the response. Examples of such helpful numbers include: Public Health Nurses, Regional Epidemiologists, and the Health and Environmental Testing Lab (HETL). District

Liaisons were listed publicly on the web site, but only general numbers for other Maine CDC staff were listed.

- Issue more directive communication from Maine CDC when appropriate, including what not to do, such as "Do not administer vaccine to xyz group".
- Make sure all school and other mass vaccine clinics are posted on the vaccine clinic locator website, in part to help the public understand how to obtain vaccine and in part to help people understand how and where vaccine is available, even if it is not available specifically to them.

Recovery

The aftermath of a pandemic is often referred to as the recovery or after action period. Unlike most emergencies, the response period for public health emergencies is very prolonged – usually months, rather than minutes (earthquake) or days (floods). Therefore, the recovery period can be especially challenging for those so heavily involved with the response. A few challenges we saw or heard about are listed below. We recommend these be considered in future pandemic planning.

- With so many staff at Maine CDC and other health institutions reassigned to H1N1 from their usual jobs, we sometimes saw or heard about contrasting responses that ranged from very strong desires to return to normal activities to strong letdowns from losing the camaraderie and focused purposes of the H1N1 response.
- Because unmet non-H1N1 work and other needs were piling up heavily during the months of the H1N1 response, many found managing the high workload they faced during the recovery period challenging.
- Specific work tasks of the recovery period were not always well staffed or planned for, especially since so many response staff needed to return to their normal work. These included: conducting after action exercises; using several venues and strategies to thank and otherwise recognize response efforts; and writing up after action reports.

CONCLUSION

Even with an extremely successful response to H1N1, as exemplified by Maine's disease burden and vaccine data, there are always lessons to be learned. Indeed, we at Maine CDC learned many lessons. However, the biggest was the importance of our partners. We continue to be deeply impressed and appreciative of the dedication of Maine people to come together to address a challenge as posed to us by the 2009 H1N1 pandemic. Thank you from the bottom of our hearts!

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