

Emergency Physician Residency Program for Weapons of Mass Destruction in Taiwan

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Abstract

In Taiwan there is still no standardized curriculum for training of emergency physicians about the health hazards related to weapons of mass destruction. To evaluate the real conditions of residency education in the related issues, we thus developed a survey to elucidate whether any formal training in biological weapons is conducted in emergency medicine programs; to determine the overall subjective ability of program directors or residency directors to recognize and clinically manage casualties of biological weapons agents; and to identify which resources might be used by emergency physicians to identify and treat biological warfare casualties. We also documented a baseline of current practices regarding biological weapons training in emergency medicine residency programs. The majority of respondents feel inadequately prepared to recognize and clinically manage casualties of biological warfare. About 75.0% of respondents were aware of appropriate protective equipment in their emergency department. The most common medical equipment mentioned was the use of the HEPA or specialty mask. Also notable in the responses was the mention of antidotes or equipment for chemical agents and cyanide poisoning. (*Ann Disaster Med.* 2004;2:39-46)

Key words: Bioterrorism; Residency Training; Emergency Medicine; Disasters

Introduction

Even though there is still no definite terrorist attack in Taiwan, we still have to admit that terrorism has become widely recognized as a significant threat to the public health and safety. It is especially true after the attacks on American citizens at US embassies in Kenya and Tanzania, the Centennial Olympic Park of Atlanta, the Federal Building of Oklahoma City, and the World Trade Center of New York. The use of weapons of mass destruction (WMD) for terrorism has become a key concern of the US

government since the 1990s. The threatening of biological warfare has become a most important worldwide concern after the 911 terrorist attacks in the United States.¹

Biological events can be an example. Because of improving disease surveillance and control in Taiwan, most of previous notorious infectious diseases such as small pox have already disappeared.² Other common pathogens used in bioterrorism such as the microorganisms of anthrax, botulism, tularemia and hemorrhagic fever are rarely or even never seen in

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Taiwan. This may incur a new challenge to the healthcare providers, especially the emergency physicians, because most of them are not so familiar with the clinical spectrum of these diseases. However, discerning the nature of the threat of biological weapons as well as appropriate responses to them requires greater attention to the biological characteristics of these instruments of war and terror. Strengthening the public health and infectious disease infrastructure is an effective step toward averting the sufferings brought by the terrorist's use of a biological agent.²

The present dilemma may be that respondents also revealed a limited approach of how to acquire information regarding biological warfare agents. It appears to be limited at best in availability of experts and reference materials. The similar phenomenon may be the frequent mention of toxicologists, poison control centers, and local health departments as reference sources for such rare infectious diseases. These sources might be unable to provide all the necessary information in cases of WMD. The diversity of responses and occasional mention of inappropriate sources down-regulates the crucial role of education regarding related information. On the other hand, the interactions among multiple agencies such as the CDC, public health departments, poison control centers, law enforcement agencies, and hospitals may be necessary to effectively and safely distribute advice to physicians and the public.

We still have no data concerning how well emergency medicine physicians are prepared to recognize or treat WMD casualties here. This study was then designed (1) to elucidate whether any formal training in WMD is conducted in emergency medicine programs; (2)

to determine the overall subjective ability of program directors or residents to recognize and clinically manage casualties of WMD; and (3) to identify which resources might be used by emergency medicine physicians to identify and treat WMD casualties. The study is also intended to document a baseline of current practices regarding WMD training in emergency medicine residency programs.

Methods

On October 1, 2003, a 20-question survey was sent by e-mail to 36 emergency medicine residency program directors participating in the Emergency Medicine Resident Training Board. If e-mail addresses were not available, the primary contact was made through telephone or fax. Follow-up reminders were made through e-mail or fax approximately 10 days after the initial contact.

The survey was conducted by a modified Delphi process. The process included input from authors and other experts in the field of WMD. The objective of the survey is to ascertain the level of formal training in WMD currently conducted in emergency medicine programs (esp. in residency training) and overall subjective ability of residency program directors to recognize and clinically manage casualties of WMD. In addition, the survey also examined the possible resources that might be used by emergency physicians in the identification and treatment of WMD casualties. Results of the survey were tabulated using SSPS 10.0 statistical software program and are presented as a percentage of respondents. The descriptive statistics were used as the presentation of the results.

Results

Of the 36 surveys distributed, 32 were returned by mail, fax, or e-mail (response rate=88.9%). Among the respondents, 87.5% were residency program directors, whereas 12.5% other positions within these programs. Approximately 50% (16/32) of the respondents were residency trained in emergency medicine, and 100% (32/32) were board certified in emergency medicine.

Sixty-three percent of the respondents (20/32) indicated that their residency program included formal training in WMD. The most common form of training in these programs was lectures (20/20 or 100% of the responses), followed by field exercises or specific rotations accounted (4/20 or 20%) and 10% (2/20,) incorporated training courses in WMD as part of their program. In contrast, 75% (24/32) of the respondents stated their program provided formal training in hazardous materials. Of these respondents, 100% (24/24) taught by lecture and exercises, whereas 16.7% (4/24) of the responses were field exercises or specific rotations. Training courses accounted for 6.7% of the responses. Those responses that did not fit in the defined categories accounted for 6.7%. Ninety-five percent of the respondents agreed that it is necessary to include training in WMD, whereas five percent of respondents did not believe that formal training in WMD defense was necessary.

Few respondents (10.0%) have access to consultants or staff with WMD expertise within their institution. Of the respondents with access to consultants within their institution, 75.0% specified the name of 1 contact and 25.0% named 2. Regarding access to an outside contact person or institution for advice and infor-

mation during a biological terrorism event, 50% of the respondents specified at least 1 contact. Approximately 30.0% pointed out 2 contacts and 10.0% 3 contacts. Only 10.0% did not specify any contacts.

Respondents were asked about access to references. About 40.0% of the respondents did not point out any reference material that would be helpful or used in a case of a biological warfare event. Another 30.0% listed only 1 reference, 20.0% listed 2, 5.0% specified 3 reference sources, and 5.0% of the respondents 4 reference sources. The most prevalent references were CDC manuals, representing 55.0% of all responses for this item.

Approximately 90.0% of the respondents stated that they routinely report suspected cases of commercial food poisoning, whereas another 10.0% stated that this was dependent on the clinical situation. About 55.0% said that they did not report such cases; 15.0% were not sure. About fifty percent of the respondents disagree that Taiwan currently has the capability to detect a WMD attack. Besides, 15.0% did not know, and 35.0% believe that such a capability exists. When asked what might be the most likely WMD for a terrorist event, 80.0% of the respondents stated a biological agent via aerosolization. Of the respondents who listed 2 answers, all listed aerosol dispersion first, followed by food or water contamination.

As to protective medical equipment in the event of a biological warfare attack, 75.0% of the respondents stated that they were aware of such equipment in their ED. Of these respondents, 66.7% were able to list 1 piece of equipment; 16.7% listed 2, and 16.7% listed 3 pieces of equipment. The most prevalent medical equipment response was the use of

high-efficiency energy particulate air (HEPA), N95 or P100 masks (85.0% of the responses). Most EDs of emergency responsive hospitals have 1 to 3 negative airflow rooms (85.0%), but 15.0% reported that their ED had no negative airflow rooms.

Respondents were also asked to self-rank their ability to recognize casualties of WMD terrorism. Seventy percent of the respondents rated themselves less than adequate or very poor. Another 20% rated themselves as adequate or more than adequate, and 10.0% had no opinion or did not specify a response. None of the respondents rated themselves as very good in casualty recognition.

As to the ability to clinically manage casualties of biological terrorism, 60.0% of the respondents rated themselves as less than adequate or very poor; 35.0% rated themselves as very good, more than adequate, or adequate; and 5.0% had no opinion or did not specify a response.

Discussion

This study suggests a relative lack of medical training and education with WMD in emergency medicine residency programs in Taiwan. The majority of respondents feel inadequately prepared to recognize and clinically manage casualties of WMD. About 75.0% of respondents were aware of appropriate protective equipment in their EDs. The most common medical equipment mentioned was the use of the HEPA or other specialty masks. Also notable in the responses was the mention of antidotes or equipment for chemical agents and cyanide poisoning. These interventions are not appropriate for biological agents. Standard curricula for training of emergency medicine physicians

should be developed and emergency medicine textbooks should be updated to include information on biological agents that may be used in a terrorist attack.

In 1984, more than seven hundreds of persons were infected with *Salmonella typhimurium* as a result of intentional contamination of restaurant salad bars in Dallas. Gangs of Bhagwan Shree Rajneesh were later admitted to causing the outbreak in an effort to influence local elections.³ In 1992, a Virginia man was arrested for spraying his roommates with a substance that he claimed to be anthrax. The house was quarantined, and 20 people were given chemoprophylaxis while awaiting test results.⁴ In 1994, a Japanese sect of the Aum Shinrikyo cult attempted an aerosol release of *Bacillus anthracis* bacteria in Tokyo. In addition to releasing sarin in Tokyo subway in 1995, cult members were also preparing to spread *Clostridium difficile* bacteria for terrorist use.⁵ During 1998 and 1999, a series of hoaxes in the United States threatened a total of several thousand letter recipients with exposure to *B anthracis*. Many of these letter recipients underwent hazardous materials-style decontamination and were given antibiotics for chemoprophylaxis.⁶

According to the United States CDC, the risk of an intentional line-source release of *B anthracis* in a major US city indicated economic impact of a bioterrorist attack can range from \$477.7 million to \$26.2 billion per 100,000 persons exposed. It said that early implementation of a prophylaxis program after an attack is essential.⁷ Reports released during 1998 by the Institute of Medicine⁸ and the CDC⁹ have noted the possibility of WMD terrorism and the relative lack of preparedness

among health care providers in managing this threat. All of these documents have identified care providers working in EMS systems and emergency departments as groups likely to come into contact with victims in the event of a WMD attack. It is therefore necessary for emergency care providers to become proficient in recognition, diagnosis, and treatment of casualties caused by WMD agents.

Our country has initiated a process of training in certain major cities but is not expected to reach each emergency care provider. In addition, the current emergency medicine core content¹⁰ and most popular training textbooks of the specialty do not contain specific reference to the recognition, reporting, detection, or management of terrorist disasters involving WMD. There is no standardized curriculum for training of emergency physicians as related to the health hazards of most weapons of mass destruction agents. It becomes the first priority for us to consider how to implement the program and practice into current medical education system and resident training protocol.

Experts believe that recognizing when a WMD terrorism attack has occurred will depend in part on recognizing the increasing number of patients that present with a similar constellation of symptoms. Emergency physicians should pay attention to clinical manifestations and diagnostic clues indicating an unusual infectious disease outbreak associated with intentional release of a biologic agent. Once suspected, we should report any endemic or epidemic events to their supervising health departments. The covert release of a biologic agent may not have an immediate impact because of the delay between exposure and illness onset, and outbreaks associated with in-

tentional releases might closely resemble naturally occurring outbreaks. Accordingly, the clues of intentional release of biologic agents include¹¹ 1) an unusual temporal gathering of illness; 2) an unusual geographic clustering (e.g., persons who attended the same public event or gathering); 3) patients presenting with clinical signs and symptoms that suggest an infectious disease outbreak (e.g., ≥ 2 patients presenting with an unexplained febrile illness associated with sepsis, pneumonia, respiratory failure, or rash or a botulism-like syndrome with flaccid muscle paralysis, especially if occurring in otherwise healthy persons); 4) an unusual age distribution for common diseases (e.g., an increase in what appears to be a chickenpox-like illness among adult patients, but which might be smallpox); and 5) a large number of cases of acute flaccid paralysis with prominent bulbar palsies, suggestive of a release of *botulinum* toxin. In our survey, 90.0% of respondents routinely report cases of commercial food poisonings. However, there is still a need to develop criteria and procedures for the centralized reporting of cases suspected to involve intentional contamination or infection.

In case of a WMD terrorism event, we expect that key medical response resources will most likely be overwhelmed. These resources include trained medical personnel, personal protective equipment, isolation rooms, respiratory ventilators, and pharmaceuticals. Of note in this survey was that most EDs staffed by our respondents have only limited negative airflow rooms. As a mass casualty event becomes an increasing threat, frequent check of antidote stockpiles and other medical resources will be essential.¹²

Our data does not represent an objective

measure of individual physician's ability or knowledge with regard to WMD agents. We believe that the involvement WMD would not be limited only in emergency medicine. Although our survey focused on the leadership of major emergency medicine training programs in Taiwan, we expect that physicians involving other fields would also feel poorly prepared to recognize and treat WMD casualties.

The survey has not been independently validated and therefore may include the potential for elements of systematic error related to informational and selection bias. They also include recall bias among respondents. There are also potential variations among the nonrespondents. However, there are no differences in the response between different program types (3 years or one-tier board versus 5 years or two-tier board).

This study strongly suggests that emergency medicine residency programs are not adequately training to respond to bioterrorism in Taiwan. Future efforts should be directed at additional training and education of emergency physicians in residency programs.

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