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## Update on infection prevention in disaster planning: New resources and policies

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The Association for Professionals in Infection Control and Epidemiology's (APIC) Strategic Goal No. 5 in its Vision 2012 document states that, "*APIC will play a leadership role in emergency preparedness related to infection prevention and control, including emerging and reemerging diseases, bioterrorism, natural disasters and other issues.*" As part of this goal, the APIC Emergency Preparedness Committee (EPC) has been tasked with identifying and/or creating needed resources for preventing infections during disasters. The APIC EPC recognized that many health care facilities and communities are ill prepared to deal with the potential infection ramifications of a large scale bioterrorism event, pandemic, or natural disaster. Much guidance is needed for infection preventionists and noninfection prevention professionals involved with disaster preparedness. The purposes of this article are to provide an overview of 2 new APIC products related to disaster planning and describe the collaborative process used to develop the products.

Many issues surrounding emergency preparedness have potential policy implications, especially those involving creation of new standards and

recommendations related to infection prevention during a disaster. In keeping with the APIC Vision 2012's Strategic Goal No. 2 Objective No. 2, which states that, "*APIC will effectively influence development of key standards and regulations that impact the practice of infection prevention and control,*" close collaboration is essential between the APIC EPC and the APIC Public Policy Committee (PPC) to address the unique infection prevention needs of disaster planning. This has been illustrated by requests from governmental agencies for APIC to develop guidelines related to allocation of limited resources during a disaster, such as deciding which groups should be prioritized for receipt of personal protective equipment (PPE). There has never been a greater need for infection prevention education, standards, and guidelines related to disaster preparedness.

Needs assessments and other research projects conducted by the APIC EPC indicate that many realities of current disaster planning, such as an identified lack of PPE and the need for sheltering large numbers of displaced individuals, put health care workers and community members at risk from exposure to communicable diseases.<sup>1-5</sup> Strategies are needed to prevent and control infections during all types of disasters. In addition, there is an identified need to create educational and reference material for noninfection prevention professionals/individuals who may need to implement infection prevention programs during a disaster. An example of this is a community shelter that needs to have an infection prevention program in place but may lack individuals with expertise in infection prevention to implement such a program.

This realization led the APIC EPC to begin strategizing about potential products and policies that could enhance disaster planning by maximizing infection prevention. Two of the most important issues identified from the APIC EPC needs assessment included what to do when stocks of respiratory protection were limited or unavailable and how to prevent infection

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transmission in shelters. At the same time, the APIC PPC was tasked with developing guidelines for minimizing infection transmission while maximizing the availability of PPE, such as N95 respirators, during a pandemic. This culminated in a joint project between the APIC EPC and PPC that involved the creation of guidelines related to the reuse of respiratory protection. In addition, the APIC EPC developed recommendations related to the prevention of infection transmission in shelters during disasters, which was reviewed by the APIC PPC. This article gives an overview of these 2 new products developed by APIC in response to needs identified by APIC members and our strategic partners in disaster planning. The first infection prevention and control product for disasters consists of a Position Statement regarding how to safely reuse respiratory protection when resources are limited. The second infection prevention and control for disasters product consists of an evidence-based planning and reference document for preventing the spread of infectious agents within community shelters. Both products are available free of charge at the APIC Web site beginning July 2008: <http://www.apic.org>.

## REUSE OF RESPIRATORY PROTECTION IN PREVENTION AND CONTROL OF EPIDEMIC- AND PANDEMIC-PRONE ACUTE RESPIRATORY DISEASES IN HEALTH CARE

The first infection prevention product for disasters consists of a Position Statement that outlines guidelines for how to safely reuse respiratory protection in health care settings during a large scale epidemic or pandemic. This Position Statement, The Reuse of Respiratory Protection in Prevention and Control of Epidemic- and Pandemic-Prone Acute Respiratory Diseases in Healthcare (Reuse of Respiratory Protection) document, was created in response to numerous requests APIC Headquarters had received. Previous research indicates that supplies of PPE, including respiratory protection, will be limited during a large scale bioterrorism attack or pandemic.<sup>1,3</sup> Past experience has illustrated that health care workers may be some of the most at-risk individuals during an infectious disease disaster in which PPE is limited or there is a lack of adherence to infection control practices, such as the outbreak of severe acute respiratory syndrome (SARS).<sup>4,5</sup> Therefore, it is imperative that health care agencies develop policies and procedures for providing the most protective work environment possible for its workers. This includes having a stockpile or method for obtaining additional supplies of PPE during a disaster, a prioritization plan for allocating scarce resources when supplies start to dwindle, and a procedure for safely reusing PPE if supplies are depleted.

**Table 1.** Topics addressed in the Reuse of Respiratory Protection Document

Topics addressed
Reasons the document was created
Recommendations for reuse of respiratory protection during periods of scarce resources
Avoiding the performance of aerosol-generating procedures
Priority for health care workers performing aerosol-generating procedures
Need for health care education regarding reuse of respiratory protection
Administrative and environmental measures to minimize potential airborne contaminants
Cohorting of infected individuals and staff
Establishing dedicated entrances and exits for infected patients
Prioritization methodology based on worker duties
Use of face shield to protect respiratory protection from contamination
Interventions for home care setting
Reuse of N-95 respirator and surgical/procedure masks
Selection of surgical or procedure masks
Proper removal of respiratory protection to prevent cross contamination
Importance of hand hygiene to prevent disease transmission

The Reuse of Respiratory Protection Position Statement is a 4-page evidence-based document that is designed to be used to generate health care policy regarding interventions to implement when there are limited or no supplies of respiratory protection during a large scale bioterrorism event, pandemic, or other disaster. It could also be used as a quick reference tool during an event. Infection preventionists, disaster planners, and/or hospital administrators can use this document to develop training programs, disaster plan procedures, and/or hospital policy related to the allocation and use of respiratory protection when resources are limited. Recommendations outlined in the Reuse of Respiratory Protection document are listed in sections based on the availability of respiratory protection supplies. For instance, one section outlines recommendations for reusing respiratory protective devices during times when supplies are still available but are beginning to dwindle significantly. Another section outlines interventions for periods in which supplies are insufficient or depleted. A list of topics addressed in the Reuse of Respiratory Protection Position Statement is outlined in Table 1.

## Product development

The Reuse of Respiratory Protection document was a joint effort between the APIC emergency preparedness and public policy committees. First, members of the APIC PPC conducted a literature review to identify relevant guidelines and policy documents that address the issue of safely reusing respiratory protection. Identified sources consisted of existing federal, public policy, and international agencies' guidelines including the Centers for Disease Control and Prevention; Division of TB Elimination; Division Healthcare Quality

Promotion; National Institute for Occupational Safety and Health; Food and Drug Administration; Health and Human Services; Institute of Medicine; Occupational Safety and Health Administration; and the World Health Organization. Once the recommendations were drafted, the APIC PPC submitted the document to the APIC EPC for review and editing. The APIC EPC reviewed the document for accuracy and feasibility. Discrepancies were discussed between both committees until consensus was reached. This process resulted in an evidence-based document that addresses the realities of disaster response when resources of respiratory protection are almost certain to be limited or nonexistent.

### **Key recommendations of the Reuse of Respiratory Protection Position Statement**

The Reuse of Respiratory Protection Position Statement emphasizes the need to follow existing recommendations/guidelines when supplies are adequate, even during a disaster. When supplies begin to dwindle, interventions must be implemented to maximize resources while minimizing the risk of infection transmission. The document outlines high-risk procedures during which respiratory droplets and airborne droplet nuclei are the most likely to be transmitted; examples include the performance of aerosol-generating procedures and removal of respiratory protective devices.<sup>6</sup> Health care worker groups who need to be prioritized by task, such as performance of aerosol-generating procedures, are identified so that health care policies can be developed to protect those workers most at risk from infection transmission.

In addition to identifying high-risk procedures, the Reuse of Respiratory Protection Position Statement also outlines interventions that can be implemented to maximize limited resources while still minimizing the risk of infection transmission. An example includes cohorting infected individuals so that health care staff can keep a single respirator on while caring for multiple patients.<sup>6</sup> This will decrease the amount of respiratory protection needed because each mask/respirator will be used for longer periods of time.

The Reuse of Respiratory Protection Position Statement also delineates administrative and environmental measures to minimize infection transmission when respiratory protection supplies are limited or insufficient. Examples include establishing dedicated entrances and exits for infected patients and the use of face shields to protect respiratory protection from contamination.

Another important component of the Reuse of Respiratory Protection Position Statement is the inclusion of infection prevention strategies for home care. Many

patients may need to be cared for in the home because hospital beds will be filled during a disaster. Interventions are needed to prevent the spread of infectious agents in all settings in which infected patients are housed, including homes. One final important component of the Reuse of Respiratory Protection Position Statement is the inclusion of procedures for safely handling potentially contaminated masks or respirators so that staff can protect themselves from cross contamination.

The Reuse of Respiratory Protection Position Statement is available free of charge on the APIC Web site: <http://www.apic.org>. Research is currently being conducted that may affect the Reuse of Respiratory Protection Position Statement. Therefore, it is advisable to verify that a current edition is being used when developing or updating health care policy. Updates to the Reuse of Respiratory Protection Position Statement can be obtained by reviewing the APIC Web site regularly.

### **INFECTION PREVENTION AND CONTROL FOR SHELTERS DURING DISASTERS DOCUMENT**

The second infection prevention and control for disasters product consists of an evidence-based planning and reference document for community shelters. This document outlines recommendations designed to reduce the risk of transmitting communicable diseases in shelters used for housing displaced individuals during a disaster. These shelters can range from community evacuation centers to basic care facilities, including tented areas, in large scale events. The need for guidance related to infection prevention in shelters was identified by infection preventionists who responded to previous disasters.<sup>2</sup> These infection preventionists indicated that infection prevention and control measures were lacking in shelters used in previous disasters and that this contributed to secondary disease transmission within the shelter.<sup>2</sup>

Shelter staff must implement appropriate infection prevention and control measures to reduce the risk of secondary disease transmission in shelters that will be used in future disasters. It is hoped that infection preventionists will be involved in community shelters, but resources may not allow this. Therefore, the Infection Prevention and Control for Shelters During Disasters document (Infection Prevention in Shelters) was written with the assumption that a noninfection prevention professional would be implementing the recommendations. The document is designed to be used as a planning and reference document for disaster planners setting up and/or running a community-based shelter.

The scope of infection prevention interventions for shelters will vary, depending on the type of disaster, services available at the shelter, and community



resources. Although shelter staff may administer first aid and other limited health care services, community shelters for individuals displaced by a disaster are not considered health care facilities. Existing health care facilities and temporary health care delivery systems, such as alternate care sites, will provide the bulk of health care services during a disaster. Ill individuals need to be identified rapidly and transferred to a medical facility or alternate care site so that they receive the treatment they need and, therefore, they do not pose a risk to other individuals in the shelter. This will require infection prevention strategies, such as triage and surveillance, to identify these ill individuals. If potentially contagious individuals cannot be transferred to a medical facility or alternate care site, more intensive infection prevention interventions, such as isolation, may need to be implemented at the shelter. In addition, environmental sources, such as food, water, and waste, can contribute to disease transmission within shelters; environmental controls will be needed.

The Infection Prevention in Shelters document provides recommendations for handling potentially contagious individuals and implementing environmental controls in shelters to prevent or limit the emergence or transmission of communicable diseases. Shelter managers should aim to implement routine/standard health care infection prevention and control strategies. However, shelter resources may be limited, and it may not be possible or feasible to implement normal standards of care. In those situations, altered standards of care, also known as *crisis standards of care*, can be implemented but should only be used when standard practices cannot be achieved. The Infection Prevention in Shelters document outlines both standard practices and crisis standards of care related to infection prevention and control. Recommendations are provided in a tiered manner; it starts by describing the most protective infection prevention measures and working towards the least. Disaster planners will need to constantly assess available resources and feasibility of various infection prevention interventions. The Infection Prevention in Shelters document assists shelter managers and/or infection preventionists in making important decisions about the best infection prevention strategies to implement during a disaster.

In addition to being a planning and reference tool, the Infection Prevention in Shelters document also has strong policy implications. The document outlines recommendations for consulting/utilizing infection preventionists when setting up and/or running a shelter, guidance on how to safely reuse respiratory protection, and procedures for setting up an isolation area within a shelter. Because of the potential policy implications of the Infection Prevention in Shelters recommendations, the APIC EPC worked closely with the APIC PPC as a final

review to ensure that only evidence-based recommendations were included. This document can be used to generate public policy related to setting up and running shelters for all types of disasters.

## Product development

The Infection Prevention in Shelters document was created using a multidisciplinary, evidence-based approach. First, members of the APIC EPC outlined the necessary components of the document using a literature review and their expertise in the field of disaster planning. Next, each APIC EPC member volunteered to develop a section of the document. APIC EPC members were instructed to do a thorough literature review for their section and record the source for each statement or recommendation made in the document. A working group of APIC EPC members gathered at a face-to-face meeting to review and collate the materials into a cohesive document. Gaps in the document were identified, and final revisions were made. Once the document was drafted, it was sent to a group of internal (APIC members with expertise in disaster planning) and external reviewers from a variety of disaster planning agencies, including the Red Cross, local and state public health departments, first responders, and others. This rigorous process resulted in an evidence-based document that addresses the multitude of infection prevention issues surrounding sheltering large numbers of displaced individuals.

## Key components of the infection prevention and control for shelters document

The Infection Prevention in Shelters document is a 51-page, evidence-based document that is designed to be used primarily during the planning phase of setting up a community-based shelter for disasters. It is also intended to be used as a quick reference tool during an event. The document is provided in short sections that are arranged by topic so that disaster responders and shelter workers can quickly find an answer to a specific question, such as how to set up a surveillance system within the shelter. A table of contents is provided to allow users to quickly identify the topics. Topics outlined in the Infection Prevention in Shelters document are listed in [Table 2](#). A few of the most important topics covered in the Infection Prevention in Shelters document include when and how to perform hand hygiene; how to put on, use, and remove PPE; how to set up a surveillance system for a shelter; and how to manage pets. Some of these issues, such as hand hygiene and PPE, have long been identified as being critical during disasters. Other topics, such as pet management, have only recently been identified as

**Table 2.** Topics addressed in the Infection Prevention and Control for Shelters During Disasters document

Topics addressed
Definition of a shelter
Infection control coverage in shelters
Triage and surveillance procedures
Syndromic surveillance
Immunization
Postdischarge surveillance
Infection control triage
Transfer to a health care facility
Isolation precautions
Setting up an isolation area within the shelter
Placement of individuals within the shelter
Hand hygiene techniques and signage
Personal protective equipment
Glove use
Gown use
Mask and respirator use
How to handle a shortage of masks and/or respirators
Managing sexually transmitted infections within the shelter
Water management
Water usage, collection, storage, and decontamination procedures
Food safety
Safe handling of human and pet food
Waste management
Safe handling and disposal of regular trash and regulated medical waste
Environmental decontamination
Selection of cleaning/disinfection agents
Cleaning body fluid spills, environmental surfaces, and cots
Handling toys within the shelter
Toy selection
Handling and cleaning communal and noncommunal toys
Frequency of toy cleaning and disinfection
Procedures for cleaning toys of infected/isolation and noninfected/ well-appearing children
Pest management
Pet management
Postmortem care

potential issues in community shelters. The Infection Prevention in Shelters document aimed to address all issues that might contribute to infection transmission in community shelters during a disaster.

The Infection Prevention in Shelters document also contains appendices that are designed to be stand-alone tools for the shelter. Examples include posters outlining appropriate configuration for cots and sleeping arrangements, instructions for cleaning/disinfecting toys, and disposal of waste. A full list of the appendices/tools provided in the Infection Prevention in Shelters document is outlined in Table 3. These appendices/tools can be photocopied and hung throughout the shelter or used in training programs for shelter workers. Both black-and-white and color copies of the appendices/tools will be available at the APIC Web site to facilitate training and photocopying as needed. The APIC EPC is also developing a set of quick

**Table 3.** Appendices/tools in the Infection Prevention and Control for Shelters During Disasters document

Appendices/tools
List of infection prevention and control equipment/supplies needed for shelters
Syndromic surveillance assessment/triage form
Syndromic surveillance poster
Infection control triage poster
Isolation poster
Respiratory etiquette poster
Figure of cot or sleeping area configuration to prevent infection transmission
Hand hygiene techniques summary
Hand hygiene poster
Personal protective equipment donning, doffing, and use posters
Water decontamination methods poster
Well water disinfection poster
Disposal of waste generated in a shelter poster
Handling toys in shelter poster

reference cards that outline content from the Infection Prevention in Shelters document in an easily accessible format. These cards will be available for purchase from the APIC Web site in early 2009.

The Infection Prevention in Shelters document will continue to change and be improved as new lessons are learned and new research findings become available. Furthermore, infection prevention recommendations can change during a disaster as more is known about the causative agent and/or situation. Community disaster planners and shelter workers should partner with local public health agencies before and during a disaster and follow recommendations from these agencies that are specific to the event. Updating and implementing the key elements of infection prevention and control activities in shelters should continue to be part of the community's preparedness planning efforts. It is important to continue to communicate and update all partners involved in sheltering any time that plans are revised. Updates to the Infection Prevention in Shelters document will be posted on the APIC Web site (<http://www.apic.org>), so it is advisable to verify that an edition is current by reviewing the APIC Web site regularly.

## CONCLUSION

Infection prevention during disasters is essential. It requires upfront planning, education, and policy development, in conjunction with just-in-time training and quick reference materials. These training and quick reference materials need to be aimed at both infection preventionists and noninfection prevention experts who may be called on to implement infection control programs in shelters and alternate care sites during a

disaster. This article outlines 2 new products that provide guidance and recommendations for preventing infection transmission during disasters for both health care and community settings. The new APIC products address some of the most critical issues facing disaster planners today: how to allocate limited resources during disasters in a manner that provides as much protection to health care staff as possible and how to implement an infection prevention program in non-health care settings such as community shelters during a disaster. These products address issues that have long been a problem during disaster response, such as food and water safety, and newly identified topics that may affect infection transmission in shelters, such as pet management.

The collaborative process used to develop these 2 new products is a new approach for the APIC. Previous APIC products have been developed by a single committee or an individual/group assigned by a member of APIC Headquarters. As more is learned about the potential infectious disease implications of disasters, it is becoming evident that a multidisciplinary approach is needed when developing reference and educational materials related to this topic. Many emergency management issues have potential policy implications, such as the reuse of respiratory protection, yet also require expertise in disaster planning. Without a multidisciplinary approach, reference and educational materials may not meet APIC members' needs nor be as accurate and effective as possible. The APIC emergency preparedness and public policy committees will continue to work together to develop new educational and reference materials for APIC members and the general public related to infection prevention during disasters.

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