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Infection preventionists' experience during the first months of the 2009 novel H1N1 influenza A pandemic

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Background: A novel strain of influenza A (H1N1) was identified in April 2009 and developed into a pandemic by June 2009. This rapid and unexpected event had enormous implications for infection preventionists (IP) internationally. Lessons learned from this event should guide future pandemic planning efforts.

Methods: Focus groups were conducted at the Association for Professionals in Infection Control and Epidemiology, Inc. (APIC) 2009 conference to evaluate IPs' experience with the novel H1N1 influenza pandemic and assess their perceived needs related to novel H1N1 topics and products required for future education and reference materials.

Results: Forty IPs (37 from the United States and 3 international) participated in the focus groups. Needed reference materials identified by attendees included infection prevention guidance for nonacute care settings; occupational health policies; and brief, multi-language patient/family educational materials. Educational topics on which IPs need to be trained include isolation precautions/personal protective equipment recommendations for novel H1N1 patients, coordination between hospitals and community response agencies, and surge management. The rapidly changing and conflicting recommendations related to patient management made responding to this event challenging. IPs require synthesized infection prevention guidelines developed in a concise, real-time format.

Conclusion: IPs must continue to partner with public health and other response agencies to address gaps in pandemic planning.

Key Words: Influenza; H1N1; infection prevention; pandemic.

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A novel strain of influenza A (H1N1) was identified in late April 2009. Within a single week, the World Health Organization (WHO) raised the pandemic phase from 3 to 5. The WHO pandemic phase 5 indicates that there is sustained human-to-human transmission of a pathogen in at least 2 countries and that a pandemic is likely imminent.¹ The Centers for Disease Control and Prevention (CDC) reported the first case of laboratory-confirmed novel H1N1 in the United States on April 15, 2009; a second case was reported 2 days later.² On April 22, the CDC activated its emergency operations center in response to the novel H1N1 outbreak; 4 days later, on

April 26th, the CDC declared a public health emergency.² Early cases were identified in Texas and California, but the outbreak soon spread widely across the United States. By May 3, 2009, the CDC deployed 25% of the Strategic National Stockpile to aid states in responding to this event. On June 11, 2009, the novel H1N1 outbreak was officially declared a pandemic by the WHO.³

Infection preventionists (IP) were on the frontlines during the early phase of the novel H1N1 outbreak, helping health care agencies develop policies and procedures to respond to this rapidly evolving event. The surge of infected individuals and "worried well" taxed hospitals and health care agencies around the world. Prior to being declared a pandemic, the novel H1N1 outbreak grew exponentially in the weeks prior to the Association for Professionals in Infection Control and Epidemiology, Inc. (APIC) 2009 Annual Educational Conference and International Meeting. This unexpected outbreak had enormous implications for IPs internationally because infection prevention guidance related to novel H1N1 patient management, such as recommendations on isolation and personal protective equipment (PPE) usage, came out sporadically from various organizations, including the WHO and CDC and health departments across the United States. The IPs who responded to this event in the early months

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of the outbreak had unique experiences that may provide lessons learned for other IPs and should guide future pandemic planning efforts.

The purposes of this study were to evaluate IPs' experience with the novel H1N1 influenza pandemic and assess their perceived needs related to novel H1N1 topics and products required for future education and reference materials. The aims are to understand better the novel H1N1 pandemic and develop educational and planning/reference materials to aid in this and future infectious disease outbreaks. This project was conducted to support APIC's goal of providing timely information relevant to novel H1N1 and to complement the work of APIC's Emergency Preparedness Committee.

METHODS

The authors developed the questions for this study. All members of APIC who were registered for the APIC 2009 Annual Educational Conference and International Meeting were invited to participate in the focus groups, regardless of size or functionality of institution or work location (within or outside the United States). The only inclusion criteria was being involved in the direct response to the 2009 novel H1N1 flu pandemic, defined as individuals who work in a hospital, health care, or public health agency that has handled/managed at least 1 confirmed positive case of novel influenza A H1N1 in 2009.

The authors recruited potential participants via e-mail. One focus group met each day in a meeting room located in the conference center site on June 7 and 8, 2009. Snacks were provided to the participants during the focus groups. The nominal group method was used to elicit information on the topics of interest.⁴ The focus group method (ie, opening-ended questions) was used to elicit details from participants' experience with the novel H1N1 influenza pandemic.⁵ Participants were informed that information collected would remain anonymous and that all responses were voluntary. Focus group sessions were audiotaped, and the digital recordings were transcribed verbatim. Content analysis included identifying, coding, and categorizing participants' response to the questions of interest. In addition, major themes that emerged were identified and categorized. Subjects' demographic data were obtained for descriptive statistics. In addition, participants were asked to complete an 11-item survey containing items related to the novel H1N1 flu pandemic, such as hospital or agency protocols for worker protection, isolation, and PPE usage during the event. The Institutional Review Board of Saint Louis University approved this study. APIC funded the costs of the food and meeting location for the focus groups; Saint Louis University covered the costs of data transcription. Quotations that characterize

the major themes are reported. The words enclosed in brackets of the quotations are used to explain the respondents' quotes and are not the participants' words.

RESULTS

All 1173 individuals registered for the 2009 Annual Educational Conference and International Meeting were contacted. Forty participants took part in the 3 focus groups; the first focus group had 13 participants, the second had 17, and the third had 10. Most focus group participants (93%, $n = 37$) reported that they resided in the United States, spanning 21 states; 3 participants were from facilities outside the United States (Australia, the United Kingdom, and Canada). Most attendees worked in a hospital (73%, $n = 29$), public health agency (13%, $n = 5$), home health (10%, $n = 4$), or ambulatory care setting (10%, $n = 4$). The facility bed size ranged from 29 (a small, rural facility) to 17,000 (a large, international multiagency health care system). Approximately half of the attendees worked in an urban area (53%, $n = 21$); only 15% ($n = 6$) were from a rural area. The majority of attendees was female (90%, $n = 36$) and aged 50 years or older (70%, $n = 28$). Approximately half had a master's degree or more education (58%, $n = 23$). Twenty-seven participants (68%) were certified in infection control. A full description of the participants' demographic characteristics is reported in [Table 1](#).

The participants identified many types of reference materials and education topics on which the participants believed IPs need to be trained for future novel H1N1 or other pandemics. The reference materials/products that received the most votes during the Nominal Group Method portion of the focus groups are outlined in [Table 2](#). The education topics that received the most votes during the Nominal Group Method portion of the focus groups are outlined in [Table 3](#). In addition, a number of themes emerged from the focus groups related to infection prevention emergency management issues encountered during the novel H1N1 influenza pandemic in spring 2009.

Infection prevention issues in alternate care sites and other nonacute care settings

One of the most frequently cited topics of importance to focus group participants was the lack of infection prevention guidance for alternate care sites and nonacute care settings such as physician offices, ambulatory care clinics, long-term care, nursing homes, and others. As one participant noted, "all the information that came out was basically for schools or acute care." Other participants stated that it was difficult to know how to manage novel H1N1 patients in this setting without guidance:

Table 1. Demographic characteristics of focus group participants

Characteristics	n (%)
Work setting*	40
Hospital	29 (72.5)
Public health	5 (12.5)
Ambulatory care	4 (10.0)
Home health	4 (10.0)
Long-term care	3 (7.5)
Emergency medical services	2 (5.0)
Hospital bed size	29
≤100 Beds	1 (3.4)
101-250 Beds	4 (13.8)
251-500 Beds	15 (51.7)
501-1000 Beds	7 (24.1)
≥1001 Beds	2 (6.9)
Sex	39
Female	36 (92)
Male	3 (8)
Age, yr	40
30-39	1 (2.5)
40-49	11 (27.5)
50-59	18 (45.0)
60-69	9 (22.5)
≥70	1 (2.5)
Highest education level	40
Associate's degree	4 (10.0)
Bachelor's degree	13 (32.5)
Master's degree	22 (55.0)
PhD or other doctorate	1 (2.5)
Employer type	40
Not for profit	23 (57.5)
Government	10 (25)
For profit (private)	7 (17.5)
Certification status	40
CIC	27 (67.5)
Not certified in infection prevention	13 (32.5)

CIC, certification in infection control.

*Participants could choose more than 1 option for this question.

“We had all these issues [in a family practice clinic]. How do we segregate [infected patients]? There’s no negative [air] flow. [How do we determine] who’s sick, who’s not sick? Do we take [potentially infected individuals] right back [to the clinic]... or send them out the back door? What do we do?”

“There was [no guidance] for ambulatory care, and public health didn’t bring anything in [to help]. When you call public health and say ‘Well, what’s your idea about this and what should we do?’ They were like ‘We got enough going on with the acute care [sites].’ ”

Employee health and safety issues

Focus group participants emphasized the importance and challenges of monitoring and managing employee health and safety issues during the novel H1N1

influenza pandemic. It was noted by numerous focus group participants that there is a general lack of infection prevention information and guidance related to occupational health issues. As one participant noted, “We really don’t have much of a focus on employee health. We really don’t. In all of our [pandemic planning] tool kits, we just have virtually nothing for employee health.” Another participant stated:

“I’m just wondering how much education employee health nurses are getting [on novel H1N1] and where occupational and employee health nurses are in the loop in this whole thing. They did not get any notification. APIC and everybody else is sending all this stuff to [IPs], but [occupational health professionals] are kind of oblivious.”

Participants recommended that APIC and/or other response agencies need to develop better infection prevention guidelines related to infection prevention in occupational health. Focus group participants suggested that there may be an opportunity for APIC to partner with the American Association of Occupational Health Nurses to develop these guidelines.

One specific occupational health issue that focus group participants felt needs to be addressed is how to manage or prevent ill health care providers coming to work sick. As one participant stated, “As much as you tell [health care workers] not to come to work sick, they still come.... We cannot allow employees to work sick, even with seasonal flu.” Money may be one potential reason that employees may work when sick. As one participant explained it, “Sometimes people will say, ‘I can’t afford not to work.’ ” Another focus group participant agreed and added, “It’s hard to keep people off work when they are sick.”

Focus group participants indicated that more administrative support and better human resource policies are needed related to furloughing staff and sick leave practices during pandemics. As one participant explained it, “We need [administrator’s] support in saying that, when people are exhibiting symptoms, then they can’t work in patient care.” Another participant agreed and added, “Of course the hospitals don’t want to hear that you’re not going to let the staff work.” One focus group member stated that her human resource department was hesitant to furlough employees due to novel H1N1 because it would cost the hospital money. She was told by human resources, “If you [furlough employees], then you’re responsible for workman’s compensation... it [doesn’t] come out of their sick time.” There was some confusion about this issue; it seemed that workman’s compensation was being administered inconsistently across facilities. As 1 participant explained, “Our [human resources department] had already said that [worker’s

Table 2. Reference materials needed for current and future pandemics**Topics that require development into quick reference materials ranked by order of importance***

Infection prevention guidance for nonacute care settings (ambulatory care, home health, physician offices, and others)
 Infection prevention guidance related to occupational health issues
 Evidence-based information for physician education
 Patient and family educational materials that are brief (eg, 1-page fact sheet) and available in multiple languages
 Patient management materials that are brief (eg, patient placement/isolation, PPE use, and others)
 Isolation precautions materials that are brief and simple: electronic format preferred
 Communication procedures when supplies run out
 Infection prevention guidance for pediatric facilities
 Resource management tool for supply allocation during a variety of events
 Screening tools and forms that are simple to use
 Algorithm/check list outlining steps of an outbreak investigation

*Order of importance determined by the Nominal Group Method.

Table 3. Pandemic preparedness education topics on which IPs need to be trained**Education topics identified as most important for future IP training ranked by order of importance***

Isolation precautions and personal protective equipment recommendations for novel H1N1
 Coordination/communication with community response agencies (resource management, funding, supply allocation, and others)
 Surge management
 Infection preventionists' role in emergency management for all hazards
 Preparedness/management of an event (acute, ambulatory, home health)
 Employee education related to pandemic planning
 Resource management and allocation during an event (eg, par levels, anti-infective therapy, PPE, prioritization)
 Resource access (eg, how and where to obtain supplies)
 Clinical description of novel H1N1 (epidemiology, signs/symptoms, transmission, treatment, control measures, and others)

*Order of importance determined by the Nominal Group Method.

compensation] would not cover occupational exposures to [novel H1N1] because it's also out in the community." There was also some confusion about and hesitancy to enforce the CDC-recommended 7-day furlough period for staff infected with novel H1N1. As one participant stated, "We had more people who wanted to come back sooner than 7 days." Occupational health issues were present in the community, as well. Companies were hesitant to allow employees to return to work without some reassurance from the medical community that the employee was no longer contagious. As one participant explained, "We had employers calling up the emergency departments and saying, 'I want this person tested, and they need to have a negative before we're going to allow them to come back to work.'" This created a lot of extra and unnecessary work for hospitals and health care agencies.

Changing and/or conflicting standards and recommendations

One issue that participants found particularly challenging was the difficulty in maintaining staff compliance and trust in the face of changing and conflicting practice recommendations/standards. The participants were asked which sources they used to obtain clinical information and infection prevention guidance about novel H1N1 during the spring of 2009. All the

participants reported that they obtained information about novel H1N1 from the CDC (100%, n = 40); other frequently cited sources of H1N1 information included state health departments (83%, n = 33), the WHO (75%, n = 30), and APIC (70%, n = 28).

Focus group participants indicated that novel H1N1 clinical information and practice recommendations changed rapidly in the spring of 2009. As one participant noted, "the case definition changed like 3 times during the course of the event for us." These rapid changes made it difficult for focus group participants to stay abreast of the latest recommendations. As one focus group member stated, "The rules change so often, it's hard to keep up." Another agreed and added, "From 8 o'clock in the morning until 4 o'clock, [the recommendations were] totally different."

Not only were the recommendations changing rapidly, but many of the response agencies and professional organizations distributed conflicting guidelines. Many focus group participants had a difficult time trying to interpret the inconsistent guidance from various agencies. As one participant explained:

"Our biggest problem was that [these conflicting guidelines are] very difficult to interpret, especially when we go from CDC to state to local health departments. So we're trying to coordinate these efforts, and it's a constantly moving target."

Another focus group member agreed and added:

"When I left [for the APIC conference], [the response agencies] still did not all agree. The CDC was still advocating [1 recommendation], we had a state health department that said [something else], a city health department that said something else, and I'm part of a [health care system that consists of 17 hospitals] that says something else, and it's very difficult."

One focus group member stated that she found it works best if you let staff know up front that the information and recommendations will be changing rapidly. As she explained, "I say to everybody, 'This is fluid, this is going to change every day, so don't expect what I say today [to be] what I say tomorrow; expect this to be changing.' " One focus group participant indicated that the rapid changes in recommended practice did not pose a problem at her facility. As she explained, "Our staff was great. They just said, 'What is [the recommended practice] today? Just tell me what it is.' " However, this facility seemed to be the exception. The general consensus from focus group participants was that the rapidly changing and conflicting recommendations caused confusion among health care professionals. As one focus group participant noted, "We [IPs] understand why these [practice recommendations change], but I'm not always sure that our staff do." The focus group participants indicated that this confusion caused many health care providers to question the credibility of the IPs. As one participant explained:

"It's very disconcerting for IPs to have to constantly put out different messages. You are constantly sending out different messages to your staff, and, after awhile, they say, 'Oh, they don't know what they're talking about.' It's very difficult [to maintain] credibility for your department."

Another participant agreed and added:

"I think the difficulty was getting the staff to [trust you]. Because, you know, here you started out with [one recommendation], and then you're telling them that now [it's changed], and I think that was really hard for staff. I think they're still having a hard time trusting that we're telling them the right thing."

Staying vigilant with infection prevention practices

The focus groups participants stated that they felt the early response to novel H1N1 was very positive in terms of staff's adherence to infection prevention. As one participant stated:

"I was amazed. I never saw more people wash their hands. I didn't have to tell one person to

wear [a mask]; they were all putting them on. They handled the situation really very well. It was amazing to me how well [staff] pulled together. For the first time in a long time, everything I said [to do], they did."

However, as the event wore on, the focus group members noted that staff compliance with infection prevention started to wane. As one participant stated, "It's hard to keep staff vigilant in the midst of any outbreak." Another agreed and added, "We're already getting a little bit less vigilant. Our protective measures are not there like they should be, and we had 2 cases identified last week."

The focus group participants stated that they believed health care workers' perceptions of the severity of novel H1N1 led to poor compliance with PPE. As one participant stated, "Many of the staff decided not to wear PPE with the idea that they wanted to get the flu, but they wanted to get mild flu, so they wouldn't get [a more virulent form of disease] in the fall." However, this did not hold true for staff compliance with influenza vaccination. Many focus group participants reported that they believe health care workers will be more eager to get vaccinated for influenza this year than in previous years. One participant stated, "What I'm thinking of are those employees who refuse to ever get the flu shot.... When the H1N1 vaccine comes out, I know they're going to be the first in line." This increased compliance with seasonal influenza vaccine is already occurring in areas outside the United States. As one participant explained, "It's our flu season now in Australia, and what we've found is that those people who usually don't want the flu vaccination are now standing at the door wanting flu vaccine."

Communication

Focus group participants indicated that communication was one of the biggest challenges and most time-consuming aspects of responding to the 2009 novel H1N1 pandemic. Focus group participants indicated that the effectiveness of communication varied greatly from location to location. A few focus group participants stated that there was good communication between departments in the hospital and between the hospitals and health departments in the region. Others, however, indicated that there were gaps in communication. One participant described the following:

"When I worked in Jersey, we had a really good rapport with the department of health. We had meetings together, we planned together... so, there was communication. Working in Florida, I don't see that communication as much."

Another participant stated:

“What we found is that there’s a huge gap in communication. I just felt that there was a disconnect, that we weren’t as fluid as what I had seen in the past.. there wasn’t that open communication. [Information was released on] kind of a need to know basis.”

One gap in communication identified was between hospitals and physician offices. As one focus group member explained:

“There’s no communication from the hospitals to the physicians in their offices. We had to end up sending things by snail mail because physicians—even though [they had an e-mail account] in the hospital—they didn’t activate it, so.. how do you even get the information out?”

Focus group participants reporting effective communication indicated that it involved frequent updates between departments and directors and between other hospitals in the region or their health care system. One participant described it this way:

“I think one of the things that I found extremely helpful—and I think was critical—was that, initially, we had 2 huddles every day. Everybody got together to [discuss the response].. and that huddle twice a day was so productive in disseminating the information.”

Many focus group participants described very frequent communication between hospitals and health departments. One focus group member stated, “[All the hospitals in the region] actually had daily phone calls with the health department at 1 o’clock.” Another stated that, “I had 3 meetings during the day for the department of health in the region.” The frequent meetings required a lot of time, as evidenced by one participant’s comment, “I was on phone call conferences for at least 3 hours a day, even on the weekend.” Devoting so much time to communication meant that focus group participants had to temporarily suspend routine duties. As one focus group member stated, “I spent most of my time communicating back and forth with the health department and [had to] delegate my regular rounds to someone else.” Others’ comments indicated that a variety of infection prevention activities had to be suspended to respond to the increased need for communication and response to this event. Examples include, “Performance improvement went by the wayside,” “I wasn’t out there [on the floors], where I should have been,” and “Surgical site surveillance was nonexistent.”

Language and translation needs

Communicating with patients and patients’ families proved to be very difficult during the novel H1N1 pandemic. Focus group participants reported that

information was released and was being changed very rapidly. This led to a lot of confusion and questions from patients and family members. The focus group participants indicated that it was essential to have patient educational materials available to address basic questions about novel H1N1. One of the most frequently cited gaps in this area was related to a lack of materials translated in multiple languages. The following quotes from participants explain the challenges focus group members faced:

“One of our biggest problems was getting information out in various languages. We have a lot of people asking us for information.. and there was nothing other than Spanish. We needed a couple other languages.”

“We had a lot of trouble getting things translated into 3 languages.... just 3 of the many languages [we need]. [It is] difficult to get translation done in a fast and accurate way.”

“We have up to 30 languages in our facility. We can get English, Spanish, Vietnamese, and Russian pretty quickly, but it’s the others that are more difficult.”

Access to supplies/supply chain issues

Obtaining sufficient numbers and the correct type of supplies is challenging during any large-scale event. The focus group participants indicated that there were a variety of issues related to obtaining supplies during the early part of the novel H1N1 outbreak, even before the WHO declared the event a pandemic. As part of a survey distributed before the focus group started, participants were asked whether or not they requested supplies from a local, regional, or national agency; approximately half (53%, $n = 17$) reported that they had requested resources. Approximately one third of the participants (36.4%, $n = 12$) reported that they received supplies from the Strategic National Stockpile (SNS). Those who requested supplies versus those who received them were not congruent; of the 17 participants whose facility/agency requested supplies, less than half (47.1%, $n = 8$) actually received them. In addition, 20% ($n = 3$) of participants whose facility had not requested supplies received them.

Access to supplies was inconsistent among the focus group participants. One participant stated, “We never had a problem with supplies,” whereas others reported having trouble getting transport media for laboratory testing, masks, N95 respirators, disinfectant wipes, oseltamivir (Tamiflu), and other products needed for infection prevention. Focus group participants reported that supplies were back ordered and that companies could not provide hospitals with what they needed in a timely manner or limited the amounts that hospitals could

order. Outside the United States, focus group members had similar problems trying to obtain supplies. As one participant explained, “We had the same problem here [in Australia] with manufacturers.... They started to limit [the number of supplies you could order].”

The lack of supplies or access to the wrong type of supplies had infection prevention implications in terms of making the response to novel H1N1 even more challenging. As participants described it:

“[One] thing that was in really, really short supply was viral transport medium. Our local public health department was getting us 4 a day for awhile when we were in the scary part of it,... and so we were not able to test a lot of patients.”

“We couldn’t get our disinfectant wipes. They were back ordered. I said, ‘Wait a minute. We have got to be able to clean this place and wipe things down and take care of our equipment and take care of our staff. What do you mean we don’t have wipes?’ But it gets back to our suppliers [who] don’t keep it [in stock]. All of the sudden you have an outbreak situation, and I feel very vulnerable that whatever is the next pathogen or if this one comes back in the next wave this fall, what are we going to do?”

“We had access to a municipal stockpile of Tamiflu—which was like 130 doses—which we blew through because everyone was freaking out, and there were so many contacts [who needed it]. After that we were told to go through our local distributors to get Tamiflu. Well, that was on allocation, and we were only able to get like 6 doses per day, which was just enough to do our inpatients. And there was quite a gap before the Strategic National Stockpile was relocated and there was any release of [Tamiflu]. So we couldn’t get it, even if we wanted to pay however much for it. We couldn’t get it.”

“We had a lot of Tamiflu, but we didn’t have a lick of pediatric suspension Tamiflu.”

“I was really concerned about having enough Tamiflu for my staff because, without my staff, I can’t take care of a surge of patients.”

Theft of supplies was also an issue reported by the focus group members. Focus group participants reported that boxes of masks and respirators would disappear quickly in the hospital, presumably used or taken by visitors. Some facilities even reported entire pallets of supplies being stolen from the hospital. One solution that focus group members identified during the response to severe acute respiratory syndrome (SARS) and the 2009 novel H1N1 pandemic was to keep supplies under lock and key. As participants described:

“[Early on] we made surgical masks available to our visitors, if they felt like they needed it for their

protection or if they had any signs or symptoms. But the first day we put them out, well that didn’t work. They disappeared right away. Then we had to confiscate all of our masks from all of our areas and units. Then you get the call from the nurse who said, ‘I can’t get any masks for my patients in droplet precautions.’ [The masks are] now down in somebody’s office.”

“We have a whole off-site under lock and key of different supplies, ventilators, and N95 masks. We learned from SARS that we keep all this under lock and key.”

“Our [supplies are kept] off-site too, and, up until this situation, they would take these huge pallets and leave them on the loading dock. That’s where ours were stolen from. We had several pallets of things stolen; not just masks, but gloves and so forth. We resecured and we rethought that out, and we have a new policy and procedure in place for that, and it’s much more secure than it was prior.”

Focus group participants expressed frustration with the way mutual aid agreements were managed during the early wave of the novel H1N1 pandemic. Many participants indicated that existing mutual aid agreements were not honored, which left the focus group members’ facilities on their own in terms of obtaining resources and supplies. As one participant stated, “Those [mutual aid agreements] were useless.” Another participant agreed and added, “Our mutual aid agreements went out the window [during the event]. [They] were hanging on to [their] masks and Tamiflu, so... we didn’t get any support.... We had to go to other sources [for help].” A third participant also expressed her frustration:

“We have a consortium [group], and we all had the same [mutual aid agreements]. Our sites were really good about following what the guidelines were.. [but] other hospitals must [not have been following the agreement]. That’s why the mutual aid agreement is great on paper, but in the end [it didn’t work]. I don’t like getting penalized because I did what I was supposed to do.”

Issues with respirators, masks, and fit testing

The infection prevention supplies with which the most focus group participants had difficulty during response to novel H1N1 were masks and respirators. Numerous issues arose in relation to masks and respirators, including running out of supplies, obtaining the incorrect supplies from regional or national stockpiles, not knowing which type of mask or respirator to use when caring for novel H1N1 patients, and logistical issues in needing to fit test a large number of staff in a short period of time.

Running out of masks and/or respirators

Participants were asked a series of questions related to mask and respirator usage during response to novel H1N1 as part of the survey distributed at the start of the focus groups. One quarter of participants stated that their facility ran out of respiratory protection during their response to novel H1N1 (26.5%, $n = 9$). As one participant stated, "We didn't have enough N95s. There was a problem with our regular N95s to begin with. They were back ordered before this even started." In addition, many health care staff did not understand why their facility could not obtain more N95 respirators. As one participant described it, "It was so frustrating because you were looked at like you could just turn on the key to get however many N95s were needed. [The staff thought], 'Just go order them.'... and it doesn't work that way."

Approximately one quarter of the participants (23.5%, $n = 8$) reported that they implemented a policy to reuse respiratory protection during the novel H1N1 outbreak to conserve supplies. Most implemented the reuse policy before running out of supplies (62.5%, $n = 5$); approximately one third reported that they depleted their stock of respirators before implementing a reuse policy (37.5%, $n = 3$).

Obtaining incorrect or insufficient supplies

Focus group participants discussed the challenge of obtaining adequate supplies of respiratory protection during the initial wave of the novel H1N1 pandemic. As one participant stated, "[We] ran out of [N95 respirators] pretty quickly. Within that first couple of days, we reordered them, but they were on back order." Some focus group members stated that respirators were available in their facility, but the sizes and/or styles did not address the staffs' needs. One participant described her experience:

"We had a lot of respirators available, but we ran out of 3 M small size quickly and couldn't get any more. We couldn't even evaluate whether the Strategic National Stockpile had that size and style. Even if it had, it wasn't released to us, so we were stuck and had to scrounge trying to find that size."

The lack of sufficient and appropriate supplies of respiratory protection led to unexpected challenges and suboptimal situations. One focus group participant stated that, "[Staff] were putting the wrong size [respirator] on because we didn't have the right size to fit them." Another participant described the situation in her institution:

"One of the hospitals that I worked at had PPE issues in that they had decided to go with a regular

surgical mask with eye protection across the board in their hospital. Well then, [during the novel H1N1 outbreak], they don't get those types of masks. That is not what's delivered to them because they've got the just-in-time 2 days of supply. So then they get this other type of mask [without eye protection], and they have no goggles in their hospital. So... people were going to Home Depot and Lowes to try and buy [eye protection], but now what do we do with them? [The staff asked], 'How do I wash them? How do I keep them [clean]?' "

Conflicting guidelines related to isolation, mask, and/or respirator use

Focus group participants stated that it was very difficult to determine appropriate isolation and PPE use for novel H1N1 patient management. Most of the participants (80.0%, $n = 28$) reported that they used a N95 respirator or equivalent as respiratory protection for staff, 11.4% ($n = 4$) used an N95 respirator with a surgical mask on top of it, and 8.6% ($n = 3$) had staff wear only a surgical mask. Of the 3 participants whose facilities had staff wear only a surgical mask when caring for novel H1N1 patients for routine practice, 75% ($n = 2$) reported that staff were instructed to wear a N95 respirator or its equivalent during aerosolizing procedures. One third of all participants (34.3%, $n = 12$) reported that their facilities changed PPE use guidelines for staff midway through the response to novel H1N1 in spring of 2009; one third (34.3%, $n = 12$) also reported changing their isolation precautions midway through the event. Almost all of the facilities that changed PPE use also changed isolation precautions midway through the event (91.7%, $n = 11$).

Most facilities used airborne and contact isolation (42.9%, $n = 15$) or airborne isolation alone (28.6%, $n = 10$) for novel H1N1 patients. Few facilities used droplet precautions alone (11.4%, $n = 4$) or droplet and contact isolation (14.3%, $n = 5$). Of the facilities that chose to use droplet or droplet and contact isolation for novel H1N1 patients ($n = 9$), almost one quarter of them (22.2%, $n = 2$) used airborne precautions during aerosolizing procedures. The majority of participants (74.3%, $n = 26$) reported that their facility recommended staff wear eye protection in addition to other PPE when caring for novel H1N1 patients.

Focus group participants indicated that one of the hardest decisions they had to make during response to novel H1N1 concerned whether to have health care staff wear a mask or respirator when caring for potentially infected patients. As one participant stated, "[There were a lot of] questions about masking, whether to use a N95 or just the surgical mask." Focus

group members discussed the lack of scientific evidence available to guide decision making and the conflicting recommendations provided by the CDC and WHO. As one participant stated:

“Our physician champion in our system was very distraught over the conflict between the CDC and WHO and when you use the respirator versus [a mask]. He felt that the science we were seeing supported what the WHO was recommending: the mask. And then we had individuals within our system [who didn’t agree], and our system health care epidemiologist was very upset because we always follow the CDC recommendations.”

Another participant indicated that the lack of scientific evidence led her hospital to take the most cost-effective approach: “One of the reasons we stayed with the surgical mask during this outbreak was because I couldn’t really justify for my chief financial officer the cost of the N95 over the surgical mask because I had no evidence to back anything up.” Switching recommendations/practice midway through the response created unique challenges for the focus group members. Participants reported that health care staff were hesitant to switch from using a N95 respirator to a surgical mask because of concerns for personal safety. Focus group participants reported that switching practice midway through the response also contributed to staff’s confusion and question the credibility of the IPs as was previously mentioned. Many hospitals also shied away from using infection prevention practices that were different from the CDC recommendations. Focus group participants explained their experiences as follows:

“[We had trouble] when we tried to switch from N95s to regular surgical masks.... Some institutions would not accept a recommendation that was different from the CDC’s.”

“[The staff think] ‘The hospital down the street that has [N95s] must love their employees more because they were able to provide them, so why should I go to work [where they won’t provide N95s]?’ ”

“[One] thing that we looked at was the legislation from our occupational health and safety act. If we didn’t offer [staff] the highest protection and then the staff got exposed, would we then be open to litigation because our health and safety office says, ‘Do this?’ We’re telling them to do that [ie, wear a surgical mask] when we could have offered them the N95.”

Fit testing

Fit testing is the process of verifying the adequacy and proper fit of a respirator for health care worker

use. The Occupational Safety and Health Administration (OSHA) requires that all health care workers be fit tested prior to respirator use in health care settings.⁶ Fit testing is a relatively time-consuming process that requires staff and supplies, including various sizes and styles of respirators. Annual fit testing is part of most hospitals’ respiratory protection program and is often spread out throughout the year. The novel H1N1 pandemic posed unique challenges for hospitals because of the need to fit test a large number of staff in a short period of time and the desire to conserve respirators. This worked well in some facilities, but other hospitals had more difficulty. As focus group participants explained:

“Our emergency operations plan includes just-in-time fit testing for [events like pandemics], and it went very smoothly. We tested almost 500 people in about 4 days. And it worked beautifully for us.”

“We had our staff fit tested prior to [the H1N1 outbreak] ever occurring. But we ran out of certain models that we had a lot of our staff fit tested for. And so we did still have N95s, but we had to do some pretty frantic fit testing to fit people for alternate models.”

“We actually stopped fit testing respirators [during the event] mainly because we didn’t want to waste [the respirators]. Every time you fit test somebody, you can use up to 3 respirators, and we just didn’t want to waste them.”

To avoid the need or reduce the number of employees who needed to be fit tested, some hospitals decided to have health care workers use powered air purifying respirators (PAPR) instead of N95s as respiratory protection when caring for novel H1N1 patients. As one participant explained:

“We used PAPRs in our facility. We had made that choice about 2 years ago to do that, and that was probably one of the best decisions we made, is to go with PAPRs. Some of my colleagues have been doing just-in-time fit testing. Some of them had to do like 500 people in 1 week.”

Novel H1N1 laboratory testing issues

At the start of the novel H1N1 outbreak, many clinicians used the rapid test for seasonal influenza A and B in an attempt to quickly identify potentially infected novel H1N1 individuals. However, it was soon discovered that the sensitivity of these rapid tests was very low for novel H1N1, leading to numerous false negatives.⁷ Confirmatory testing consists of reverse-transcription polymerase chain reaction (RT-PCR) or viral culture; this testing is usually obtained via state health department reference laboratories. The focus group participants stated that many patients with negative

rapid tests were later found to be positive for novel H1N1 on RT-PCR or viral culture. The focus group participants identified various infection prevention issues resulting from the lack of a reliable rapid test for novel H1N1. One issue identified by the focus group members was the lack of consistency regarding the use of the rapid test for surveillance or treatment purposes. As one participant noted, "We don't clearly define what we want the testing to provide for us. It's either a surveillance and/or a treatment modality." Many focus group participants emphasized that testing only lasted for a short period of time and had very specific rules regarding who could be tested. This caused a lot of confusion among the general public and made surveillance and control measures much more difficult for the focus group members. As one participant explained it, "That's one of the reasons the decision was made to stop [testing] because we knew [novel H1N1] was out there. So what's the point? We're not going to treat [the infected individuals]. We're not going to do anything unless they're admitted, critically ill, etc." Another focus group member relayed her experience with the public's perception about rapid testing:

"We were pretty rigid about following the case definition.. that zeroed in on high-risk, hospitalized comorbidity patients. We had an 11 year old who went to see a pediatrician, and the pediatrician wanted the child tested, but the child didn't fit into one of the groups in the algorithm. And so they sent the child's specimen to an outside lab.... and they were able to identify that the child did have H1N1 swine origin influenza A. And then the media [said], 'You don't care about this 11-year-old child!' because you refused to test the child."

There were also challenges obtaining confirmatory testing that was coordinated through state public health reference laboratories. Many focus group participants described long waits for test results that made implementing control measures more difficult. As one participant stated, "[Reference laboratories] back log initially was just horrid." Focus group members stated that they often had to wait weeks for test results, making contact tracing, surveillance, and control strategies nearly impossible. Two participants described their experience as follows:

"We have a lot of physicians who, if the patient tests negative in the rapid test, they want to take them off of isolation. The nurses need to know [about the unreliability of the rapid tests] too because the nurses can certainly isolate without a [physician's] order."

"It took us about 2 weeks to get positive results from the health department. So 2 weeks later, you tell [the patient], 'Oh, by the way, you were

positive.' And then what do you do? You know, they've already gone back to work. You can't really do exposure follow-up because it's been 2 weeks already. And then we had the patients that were in-house at the hospital that the physicians were afraid to discharge until they got the results back. What do you do about that?"

Screening, triage, and visitor control

Focus group participants described varying degrees of success with their facility's attempts to screen and triage staff, patients, and visitors. Some focus group participants stated that screening was successful. As one participant described:

"[Everyone] had to be screened, and, if they didn't pass the first screening, then they were sent over to the next station to do a quick temperature check. If they were employees, they were sent to employee health and most of the time, sent home. So it really worked; it was really a cohesive effort on our part."

Other focus group participants described difficulties with the screening process, especially related to the large number of visitors and numerous entrances to facilities. As one participant stated, "I'm envious of the people who were able to screen visitors. We're not that large—we only have 650 beds—but the visitor traffic [was overwhelming]. We have about 20 entrances to the hospital." Another participant agreed and added, "From our parking deck, [visitors] can get into the hospital at 3 or 4 different levels." Solutions recommended by the focus group members to help control and screen visitors included locking the main entrances so people can exit but not enter without being screened and having security professionals or volunteers conduct visitor screening. Phone triage was another strategy emphasized by numerous focus group participants as being an essential component of pandemic planning because it reduces unnecessary traffic in the hospital emergency department for patient screening. Two participants described their experience with phone triage as follows:

"[Phone triage is] a resource for people to call in and talk to a live person about whether or not they should come in to our emergency department. We had a resource line, but not 24/7, and there were people that just needed to [hear from a medical professional] to say 'No, your kid is not sick enough. Stay home and watch his temperature' and to reassure them so they didn't end up in our emergency department."

"[Phone triage is] something that pediatric facilities generally do pretty well because we don't want parents flooding in all the time every time

there's something going around. I think we do that really well.... [We] have off-hours phone triage available for support, and I think that that's a lesson that perhaps everybody can learn, is how useful that is. And it will save you money, and parents and families would love the support."

One focus group participant also described the need to have indoor or covered areas to triage individuals. The participant described her experience:

"We were going to triage outside, and we're in a very warm climate, and so mosquitoes [could have been a problem]. Fortunately, rain hadn't started yet, but it could have been a really bad disaster. So, part of our next planning phase is to find ways to bring [triage] indoors, or at least to bring it under shelter, because had it been raining during those 3 weeks, it could have been a disaster; and, as it was, we had to do a lot of mosquito prevention."

Education

Focus group participants discussed many educational topics on which IPs should be trained. The most important educational topics identified by the focus group participants according to their ranking using the Nominal Group Method included the following: (1) isolation precautions and PPE recommendations, (2) coordination with community response agencies, (3) surge management, and (4) the IP's role in emergency management. A full list of educational topics identified by the focus group participants are outlined in [Table 3](#).

The focus group participants emphasized that the written educational materials need to be much shorter than what was offered in spring 2009. As one participant noted, "The information sheets [created by CDC] were too long. The first one was 4 pages." Focus group participants stated that educational materials need to be evidence-based, short (1-2 pages at most), and written in "bullet points," or else health care providers will stop reading.

DISCUSSION

The focus group discussions provided several important findings. Information provided by the focus group participants highlights a number of educational/reference materials that are needed for the current novel H1N1 event and future pandemics and describes the best format for these items. Whenever possible, reference materials need to be translated into multiple languages so that all health care clientele can access this information. Pandemic planning educational and reference materials identified by the focus group participants need to be generated and made available as soon as possible, given the potential resurgence of novel

H1N1 or concomitant outbreaks of seasonal influenza and novel H1N1 in fall/winter 2009.

The novel H1N1 pandemic illustrates the need for IPs to find new ways of controlling surge and preventing secondary health care-associated transmission during an infectious disease outbreak. Historically, IPs have been concerned primarily about hospitals and acute care settings. The novel H1N1 pandemic demonstrates the need to implement infection prevention strategies in all health care settings, including ambulatory care centers, physician offices, home health, and long-term care. Infection prevention emergency management guidance for these nonacute care settings has been lacking. It is essential that infection prevention recommendations be developed for these settings to help control disease spread and ultimately prevent and control surge in hospitals. One essential component of these recommendations is the identified need for a stronger focus on occupational health. Staff surge capacity is necessary to maintain functionality of health care facilities during pandemics, and healthy staff contributes strongly to sustaining this capacity. Occupational health issues that need to be addressed include having policies and procedures for screening/triaging staff, furloughing employees, and better sick leave practices to prevent ill health care providers from coming to work sick during pandemics.

Changing standards and recommendations are to be expected during outbreaks of emerging infectious diseases and pandemics as more is learned about the causative agent and new anti-infective therapy and/or control measures are discovered. These changing practices must be communicated carefully to prevent mistrust among the staff. Failure to do so can result in poor adherence to infection prevention practices because of confusion among health care professionals. This could lead to secondary transmission in health care facilities and occupational exposures. Health care professionals should be told that outbreaks of emerging infectious diseases, such as novel H1N1, are expected to bring rapidly changing case definitions, surveillance methodologies, and control measures. These changes should be evidence based and communicated to staff as clearly and concisely as possible to prevent confusion and mistrust.

Researchers need to continue to examine disease transmission and appropriate isolation and PPE for novel H1N1. Conflicting guidance on infection prevention for novel H1N1 has led to a lot of confusion among health care professionals and frustration for IPs. One third of the focus group participants reported that they changed isolation precautions and protective measures midway through response to the novel H1N1 outbreak. Focus group participants also reported that the potentially unnecessary use of N95 respirators caused

much confusion for staff and resulted in a shortage of supplies in their facilities, according to those who participated in the focus groups. These focus groups occurred the week before the World Health Organization officially declared the novel H1N1 outbreak a pandemic, yet hospitals were already running out of supplies—even after regional and national stockpiles were deployed. One quarter of all focus group participants' facilities ran out of respiratory protection supplies during the spring of 2009, and almost one quarter needed to implement a reuse policy for respirators to conserve limited resources. Hospitals need better plans for obtaining or reusing necessary equipment and supplies during patient surges.

Overall, the focus group method of inquiry served as a valuable tool in eliciting rich, detailed information about IPs' opinions of lessons learned from the first part of the 2009 novel H1N1 influenza A pandemic. Structured surveys with closed-ended responses (opposed to the open-ended questions used in this study) may have revealed different opinions about references materials needed for future pandemics and educational priorities for IPs. It is not known whether the IPs who chose to participate differed from those who were eligible but chose not to participate. Therefore, the information presented here may not be generalizable to all hospitals. This is especially true for the survey questions regarding hospital or agency protocols for worker protection, isolation, and PPE usage during the event; the small sample size needed for focus group methodologies may limit the generalizability of the survey results.

CONCLUSION

IPs involvement in preparedness and response to pandemics and other disasters involving a biologic agent is essential. This study identifies lessons learned from the first part of the 2009 novel H1N1 influenza A

pandemic and highlights gaps in emergency management most in need of being addressed: infection prevention in nonacute care settings, employee health during pandemics, communication, PPE availability and recommendations for use, and maintaining quality of care during times of rapidly changing and conflicting recommendations. IPs must continue to address gaps in pandemic planning. One way to accomplish this is through the creation and distribution of IP-specific educational tools and reference materials for emergency management. The topics identified by IPs who experienced the first wave of the 2009 novel H1N1 influenza A pandemic should be used as the basis for these new educational initiatives.

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