Medical and Dental Enhancements Project:
Increasing First Responder and
Public Health Capabilities
During Times of Crisis

Collected Publications

PRINCIPAL INVESTIGATORS
NOVEMBER, 2006
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November, 2006

A project of the Center for Catastrophe Preparedness & Response at New York University
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ABOUT THIS PUBLICATION

This publication is a collection of peer-reviewed and noted works produced under the Medical and Dental Enhancements Project that have appeared in various medical journals from June 2003 to March 2006. This publication provides an overview of the critical research of the Project by presenting nine articles highlighting a range of issues centered on dentistry and emergency response. The articles are authored by the Project’s principal investigators, Drs. Glotzer and Psoter, and their colleagues. All pieces herein are reproduced in full and are to be cited from their original source.

PROJECT OVERVIEW

The Medical and Dental Enhancements Project is led by Walter Psoter, DDS, Ph.D. of New York University’s School of Dentistry. The project considers how, in the event of a large-scale disaster, the dental profession can be engaged to enhance first response and emergency public health capabilities. This question is predicated on the recognition that in the event of a large-scale disaster such as Hurricane Katrina or an untold terrorist event, human causalities and injuries as well as damage to critical infrastructure could overwhelm and even diminish first response and public health systems capacitates. In such a scenario, it is imperative that qualified alternative groups of health professionals capable of augmenting the traditional ranks of first responders (e.g. fire and EMS) and emergency public health professionals (e.g. emergency room doctors and staffs) be engaged. The dental profession is one such example of a qualified medical profession that can aid the medical community in the event of a strained or diminished health system following a disaster.

While dentists have been included in plans of the Medical Reserve Corps and it is possible dentists could be included in ad hoc response scenarios, there has been little formal training or integration of the dental profession into disaster planning that would suggest a meaningful engagement. The project has conducted studies that show there is interest and capability in the dental profession for a place within disaster preparedness, and the recent development of curriculum and certificate programs at the university level –including at New York University –demonstrate an emerging commitment of students and educators to formalize responder credentials for the dental community.

The key elements of this project include:

- Developing curriculum that can be effectively and rapidly applied to existing academic regimens that can educate the dental student, the hospital dentist, and those already out in practice.
- To evaluate how to best utilize private practices
- Applying informatics technology to enhance the skill and knowledge of dental professionals to both expand the manpower pool of responders as well as the manpower associated with expanded support functions
- Sustaining the skill and knowledge of dental responders with up-to-date and accessible information on new techniques, plans, and protocols

For more information on the Medical and Dental Enhancements Project, visit the Project’s dedicated site at http://chip.med.nyu.edu. The site hosts disaster medicine courses, interactive education modules, content for handheld devices, and links to sites specially geared to the dental profession. The site is continually updated and has over 700 registered users from across the country.
INVESTIGATORS

WALTER PSOTER, D.D.S, PH.D. — PRINCIPAL INVESTIGATOR

Dr. Glotzer is a clinical professor at New York University’s School of Dentistry in the department of cardiology and comprehensive care. Dr. Gotzer has been involved in two major areas of interest at the College. First, is working through the paradigm shift to treating caries from a surgical to a medical approach, and to the understanding that caries is a bacterial infection caused by specific bacteria, and is a reversible multifactorial process. Second, is to define a role for dentists in a public health surge response to a major disaster situation.

As a leading researcher and instructor in examining the role of dentists in catastrophes, Dr. Glotzer has been named to the Dean’s Committee for Catastrophe Response and has been involved in developing and implementing curriculum and certificate programs around disaster medicine for the Schools of Dentistry and Medicine. He has also assisted in the development of a university-wide emergency management plan and has sought additional training opportunities for faculty.

Dr. Glotzer is served at a colonel in the United States army and received the Legion of Merit. He is a graduate of New York University’s College of Density.

DAVID GLOTZER, D.D.S — CO-INVESTIGATOR

Dr. Psoter has extensive experience working and collaborating in the international and public health arenas with his research focused on caries and cancer. He has seventeen years of clinical and administrative experience in public health, community health and hospital programs working with underserved populations. Dr. Psoter’s international experiences include collaboration on the Bahamas National Oral Health survey and primary scientific field consultant and leading one of three field data collection teams for the WHO/PAHO Basic Oral Health Survey in Haiti. He has consulted in Costa Rica with INCIENSA, the government health research agency on caries and fluorosis. As a Visiting Professor at the University of Puerto Rico School of Dentistry, over the past six years, Dr. Psoter has served as a consultant on graduate student and faculty research projects including the National Oral Health Survey of 12-year old Puerto Ricans. He was the Associate Project Director of the University of Puerto Rico’s research infrastructure development funded by the National Institutes of Health (NIH), and is Principal Investigator of an NIH R-01 titled “Early childhood malnutrition and oral outcomes.

Dr. Psoter is a tenure-track Assistant Professor at New York University’s College of Dentistry in the Department of Epidemiology and Health Promotion; concomitantly he is appointed as an Associate Professor at University of Puerto Rico School of Dentistry. Active in research training, Dr. Psoter is faculty on the NYU Oral Epidemiology Comprehensive Training Grant, an NIH program to train oral epidemiologists at the doctoral level and clinical trialists at the Masters level. Dr. Psoter received his D.D.S. from New York University’s College of Dentistry and his Ph.D. in Epidemiology, specializing in Chronic Diseases, from Yale University.

DIANNE REKOW, MBA, D.D.S., PH.D. — CO-INVESTIGATOR

Dr. Rekow chairs the NYU College of Dentistry Task Force on Catastrophe Response, a multidisciplinary team focused on multifaceted aspects of involvement of health professionals in catastrophe preparedness and response. Successes of the team include (1) being the first dental school in the country to integrate components of catastrophe preparedness into all four years of dental school training; (2) collaborating with the US Army to train dental, nursing, and medical faculty and students in didactic and field exercises of disaster response; (3) establishing a shelter-in-place plan and putting resources in place to support 1000 people for up to 3 days; (4) becoming a resource for the CDC and dental professional organizations; and, of course, (5) participating in various catastrophe related research activities.
Dr. Rekow chairs the Department of Basic Science and Craniofacial Biology, is the Director of Translational Research, and is a professor of orthodontics at the NYU College of Dentistry. She earned her PhD in biomedical engineering, DDS, and orthodontic specialty certificate at the University of Minnesota and her MBA at the College of St. Thomas. She has led interdisciplinary teams in industry as well as academia. Most recently she is the principal investigator of a $10 million NIH-funded program project grant investigating damage evolution in brittle materials integrating efforts of investigators at 7 institutions.

**Marc Triola, M.D. — Co-Investigator**

Dr. Triola’s research experience and expertise includes computer-based medical education, the use of virtual patients, factors affecting the usability and impact of clinical information systems, and the assessment of change in knowledge and attitudes resulting from online patient education programs. He is the Chief of the Section of Medical Informatics at NYU’s School of Medicine, an academic research group focused on both educational and clinical Informatics. Dr. Triola is also Associate Director of the Advanced Educational Systems laboratory at NYUSM, one of the largest Educational Informatics laboratories in the country. In addition, Dr. Triola is a member of the Clinical Informatics service at the New York Harbor Health Care System of the Veterans Health Administration.

Dr. Triola is the Principal Investigator of an NIH/NLM funded IAIMS grant evaluating the use of technology in medical education of health care providers and patients and has participated in several multi-center trials evaluating both clinical and educational Informatics interventions. He is a national expert on Virtual Patients and serves on the national advisory board for creating standards for Virtual Patients and as a Project Chair of an AAMC subcommittee on distance learning in education.

Dr. Triola is a graduate of Johns Hopkins University and the NYU School of Medicine. He completed residency training in Internal Medicine at NYU School of Medicine and subsequently served as Chief Resident for the Internal Medicine Training Program. He completed a Research Fellowship in Medical Informatics at the NYU and Mount Sinai Schools of Medicine. Dr. Triola is Board Certified in Internal Medicine and is a practicing Hospitalist at the Manhattan Veterans Affairs Medical Center in New York City. He is an invited Lecturer on Medical Informatics at two NIH K-30 programs in New York City and the Courant Institute of Mathematics and Computer Science. His first textbook, “Biostatistics for the Biological and Health Sciences”, was recently published by Addison Wesley. Dr. Triola’s is the principal author of the software program Statdisk, one of the most popular statistical software packages used in undergraduate education.

**ADDITIONAL INVESTIGATORS**

**Benjamin Godder, D.M.D.**

**Miriam Robbins, D.D.S., M.S.**

**Joan Phelan, D.D.S., M.S.**

**Robert Boylan, Ph.D.**

**Jill Fernandez, R.D.H.**

**Sumathi Sivapalasingam, M.D.**

**Michael Alfano, D.D.S., Ph.D.**
ABOUT CCPR

The Medical and Dental Enhancements Project is one of twenty-two research projects supported by New York University's Center for Catastrophe Preparedness and Response (CCPR). CCPR was founded in 2002 as a university-wide, cross-disciplinary center to improve preparedness and response capabilities to catastrophic events including terrorism, natural disasters, and public health emergencies. Drawing on resources from New York University's fourteen schools and engaging over sixty faculty and staff, CCPR facilitates research projects that address issues ranging from first responder capacities during crisis, to public health response, to legal issues relating to security, to private sector crisis management and business continuity. CCPR is a national resource with added focus on the unique issues related to emergency preparedness and response in the urban environment.

More information about CCPR is available at www.nyu.edu/ccpr.

CCPR PROJECTS

(Principal Investigator / Co-Principal Investigator)

Center for Law and Security (Karen Greenberg, Ph.D.)
Medical and Dental Enhancements Project (Martin Blaser, M.D. / Walter Psoter, D.D.S., Ph.D.)
Public Safety Trauma Response (Linda Mills, Ph.D.)
(LaSER)*: Modeling and Simulation (Lewis Goldfrank, M.D. / Bud Mishra, Ph.D.)
(LaSER): Legal Issues (Lewis Nelson, M.D.. / Christian Lucky, J.D.)
(LaSER): Organization-Based Incident Management (Terry Fulmer, Ph.D. / George Foltin, M.D.)
(LaSER): Organizational Safety Net (Esther Chachkis, D.S.W.)
(LaSER): Risk Communications (Rae Zimmerman, Ph.D.)

Improving Robustness And Resiliency In Catastrophe Response Networks (Mitchell Moss, Ph.D.)
Public Infrastructure Support For Protective Emergency Services (Rae Zimmerman, Ph.D.)
International Center for Enterprise Preparedness (William Raisch, M.B.A.)
Responding to Epidemic Threats Using Modern Bioinformatics Tools (Bud Mishra, Ph.D.)
The Project On Organizational And Community Preparedness (Paul C. Light, Ph.D.)
The Politics of Facial Recognition Systems: Issues and Policy (Hellen Nissenbaum, Ph.D.)

POST-KATRINA RESEARCH

Astrodome Interview (David Dent, M.S.)
Conveying ‘Bad News’ Up Hierarchies (Frances Milliken, M.B.A., Ph.D.)
Documentary Film - Extended Stay (Judith Helfand)
American Diaspora (Mary Driscoll, Ph.D.)
Cultural Integration and Social Capital Development after Katrina (Robert Hawkins, Ph.D.)
Disaster Planning: Moving Image and Sound Collection (Howard Besser, Ph.D.)

* Large Scale Emergency Readiness Project
Enhancing Medical and Public Health Capacities During Times of Crisis

New York State Dental Journal, May 2003


ABSTRACT

Terrorist attacks and other catastrophic events will create demands that severely challenge the capacity of the medical/public health system. To meet the surge, a cadre of professionals should be trained to operate around the nucleus of medical/public health officials. At New York University, an inter-institutional team is considering specific roles for and an approach to training dentists to enable these health care professionals to supplement medical/public surge needs based upon informatics systems that provide critical information.

RESPONSE

Terrorist attacks and other catastrophic events are likely to create demands that far exceed the capacity of the medical and public health systems to respond. Not only are the numbers of casualties likely to be high, fear and the urgent need for information will complicate the ability to react. The precipitating events could be explosive, chemical, biological, radiological or nuclear in nature, and could occur as a single catastrophic episode or a diffuse, evolving epidemic. Each scenario presents situations that are unique and challenging.

The uniqueness of each of the different threat scenarios is already creating pressure on the health care and public health communities to understand and address the array of pre-attack warnings and post-attack signs and symptoms: Health care practitioners must also consider this range of potential events when educating the community about appropriate levels of concern and response to each threat. Additionally, clinicians must acquire specific knowledge and skills to treat physical and mental injuries associated with catastrophes.

In the event of an attack or other health crisis, all health care practitioners, including dentists, need to respond rationally and effectively, despite concerns for personal safety, limited or incomplete information, and pressures from multiple fronts—among these, a probable reduction in the number of available personnel as the result of injury or disease. Biological attacks are particularly insidious. Biowarfare agents can be widely disseminated and self-propagating, thereby expanding quickly from local to national and international involvement.

Biological attacks also have the potential to create extreme demands on the medical/public health systems, and to simultaneously disrupt the medical/public health infrastructure by indiscriminately infecting the caregivers and public health officials. Health care and public health surveillance—information capabilities could be overwhelmed during an epidemic. The public will need trusted community members to “interpret” information from local and national command structures and media.

In addition, communities will also require a mechanism to communicate back to operational control structures the public’s perceptions and intentions in order for these response authorities to focus information and resources efficiently.

DENTAL PROFESSION AND RESPONSE

Dentists and dental auxiliaries (trained hygienists and
assistants) offer a ready resource of expertise and skill to become part of such a trained reserve.¹

Reasons to believe that dentists could effectively augment the available manpower in catastrophe response areas follows:

- Dental education includes a comprehensive and rigorous curriculum in both basic science and medicine; therefore, with additional, specific, pre-attack training and access to timely authoritative information, dentists could easily and effectively be mobilized to integrate into a surge demand response team.

- Dentists represent a large pool of skilled health care and public health care providers that will materially enhance the effectiveness of catastrophe response in surge demand.

- Dentists are geographically distributed throughout the community, and many are already hospital-based or affiliated.

- Dentists are among the most respected professionals in a community, making them a ready resource in facilitating information transfer to and from the public.

- Dental offices, with infection control practices and sterilization in place, are better equipped than most physicians’ offices to handle infectious materials. Radiographic equipment and diagnostic skills may permit mass screening, aid diagnosis and provide emergency stabilization care following attacks with some agents.

INFORMATION SYSTEMS

In an effort to prepare for anticipated future catastrophic events, many institutions and agencies are producing materials and programs to educate health care providers about the diagnosis and treatment of previously unseen diseases and biologic agents. Although this strategy will certainly improve knowledge, there remains a concrete need for “just in time” information and expertise that is available locally at the time of a catastrophic event. Such information needs to be authoritative, comprehensive and up-to-date. Not only would this information improve the ability of health care workers to triage more efficiently and effectively, and to diagnose and respond to incidents involving biological, chemical or radiological contamination, it would also allow for greater protection and safety of personnel at all levels of a response. Using modern electronic means to provide information and education would reduce the burden placed on local health officials, emergency response agencies and local law enforcement.

The information needs to be widely distributed, updated regularly and be interpretable by people of varied backgrounds as well as onsite health professionals. The system must also be easy to implement in settings and locations of varying financial and technical capabilities. Such a system would greatly enhance the adaptation and utility of dental personnel in non-traditional roles during a catastrophic event, providing both an education/training mechanism, and a viable, available information platform to assist them in the successful fulfillment of any defined mobilization roles for dental personnel.

DEVELOPING METHODS AND ROLES

New York University College of Dentistry (NYUCD) and School of Medicine (NYUSM), both closely integrated components of New York University (NYU), a research university located in lower Manhattan, are in an important position to address this specialized need for information, education and training. Each institution has a diverse set of relevant resources, and both are ideally situated geographically to be leaders in local preparedness planning. Faculty and staff are considered national leaders in their fields, and the schools have substantial histories of basic science and clinical research into potential biological and chemical weapons of mass destruction, including currently funded studies.²⁻⁴

NYU Medical Center and its affiliates deliver a large proportion of the health care services to lower Manhattan, and many of the faculty at the schools have already established or are in the process of establishing close professional relationships with national, state and New York City health and emergency responders.

The NYUCD and NYUSOM have formed a working group that is examining roles for dental personnel to augment medical and public health manpower. This group is exploring methods and roles of “enhancing medical and public health capabilities during times of crisis;” that is, events that would overwhelm the current capacity of the U.S. medical and public health response resources.

The methods and roles being considered seek to apply informatics to enhance the abilities and knowledge of a diverse group of health care providers and, by doing so, to
expand the manpower pool of selected first responders, as well as the manpower associated with backup, expanded and support functions. The application of informatics systems will be an enabling mechanism for sustaining the enhancement for surge demands through involvement by dental professionals who have not traditionally been utilized in medical and public health responses.

Examples of roles dentists could play to enhance the medical/public health response that are being explored are:

Integration into the medical catastrophe response team:
• Emergency triage
• Medication/vaccination delivery
• Treatment of head and neck trauma under bio/chemical conditions

Integration into the public health catastrophe response team:
• Serving as a community resource for information (taking the “terror” out of events)
• Supplementing public health teams in case-finding/contact tracing

Implicit in these planning considerations are specific actions to achieve the following: 1. establish a consensus within the dental profession and across all levels of government regarding these expanded roles; and 2. create a “train the trainers” infrastructure for the expansion of these capabilities nationally, via rich media, Web-based teaching modules and a system to deliver the authoritative information.

DISCUSSION
Effective integration of dental professionals and, potentially, their auxiliaries into catastrophe response teams begins with careful planning and coordination with professionals in traditional medical and public health roles. It ends with a critical and in-depth review and critique of the effectiveness of the surge demand response team. The dental profession, in coordination with medical and public health specialists, must prepare a blueprint for developing, demonstrating, and evaluating appropriate roles for dental professionals and their auxiliaries to complement and enhance medical and public health response to surge demands. The tasks and roles must be within the scope of practice and professional skills of dentists, generally require little additional training, and yet may be critical in successfully meeting the health care needs following a catastrophic event.

REFERENCES
12. EIS Training: http://www.cdc.gov/epo/dih/training.html
13. White ME, McDonnell SM, Werker DH, Cardenas


Bioterrorism and Catastrophe Response: A Quick-reference Guide to Resources


Health care workers are a critical first line of defense against and in response to catastrophic events, especially terrorist attacks. Attacks could be explosive, chemical, biological, radiological or nuclear and could occur as a single catastrophic event or a diffuse, evolving epidemic. Each possibility presents challenging and different situations, creating pressure on the health care and public health communities to understand an array of preattack warning signs and postattack signs and symptoms, prepare for diverse types of potential attacks, educate the community about appropriate levels of concern and responses to each threat and acquire knowledge and skills to treat physical and mental injuries. Additionally, in the event of an attack, health care workers should know how to respond rationally and effectively despite concerns for personal safety, need for additional information and pressures from multiple fronts.

Vast amounts of information about potential biological agents, signs and symptoms, modes of treatment and appropriate responses to an attack have been amassed and made available on the World Wide Web and in journals. Distilling all of it into information that is usable in the dental environment and that can be accessed easily during an emergency or when treating a patient with suspicious symptoms is a challenge. The Web can be a maze with seemingly infinite numbers of tangential links with varying detail, emphasis and scientific basis. Many Web sites are directed toward the general public and fail to provide the depth of information useful to dental practitioners. Other sites are directed toward hospitals and laboratories with diagnostic capabilities that exceed those available to a typical dentist. Journal articles vary in quality and may become outdated.

In this article, we provide an easy-to-use guide for dental practitioners to use to assess quality information about bioterrorism and catastrophe response quickly. We limited the Web sites we cited to those sponsored by a federal institution or those of an academic or professional nature; we omitted commercially oriented Web sites. We identified journal citations by conducting a traditional literature review, and then we screened our results so that citations in the guide include articles published in English within the last six years in journals generally available at libraries in higher education institutions. Whenever possible, we included The Journal of the American Medical Association consensus statement articles. These articles, developed by the AMA’s Working Group on Civilian Biodefense, provide consensus-based recommendations for measures to be taken by medical and public health professionals if the agent being discussed is used as a biological weapon against a civilian population.

BACKGROUND

While any attack is frightening, attacks with biological agents are among the most insidious and breed the greatest fear. Attacks could go undetected for a long time, potentially exposing a vast number of people who are unaware of the threat. Because the initial response to many biological agents is nonspecific, flulike symptoms, diagnosis time often is delayed beyond the limit during which prophylactic measures, therapeutic measures or both are effective.

The Centers for Disease Control and Prevention, or CDC, ranks the biological agents and diseases that have the potential to be used as weapons into three categories. Category A, high priority agents and diseases, are the most likely to be used as weapons, posing a substantial risk to national security. Their classification reflects the ease of dissemination of the agent or transmission of the resulting disease, probable high mortality rates, the potential for major public health impact, the likelihood of causing public panic and social disruption, and challenges for public health preparedness. Category A agents and diseases include anthrax (Bacillus anthracis), botulism (Clostridium botulinum toxin), plague (Yersinia pestis), smallpox (variola major), tularemia (Francisella tularensis) and viral hemorrhagic fevers (Ebola, Lassa, Machupo and Marburg). Category B biological agents and diseases are considered to be less easy to disseminate, have lower morbidity and mortality rates, and are less likely to challenge the public health system. Agents and diseases in...
this category include brucellosis (Brucella species), food safety threats (for example, Salmonella species), glanders (Burkholderia mallei), psittacosis (Chlamydia psittaci), Q fever (Coxiella burnetii), typhus fever (Rickettsia prowazekii) and water threats (for example, Vibrio cholerae).

Emerging pathogens are defined as Category C agents. They could be bioengineered for mass dissemination in the future because of their availability, ease of production and dissemination, and potential for high morbidity and mortality rates. Currently, Nipah virus and hantaviruses are Category C agents or diseases. A wealth of information about bioterrorism and the use of biological agents as weapons throughout history can be found from Web sites sponsored by the U.S. Army, the CDC, the Infectious Diseases Society of America, the Infectious Disease Association of California and the Mayo Clinic. Journal articles of particular use include those by Miller, Lutwick and colleagues, Leggiadro, Kortepeter and Parker, Varkey and colleagues, Davis and Morens.

ORGANIZATION OF THE GUIDE

Because biological attacks are more difficult to detect and have a greater potential to affect large segments of the population negatively than do chemical, radiological or explosive events, we decided to limit the focus of this article to biological agents only. We further narrowed the focus of this article to Category A diseases and agents, as they are the most likely threats.

The table lists Web sites and journal articles that can serve as resources for dentists about specific agents or diseases. We suggest that health care workers be familiar with these resources and periodically revisit them, since familiarity with them, their content and their organization is essential for rapid review and use.

In addition, information on the Web sites often is updated and a periodic review will allow health care workers to maintain an accurate listing of any changes.

We have provided three categories of resources for each agent. This organization reflects the diversity of roles that dentists and other health care professionals play in response to bioterrorist attacks and catastrophe response. Sources include summary fact sheets suitable for dentists to use for patient or community education (Column 2), background articles that give an overview of the disease and the history of the agent’s use as a weapon (Column 2), describe signs and symptoms (often accompanied by illustrations) (Column 3) and delineate current prophylactic and treatment approaches (Column 4).

We selected the table format for two reasons. First, responsible health care workers must acquire a minimum knowledge base to act responsibly in this post–Sept. 11, 2001, environment. Because Category A diseases are rare, most health care workers are unlikely to see the clinical signs and symptoms on a routine basis, and information that is not used routinely often is forgotten. Second, presenting resources in this format creates a guide that can be used easily under stressful conditions should an attack occur or be suspected.

Dentists can serve as effective communicators to their patients and the public. For example, the anthrax events in the fall of 2001 resulted in thousands of false alarms raised by people who were fearful of exposure and demanded that samples be tested. That demand exceeded the capacity of diagnostic laboratories, though anthrax was diagnosed in only 22 people. By providing accurate and responsible information, the “white noise” of background misinformation and the ensuing public panic probably could have been minimized.

Dentists can provide a valuable service to their patients and communities by providing quality information about the potential for attacks, what to watch for and how to respond appropriately should an attack occur. The Web sites and journal articles we list in Column 2 (Fact Sheets/Background) of the table provide information that could be distributed to patients or public as a community service. However, none of these materials can be printed or reproduced without prior written permission of the copyright holder.

Another important role for dentists and other health care providers is to recognize the signs and symptoms of a biological attack early. This often is difficult, yet it is critically important. Initial signs and symptoms usually are nonspecific, flu-like general discomfort. Biowarfare agents can be disseminated massively, are selfpropagating (and thereby quickly expand from local to national to international involvement), create extreme demands on the medical and public health system and simultaneously disrupt the medical and public health infrastructure by indiscriminately infecting caregivers and public health officials.

Early recognition of atypical illness patterns and di-
agnostic clues could save millions of lives. Dark Winter, a simulation of a smallpox attack in the United States, pointed out the urgency of early response. In this fictional scenario, 24 patients report to a hospital in Oklahoma on Sept. 12 with smallpox-like symptoms. The vaccine, when available, is effective only before symptoms manifest, so it was anticipated that mortality would have been approximately 33 percent of the cases in which smallpox was diagnosed. Three thousand cases likely would have developed by Dec. 17. By Feb. 6, the number of cases could have risen to 3 million (with approximately 1 million deaths).

Meltzer and colleagues modeled the spread of smallpox infection both with and without interventions such as vaccinations and quarantine. Without intervention, only 10 people who were infected initially would each infect three others, resulting in 64 people being infected within the first month, 4,500 by three months, 2.2 million by nine months, and 774 billion by the end of one year. O’Ttoole and Inglesby modeled the spread of the plague, suggesting that four days after the first case is identified, 3,000 people could be dead and 15,000 could be ill with plague-like symptoms. Clearly, even a few days saved by recognizing signs and symptoms could save a substantial number of lives. Column 3 (Signs and Symptoms) of the table provides resources that describe signs and symptoms, discuss differential diagnoses, and, for some agents, include photographs of typical disease expression. Understanding prophylactic and vaccine status and treatment approaches also is of paramount importance to preparing for and responding to a bioterrorist attack intelligently. Column 4 (Prophylactic Measures and Treatment) of the table sum-

### TABLE

**A QUICK-REFERENCE GUIDE TO BIOTERRORISM AND CATASTROPHE RESPONSE RESOURCES.**

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The Center for Catastrophe Preparedness & Response

REPORTING STRANGE EVENTS OR OBSERVATIONS

Our surprise at and response to the Sept. 11, 2001, attacks and the subsequent, intentional distribution of anthrax spores emphasized the need for information about appropriate responses to terrorist attacks. Noticeable in-

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| A QUICK-REFERENCE GUIDE TO BIOTERRORISM AND CATASTROPHE RESPONSE RESOURCES. (CONTINUED) |
|---|---|---|---|
| **AGENT** | **FACT SHEETS/BACKGROUND** | **SIGNS AND SYMPTOMS** | **PROPHYLACTIC MEASURES AND TREATMENT** |
| Journal articles | Henderson and colleagues,10 Breman and Henderson,16 Boyleton,27 Drazen8 | Henderson and colleagues,10 Breman and Henderson,16 Henderson,29 and Meltzer and colleagues,20 Whitty and colleagues14 | Henderson and colleagues,10 Breman and Henderson,16 Burda and Sigg,20 Russell22 |
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* Abbreviations found in the Web site addresses are scponline: American College of Physicians and American Society of Internal Medicine; ama: American Medical Association; usamriid: United States Army Medical Research Institute of Infectious Diseases; whonc: World Health Organization.

1 All of the Web site addresses in this table were correct at press time. If they have changed, you can perform a keyword search in the search engine of your choice to find similar or updated information.

2 A Journal of the American Medical Association consensus statement article. These articles, developed by the AMA’s Working Group on Civilian Preparedness, provide consensus-based recommendations for measures to be taken by medical and public health professionals if the agent being discussed is used as a biological weapon against a civilian population.
creases in unusual illnesses, symptom complexes or disease patterns (even without definitive diagnosis) should be reported to public health authorities (go to “www.statepublichealth.org” to search for local and state public health departments’ contact information).

If local health officials suspect that illness is caused by a bioterrorist incident, they inform and involve the state health department that, in turn, notifies the CDC following a flow chart with explanations for responsibilities at each step.60 The CDC then conducts an investigation to confirm whether a bioterrorist attack has occurred. If so, it notifies the FBI, which proceeds with its own investigation.

When local health officials become aware that a bioterrorist event has occurred or that a threat has been made, they first notify the FBI and local law enforcement officers. Then they notify and involve the state health department and other response partners according to a pre-established notification list, which, ultimately, includes the CDC. Discussion of behind-the-scenes responses and epidemiologic investigations can be found in Butler and colleagues61 and Bales and colleagues.62 The CDC60,63 emphasizes the urgency of rapid recognition of clinical signs and symptoms and the appropriate use of masks and isolation, especially with patients with infectious diseases.

The United States Postal Service has been used to deliver biological agents as weapons. Information about general precautions and proper response protocol for handling letters or packages suspected to include biological agents is available at “www.nysegov.com/news/anthraxinfo.htm” and “www.usps.com/news/2001/pres/_pr01_1010tips.htm” or by calling your local post office. Letters or packages that are suspected to be biological agents should be handled as little as possible and be isolated. Local law enforcement authorities should be called immediately. As soon as is practical, everyone known to have touched the letters or packages should take a shower using soap and water. A list of these people and their contact information should be prepared for the authorities for subsequent investigations and so that intelligent treatment decisions can be made if needed. For questions that cannot be answered otherwise, the CDC has a 24-hour emergency response hotline at 1-770-488-7100.

CONCLUSIONS

The threat of terrorist attacks has redefined the role that dentists can play in response to a catastrophe. Armed with information about biological agents that could be used as weapons, dentists can provide accurate information to their patients and communities, recognize signs and symptoms of responses to biological agents—which can facilitate diagnosis and help contain further spread of the diseases and agents—and direct patients to seek appropriate prophylactic measures or treatment.

The reference guide we created focuses on the agents most likely to be used in biological attacks. It is intended to facilitate ready access to relevant resources. Web-based resources likely will remain the timeliest because they are updated continually to incorporate the newest advances. Journal articles can be used to create a private library of resources that could be used should the Web become unavailable in an attack.

The guide also provides a platform for dentists to use to prepare contingency plans for their own responses to an attack and to consider when defining their broader role in future health care delivery, including being involved in emergency teams; providing triage and shock management; acquiring further education in this field; or converting their practices into minihospitals to meet surges in demand for medical care.

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The effort to create this article reflects the enthusiasm and support of the New York University College of Dentistry Task Force on Catastrophe Preparedness, which includes faculty from every discipline. The authors appreciate and applaud their help, interest and passion for this critically important endeavor.

REFERENCES

The Center for Catastrophe Preparedness & Response


Preparing for a Terrorist Event: A Scenario-Driven Approach

NEW YORK STATE DENTAL JOURNAL, June/July 2004


ABSTRACT

Since September 11, 2001, government agencies on all levels have focused on planning and preparing to respond to another possible terrorist attack. In addition to emergency and medical issues, these agencies must be concerned about the public’s behavior and psychological response when they plan the management of a bioterrorist event. We present readers with one such possible incident, a radiological bomb scenario, with the aim of educating dentists and communicating the risks involved.

The May 2003 edition of The NYSDJ addressed the issue of bioterrorism preparedness and its potential relevance to the dental profession and to individual dentists. In an editorial in that Journal, New York University College of Dentistry Dean Michael Alfano discussed the many reasons why dentists can and will participate in reacting to any health disaster in their community. He also profiled some of the activities that NYUCD has put into place to help graduates, faculty, students and staff be better prepared, and to contribute “when” the next 9/11 occurs.¹

These NYUCD activities include a continuing education course on “The Dentists Role in Bioterrorism”; integrating bioterrorism competencies into the current dental school curriculum; interacting with other dental schools, the American Dental Association and the American Dental Education Association on this matter; and preparing and training to protect the many individuals who are in our building at any given moment.

Addressing the need to respond positively to a terrorist attack has two possible benefits. First, as in any emergency, being ready to respond will help individuals protect their health and safety. Secondly, being prepared and informed will give individuals a sense of empowerment and confidence, so that they are not totally panicked by an event—which is one of the major aims of terrorism. The leadership, whether in a private dental office or a large institution, must plan and direct that organization’s terrorism response.

To prepare the leadership and the key administrators at the NYUCD for a possible chemical, biological, radiological, nuclear or explosive (CBRNE) disaster, a series of “tabletop” exercises were held. Each exercise has a plausible scenario that forces the assembled group to think about alternative best practices in reacting to protect individuals, that is, is it a chemical, biological or radiological release? Do we evacuate or shelter in place? Only by defining those actions necessary in a particular situation can we plan to respond and prepare for them, for example, to store water, food, blankets, etc., if the decision is to shelter in place.

What can emerge from these exercises and the various scenarios is a belief that no situation is totally hopeless and that we should not be solely reliant on outside experts. Every event begins as a local event and can be managed, at least to some extent, by individuals acting prudently.

We present one such scenario to “sensitize” the dental profession to a possible event. The intention is neither to frighten nor to panic people, but, rather, to give them a sense of the magnitude of an attack, how it may affect the infrastructure and critical services of society, and to provide a framework for dental professionals to begin a proactive analysis of a possible response.

RADIOLOGICAL WEAPONS

When the Department of Homeland Security raised the national threat level to orange at the end of last year, one of the threats officials were deeply concerned about was a dirty bomb.

A dirty bomb is a radiological weapon that consists of a conventional explosive, such as dynamite, that has been packaged with radioactive material. It kills or injures by the initial blast (a relatively limited event), and then creates terror by the dissemination of airborne radiation, creating a contaminated area and a radiological “plume.” It is the perceived radiological threat and misperception that this is a nuclear weapon that creates terror. The contaminated area, however, would have to go through months of cleanup, and that, together with people seeking treatment because they think they have been ad-
versely affected, could severely affect a local economy.\(^2\) A dirty bomb is not a nuclear weapon; and it is relatively easy to construct. A radiological bomb can be assembled with readily obtained explosives and radioactive material, such as strontium 90 or cesium 137, which is used medically and can be stolen from commercial sites. (The Energy Department’s Los Alamos Laboratory and the GAO found 1,300 cases of lost, stolen or abandoned radioactive material.) The real possibility of this type of attack is evidenced by the federal government’s activities. At the end of last year, with huge New Year’s Eve celebrations and college football games scheduled, the Department of Energy dispatched nuclear scientists to five major U. S. cities (New York City, Washington, Baltimore, Las Vegas, Los Angeles).\(^3\)

The potential risk for adverse health consequences associated with radiation depends upon its source. The three principle types of radiation and selected attributes are presented in Table 1.\(^3\)

With any terrorist occurrence, personal awareness of the situation is critical to informed action taking and response. Information that should be sought might include:

1. What is the nature of the incident, that is, is it chemical, biological, radiological, nuclear or a combination of any of these agents?
2. What is its scope, that is, is it confined to one site, multiple sites, an entire city or a geographical region?
3. What is the time element; how long ago did it occur?
4. Are there mass casualties involved?
5. Are the local emergency resources overwhelmed?
6. How severely is the transportation network affected?
7. Where is authoritative information accessed?

Fear and panic can be expected. While, clear, consistent and useful information should be expected from the emergency response agencies, individuals may have to immediately decide whether to:\(^5,6\)

1. Seek medical attention if injured or exposed to an agent (biological, radiological or chemical).
2. Decontaminate themselves.
3. Shelter in place.
4. Evacuate an area.

### SCENARIO

This is the scenario used at an NYUCD exercise. It will give the reader a sense of the timeline and possible sequence of events and responses to a radiological event. Suppose the following were to happen:

8:10 a.m., Nov. 12, 2003: A huge explosion of a school bus parked at Broadway and Wall Street, near Trinity Church in New York City. There are 5,000 people in the immediate vicinity of the blast. The bus contained the equivalent of 4,000 lbs. of TNT and 1.5 lbs. cesium 137. Initially there are 250 people dead or wounded in the area. The smoke spreads downwind at 10 m.p.h.

8:30 a.m.: A radiation detector on a fire truck at the scene alerts first responders that the explosion may involve radioactive material. Hazmat teams are alerted. A perimeter is established around the explosion site. Only emergency personnel are allowed in the cordoned zone.

8:45 a.m.: News of a dirty bomb blast is released by the media. Many people try to self-evacuate from the city. All major roadways are jammed. There are false reports of additional explosions. Widespread fear and panic set in. Bridges and tunnels into Manhattan are closed to all but emergency vehicles.

### TABLE 1

<table>
<thead>
<tr>
<th>Radiation Type</th>
<th>Range</th>
<th>Skin Penetration</th>
<th>Shielding</th>
<th>Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha (α)</td>
<td>Short</td>
<td>No</td>
<td>Easiest</td>
<td>External, Internal*</td>
</tr>
<tr>
<td>Beta (β)</td>
<td>Medium</td>
<td>Yes</td>
<td>Somewhat</td>
<td>External, External</td>
</tr>
<tr>
<td>Gamma (γ)</td>
<td>Long</td>
<td>Yes</td>
<td>Difficult**</td>
<td>External, External</td>
</tr>
</tbody>
</table>

* Internal Hazard if Inhaled
** Need Concrete or Lead to Shield
8:50 a.m.: Hazmat team with more elaborate equipment confirms the presence of radioactivity.

9:15 a.m.: The mayor’s office releases the following statement: “A release of radioactive material has been detected at the blast site. Response teams are working to identify the source, and determine the cloud’s direction and characteristics. The federal government has expert assistance on the way from the Department of Homeland Security. The highest levels of contamination are expected within the restricted area. However, some radioactive material may carry downwind.

“As a precaution, people within five miles of the blast are advised to take shelter at once (shelter in place). Close doors and windows, and shut off all fans, air conditioners and other ventilation systems.

“It is important that movement in and out of the area below 14th Street be strictly controlled. Only emergency services are being allowed into the cordoned area. The public should stay away to reduce any possibility of further radiation exposure and to facilitate response efforts.

“Remain in place, tuned to radio or television for announcements until further advised.”

**DISCUSSION**

What are some of the planning issues to address? Suppose you are in your office in Midtown Manhattan. Do you keep patients and staff there? How do you reassure them? Can you keep parents from leaving even if it is not safe to get their children?

The most important first step in coping with an emergency is discussing the various possibilities with your staff and creating a response plan. The two principle issues to consider in a disaster response plan are: 1. What will you need to do if you must leave your office? 2. What will you need to do if it is safer to remain inside and shelter in place?

Multiple systems and social stress will be in—play. CBRNE weapons are especially effective at causing terror. We know that communities may respond well, based on information from leaders they trust. On the other hand, fear and terror can overtake the public’s psyche. The effects of radiation are not immediate, but delayed and often protracted. It is doubtful that individuals will receive more than the 10 rem above the normal background radiation—a low increase in cancer risk—from a relatively crude dirty bomb. It is hoped that the government and medical leadership will provide effective risk communication and risk management to bolster the public’s confidence.

Police, fire and EMS personnel will have to deal with mass confusion, relocation, false reports and with setting up of exclusion zones, while concerned about the safety of their own people. Medical services will have to decide how to decontaminate victims, treat the blast injuries that are contaminated, and the walking—well coming in and demanding to be tested and treated.

There will be short—term psychosomatic symptoms and longterm anxiety about developing cancer. Public Health officials will have to inform members of the public how to best protect themselves, decide on areas that have to be evacuated and monitor the environment. They must inform the public how much exposure is harmful, what the real risk is and what actions to take. Transportation officials will also deal with crowd and traffic control issues, as well as alarm and panic on the roadways.

In a dirty bomb scenario as described, if you are not injured by the initial blast, and, therefore, do not require immediate medical care, your first priority is to avoid inhaling dust that could be radioactive. That is why where you are in relation to a release is paramount and dictates your response as follows.
1. If in close proximity, covering your nose and mouth with a cloth is vital.

2. If you are in an undamaged building in the immediate blast or plume zone, stay there, and seek an interior space.

3. You can decontaminate yourself significantly (90%) by removing your outer clothing, and showering.

4. If you are unsure if you are at risk for exposure, that is, you are positioned further up wind, move indoors or stay indoors, finding an interior space and shutting down the airflow if necessary.

5. Exit and relocate out of the contaminated zone if instructed to do so by emergency officials.

Municipalities’ emergency response and the health care systems’ ability to mobilize all its resources—including facilities, equipment and personnel—during a required surge capacity are yet to be tested, other than by a very few field exercises.

In fact, the largest terrorism response drill ever held in the U.S., TOPOFF 2, was held in Seattle in May 2003 and used a simulated dirty bomb detonation as described above as its focus. It was three years in the planning and was designed to test the capacity of all three levels of government and the American Red Cross.

Another critical factor is the communications network. Will it function adequately and enable public health authorities to collect, analyze and disseminate crucial information to both the medical system and the public at large? Informed individuals may have to direct others in taking appropriate actions in response to a terrorist attack.

Dental professionals may provide such leadership in their immediate area, in the office, the building or block. This leadership requires at least a minimal understanding of potential terrorist weapons and their impact. All dentists should have enough knowledge to help themselves, their staff, their family and others survive a terrorist attack.

The federal government created much anxiety over the holidays by raising the threat level to orange, but federal officials felt it was the responsible course of action when the situation is one of “high risk.” From the scenario approach presented here, the principle goal is to decide what individuals can do to prepare for and respond to a terrorist catastrophe, and adapt to a particular strategy needed in a particular situation. The objective is to prevent or minimize injury regardless of the scale of an attack or the timeline involved.

Someone said, “Knowledge is the antidote to fear.” Dental professionals can remove much of the fear that terrorists hope to generate by learning as much as possible about each type of terrorism scenario.

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Preprofessional Dental School Curriculum for Catastrophe Preparedness

**ABSTRACT**

Preparing for catastrophic events, both human-made and natural, is in the national interest and has become a priority since catastrophic events in Oklahoma City, Washington, DC, and New York City. Dentists are a large source of non-physician health manpower that could contribute to the public welfare during catastrophic events that require additional public health human resources. Dentists, by virtue of their education, understand biomedical concepts and have patient care skills that can be directly applied during a catastrophic event. Dentists also can provide training for other types of health care workers and can supervise these individuals. In this article, we propose that dentistry can make a significant contribution as part of a national response before, during, and after a catastrophic event or at the time of a public health emergency. We describe the potential collaboration among a dental school, city and state health departments, law enforcement, the military, and others to develop a curriculum in catastrophe preparedness. Then we describe one dental school’s effort to build a catastrophe preparedness curriculum for our students. The competencies, goals and objectives, and sources of content for this catastrophe preparedness curriculum are described as well as suggestions for sequencing instruction.

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This article describes the development of a curriculum to prepare dental students to respond to a catastrophic event. This curriculum is based on the collaborative activities of one dental school with partners in organized dentistry, medicine, law enforcement, the military, and the federal government. The competencies, goals and objectives, and sources of content for this catastrophe preparedness curriculum are described as well as suggestions for sequencing instruction.

Dental graduates who possess the competencies described here are empowered to play an appropriate role in their communities as early responders to a catastrophic occurrence, whether it is natural or human-made. These competencies are based on the principle that the knowledge and skill learned during the dentist’s education can be directly applied in the dentist’s traditional role as a member of the community health care system.

As a reference point for this discussion, terrorism is defined as the illegal use or threatened use of force or violence; an intent to coerce societies or governments by inducing fear in their populations; typically with ideological and political motives and justifications; and an “extra-social” element, either “outside” society in the case of domestic terrorism or “foreign” in the case of international terrorism. The impact of such an event or threat is to cause “widespread confusion, fear, and psychological stress that have lasting effects on the health of affected communities and on a nation’s sense of well-being.” Thus, the
The Center for Catastrophe Preparedness & Response

curriculum discussed in this article is designed to prepare dentists to perform three critical tasks: 1) contribute to the prevention of events, 2) recognize conditions that indicate there has been an event, and 3) collaborate with others to respond to the needs of the public.

Recent terrorist events in Oklahoma City, Washington, DC, and New York City have captured world attention and stimulated the health care community to enact programs designed to preserve the well-being of the public. The vigorous responses of the public health system to an outbreak of anthrax in Florida and the actions after letters laced with anthrax spores were received by U.S. Congressional offices in October 2001 are significant landmarks in refining the nation's preparedness for bioterrorism and public health emergencies. In addition to bioterrorism, the outbreak of sudden acute respiratory syndrome (SARS) illustrated the impact of emerging diseases on the health of the public. The SARS outbreak demonstrated the need to respond to natural as well as human-made catastrophic events. The anthrax and SARS episodes demonstrate the need for the entire health care community to understand the processes employed in the identification of new infections, contact tracking, and other elements of surveillance related to the identification of the etiologic agents, manner of spread, and treatment. This is an opportune time to reinforce the characteristics of a sensitive surveillance program and to demonstrate how non-physician health care providers, like dentists, can enhance our capacity to respond effectively in the event of a public health emergency.

RATIONALE FOR DENTISTS' ROLE IN RESPONDING TO CATASTROPHIC EVENTS

A common element learned from past catastrophic events is the surge in demand for individuals trained to assist in the response. The potential vulnerability of the public to attacks with biological weapons—where thousands or even millions may require medical intervention—led to an analysis of the impact of such an event on the health care community. The United States has a need for an effective network of trained people who are prepared to act in the event of a terrorist attack using chemical, biological, radiological, nuclear, or explosive devices (hereafter referred to as CBRNE), a public health emergency caused by the outbreak of a virulent new disease, or a natural catastrophe, such as a hurricane or flood, involving large numbers of people. One approach is to develop non-physician health care providers such as dentists, nurses, and pharmacists as potential frontline or near-frontline personnel to assist in the event of a public health emergency. The “National Public Health Strategy for Terrorism Preparedness and Response 2003–2008” identifies the major components needed to preserve the public health and safety. In its recommendation for the training of a competent sustainable workforce, this report proposes the training of three million professionals in addition to the nation's current workforce of 500,000 physicians, nurses, and public health professionals. In an analysis of the 2001 anthrax scare in the northeast United States, the Rand organization observed that physicians, hospitals, and health departments were besieged by inquiries about what to do, and they were poorly prepared, did not answer, and at times provided conflicting answers. Thus, it is likely that the surge in demand for assistance in future crises will exceed the capacity of the health care system unless additional care providers are trained.

Dentists are well prepared to play an important role in the response to catastrophic events. Dentists are: a) experts in barrier techniques and infection control; b) trained and skilled in administering drugs by injection; c) skilled in placing sutures and controlling bleeding; d) able to participate in interdisciplinary professional groups; and e) adept at managing uncomfortable patients.

There are 195,000 dentists in the United States mainly practicing general dentistry. Dentists are widely distributed and provide patient care in private practices located in their communities throughout the country. Dentists are respected members of their community and can be available to provide information to alleviate fear. Data from the Centers for Disease Control and Prevention (CDC), Behavioral Risk Factor Surveillance System, in 1999 showed that nearly 70 percent of Americans had at least one dental visit. In addition, all practicing dentists are licensed and have graduated from an accredited dental school. Annually, the fifty-six U.S. dental schools graduate about 4,000 new dentists. As they receive additional training, dentists can add to the response capability in the event of a catastrophic event or public health emergency.

This article describes how one dental school has built a catastrophe preparedness curriculum. Based on the design of the curriculum that was already in place, it was decided that the most efficient approach would be to organize relevant information and supplement the curriculum in the form of units of instruction (case studies, exercises, and modules) that could be integrated into the instruction without significantly expanding curriculum time or ob-
RESOURCES FOR A CATASTROPHE PREPAREDNESS CURRICULUM

Our faculty recognized that by modifying existing course content, we could provide specific catastrophe preparedness content that met existing course requirements and at the same time provided information related to achieving the objectives for catastrophe preparedness. To accomplish this task, the faculty made heavy use of a wide array of resources that are already available in the public domain.14-17

We started by creating an interdisciplinary task force to construct the overall catastrophe preparedness program. This was highly effective to achieve integration, to identify opportunities for collaboration, and to transfer knowledge between faculty members with various responsibilities for courses. This team consisted of faculty members who expressed an interest in the project and had expertise in relevant areas. They included five faculty with expertise in the following areas: microbiology, oral medicine, oral pathology, dental practice (a retired military person), health promotion, and curriculum development, plus two faculty who were investigators in grants that are focused on preparing health care providers to assume roles in the event of a catastrophe. As the process unfolded, there was dialogue about the appropriate scope and depth of knowledge and skills for the general dentist. Assistance in providing answers for these questions came from a variety of sources such as the school of medicine, the local office of emergency management, the county board of health, and law enforcement and emergency medical personnel (local fire department). As these questions were posed to external sources, closer collaborations followed and networks were formed where the manpower provided by dentists, dental students, and allied dental health care providers was utilized. Students who have volunteered to pursue advanced training opportunities have provided valuable feedback about the curriculum as it is being tested and implemented.

Developing Competencies, Goals, and Objectives

The first step in developing the curriculum was to identify the catastrophe preparedness competencies that we wanted our students to achieve. There are several models that can be used to develop designing competencies for catastrophe preparedness. For example, the CDC has developed the document “Bioterrorism and Emergency Readiness: Competencies for All Public Health Workers.” In addition, the Federal Emergency Management Agency (FEMA) and offices of emergency management in each state can serve as resources for determining competencies. Recently, the Association of American Medical Colleges released an association report titled “Training Future Physicians About Weapons of Mass Destruction: Report of the Expert Panel on Bioterrorism Education for Medical Students.” 22 The American Dental Association (ADA) and American Dental Education Association (ADEA) jointly hosted a workshop addressing terrorism and mass casualty curriculum development in November 2003, which concluded that graduating dentists should be able to 1) detect, contain, refer, and report terrorism and mass casualty events and 2) know where to find resources related to terrorism and mass casualty events. 23

All of these resources share common themes: 1) all health professionals have a potential role in a response; 2) education at the predoctoral level can prepare non-physician health care workers for effective roles; 3) for any responder, there must be specific knowledge about the plan for a national response; 4) all health care workers must have references that are readily accessible for use in the case of an emergency; 5) education must include practice to develop problem-solving skills that can be applied; and 6)
education must emphasize a conceptual framework rather than exhaustive information about specific facts about potential agents.

CATASTROPHE PREPAREDNESS COMPETENCIES

Based on these resources, we wrote the following competencies for dental graduates:

- Competency 1: Describe the potential role of dentists in the first/early response in a range of catastrophic events.
- Competency 2: Describe the chain of command in the national, state, and/or local response to a catastrophic event.
- Competency 3: Demonstrate the likely role of a dentist in an emergency response and participate in a simulation/drill.
- Competency 4: Demonstrate the possible role of a dentist in all communications at the level of a response team, the media, the general public, and patient and family.
- Competency 5: Identify personal limits as a potential responder and sources that are available for referral.
- Competency 6: Apply problem-solving and flexible thinking to unusual challenges within the dentist’s functional ability and evaluate the effectiveness of the actions that are taken.
- Competency 7: Recognize deviations from the norm, such as unusual cancellation patterns, symptoms of seasonal illnesses that occur out the normal season, and employee absences, that may indicate an emergency and describe appropriate action.

Appendix 1 is a list of goals and objectives that will achieve these competencies. They are measurable objectives that will validate the competencies have been achieved.

APPROACHES TO THE DEVELOPMENT OF COURSE CONTENT

Foremost in developing course content is the need to build consciousness within the dentist that he or she has a professional and ethical obligation to participate in the response to a catastrophic event and to help the dentist understand how to respond. When responding, all health care workers need to be aware of how they fit into the overall coordinated response after a catastrophic event and know where to access the response team. The United States has built a response infrastructure through the Department of Homeland Security (DoHS) and the Federal Emergency Management Agency (FEMA).

Based on our experiences at NYU, we recommend six strategies to achieve curriculum objectives:

1. Integrate cognitive information that is already part of the predoctoral curriculum. This information plays a critical role in providing the foundation knowledge for understanding CBRNE agents. For example, instruction in microbiology already addresses agents like anthrax, smallpox, tularemia, plague, and other biological agents that have been weaponized. Radiology can be a focus area for radiological physics in terms of radiological weapons.

2. Increase curriculum emphasis on public health, epidemiology, and health promotion. These synergistic areas provide foundational knowledge in such areas as disease patterns and surveillance, increased sensitivity to the needs of the community, and provide an opportunity to apply a national response framework to a local challenge. These topic areas also provide an ideal setting for gaming and case studies that will demonstrate appropriate responses to a catastrophe.

3. Use exercises to facilitate application of knowledge of circumstances characteristic of manmade and natural catastrophic events and public health emergencies. There are case studies of previous events and epidemics that can serve as vehicles for students to learn about the circumstances prior to an event, the details of an event, the response mechanism, the needs of victims that must be met, and the long-term consequences of an event.

4. Use case studies, drills, and dramatizations using multimedia (such as videotaped scenarios) to simulate potential catastrophic events and to effectively study the circumstances surrounding past events. This is a critical part of the students’ education because it provides practice in solving problems likely to occur in a catastrophe. Dentists can be early responders during a catastrophic event, or they may assume a leadership position during the organization and implementation of a response. Thus, it is essential to understand the organization of a community response, its levels, and at what level dentists are most likely to participate.

5. Organize catastrophe drills in a manner that provides
evaluation and direct feedback. While this is a fundamental part of teaching, it is particularly useful in educating responders. Problems solving skills will become more effective when the potential responders receive feedback.

6. Introduce new units to provide advanced training for volunteers who want to be equipped for service at the frontline after an event. It is our experience that many students will want advanced training and seek to serve frontline roles during the response to an event.

EVALUATION

Our evaluation plan is designed to assess the degree to which students can delineate categories of catastrophic events; use the language associated with catastrophic events and the public response; describe the national response organization and the organization in the state and local area; develop communication for use within the response team, family, media, and the general public; apply problem-solving to novel situations and devise appropriate responses; and demonstrate willingness to consider responding at the time of a catastrophic event.

Cognitive knowledge about CBRNE will be evaluated as part of examinations in biomedical sciences in the appropriate subjects, such as microbiology and biochemistry. The collaborative group developing the curriculum includes faculty who teach systemic and oral pathology, oral medicine, microbiology, practice management, and ethics. These faculty members are well placed to assess responses to case studies that they included. For example, they could study the response of students to a case study in which Bacillus anthracis spores are introduced into a workplace by a package in the mail. In another example, in oral medicine, they could evaluate knowledge about a smallpox vaccination program, including indications, contraindications, vaccination technique, post-vaccination response, and risks as part of the testing in that course. In the fourth year, groups of students will be evaluated in their approach to problem solving during table top exercises. Finally, students will complete an instrument that surveys their assessment of the importance of a variety of CBRNE agents and an assessment of their competence to respond.

THE CURRICULUM

Implementing the curriculum in catastrophe preparedness was accomplished in a short period of time. There were content experts within the present faculty who volunteered and assisted in adapting content. Basic science faculty, for example, used information in the public domain and altered course content to include relevant CBRNE examples in their teaching. Technology is ideal to use for providing information for students as well as presenting examples. Since 2000, the NYU College of Dentistry has employed the DVD-based searchable text collection (Vitalbook®) in the predoctoral program. In addition, course directors utilize the “Blackboard®” program to present resources to students. In general, students are accustomed to searching digital resources for information. A recent survey of fourthyear students showed that more than 50 percent use a personal digital assistant as part of their clinical activity. A skill necessary at the time of a catastrophic event is the application of information-seeking skills. These skills can be practiced by our students without adding new resources or developing new infrastructure.

Other external resources were reformatted for use in our curriculum. In an oral medicine course, for instance, images and information about the smallpox vaccination program from the CDC website were incorporated into the course.25,26

At the present time, planning is proceeding to use digital resources like personal digital assistants for the storage of basic facts, clinical signs and symptoms, and first-line responses about the infectious diseases that may introduced during a terrorist action. PDAs can also be used to record telephone numbers that should be readily available to responders such as local law enforcement, the county and/or state health departments, and the CDC. Some of the knowledge and skill that are essential in responding at the time of a catastrophic event is already part of students’ fundamental training.

Students receive certification in basic CPR, learn about the management of wounds, and become experts in practicing infection control and skilled in managing infectious patients early in their dental education. These skills basic to the practice of dentistry can be generalized and effectively applied in the management of persons after a catastrophic event.

Students develop skills in a sequential manner and are capable of increasingly complex skills. Therefore, the curriculum has been developed in stages or levels that correspond to the academic years to correspond with the increased capability of learners and the potential for the curriculum to provide the needed skills and knowledge.
within the context of the integrated program we have developed. At the present time, all students in all years have had contact with the new catastrophe curriculum. The Class of 2004 experienced an abbreviated version because the content was developed when they were third-year students. Students in the first, second, and third years will experience the full curriculum in catastrophe preparedness. The sequence of instruction is described here to guide other schools who may wish to implement a similar curriculum.

**First Year.** The initial experience is designed to provide familiarity and understanding of catastrophic events and raise important ethical issues about the dentist’s responsibility to respond during an event or public health emergency. The language of CBRNE (chemical, biological, radiological, nuclear, and explosive) is introduced. The curriculum includes a short-duration course that explores contemporary issues in dentistry. One issue is “the dentist’s role in catastrophe preparedness” and the ADA’s efforts to provide education for dentists. An ethics course explores the dentist’s obligation to take a responder role as part of the study of the ethical principles of Beneficence and Social Justice. Information about the impact of CBRNE agents has been incorporated into biomedical sciences courses as part of understanding biological processes with emphasis on the impact of selected chemical agents at the cellular level. A course that explores doctor-patient relationships includes methods of communication at the community level.

**Second Year.** Students at this stage have acquired knowledge about biomedical sciences. Also, they have accumulated relevant facts such as the CDC categories of agents. The analysis of case histories of past catastrophic events provides increased breadth of understanding about the form of previous events and the response to them. An essential part of this analysis is providing information about the structure of a national response and the qualifications that are required of the responders. The second-year curriculum expands students’ knowledge about microbiological agents and the pathophysiology of potential chemical and biological agents. Students analyze a clinical case that resulted from a terrorist event and a case about a public health emergency.

**Third Year.** At this stage, students have foundation knowledge about biological agents and have analyzed previous events. Through experiences in the clinical curriculum, students acquire skills to qualify as early responders including certification in CPR, management of simple wounds, and infection control procedures. Communication skills are refined through clinical experiences and feedback. Students demonstrate, through self-assessment, a level of comfort with their knowledge and a willingness to respond at the time of an event. The elements of surveillance activities, such as appointment cancellation tracking and disease patterns, are added to the students’ capabilities.

**Fourth Year.** Seniors have mastered the basic knowledge and possess the skills that make them capable of functioning as a responder. Building on their patient care experiences and education in practice management, basic elements of surveillance are applied using small group table-top exercises. Seniors develop a personal catastrophe response plan for themselves, for a hypothetical practice, and for their families. Digital and hardcopy resources are made available; for example, the clinical features of cutaneous and inhalational anthrax, signs, symptoms, and patterns of smallpox, and the management of those diseases. At this level, students are assessed to determine the importance they assign to their role in the community to be a responder during a catastrophic event. Also, students’ confidence in serving as a responder and accomplishing the catastrophe preparedness competencies previously described are assessed. Based on preliminary data from a pilot administration, there is evidence that our students are willing to consider taking part in a response to a catastrophic event in their community.

**SUMMARY**

Each U.S. dental school should consider how it will develop a curriculum to prepare dentists for responding in the event of a catastrophic occurrence. At the present time, as the result of ADA-ADEA activity, six dental schools are collaborating to develop catastrophe preparedness content they will make available to other schools. Developing relevant course content does not require allocating large numbers of new hours or sacrificing experiences that compete for curriculum hours. Existing courses can undergo modest refinements to provide examples relating to terrorism and catastrophe response. With the ongoing threat of terrorist events, the competencies proposed in this article, modified to fit the needs of each school, should become part of the educational experiences provided to students so that the skill set of practicing dentists includes the capacity to serve as an early responder in a catastrophic event.
REFERENCES


Appendix 1. Goals and objectives of a curriculum in catastrophe preparedness

Goal 1: Develop foundation knowledge about chemical, biological, radiological, nuclear, and explosive events as circumstances that may result in a public health emergency.

Objective 1.1: Describe the general characteristics of agents that have potential as CBRNE agents (CDC Category A, B, and C agents, radioactive materials, nuclear devices, and other weapons of mass destruction).

Objective 1.2: Describe a range of agents used by terrorists, including chemical, biological, radiological, nuclear, and explosive devices.

Objective 1.3: Define the terms chemical, biological, radiological, nuclear, and explosive (CBRNE) in the context of terrorist activities in the past, recent, and potential in the future.

Objective 1.4: Understand the psychological impact of a catastrophic event and how a potential responder may feel.

Objective 1.5: Describe the organization of a response to a terrorist event and/or a public health emergency.

Objective 1.6: List and describe actions that are characteristic of first responders.

Objective 1.7: Synthesize information between terrorist events, public health emergencies, and knowledge from the biomedical sciences.

Objective 1.8: Apply the principles of wound management to the management of head and neck trauma associated with explosive devices.

Goal 2: Gain knowledge about the scope and breadth of a national response after a catastrophic event.

Objective 2.1: Describe generally the role of various health care professionals in a coordinated response to a catastrophic event or public health emergency.

Objective 2.2: Describe the general role of federal, state, and local agencies at the time of a human-made or natural catastrophic event.

Objective 2.3: Describe the specific role of each major component and the point at which dentists, acting alone or in groups, would interface with the national response.

Goal 3: Develop skill that can be used to participate or assist in a response at the time of a CBRNE event.

Objective 3.1: Describe the organization of a response to a catastrophic event and/or public health emergency.

Objective 3.2: List and describe the principles of triage.

Objective 3.3: Demonstrate skill in interacting with victims after an event or over a long-term period.

Objective 3.4: Demonstrate skill in adapting the techniques learned for dental treatment to the administration of drugs, vaccines, and other agents that may be required in the pre-event or post-event period.

Objective 3.5: List and define the components of a response team and potential contributions that can be made by dentists.

Goal 4: Develop skills in communication.

Objective 4.1: State the local, state, and/or federal guidelines and regulations that may be applied to a terrorist event or a potentially catastrophic public health emergency.

Objective 4.2: Categorize information related to a CBRNE event or a public health emergency in a manner that is useful to civil and military authorities.

Objective 4.3: Demonstrate skill in communicating with lay persons about risks and outcomes from exposure to toxic materials and biological agents.

Objective 4.4: Develop a prototype response to support patients and family in the event of a terrorist event or public health emergency.

Objective 4.5: Demonstrate an understanding of the basic components of surveillance.

Goal 5: Provide experiences that will facilitate the development of problem-solving skills in response to new and novel circumstances presented in scenarios and simulations to gain and practice skills needed at the time of a catastrophic event or public health emergency.

Objective 5.1: Demonstrate problem-solving in large and small groups when faced with a new and novel program.

Objective 5.2: Demonstrate skill during training opportunities and gaming about catastrophic events.

Objective 5.3: Demonstrate consistent progress in analyzing study cases of terrorist events and public health emergencies.
Emergency Preparedness in the Dental Office

*Originally published in the JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, November 2004*


If you were in your office at 9 a.m. Eastern Daylight Time on Sept. 11, 2001, how did you react? How did staff members, patients and family members react on that fateful day, and what would you have done if there had been an attack in your community? Terrorist attacks have become a daily concern. In an era in which it has been necessary to create the U.S. Department of Homeland Security, our domestic threat level changes frequently and our enemies have demonstrated a relentless ruthlessness, dentists must be prepared to react quickly and effectively, even in their daily professional routines. An emergency can occur without warning and need not be the result of bioterrorism. Industrial accidents can create dangerous conditions, and nature sometimes has been called the greatest terrorist of all. Earthquakes, floods, hurricanes, tornadoes, wildfires and snow can create conditions necessitating a disaster response.

The JADA article by Han and colleagues\(^1\) in 2003 guided dental practitioners to information on bioterrorism and catastrophe response; however, it considered only the impact of biological agents. What if the incident is not biological, however, but rather a sudden chemical, radiologic or blast-type event? After such nonbiological incidents, authorities may notify the populace that there is an outdoor environmental hazard, which may have been precipitated accidentally or intentionally.

Although reports vary, as many as 40 percent of small businesses do not reopen after a major disaster such as a flood, tornado or earthquake.\(^2\) Appropriate and quick actions can help minimize the impact of any emergency on people and the physical infrastructure. Those in the danger zone must consider the human and physical resources available and must establish priorities for resuming operations when a danger has passed. These responses must be planned and drills must be conducted.

Disasters are different from daily emergencies—which are part of a community’s routine\(^3\)—and can present unique problems. The difference is more than just the magnitude of casualties and physical damage; roads may be blocked or jammed, telephones may be overloaded or nonfunctional, emergency responders and the public health system may be overwhelmed, electricity may be out and major facilities may be damaged.\(^2,3\) The objective of this article is to describe actions that the dental professional may take to be prepared for a natural, an accidental or a terrorist-induced disaster.

**BEFORE THE EMERGENCY**

The most important step in coping with an emergency is to discuss the various alternatives with dental of-

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**TABLE**

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<thead>
<tr>
<th>ATTRIBUTE</th>
<th>SHELTER IN PLACE</th>
<th>EVACUATE</th>
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<tbody>
<tr>
<td>Chemical, Radiologic Plume</td>
<td>Tight housing, prepared plan</td>
<td>Leaky housing, unprepared</td>
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<tr>
<td>Time of Day</td>
<td>Night</td>
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<td>Population Size and Density</td>
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<td>Road Conditions</td>
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<td>Toxic Duration</td>
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<td>Toxic Intensity</td>
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* Adapted with permission of the Oak Ridge National Laboratory and the U.S. Department of Energy by Sorensen and colleagues.\(^5\)
The Center for Catastrophe Preparedness & Response

The Center for Catastrophe Preparedness & Response

GO-PACK CHECKLIST.*

- Bottled water
- Nonperishable foods such as energy bars
- Flashlight, extra batteries and battery-operated AM/FM radio
- Necessary medications and extra pair of eyeglasses
- Small first-aid kit and a whistle
- Sturdy, comfortable shoes and lightweight rain gear
- Contact information for your household and cash in small denominations

* Source: American Red Cross.7

EVACUATION CHECKLIST.*

- Remain calm and focused
- Shut off all controllable mechanical equipment and utilities; unplug appliances
- Close all doors and windows
- Take go packs and proceed to the rally point
- Do not use elevators; know at least two escape routes out of the building
- Assist any disabled person or any visitor
- Know the primary and alternate routes to take to reach the final destination; local maps of streets and highways, as well as up-to-date bus and subway routes, should be available for everyone in the office
- Check all rooms to see that people have been evacuated

* Sources: Federal Emergency Management Agency; American Red Cross; National Institutes of Health.26

A disaster or emergency response plan consists of two important components:

- what you will do if you need to leave your office (for example, because of fire);
- what you will need to do if it is safer to remain inside your office (for example, because of noxious or radiologic elements in the environment).4-6

Evacuation, especially when the threat is a fire, long has been the established and instinctive method to protect the public. It also is used to move people out of an area where there are dangerous levels of a hazardous material (that is, the “hot zone,” where contamination actually is present and responders must wear appropriate protective gear). Under certain circumstances, however, evacuation may take excessive time and have some inherent risks.6 Consequently, the concept of “sheltering in place” has been gaining acceptance. It usually is the first option in the area just removed from the center of an incident, and it will be the main focus of this article.

The table provides a checklist to help in deciding whether to choose evacuation or sheltering in place. Unfortunately, simple rules cannot be applied in all circumstances, and a good analysis of any situation needs to be conducted in the planning stage rather than in the response mode. In certain cases, a particular response clearly is preferred.

- When no fatalities are expected, either protective action is reasonable.
- When people can be evacuated before the event, evacuation is preferable.
- When conditions make evacuation impossible, shelter is preferable.
- When the public is uneducated and unprepared to shelter, evacuation is the only possible response.

For each of these different scenarios, some basic issues need to be addressed. First, the entire office staff should be familiar with the community’s disaster warning signals and know how to determine the appropriate action. For example, a battery-operated National Oceanic and Atmospheric Administration, or NOAA, Weather Radio receiver with a tone-alert feature will provide accurate information about severe weather and what protective actions to take. Staff members should know who in the community is responsible for alerting and warning the public and issuing evacuation orders (and a list should be posted in the dental office). In addition, all dentists must maintain their first aid skills and cardiopulmonary resuscitation certification. Dentists should keep telephone numbers of key employees and their families in the office and at home, as well as carry their numbers with them, should the need arise to contact them quickly. It may be appropriate for dentists to arrange for call-forwarding of the dental office telephone lines to their homes. A duplicate set of keys entrusted to an employee or a friend who lives in the vicinity of the office may be useful for some situations.7 That person with ready access to the dental office may be able to minimize the physical impact of a disaster in the event that the dentist is unable

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to access the office in a timely manner. It is important that dentists, as well as anyone with keys to the office, know how to turn off the utilities. Turning off gas and electricity before a potential disaster helps prevent damage to a structure and injury to rescue personnel. Good practice includes backing up computer data frequently and keeping a data storage backup off site.

Each staff member should assemble a “go pack” beforehand in an easy-to-carry, sturdy container that can be grabbed easily, whether evacuating or sheltering in place (Box 1). He or she should include items that meet any special needs and be responsible for storing his or her container.

EVACUATION PLAN

If the dental office needs to be evacuated, all staff members should know the best escape route, both within the office and when leaving the office area. There should be at least two doors to exit, and all patients, including those in wheelchairs, need to be able to exit both doors. For years, the American Red Cross has urged families to have a fire emergency plan and to select a place to meet outside the home; this is a sound practice for dental offices to follow as well. An assembly area at least 50 feet away from the dental building should be specified so that all patients and staff members can be accounted for before they disperse. The dentist then will be sure about the safety of everyone in the office. Diagrams for the evacuation, with emergency exits clearly delineated, should be placed on office walls, and practice fire or evacuation drills should be held at least twice a year.

Box 2 presents the evacuation checklist for dentists and staff members to follow when leaving the office.

SHELTER IN PLACE

Staying inside can be the most effective response to some environmental hazards, including those that result from some natural disasters (for example, tornadoes), as well as from chemical plumes, radiologic clouds, or both. The aim of sheltering in place is to limit exposure to a hazard by using the natural protection of a building to limit exposure to noxious substances. Realistic computer simulations of outdoor and indoor gas concentration fluctuations, together with models for biological toxic loads, have shown the advantages of sheltering in place.

One study demonstrated that in a modern, energy-efficient building, the exposure to a chemical plume was one-tenth that of the outside dose. Because the total dose to which an individual is exposed is the product of the concentration of the agent and the amount of time of exposure, it may be prudent to remain in place rather than attempting (or recommending) evacuation (or, perhaps more accurately, panicked flight). In addition, local governments simply may close down all highways and major thoroughfares, requiring people to remain where they are.

In certain situations, it may be necessary or required by civil authorities to keep patients and staff members in the office for some time. The Federal Emergency Management Agency, or FEMA, along with most other federal agencies, recommends planning for an average number of patients, staff members and the dentist for three days. This requires offices to keep some basic supplies on hand, including water, food and some medical supplies. The American Red Cross recommends that offices keep a minimum of 1 gallon of drinking water per person per day stored in plastic containers, together with nonperishable food (including some that can be eaten by infants). Some basic medications (for example, pain relievers, antidiarrheal medication, antacids) should be standard dental office items; a staff member should check the quality of the supplies every six months.

People are likely to be frightened in emergency situations, so some form of diversion may be appropriate. For example, the Australian Government has provided a pack of playing cards to each family in the country as part of its emergency kit.
In addition to the items included in Box 3, some agencies, including FEMA, recommend a compass, matches in a waterproof container, needles and thread, medicine droppers and a shut-off wrench (to turn off gas and water). To demonstrate professional concern and to be comprehensive in planning efforts, dentists should consider making protective garb available for staff members, and keep a few extra on hand for patients. For example, a protective kit that includes an overgarment, goggles, nitrile gloves, an N95 mask and a 12-hour light stick is commercially available (Henry Schein, Melville, N.Y.). It is important to point out that these garments are not professional Hazmat (hazardous materials) suits, but would provide some protection in certain disaster scenarios for people who choose to leave the dental office. Under certain circumstances, however (depending on the type of noxious agent involved), the dentist may have to decide that if someone leaves, he or she cannot return to the secured area, because he or she could contaminate the previously safe environment.

For terrorist-induced emergencies in which there is danger of exposure to radiation or chemical agents, it generally is preferable to remain above ground level. This reduces the risk of exposure to agents settling in low areas and/or seeping into basements even when windows are closed. Temperature, sunlight and the force and direction of the wind are important risk factors with nuclear, radiologic, chemical and biological agents; these factors affect agent dispersion, concentration and rate of degradation.

A room or hallway with few windows, doors or vents will minimize the risk of exposure. Open windows and doors should be closed and vents covered. If possible, airflow should be minimized, with plastic sheeting taped over windows, doors and vents that might permit air leaks to the immediate areas where people will congregate. A staff member should turn off heating, ventilation and air-conditioning equipment. A primary person, as well as a backup person, should be specified in the dental office emergency plan to perform these activities.

When choosing the location to minimize exposure, however, the practitioner must take care to ensure that it still is possible to communicate with officials outside the building. Information on the radio, television or the Internet will be important in deciding when it is safe to leave the area, or if local officials subsequently require evacuation in specific areas of greatest risk. Box 4 summarizes shelter-in-place procedures.

Realistically, people must believe that a threat is real and that those in charge are credible. Everyone will be concerned about the safety of family members and other loved ones, and probably will try to make contact with them before they are willing to seek shelter. The dentist must remain calm and be positive, and remember that neither staff members nor patients can be forced to shelter in place. The authoritativeness of the office plan will be enhanced through the dentist’s participation in continuing education programs on emergencies and bioterrorism.

COMMUNICATION PLAN

Communication is the most vital element in any emergency plan. The dental office needs to receive accurate and updated information from the news media and local authorities so staff members and patients can keep abreast of an evolving situation. Monitor the radio, the Internet or television for further instructions from public health, public safety and emergency management officials. Ideally, alerts not only should warn people of a risk, but should present safety instructions as well. Poor communication from the authorities can lead people to take action that is not in their best interest. As health care professionals, dentists should be involved in their community’s disaster planning, and be advocates for multiple and redundant communication systems.
If possible, people should not rely on only one form of emergency communication. Cell phone towers were overloaded on Sept. 11, 2001, and in the blackout of August 2003. The dentist, staff members and patients will want to be able to communicate with concerned family or friends. Everyone should keep a contact telephone number with them so they can let others know they are safe—perhaps a long-distance number because local telephone lines may be overused or out, and it is less likely that the person receiving the call will be involved in the present danger. The dental office should have the telephone numbers of all local emergency responders and emergency management officials easily accessible and clearly visible.

Box 5 provides a summary of key factors for emergency preparedness.

CONCLUSION

The procedures outlined in this article have been summarized and adapted for the typical dental facility, using the four primary authoritative sources of information found on the Internet:

• National Institute for Chemical Studies ("www.nicsinfo.org");
• Oak Ridge National Laboratory ("www.ornl.gov");
• American Red Cross ("www.redcross.org");
• Federal Emergency Management Agency ("www.fema.gov").

People must be educated beforehand about the protective action concept and how to react. The dental profession should be active, ensuring that there are ongoing public information and education programs in place in communities regarding protective actions. These community actions are similar to those that health care professionals should take in the dental office with staff members and patients, as well as in the home with families.

Unfortunately, there is no single or simple determinant that will help us make decisions that protect lives. Although evacuation is a more familiar and intuitive response when danger is present, it may be safer, albeit more challenging, to shelter in place.

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The Medical Reserve Corps: An Opportunity for Dentists to Serve

NEW YORK STATE DENTAL JOURNAL, JANUARY 2006


ABSTRACT

The response to the events of Sept. 11, 2001, relied on local resources and personnel. Aware of how important their contribution could be, many people are now inspired to volunteer during times of crisis. The Medical Reserve Corps is a community-based volunteer network of health professionals that trains to respond to large-scale emergencies.

W e live with the risk of being attacked by terrorists with CBRNE (chemical, biological, radiological, nuclear and explosive) weapons. Because B. anthracis was successfully sent in the mail in the fall of 2001, this country is now particularly concerned about biological agents. Biological weapons have been used for centuries, dating as far back as the Middle Ages, when the Tartars threw plague-infested carcasses of dead animals into their enemy’s camp.1, 2

Catastrophic events are likely to create demands that far exceed the capacity of the medical and public health system.3 In the anthrax attacks in 2001, only a few people were actually affected,4 yet demand for prophylactic antibiotics created nationwide shortages of drugs and concerns about “white powder” overloaded testing laboratories.5 Hospital capacity may be overwhelmed with casualties and/or “worried well.” To meet a possible surge in demand for human resources, a cadre of health professionals and paraprofessionals should be trained to complement the established medical and public health infrastructure in a planned and integrated manner.

The dental profession has approached bioterrorism response in a variety of ways.6-8 Within the dental community, there have been national meetings, local dental society initiatives, changes to dental school curriculums,9 and continuing education courses created to address “Dentistry and Bioterrorism.” At the New York University College of Dentistry (NYUCD), the largest dental school in the country, specific competencies and objectives were identified for a “Catastrophe Preparedness” curriculum. Existing course content was modified, and a senior level course was added to provide new dentists with the skills to play a helpful role in responding to a disaster.9

However, to contribute optimally to an emergency effort, dentists should be integrated into a much larger system that includes other professional communities. In an emergency, local, state and federal agencies will be in charge.7, 10, 11 Importantly, with more than 195,000 dentists9 in the United States (13,246 members in the New York State Dental Association), dentists can provide a large emergency workforce.

INTEGRATING DENTISTS INTO A RESPONSE PLAN

The Medical Reserve Corps (MRC) is a specialized component of the Citizen Corps Council (CCC) that offers an opportunity for dentists to become an integrated part of an emergency response plan. The CCC is a national network of volunteers dedicated to making sure that their families, homes and communities are safe from terrorism, crime and disasters of all kinds.12 The MRC program was officially launched as a national, community-based movement in July 20027, 12 and is overseen by the United States Office of the Surgeon General. Its mission is to organize teams of local volunteer medical and public health professionals who can supplement existing community emergency response systems during large-scale emergencies. In some communities, volunteers may contribute their skills and expertise throughout the year, as well.12

There are approximately 267 MRC units nationwide. There is no “typical” MRC unit; each unit is organized to meet its area’s specific goals.12 With community partners that run a spectrum from local voluntary organizations to private corporations, the “face” of each MRC community is unique.

New York State has 19 MRC units. The MRC developed by the New York City Department of Health and Mental Hygiene (DOHMH)13 consists of a multidisciplinary group of volunteer health professionals, including physicians, pharmacists, dentists, nurses and nurse practitioners, physician assistants, emergency medical techni-
The Center for Catastrophe Preparedness & Response

Doctors, mental health practitioners and others who can be mobilized rapidly during a public health emergency.

The New York City MRC works in partnership with professional associations, universities and hospitals. A bioterrorist attack may require mass prophylaxis. To dispense antibiotics or vaccine to the public, point-of-dispensing clinics (PODs) would be set up. Thousands of health professionals would be required to staff these PODs. POD functions include: medical evaluation, triage, vaccination or distribution of medication, and customer service/line management. Clinic roles are assigned to each professional based on his or her skills and licensure. Volunteers are covered against malpractice under General Municipal Law, section 50-k, for volunteer work performed with DOHMH. Dentists can get involved and be a valuable resource to their community by volunteering with the MRC. To find the MRC closest to your location, visit www.medicalreservecorps.gov/index, or contact the local Citizens Corps Council.

WHY JOIN AN MRC?

There are several benefits to membership in the New York City MRC. All volunteering is automatically registered with the city Health Alert Network (HAN), an information-sharing forum for medical providers. During an emergency response, volunteers are provided with the necessary antibiotic or vaccine prophylaxis before they start working in the PODs. Several live POD training sessions are offered each year, and training materials are available online. In addition, there are online training programs that focus on smallpox and how to run a POD. Dentists may earn up to 9.0 continuing dental education credits by viewing these online tutorials.

POD training was hosted at NYUCD. Organized and managed by the New York City DOHMH, the training was based on a tularemia release at a local shopping mall. Widespread dispensing of antibiotics to a large number of people was required. Staff from the DOHMH announced the “outbreak.” NYUCD students and faculty, and DOHMH school nurses were provided with a didactic training session, assigned clinic roles and began running the POD. “Staff members” used an algorithm that helped determine which “patients” got the first-line drugs and those who needed more thorough medical evaluation. All who took part in this exercise were impressed with how rapidly the volunteers learned the necessary POD tasks of their assigned roles and how quickly long lines of “patients” moved through. Their performance in this exercise demonstrated that dental faculty and students would be a helpful addition to the emergency workforce.

Regardless of where you practice, the MRC is an effective way to serve your community. A major catastrophe would interrupt daily life, including dental practice. A rapid emergency response will provide a rapid return to regular dental practice. The MRC is a definitive and formal opportunity for dental professionals to serve their communities. It is an effective way to use valuable professional skills in an integrated national response.

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Introducing a Senior Course on Catastrophe Preparedness into the Dental School Curriculum

**Journal of Dental Education, March 2006**


**ABSTRACT**

This article describes an integrated fourth-year course in catastrophe preparedness for students at the New York University College of Dentistry (NYUCD). The curriculum is built around the competencies proposed in “Predoctoral Dental School Curriculum for Catastrophe Preparedness,” published in the August 2004 Journal of Dental Education. We highlight our experience developing the program and offer suggestions to other dental schools considering adding bioterrorism studies to their curriculum.

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Due to the changes this nation has undergone since September 11, 2001, the need for a large force of health care providers trained to react to a major disaster in a surge environment, where the need for medical services far exceeds the resources available, has grown considerably. In an attempt to ensure that the public and private health care systems in the United States are capable of responding to emergencies, the federal government has directed financial and logistic resources to strengthen the emergency response system, create medication stockpiles, and improve the public health infrastructure. Emergency medicine will always have to be ready to confront another crisis, and in many of these catastrophic events, as we have recently seen during Katrina, the emergency medical system itself may be overwhelmed and/or totally crippled. As a consequence of the heightened awareness and needs associated with emergency response, new requirements have been proposed for the dental profession to help meet the special needs of society in the event of a disaster.

In June 2002 the American Dental Association (ADA) held a meeting to identify potential roles for dentists in response to a bioterrorism attack. One area of concern expressed at that time was what role dental schools should play in emergency preparedness. The participants at this meeting concluded that bioterrorism training should occur in the predoctoral dental curriculum and should include training that allows dental students to recognize disease, aid in triage, implement preventive measures, and assist in treatment under the direction of emergency-response agencies.1

In this article we describe New York University College of Dentistry’s (NYUCD) effort to build a catastrophe preparedness curriculum for our predoctoral students. The faculty of NYUCD used the competencies, goals, and objectives as proposed by More et al. for the development of this curriculum (see Table 1). These competencies are based on the recognition that the knowledge and skills possessed by the average dental student upon graduation may be utilized by the public health care system in times of crisis.2

NYUCD’S CATASTROPHE PREPAREDNESS CURRICULUM

NYUCD has implemented a new experience for a dental student that incorporates four components: curriculum integration, modular components, an actively participating senior course, and continuous evaluation. Initial outcomes assessment indicated a very positive response from the NYUCD graduating class of 2005.3
SUPPLEMENTAL UNITS IN THE FIRST THREE YEARS

NYUCD has approximately 340 students enrolled in the senior class (D4). Freshmen, sophomores, and juniors are introduced to the subject of bioterrorism preparedness by supplementing the established curriculum with units of instruction in modular form, as follows:

Freshman Curriculum (D1): Shelter in Place, Emergency Evacuations, and Fire Hazard, as part of the freshman orientation. Total D1: 1.0 hour.

Sophomore Curriculum (D2): Students are introduced to pathogens that can be used as agents of bioterrorism during the General Pathology and Infectious Diseases course. Total D2: 7 hours. Topics include:

- Bacillus and Clostridium:
  - B. anthracis: detailed review of anthrax and the unique properties of B. anthracis, its spore-former, toxins, capsule, and ease of dissemination that make it such a good potential bioweapon;
  - C. botulinum: review of its toxin, how it works in the host, and how it may be spread;
  - gram-negative pathogens: plague and tularemia—properties and modes of transmission of these nonspore forming bacteria;
  - DNA viruses: smallpox virus—properties and life cycle of pox viruses, campaign for the eradication of smallpox;
  - RNA viruses: discussion of the viruses that cause viral hemorrhagic fevers (VHF) as well as the attributes of the SARS virus;

- microbial agents of bioterrorism: discussion of all of the biological agents in the CDC’s category A list—anthrax, botulism, plague, smallpox, tularemia, and VHF (viral hemorrhagic fever). Aspects covered: agents, how they may be spread, and why a bioterrorist might select them. Additional topics include ricin and briefly CDC category B and category C agents.

Junior Curriculum (D3): Students are introduced to oral and systemic manifestations of bioterrorist agents including clinical signs and symptoms. This topic is introduced as part of the course entitled “Care of the Medically Complex Patients.” Total D3: 3 hours. Topics addressed are:

- clinical symptoms of anthrax, smallpox, and plague;
- smallpox vaccine; and
- catastrophe preparedness—chemical agents, nerve gases.

SENIOR CURRICULUM (D4)

After experiencing this curriculum during their first three years, the senior students (D4s) have already acquired the basic foundation knowledge in the biomedical sciences, including biological agents; knowledge of chemical, biological, radiological, nuclear, and explosive (CBRNE) weapons; CPR training; wound management; and infection control procedures. In addition, they have experienced the impact of an ethics course that explores a dentist’s obligation to the community.

After developing the core educational content for the first three years of the curriculum, the faculty addressed the challenge of developing a stand-alone D4 program that would build on the previously described curriculum components and work in conjunction with their senior-year patient care and patient management experience.

Key questions included:

- What competencies should be reinforced?
- What instructional methods should be used? (lecture, ro-

Table 1. Catastrophe preparedness competencies

| Competency 1: Describe the potential role of dentists in the first/early response in a range of catastrophic events. |
| Competency 2: Describe the chain of command in the national, state, and/or local response to a catastrophic event. |
| Competency 3: Demonstrate the likely role of a dentist in an emergency response and participate in a simulation/drill. |
| Competency 4: Demonstrate the possible role of a dentist in all communications at the level of a response team, the media, the general public, and patient and family. |
| Competency 5: Identify personal limits as a potential responder and sources that are available for referral. |
| Competency 6: Apply problem-solving and flexible thinking to unusual challenges within the dentist’s functional ability and evaluate the effectiveness of the actions that are taken. |
| Competency 7: Recognize deviations from the norm, such as unusual cancellation patterns, symptoms of seasonal illnesses that occur out of the normal season, and employee absences, that may indicate an emergency and describe appropriate action. |
leplay, seminars)

- How should students’ attitudes and the course effectiveness be evaluated?

With these questions guiding the planning process, a fourth-year course was developed for implementation in the spring semester within two months of graduation. Many senior dental students at that time of the year are deeply concerned with passing regional licensing examinations, completing their curriculum requirements, and preparing for their professional futures. Based on our knowledge of typical senior students’ priorities and distractions during their last semester in dental school, it was evident that the emergency preparedness course material had to be presented in a particularly stimulating and attention-grabbing manner.

The course developed for these fourth-year dental students was organized around four questions:

1. Why should dentists be concerned and involved?
2. How can dentists respond to a catastrophe as part of the organized public health response system?
3. What additional practical training is useful for dentists?
4. How can the average general dentists prepare to protect themselves if a disaster occurs when they are in their offices?

The first question—why should dentists be concerned and involved with catastrophe preparedness?—is of such critical importance that it was addressed in an introductory lecture delivered by the dean of the dental school. The lecture emphasized to the students their obligation to the profession, to the community, to their own families, and to their country. The lecture reminded students of the skills they bring with them in the event of an emergency. The opportunities available to join an organized response effort such as the Medical Reserve Corps (MRC) are discussed. Additionally, the dean described the abilities that graduate dentists can utilize in an emergency situation; for example, if dentists can accurately administer an inferior alveolar nerve block injection in the recesses of the mouth, they can certainly “hit” the large deltoid muscle in the arm to administer a smallpox vaccination with minimal training.

The second course theme addressed the question of why dentists should participate in the community’s established and organized disaster response system. The approach taken to achieve this objective was to use an existing surge response public health mechanism. NYUCD has had a close relationship with the New York City Medical Reserve Corps (MRC) for several years, ever since NYUCD and the city conducted a simulated Point of Dispensing (POD) exercise together. The MRC developed by the NYC Department of Health and Mental Hygiene (DOHMH) consists of a multidisciplinary group of volunteer health professionals, including physicians, pharmacists, dentists, nurses, mental health practitioners, and others, who can be mobilized rapidly during a public health emergency. The MRC/NYC works in partnership with professional associations, universities, and hospitals. As an example, a bioterrorist attack may require mass antibiotic/vaccination prophylaxis. To dispense antibiotics or vaccine to the public, Point-of-Dispensing clinics (PODs) would be set up. POD functions include medical evaluation, triage, vaccination, and distribution of medication, and line management. Clinical/support roles are assigned to each professional based on his or her skills and licensure.

During a three-hour POD drill, with an improvised scenario, the NYUCD’s main auditorium was transformed into a smallpox vaccine dispensing center as our senior students acted as both members of the MRC (triaging, evaluating, dispensing, and inoculating the public) and as patients eagerly looking for answers and protection. The exercise was filmed for use in future classes and to help demonstrate that dentists, with their strong background in infection control, biological agents, collecting medical histories, and patient management, can relatively quickly be organized into an effective, much-needed component of the catastrophe response system. The third theme of the D4 course addressed the question “What additional practical training is useful for dentists?” In 2003, the American Medical Association (AMA), in partnership with four major medical centers and three national health organizations, established the National Disaster Life Support (NDLS) training program to better prepare health care professionals and emergency response personnel for mass casualty events. The NDLS courses stress a comprehensive all-hazards approach to help physicians and other health professionals deal with catastrophic emergencies from terrorist acts as well as from explosions, fires, natural disasters (such as hurricanes and floods), and infectious diseases. The program consists of three levels of courses of increasing clinical complexity: 1) Core Disaster Life Support (CDLS), 2) Basic Disaster Life Support (BDLS), and 3) Advanced Disaster Life Support (ADLS).

The first component (CDLS) of this hierarchical set of training courses was chosen for its practicality and to introduce those students interested in this material to the possibilities
for further training. Core Disaster Life Support is a four-hour instructor-led course designed for all public health care personnel and social workers, clergy, mental health personnel, and planners. CDLS is intended to provide a basic uniform standard of competencies, skills, and knowledge to health care and public health responders for weapons of mass destruction (WMD) response. There was strong agreement among the faculty involved in our bioterrorism preparedness curriculum that since this “formal” presentation already existed, there was no need to initiate and develop another appropriate program.

In the CDLS course, participants learn to:
- define All-Hazards Terminology,
- recognize potential public health emergencies (PHE) and their causes, risks, and consequences,
- define the D-I-S-A-S-T-E-R™ paradigm,
- list scene priorities of a mass casualty incident (MCI) response,
- describe pre-hospital and hospital medical components of a disaster incident response,

![Bioterrorism Preparedness Self-Assessment](image)

Figure 1. Students’ self-assessment survey

<table>
<thead>
<tr>
<th>Activity</th>
<th>Use the scale below to rate the importance of the item</th>
<th>Use the scale below to rate how well prepared (confident) you feel you are in the area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I can monitor, diagnose, investigate, and respond to health threats that might occur in my community.</td>
<td>1=do not know/uncertain 2=not very important 3=somewhat important 4=very important 5=critically important</td>
<td>1=uncertain/do not know 2=a little prepared 3=somewhat prepared (novice) 4=prepared (beginner) 5=well prepared (competent)</td>
</tr>
<tr>
<td>2. I know how to acquire and analyze data that may determine if there is a health threat in my community.</td>
<td>1=do not know/uncertain 2=not very important 3=somewhat important 4=very important 5=critically important</td>
<td>1=uncertain/do not know 2=a little prepared 3=somewhat prepared (novice) 4=prepared (beginner) 5=well prepared (competent)</td>
</tr>
<tr>
<td>3. I feel able to communicate information about health threats to government authorities and agencies in my community.</td>
<td>1=do not know/uncertain 2=not very important 3=somewhat important 4=very important 5=critically important</td>
<td>1=uncertain/do not know 2=a little prepared 3=somewhat prepared (novice) 4=prepared (beginner) 5=well prepared (competent)</td>
</tr>
<tr>
<td>4. I am aware of websites and other sources of information to help me understand a potential health threat that might arise in my community.</td>
<td>1=do not know/uncertain 2=not very important 3=somewhat important 4=very important 5=critically important</td>
<td>1=uncertain/do not know 2=a little prepared 3=somewhat prepared (novice) 4=prepared (beginner) 5=well prepared (competent)</td>
</tr>
<tr>
<td>5. I feel confident that with the appropriate information I could provide information and empower people in my community about health threats.</td>
<td>1=do not know/uncertain 2=not very important 3=somewhat important 4=very important 5=critically important</td>
<td>1=uncertain/do not know 2=a little prepared 3=somewhat prepared (novice) 4=prepared (beginner) 5=well prepared (competent)</td>
</tr>
<tr>
<td>6. At the present time, I believe I can develop a plan that would enable me to respond appropriately to health threats.</td>
<td>1=do not know/uncertain 2=not very important 3=somewhat important 4=very important 5=critically important</td>
<td>1=uncertain/do not know 2=a little prepared 3=somewhat prepared (novice) 4=prepared (beginner) 5=well prepared (competent)</td>
</tr>
<tr>
<td>7. After training, I could actively participate in the emergency response network in my community.</td>
<td>1=do not know/uncertain 2=not very important 3=somewhat important 4=very important 5=critically important</td>
<td>1=uncertain/do not know 2=a little prepared 3=somewhat prepared (novice) 4=prepared (beginner) 5=well prepared (competent)</td>
</tr>
<tr>
<td>8. I believe it is important to be well informed about the signs, symptoms, and treatment of smallpox.</td>
<td>1=do not know/uncertain 2=not very important 3=somewhat important 4=very important 5=critically important</td>
<td>1=uncertain/do not know 2=a little prepared 3=somewhat prepared (novice) 4=prepared (beginner) 5=well prepared (competent)</td>
</tr>
<tr>
<td>9. I believe it is important to be well informed about the signs, symptoms, and treatment of anthrax.</td>
<td>1=do not know/uncertain 2=not very important 3=somewhat important 4=very important 5=critically important</td>
<td>1=uncertain/do not know 2=a little prepared 3=somewhat prepared (novice) 4=prepared (beginner) 5=well prepared (competent)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Activity</th>
<th>Use the scale below to rate the importance of the item</th>
<th>Use the scale below to rate how well prepared (confident) you feel you are in the area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>1. I can monitor, diagnose, investigate, and respond to health threats that might occur in my community.</td>
<td>1=do not know/uncertain 2=not very important 3=somewhat important 4=very important 5=critically important</td>
<td>1=uncertain/do not know 2=a little prepared 3=somewhat prepared (novice) 4=prepared (beginner) 5=well prepared (competent)</td>
</tr>
<tr>
<td>Male</td>
<td>1. I can monitor, diagnose, investigate, and respond to health threats that might occur in my community.</td>
<td>1=do not know/uncertain 2=not very important 3=somewhat important 4=very important 5=critically important</td>
<td>1=uncertain/do not know 2=a little prepared 3=somewhat prepared (novice) 4=prepared (beginner) 5=well prepared (competent)</td>
</tr>
</tbody>
</table>

1. Which is the most likely practice setting for you in the next year?
   - Private Practice
   - CPR/AEDG Resident
   - Federal/Military Service
   - Community Health Center
   - Other

2. Which is the most likely practice setting for you in five years?
   - Private Practice
   - CPR/AEDG Resident
   - Federal/Military Service
   - Community Health Center
   - Other
• describe personal protective equipment (PPE) and decontamination, and • describe the role of the local public health system in PHEs.5

After presentation of the course and a short twenty-five-question examination, the AMA offers a certificate of completion with name and degree to each participant. Three hundred and twenty of NYUCD’s senior students who graduated in 2005 completed the CDLS course and received certification. It was very rewarding to see how proud our seniors were of their certificates and the fact that they had completed formal training in Core Disaster Life Support.

The fourth component of the D4 catastrophe preparedness curriculum addresses awareness and personal protection. NYUCD has an active Emergency Plan and a Shelter-in-Place protocol in place. This is a plan that would allow the college to prepare, respond, and recover from any man-made or natural disaster during the first seventy-two hours of an incident. It is focused on the realization that the major decision to be made is whether we should evacuate the building or use the inherent protection of the structure to shelter in place. The NYUCD student body is therefore aware of the need for anticipating and planning for a possible attack or disaster. It has been shown that the positive behavioral response of individuals goes a long way toward mitigating the consequences of a serious event and has important implications for the practical management of a disaster scene.

Using this as the basis to achieve the final course objective, the senior students were required to work in groups of four, on their own time, to develop either an evacuation and/or a shelter-in-place plan for the type of dental office or clinic in which they plan to practice. Students could tailor the plan to a specific bioterrorist agent (for example, a dirty bomb, sarin gas, a biological weapon) or make it generic for either a natural or a man-made disaster. Interestingly, many students used a likely event related to the particular state in which they thought they would practice. Earthquakes were an issue for those who planned for California, tornadoes for the potential midwesterners, and hurricane-related damage in the Southeast.

Faculty with a strong background in catastrophe preparedness then selected and presented to the whole class the more interestingly detailed and thought-provoking scenarios submitted and moderated the class discussions that followed.7

At the completion of this first-time course, the dean and the curriculum committee were interested in determining if the curriculum helped students achieve the bioterrorism competencies in the predoctoral dental curriculum. Evaluation questions included:

1. Did students graduate with sufficient knowledge of the clinical signs and symptoms and prevention strategies of the most likely bioterrorist agents (Class A agents)?

2. Did students graduate sufficiently empowered to react positively to protect their patients, staff, families, and themselves from the multiple hazards of these agents and other hazards?

3. Did students graduate with sufficient knowledge of the resources available to improve and sharpen their skills and to familiarize themselves with their community response plan?

4. Most importantly, did students graduate with a desire and willingness to contribute to catastrophe preparedness with an understanding of the ethical issues and obligations involved?

To assess these questions, a survey was developed as a pretest and post-test to assess the attitude of the D4 students about various aspects of catastrophe preparedness. The underlying assumption was that students’ attitudes about catastrophe preparedness would be changed as a consequence of the curriculum experiences described in this article. A survey (which had received an IRB-exempt designation) was administered on the first day of the D4 course. The survey appears in Figure 1. Senior students were requested to self-assess their knowledge about bioterrorism and their confidence in their competency on that issue. The same survey was administered after the course.

The preliminary data from the pilot program suggested that student attitudes were changed after the course. They saw more aspects of catastrophe preparedness as “important” and said the program made them feel more “confident” to assume a role as a responder.3 We describe only the initial impressions of data here because we have yet to have it fully statistically analyzed and it is secondary to the description of the program this article presents—a program that we feel should invoke discussion and debate in the dental academic community. It is our intention to analyze the data and present the findings of the student assessment in a future article that will offer a full and complete picture of the students’ response. Following the initial More et al. article and this current article, an analytical third article would complete the sequence regarding catastrophic preparedness training for dental students. Conclusion The senior curriculum de-
scribed in this article consists of twelve hours of organized presentations, roleplaying, and seminars. At NYUCD, we believe a capstone course of this nature goes a long way in fulfilling the community obligation for dental schools to train dentists in the core competencies required to be able to lend additional support to the public health infrastructure in a surge environment.

A recent feature article in the New York Times describing NYUCD’s unique efforts in mandating terrorism preparedness for its students summed up the college’s goal: “All graduates are now required to have a fundamental working knowledge of the proper response to a variety of natural and terrorist threats.”

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Disasters and the Surge Environment

JOURNAL OF EMERGENCY MANAGEMENT, MAY/JUNE 2006

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WALTER J. PSOTER, DDS, PHD

ABSTRACT

With the recent actual, and the anticipated possible, disastrous events in this country, it is an absolute duty of responsible agencies on all levels to prepare and improve the medical response system. Past experience has shown that one critical area of preparedness that needs to be addressed is the available number of trained individuals in the public health workforce that can and will respond. We propose that the dental profession, with proper additional training and integration into an organized healthcare system, can be one additional source of this much needed manpower.

INTRODUCTION

Disasters are different in magnitude than routine emergencies, and disasters often pose unique problems that are not present in routine emergencies. Disasters disrupt the normal lives of a population, and the resources available for response are likely not adequate for the given situation. Disasters involve different levels of government, change the command structure of responding organizations and their programmed tasking, and can disable the medical facilities and emergency personnel that routinely respond. Further, it is likely that response confusion will result, which can include a failure in communication due to both the physical destruction involved and the new evolving command and control structure.

Catastrophic events have the potential to place severe stress on the manpower resources of medical and public health systems. A requirement for effective response from the health systems may be the existence of a reserve “surge response” capacity. This surge response may be defined by temporal parameters: 1) short term with a very high casualty volume, e.g., aerosol weapons-grade anthrax over an urban area; and 2) sustained labor with intensive demands, e.g., avian flu. Moreover, surge response can also be considered a spatial/density manpower adaptation to highly demanding events, such as 1) overwhelming casualties or demand for preventive treatment, e.g., smallpox vaccinations; 2) shortage of health workers due to casualties, fear, or infrastructure destruction preventing movement; and 3) newly operational event-driven systems, e.g., telephone triage by public health departments for an emerging disease. This surge manpower demand is especially present in urban settings because the high population density and reliance on a complex and concentrated urban infrastructure (e.g., mass transit systems, tunnels and bridges, and high-rise buildings) adversely affect the ability to meet surge capacity needs. In addition, these factors hinder the ability of healthcare workers to report to work during various overwhelming events, and even their willingness to report under those circumstances may be limited. With recent events such as hurricanes Katrina and Rita and anticipated events such as a possible Avian flu pandemic or large-scale acts of terrorism, it is an absolute necessity that the medical care infrastructure and emergency services work toward preparedness for major disasters. Preparedness requires that many areas be addressed: risk analysis, prevention and surveillance planning response efforts, training, and storing additional equipment and supplies. Finally, the most pressing issue, and the one that is the focus of this paper, is increasing the medical manpower available to meet the demands of these events. As an example, in 1994 more than 5,000 people presented themselves to hospitals in Tokyo after the release of sarin gas in the subway, all needing to be evaluated, and yet 80 percent were released after examination without requiring any treatment.

Experience indicates that to be properly prepared for a disaster, additional trained, willing, and available personnel should be identified beforehand to insure optimal survival rates and healthcare outcomes. To meet such surge medical and public health manpower needs, a paradigm shift may be required in terms of projecting the sources and potential roles of catastrophic event responders. A surge capacity must be built by drawing on and training other professionals to complement the traditional medical and public health workforce. Clearly, these personnel sources require some familiarity with health/public health principles and practice and must be from an elective health service, as the normal day-to-day demands on the surviving medical and public health services will continue during any type of disaster. Dentists, with their healthcare training and clinical skills, are one group of professionals that is prototypical of these
requirements for a surge reserve medical/public health group.

The New York University School of Medicine and the New York University College of Dentistry were jointly awarded a Department of Justice (DOJ) and, subsequently, Department of Homeland Security (DHS) grant entitled “Enhancing Medical and Public Health Capabilities during Times of Crisis.” This grant is the mechanism being used to develop training content and programs for dentists (and other potential responders) that heighten their knowledge of weapons of mass destruction and other “all hazards” catastrophic events to prepare them for potential inclusion in responding to such events, e.g., by complementing emergency room staff, performing triage, providing certain basic hands-on skills, and possibly playing a role in decontamination. For example, some grant activities have shown that as members of the local (New York City) Medical Reserve Corps (MRC), dentists are very effective in manning points of distribution, which distribute medications or vaccines to an affected population. In addition, a limited number of dental personnel have been trained in telephone triage by the NYCDepartment of Health for epidemiological tracking in widespread infectious disease reporting.

METHOD

First, a broad consensus must be established regarding the utility of the concept of nontraditional medical and public health professionals as a surge manpower resource. A critical element in the discussion when considering dentists in that role is assessing how committed the leadership of the medical and dental professions is to the concept in general and what specific roles it envisions. This question motivated a survey that was reported by the NYU grant team on their Web site http://med.nyu.edu/chip: What is the attitude of the academic and professional leadership of the medical and dental communities regarding the participation of dentists in a surge manpower environment? This leadership is defined as deans of US medical and dental schools, presidents of state medical and dental societies, and a select group of national experts and leaders in catastrophic response. This survey is a first look at the issue, and the survey can subsequently be modified and applied to other targeted catastrophic event planners, e.g., emergency management officials, emergency medicine directors, and state public health directors.

The targeted academic and professional leaders were invited to complete a mailed, self-administered, structured questionnaire on their opinions about the potential roles of dental professionals in a catastrophic event. The questionnaires were prepared by this project’s staff and included 22 categorical items with an open-ended comments page. Questionnaires were sent twice at an interval of two months. The data from completed questionnaires were double-entered and then statistically analyzed. A total of 261 questionnaires were sent to five groups of health profession leaders: the deans of dental and medical schools, the presidents of dental and medical societies, and other experts. As to the distribution of questionnaires sent, 46 percent of the questionnaires were mailed to deans of medical schools, 20 percent to deans of dental schools, and 16 and 13 percent to presidents of dental and medical societies, respectively (Table 1).

RESULTS

Overall, this survey found broad, statistically supported agreement among the leadership groups that dental professionals have skills that can be part of a catastrophic response team; in fact, they have an ethical obligation to provide assistance during the response to such an event. This favorable view of dentists’ involvement in catastrophic-event response appears conditional on some type of significant additional training and integration into an organized response system. Although all groups agree that dentists need additional training, there was not strong agreement that dental professionals are receptive to additional training, or that medical professionals would be receptive to assistance in a surge environment. The survey’s reported findings may suggest that most communities are in the early stages in surge response planning and that the public health infrastructure has not yet given sufficient deliberation to the idea that response systems could utilize this potential manpower pool. In terms of specific tasks suggested in the survey questions, the traditional forensic role of dentists is strongly recognized and supported. Other tasks deemed acceptable tend toward minor surgery, infection control, and prescribing medications. Medical school deans are less favorably disposed toward tasks that may be construed as “medicine,” i.e., taking medical histories and interpreting radiographs. These may be real limitations, or they may only apply to those dental professionals without ad-
DISCUSSION

It can be concluded that the medical and dental academic communities and the dental profession’s organized leadership, as well as specialists in the field, see a role, and perhaps obligation, for dentists in meeting surge manpower requirements in response to catastrophic events. This role will require additional training. Definitions of specific tasks and the operations/systems in which these tasks will be performed need to be developed. The leadership of more varied catastrophic response stakeholders, i.e., first responders and emergency room directors, should be both informed of these findings and assessed as to their views. This survey should initiate serious discussions of “stepping outside the box” in thinking and planning for surge manpower demands. Other “elective” health services personnel may consider their roles in light of this report’s findings that dentists can potentially participate in catastrophic-event response. The overall results and recommendations summarized by this DOJ/DHS-funded report are clearly that the healthcare surge response manpower pool must be considered by the wider professional community.

The following proposals bear consideration by the dental, medical, and public health leadership:

1. Dental curricula should be redesigned and should incorporate education in catastrophic-event procedures in the dental and graduate programs.

2. Dental educators, in collaboration with their medical counterparts, should develop catastrophic-event continuing-education programs for the dental community.

3. Catastrophic-event training for dentists should be flexible in adapting to future defined roles and should be particularly attentive to the local medical and public health infrastructures.

4. Various other professional leadership groups should be included in more detailed role/tasking surveys regarding dentists’ and other professionals’ participation in catastrophic-event response (e.g., state public health officers, Office of Emergency Management).

5. Command and field exercises testing prototype operations and systems that incorporate dentists and other nontraditional medical support personnel should be encouraged at the levels of institutions (e.g., hospitals), communities (e.g., Office of Emergency Management), and federal government (e.g., DHS, Health and Human Services).

6. Surveys and assessments should be done of individual members of the dental profession regarding their willingness to participate and be trained in catastrophic-event response.

Since September 11, 2001, and the anthrax attacks that followed, the federal government has increased the support, development, and national attention given to public health emergency preparedness. The survey reported here suggests one willing and appropriately trained supplemental workforce that can be developed for catastrophic-event response. However, the challenges to the use of surge or supplemental healthcare professionals that can be mobilized to respond within an organized pre-planned system are significant. Hospital administrators involved in responding to the World Trade Center tragedy reported that they couldn’t use medical volunteers when they were unable to verify the volunteer’s identity, licensing, and credentials (training, skills, and competencies). In effect, this precious, needed surge force of unorganized individuals could not be used.

At least two systems are now in place and are available to emergency healthcare planners to insure that surge volunteers have a professional license, have recognized professional skills, and may have additional preparedness training. Congress recognized the need to make optimum use of volunteer health personnel in an emergency and authorized the development of an Emergency System for Advance Registration of Health Professions Volunteers (ESAR-VHP), the Public Health Security and Bioterrorism Preparedness and Response Act of 2002, Section 107.6 The Health Resources and Services Administration (HRSA) was delegated the responsibility for carrying out this legislation and is assisting each state (and territory) in establishing a standardized volunteer registration system. The establishment of these standardized systems will give each state the ability to quickly identify and better utilize health profession volunteers in emergencies and disasters.

The program goal of ESAR-VHP is to have in place state-based systems that will, when complete, form a national system that will allow efficient utilization of health profession volunteers in emergencies by providing verifiable, up-to-date information regarding the volunteer’s identity and credentials. This will allow for the quick and easy exchange of health professionals with other states. Through extensive collaboration with individual States,
professional associations, accrediting organizations, and federal partners, HRSA developed draft interim Technical and Policy guidelines and Standards and Definitions guidelines. Pilot testing of the guidelines began in spring 2005 for physicians, registered nurses, and behavioral health professionals, with 10 states involved. The next version of the guidelines will involve credentialing standards for additional high-priority occupations, including dentists, paramedics, and pharmacists.7

The second system, already in place, that organizes health professionals in anticipation of a potential mass-casualty incident is the Medical Reserve Corps (MRC). It is a specialized component of the Citizen Corps Council (CCC) that offers an opportunity for all healthcare providers to become an integrated part of an emergency response plan. The CCC is a national network of volunteers dedicated to making sure that their families, homes, and communities are safe from terrorism, crime, and disasters. The MRC program was officially launched as a national community-based system in July 2002 and is overseen by the US Office of the Surgeon General. Its mission is to organize teams of local volunteer medical and public health professionals who can supplement existing community emergency response systems during large-scale emergencies. There are approximately 420 MRC units nationwide. There is no “typical” MRC unit; each unit is organized to meet its area’s specific response goals.8

DHS began the process of developing this country’s National Response Plan (NRP) using 15 emergency scenarios developed by the president’s Homeland Security Council, 12 of which are terrorist events.9 According to DHS, their purpose was to form the basis for identifying the capabilities needed to respond to a wide range of major emergency events. These 15 scenarios were developed to identify a range of unique tasks and critical goals, all of which illustrate the scope and magnitude of large-scale catastrophic emergencies for which the nation needs to be prepared (Table 2). DHS also issued the National Preparedness Guidance in April 2005, which provides information, instructions, and examples on how to prepare to prevent, protect from, respond to, and recover from a major disaster.10 This guidance identifies the most urgent needs for enhancing national first-responder preparedness capabilities in terms of seven priorities (Table 3). The first three are more general priorities that will improve overall planning effectiveness. The latter four are more specific goals that will improve capabilities in selected areas in which there is an urgent national need. The one that we are most concerned with, that may demonstrate a potential role for the dental and other health professions, involves strengthening capabilities in medical surge and mass prophylaxis (#6). DHS-written guidance on this issue urges a multidisciplinary and multijurisdictional collaborative approach to ensure effective response capabilities. It calls for meaningful integration among public health, healthcare services, and other appropriate disciplines to enhance the number of surge volunteers.10 The issue of increasing the surge resources involves supplies, facilities, equipment, transportation, and most importantly staffing. There may be short-term solutions now in place for a controlled event such as a plane crash or a train wreck but certainly not for a major disaster over a large geographical area. There may be legal and regulatory obstacles to overcome, but planning must take place to identify available healthcare volunteers and to implement a viable response strategy. The report of the survey of dental and medical leadership described here is one attempt to develop a source of additional healthcare personnel—members of the dental profession—that can be trained and organized to respond in an overwhelming disaster and that would set a pattern for the other health-associated professions. The full report is presented at http://med.nyu.edu/chip.

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REFERENCES


Proposed Educational Objectives for Hospital-Based Dentists During Catastrophic Events and Disaster Response

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ABSTRACT

The purpose of this project was to define education and training requirements for hospital-based dentists to efficiently and meaningfully participate in a hospital disaster response. Eight dental faculty with hospital-based training and/or military command and CBRNE (chemical, biological, radiological, nuclear, and explosive) expertise were recruited as an expert panel. A consensus set of recommended educational objectives for hospital-based dentists was established using the following process: 1) identify assumptions supported by all expert panelists, 2) determine current advanced dental educational training requirements, and 3) conduct additional training and literature review by various panelists and discussions with other content and systems experts. Using this three-step process, educational objectives that the development group believed necessary for hospital-based dentists to be effective in treatment or management roles in times of a catastrophic event were established. These educational objectives are categorized into five thematic areas: 1) disaster systems, 2) triage/medical assessment, 3) blast and burn injuries, 4) chemical agents, and 5) biological agents. Creation of training programs to help dentists acquire these educational objectives would benefit hospital-based dental training programs and strengthen hospital surge manpower needs. The proposed educational objectives are designed to stimulate discussion and debate among dental, medical, and public health professionals about the roles of dentists in meeting hospital surge manpower needs.

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The National Incident Management System (NIMS) is responsible for planning responses to catastrophic events that affect the health and well-being of large numbers of people and may encompass wide geographic areas. NIMS is to be used during any emergency event nationwide at the federal level through the Office of Emergency Preparedness and Federal Emergency Management Agency (OEP, FEMA). NIMS was developed to provide an organizational structure that would allow responders from different jurisdictions and disciplines to effectively work together in catastrophic incidents. This multilayered level of response has been developed and continues to be adapted to prepare for the significant probability of both natural and manmade catastrophic events that may require multijurisdictional resources. NIMS can be activated to respond to chemical, biological, radiological, nuclear, and...
explosive (CBRNE) threats, natural infectious epidemics, and weather and other natural disasters that can occur at any time and in any place with any intensity.

Multiple scenarios have been developed that describe situations of large numbers of physical and true psychological casualties and the encompassing demands on responders by those who are not at risk but are concerned for their health, i.e., “the worried well.” These scenarios have often focused on local hospitals that have diminished staff due to casualties and/or infrastructure damage and the effect of overwhelming patient demand that stretches the capacity of medical institutions to respond adequately. The need for a local surge manpower capacity in catastrophic events was evident during the fall 2005 hurricane season, particularly with the Katrina response. As is clearly evident to any observer, the NIMS failed in that immediate critical period. Regional and national resources were limited in their immediate supporting response due to mobilization and transportation requirements, as well as due to a graphically wide natural disaster area. These resource limitations may reoccur with future natural or terrorist events. This Katrina response failure demonstrates that planning for and executing these plans in the field are different entities and that better preparation and field operations simulations are necessary. Further, the initial Katrina response inadequacies demonstrated the absolute necessity of local institutions to be independently self-sufficient for several days in their ability to respond to high volume emergency/disaster needs of their catchment population. This provides the rationale for considering their dental staff as one partial source for a surge manpower pool for hospitals.

In the dental profession, oral and maxillofacial surgery (OMFS), general practice residency (GPR), and many pediatric dentistry (PD) training programs are hospital-based or contain a major hospital training component. All of these programs have various levels of additional training and education in medicine and surgery above that presented in a standard dental school curriculum. Further, graduates of these hospital-based programs often continue to have hospital practices or affiliations. These personnel are present and should accept their ethical obligation to participate in the management of mass casualties. Therefore, minimal additional training consistent with the goals of the advanced and specialty dental training programs may be all that is necessary to enable these dentists to be integrated into the hospital response in certain catastrophic events. Logic dictates that hospitals planning to respond to a catastrophic event must include optimization of scarce human resources. The training and education of hospital-based dentists coupled with the elective nature of much of their routine clinical activities suggest that these personnel may be able to augment emergency staffs in surge manpower situations, that is, those conditions in which extra health practitioners are needed to respond to large numbers of casualties who may quickly overwhelm hospital manpower resources in catastrophic events. The demand for services during a catastrophic event could create situations in which the OMFS, GPR, and PD residents and hospital staff dentists assume roles that may include the triage and initial treatment of individuals who have experienced head and neck injuries. These activities can be vitally important and may be conducted in environments with potential secondary chemical, biological, or radiological contamination. Casualties in these contaminated situations may have extensive morbidity and include other concomitant injuries. Additionally, training dentists to start IVs, provide respiratory support, conduct injury triage, and provide decontamination may support skilled emergency room manpower during periods of surge requirements. Special needs patients (the infirmed and elderly and children) are often not attended properly or may be overlooked in disaster situations. An additional skill that PDs can offer is their understanding of children’s response to a crisis and their ability to manage fear in that particular population.

The purpose of this project was to identify the additional education and training requirements for hospital-based dentists that would allow their efficient and meaningful participation in hospital disaster responses to catastrophic events. These educational objectives were developed by means of an expert opinion consensus process. The project was supported by the U.S. Department of Justice and Homeland Security.

As a foundation for developing education and training to prepare dentists to contribute meaningfully to a hospital’s surge manpower response to a catastrophic event, five dental faculty conducted a literature review, held discussions with New York City Office of Emergency Management and Health Department planners and the U.S. Army’s Nuclear, Chemical, and Biological Health Sciences Department, and participated in NYC Department of Health and Mental Hygiene point of distribution (POD) exercises and the American Medical Association’s National Disaster Life Support training programs. Based on information gained through these activities, this group
The Center for Catastrophe Preparedness & Response

of faculty developed the following working assumptions:

1. Minor intraoral and extraoral traumatic injuries will likely be the responsibility of dentists.

2. All patients of dental personnel will require a physical examination due to the nature of initial triage. 10

3. Some catastrophic events scenarios may require dental personnel to stabilize and manage extensive facial injuries. 10,11

4. Some catastrophic events scenarios may require dental personnel to stabilize and manage systemic traumatic injuries. 10,12

5. Some catastrophic events scenarios may require dental personnel to assist in the immediate post-stabilization and emergency treatment of systemic traumatic injuries.10,12

6. Blast and burn injuries may be contaminated by radiological or chemical agents that dental personnel must know how to manage. 10,12-14

7. Dental personnel may be utilized in other roles in hospital disaster plans such as:
   a. part of the decontamination team, 12
   b. part of the vaccination/medication delivery team in biological events,15,16
   c. triage officers,7,17,18and
   d. to direct or facilitate communication, particularly with the worried well.

8. Biological attacks employing toxins such as botulism may require a surge capacity of personnel capable of respiratory management, which could include dental personne1,4,10,12

It should be noted that many of these assumptions may suggest additional training in medical and nursing education. 19,20 Moreover, the developed model is not limited to dental professionals, but it can be applied to other nonphysician and nurse health care groups such as dental hygienists, pharmacists, podiatrists, and mental health workers. By identifying particular areas of surge manpower needs and the underlying training needed by health care professionals including dentists, surge roles can be addressed and the necessary skill sets can be incorporated into these professionals’ education.

METHODS

Eight dental faculty with hospital-based training~ two oral and maxillofacial surgeons (OMFS), two pediatric dentists (PD), one oral medicine specialist (OM), one general practitioner (GP), and two additional faculty with military command and CBRNE expertise~ were recruited as an expert panel. A consensus set of recommended educational objectives for hospital-based dentists was developed using this process: 1) identify assumptions supported by all expert panelists, 2) determine current advanced dental education training requirements, and 3) conduct an additional training and literature review and discussions with other content and systems experts.

The process of establishing the consensus recommendations was as follows. First, two panel members drew up a list of assumptions based on literature reviews, their previous theoretical work on meeting surge manpower requirements, and individual discussions with the panel members. This list was circulated to three additional panel members for comment. These revised assumptions were then circulated until final agreement was reached. Second, the accreditation requirements and the specific hospital-based training programs’ curricula with which specialist panel members were involved were reviewed and summarized to provide the panel with a contextual base to integrate proposed learning objectives. Third, the same process as described for establishing the assumptions on which the proposed training was to be based was repeated for the proposed learning objectives: the initial proposal was circulated and comments were used to establish a revised set that was then recirculated until five panel members agreed.

The final step of the educational objectives development process was a review by medical experts in emergency medicine and/or catastrophe response. Their suggestions were then incorporated into the final recommendations following a last review and agreement by all eight panel members. Several notable background activities were concomitantly conducted by various members of the panel to assist in the decision process for competency determination. Among these activities were:

1. Five of the expert panelists attended a comprehensive five-day training course at Fort Sam Houston in San Antonio, Texas. This course was designed by the U.S. Army’s Nuclear, Biological, and Chemical Sciences Division of the Army’s Health Sciences School. The purpose of this training was to enhance the panel’s knowledge base regarding bioterrorism and weapons
of mass destruction including chemical, biological, radiological, nuclear, and explosive (CBRNE) devices. The course also outlined the role of military dentists as triage officers on the battlefield. The first four days consisted of lectures on the types of weapons that have been used and the weapons with the greatest potential for use. The role of government agencies in the chain of command in times of crisis was included. Part of the fourth day was spent on case scenarios to help panel members become familiar with effects of the types of weapons that could be used in an attack. The fifth day was devoted to a field exercise designed to enable the participants to experience and test themselves in setting up a decontamination station and effectively treating casualties in a simulated terrorist attack.

2. Two members of the expert panel participated in a series of courses conducted by the American Medical Association on disaster life support from core through basic and advanced levels (CDLS, BDLS, and ADLS). These courses are designed to better prepare health care professionals and emergency response personnel for all-hazards mass casualty events. The overarching goal of these courses is to standardize emergency response training nationwide and strengthen the nation’s public health system. The courses stress a comprehensive all-hazards approach to help physicians and other health professionals deal with catastrophic emergencies from manmade acts as well as from explosions, fires, natural disasters (such as hurricanes and floods), and the outbreak of infectious diseases.

3. Under the direction of the New York City Department of Health, two point of distribution exercises were conducted at the New York University College of Dentistry. In the case of a bioterrorist attack, mass prophylaxis may be required. To dispense antibiotics or vaccine to the public, point of distribution (POD) systems would be set up, requiring thousands of health professionals as staff. In these PODs, clinic roles are assigned to each health professional based on his or her skills and licensure. Specific POD functions include medical evaluation, triage, vaccination or distribution of medication, and customer serviceline management. Four members of the expert panel participated, with one member also directing one of the POD exercises.

4. Two members of the expert panel participated in six disaster response seminars developed by NYU Medical School’s emergency medicine faculty and also participated in a mini-internship in the Emergency Medicine Department at Bellevue Hospital where, under the direction of ER physicians, they were exposed to the skills of rapid patient evaluation and the search for underlying systemic disease.

5. Six of the expert panel’s members were trained by the New York City Department of Health and Mental Hygiene in telephone triage for an avian flu outbreak. Four of these participants are now part of New York City’s Medical Reserve Corps specifically assigned to the health department for telephone triage duties.

PROPOSED EDUCATIONAL OBJECTIVES

After participating in the training experiences and reviewing their own experiences, the expert panel developed educational objectives in five thematic areas for hospital-based dentists during catastrophic events and other disaster response situations. The educational objectives define skills that the panel believes necessary for hospital-based dentists to be effective in treatment or management roles in times of a catastrophe.

The proposed learning objectives are presented in Tables 1-5. Each table contains the learning objectives of one of the five thematic areas: 1) disaster systems, 2) triage/medical assessment, 3) blast and burn injuries, 4) chemical agents, and 5) biological agents. Each table contains a column with the specific learning objectives and sources where information on the learning objective can be found. The right column on each table provides the specific detailed citation reference chapters/pages for sources referenced under multiple learning objectives.

Overall, hospital-based dentists must show competency by meeting the educational objectives in the following content/topic areas:

1. Disaster Systems

The first set of educational objectives is related to gaining an understanding of hospital and national response systems (Table 1). Attainment of this knowledge base will enable dentists to communicate effectively and professionally with staff and the public regarding a response to a catastrophic event. These educational objectives also may promote dental professional involvement at all levels in disaster planning and response.

2. Triage/Medical Assessment

The triage/medical educational objectives address emergency medical assessment in addition to triage sys-
Natural or manmade catastrophic events place great manpower demands on communities and their health care and public health systems. This surge manpower requirement may need to be addressed in innovative ways that utilize the skill of clinically experienced personnel who are not physicians or nurses and fall outside the traditional model for delivering care in a hospital and/or emergency room. Accomplishing this will require a paradigm shift in thinking about who should be recruited, how they should be trained and credentialed, where they should function and in what capacity, and what is the mechanism to integrate them seamlessly into the health delivery system. To accomplish this concept shift, the designers of emergency management programs should think broadly about any health care professional group or allied health group whose training provides a basic skill set that could be used to meet the manpower needs during an emergency response.

Dentists, particularly those trained and/or associated with hospitals, have advanced clinical training and a familiarity with the operation of such medical systems. This knowledge makes hospital-based dentists a considerable resource in mass casualty situations. However, additional training and the combined efforts of the dental and medical professions are needed to encourage and demonstrate practical integration of dentists into hospital disaster response plans. Additionally, dentists receiving specialized training modules related to catastrophic events will be able to provide leadership in their communities’ planning, even in the absence of a direct surge manpower responsibility, and assist in formulating public health response planning.

Although the proposed competencies described here may seem extensive and difficult to incorporate into the typical postgraduate dental training program, much of the material is already available or already exists in dental residency training components such as anesthesia rotations or modules on physical diagnosis. Given that many of the competencies we propose are mutually reinforcing to the medical training that hospital dentists normally receive, one would expect an enhanced learning experience to result, allowing development of additional skills that will be valuable during a response to a mass casualty emergency requiring deployment of surge manpower.

Many of the proposed components have also been suggested for inclusion in the dental school curriculum and are, in fact, integrated at some dental schools. Such actions at the dental undergraduate level would both decrease the time/resources commitment needed at the postdoctoral level and present an intellectual argument within hospital environments for the practicality of dentists’ having a broader role in disaster response planning.

DISCUSSION

Natural or manmade catastrophic events place great manpower demands on communities and their health care and public health systems. This surge manpower requirement

3. Blast and Burn Injuries

These educational objectives include validating the knowledge of pathophysiology and general treatment of blast and burn injuries (Table 3). Dental professionals who acquire the knowledge and skills addressed in these objectives will be able to recognize specific symptoms and differentiate types of blast and burn injuries. The didactic and clinical skills described will prepare the dentist to carry out an assessment and emergency treatment to casualties with blast and burn injuries.

4. Chemical Agents

Table 4 lists educational objectives regarding chemical agents and the decontamination process. Meeting these objectives will provide dentists with a working knowledge of different types of chemical agents and treatments for them. Dental professionals who acquire these skills may be able to function as a responder in the event of chemical attack. In addition, dental professionals will be able to properly use personal protective equipments as well as perform mass decontamination in the chemical environment.

5. Biological Agents

The final set of educational objectives is related to the understanding of biological agents and mass medication/vaccination delivery systems (Table 5). Dental professionals who accomplish these objectives will be able to understand the specific symptoms and signs of various Class A biological agents. Moreover, meeting these educational objectives will enable dental professionals to participate in a point of distribution (POD) system and perform medication delivery and vaccinations. The biological agent objectives will encourage dentists to play a role in the response to a biological attack or outbreak.

Discussion

Natural or manmade catastrophic events place great manpower demands on communities and their health care and public health systems. This surge manpower requirement

systems (Table 2). Dental professionals who acquire these skills will understand the operation of triage systems and how casualty classification is performed in response to a catastrophic event. Furthermore, dental professionals will be able to perform critical medical assessment and immediate treatment with the training proposed for emergency medical procedures.
We conclude that there are specific educational objectives that would benefit hospital-based dental training programs and strengthen hospital surge manpower needs in catastrophic events. Further, the knowledge base and the skills we described here may be considered for the dental school curriculum and non-hospital-based advanced training programs to provide communities with trained leadership from the dental profession for a significant contribution to local catastrophic response planning. The proposed training should be a catalyst for dentists, physicians, public health specialists, dental educators, and faculty in accredited dental residency programs to discuss and debate the roles of dentists in meeting surge medical and public health needs.

We invite our readers’ feedback and encourage formal discussions as to whether these proposals truly improve community capacity to deal with disasters. Is the initiative to give hospital-trained dentists a role on the emergency medicine team valid? Have the proper and realistic priorities been addressed, and are the proposed competencies adequate to achieve their training goals? Readers are directed to “Dental Profession Comments Forum” at chip.med.nyu.edu/course/view.php?id=36. Acknowledgments We would like to thank the following New York University faculty and students for their assistance on this project: Drs. Robert Glickman, Rajiv Karloopia, and Vasiliki Karlis and Mr. Seokhwan Oh. We would also like to express our appreciation to the U.S. Army’s Nuclear, Biological, and Chemical Sciences Division of the Army’s Health Sciences School faculty and staff, the New York City Department of Health and Mental Hygiene, and the faculty and staff of Bellevue Hospital Emergency Department, New York City.

REFERENCES


### Table 1. Educational objectives for disaster systems

<table>
<thead>
<tr>
<th>Educational Objectives</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe the hospital disaster plan.</td>
<td>ch. 8, pp. 57-89 in <em>Disaster Medicine</em></td>
</tr>
<tr>
<td>2. Describe the national incident management system (NIMS).</td>
<td>ch. 10, p. 109 in <em>Disaster Medicine</em></td>
</tr>
<tr>
<td>3. Describe the incident command system.</td>
<td>ch. 2, pp. 3-5 in <em>Advanced Disaster Medical Response</em></td>
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<td></td>
<td>ch. 10, p. 243 in <em>Tactical Emergency Medicine</em></td>
</tr>
<tr>
<td>4. Identify who would respond at the state and/or federal level (e.g., FBI, FEMA, and AMR) based on the type of attack.</td>
<td>ch. 2, pp. 14-26 in <em>Weapons of Mass Destruction</em></td>
</tr>
<tr>
<td>5. Describe the Federal Response Plan.</td>
<td>ch. 12, pp. 123-32 in <em>Disaster Medicine</em></td>
</tr>
<tr>
<td>7. Know what the Medical Reserve Corps is and how to join.</td>
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</table>

### Table 2. Educational objectives for triage/medical assessment

<table>
<thead>
<tr>
<th>Educational Objectives</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe the Military 4 stage system.</td>
<td>pp. 5-16, General Triage, at chip.med.nyu.edu</td>
</tr>
<tr>
<td>2. Demonstrate the ability to properly classify casualties into the proper triage category [ideal].</td>
<td>ch. 2, p. 14 in <em>Disaster Medicine</em></td>
</tr>
<tr>
<td>3. Conduct a physical exam that assesses cardiorespiratory status [minimum], extent of head and neck injuries [minimum], and complete physical examination including neurological assessment [ideal].</td>
<td>pp. 8-10, General Triage, at chip.med.nyu.edu</td>
</tr>
<tr>
<td>4. Must be certified in Basic Life Support (BLS) [minimum], Core and Basic Disaster Life Support (C/BLS) [minimum], Advanced Cardiac Life Support (ACLS) [ideal], and Advanced Disaster Life Support (ADLS) [ideal].</td>
<td>pp. 84-97 in <em>Sheehy's Emergency Nursing</em></td>
</tr>
<tr>
<td>5. Describe the psychological effects of terrorism.</td>
<td>Trauma &amp; Injury Triage, at chip.med.nyu.edu</td>
</tr>
<tr>
<td>6. Accurately select and identify criteria that would allow the application of a tourniquet and describe the proper application of such.</td>
<td><a href="http://www.ama-assn.org/ama/pub/category/12606.html">www.ama-assn.org/ama/pub/category/12606.html</a></td>
</tr>
<tr>
<td>7. Recognize signs and symptoms of acute shock.</td>
<td>ch. 24, pp. 177-84 in <em>Advanced Disaster Medical Response</em></td>
</tr>
<tr>
<td>8. Demonstrate ability to use adjunctive airway support including the Laryngeal Mask Airway (LMA).</td>
<td>ch. 35, p. 636 in <em>Clinical Procedure in Emergency Medicine</em></td>
</tr>
<tr>
<td>9. Based on appropriate assessment, hospital-based dentists must properly record the information on the casualty and describe reasons for doing so.</td>
<td>Section 2, ch. 5-9, pp. 49-63 in *Emergency Medicine Manual Appendix D, pp. 346-59 in <em>Tactical Emergency Medicine</em></td>
</tr>
<tr>
<td>10. Be able to place an appropriate I.V. [ideal].</td>
<td>ch. 2, p. 13 in <em>Disaster Medicine</em></td>
</tr>
<tr>
<td>11. Be able to monitor fluid status [ideal].</td>
<td>Appendix C, pp. 334-45 in <em>Tactical Emergency Medicine</em></td>
</tr>
<tr>
<td>12. Be able to perform an emergency tracheotomy [ideal].</td>
<td>ch. 21, pp. 401-12 in <em>Clinical Procedure in Emergency Medicine</em></td>
</tr>
<tr>
<td>14. Must complete a minimum two-week emergency medicine rotation with the goal of achieving minimal competence in airway assessment and management.</td>
<td>ch. 41, pp. 252-62 in *Internal Medicine Appendix D, pp. 346-59 in <em>Tactical Emergency Medicine</em></td>
</tr>
<tr>
<td>Educational Objectives</td>
<td>Reference</td>
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</tr>
<tr>
<td>1. Describe the effects of blast injuries; describe the pathophysiology and the assessment and management of 1) pulmonary air embolus, 2) respiratory failure, 3) abdominal injuries, 4) organ assessment, and 5) hearing loss.⁵,¹⁰,¹²</td>
<td>ch. 13, pp. 95-7 in Advanced Disaster Medical Response</td>
</tr>
<tr>
<td>2. Describe the pathophysiology and management of burn injuries related to explosives and chemicals, including the ability to differentiate between partial thickness and full thickness burns.⁴,¹⁰,¹²</td>
<td>ch. 17, pp. 123-30 in Advanced Disaster Medical Response</td>
</tr>
<tr>
<td>3. Describe the pathophysiology of airway burns and describe the signs and symptoms of airway burns.¹⁰,²⁷</td>
<td>ch. 4, pp. 75 in Tactical Emergency Care</td>
</tr>
<tr>
<td>4. Define and properly triage casualties based on the estimation of the body surface area (BSA) involved.⁵,¹²</td>
<td>ch. 4, pp. 65-80 in Tactical Emergency Care</td>
</tr>
</tbody>
</table>

The Center for Catastrophe Preparedness & Response

Originally published in the *Journal of Dental Education*, August 2006
Table 4. Educational objectives for chemical agents

<table>
<thead>
<tr>
<th>Educational Objectives</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe the types of chemical agents that could possibly be used in an attack [minimum].</td>
<td>ch. 11, p. 70 in Advanced Disaster Medical Response</td>
</tr>
<tr>
<td>2. Describe the pathophysiology of different chemical agent types, e.g., choking agents (pulmonary), blister agents (vesicants), blood agents (asphyxiants), nerve agents (cholinesterase), and incapacitating agents [minimum].</td>
<td>ch. 5, pp. 92-4 in Tactical Emergency Care</td>
</tr>
<tr>
<td>3. Describe and appropriately demonstrate the ability to properly triage chemical casualties [ideal].</td>
<td>ch. 4, pp. 45-6 in Weapons of Mass Destruction</td>
</tr>
<tr>
<td>4. Describe the principles and practice of a mass decontamination station [minimum].</td>
<td>ch. 206-7, pp. 1288-99 in Internal Medicine</td>
</tr>
<tr>
<td>5. Understand the use of chemical and radiological monitoring devices [ideal].</td>
<td>pp. 11-30, Recognizing Clinical Syndromes for Disaster, at chip.med.nyu.edu</td>
</tr>
<tr>
<td>6. Describe the prognosis and treatment modalities of specific chemical agents [ideal].</td>
<td>ch. 11, pp. 62-8 in Advanced Disaster Medical Response</td>
</tr>
<tr>
<td>7. Describe and demonstrate the proper use of personal protective equipment (PPE) [ideal].</td>
<td>ch. 5, pp. 94-113 in Tactical Emergency Care</td>
</tr>
</tbody>
</table>

Table 5. Educational objectives for biological agents

<table>
<thead>
<tr>
<th>Educational Objectives</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. Define and describe the nature and classification of biological agents (i.e., what makes a good biological weapon and why?) [minimum].</td>
<td>ch. 6, pp. 128-30 in Tactical Emergency Care</td>
</tr>
<tr>
<td>2. Appropriately describe the delivery and route of exposure of such agents [minimum].</td>
<td>ch. 5, pp. 65-7 in Weapons of Mass Destruction</td>
</tr>
<tr>
<td>3. Describe the pathophysiology of the various Class A biological agents [minimum].</td>
<td>ch. 34, pp. 131-41 in Tactical Emergency Care</td>
</tr>
<tr>
<td>4. Describe the use of personal protective barriers needed for biological agents and how they differ from the standard universal precautions [minimum].</td>
<td>ch. 5, pp. 67-78 in Weapons of Mass Destruction</td>
</tr>
<tr>
<td>5. Describe the set-up and practice of a point of distribution (POD) system [minimum].</td>
<td>ch. 7, pp. 110-5 in Weapons of Mass Destruction</td>
</tr>
<tr>
<td>6. Demonstrate the ability to perform appropriate vaccination to the masses [ideal].</td>
<td>ch. 10, pp. 10-21, Hospital Decontamination and PPE, at chip.med.nyu.edu</td>
</tr>
<tr>
<td>7. Demonstrate the ability to actively participate in a mock POD delivery system [ideal].</td>
<td>ch. 5, pp. 94-113 in Tactical Emergency Care</td>
</tr>
<tr>
<td>8. Demonstrate the ability to detect the signs and symptoms of specific biological agents [ideal].</td>
<td>ch. 4, pp. 29-30, ch. 34, pp. 355-6 in Disaster Medicine</td>
</tr>
</tbody>
</table>

The Center for Catastrophe Preparedness & Response
APPENDICIES
CITATIONS

Psoter WJ, Triola MM, Morse DE, Rekow EDE. Enhancing Medical and Public Health Capabilities During Times of Crisis, NYSDJ 2003, 69: 25-27


DENTAL CURRICULUM

The catastrophe preparedness curriculum at New York University’s College of Dentistry is given to all dental students including dental hygiene students who participate in the senior year (D4) curriculum. NYU’s College of Dentistry has approximately 350 seniors annually, making it by far the largest in the country. Below is an outline of New York University College of Dentistry catastrophe preparedness curriculum.

Freshman Curriculum (D1)
- Shelter in Place, Emergency Evacuations, and Fire Hazard –Part of D1 orientation.

Total D1: 1.0 hour

Sophomore Curriculum (D2)
- Agents of Bioterrorism –Pathogens, as part of the General Pathology and Infectious Diseases course. In this year we employ the concept of inserting new modular elements into existing courses with particular emphasis on the CDC Category “A” agents.

Total D2: 7.0 hours

Junior Curriculum (D3)
- Oral and Systemic Manifestations of Bioterrorist Agents –Clinical signs and symptoms as part of the course entitled, Care of the Medically Complex Patients. Students are introduced to oral and systemic manifestations of bioterrorist agents including clinical signs and symptoms.

Total D3: 3.0 hours

Senior Curriculum (D4)
- A stand alone course given to all students
  1. Lecture form the dean or invited guest around “Why Dentists Should be Involved” or “How They Can Contribute”
  2. Core Disaster Life Support (CDLS), 4-hour AMA course for healthcare providers, leading to a certificate of completion from the AMA
  3. A Point-of-Distribution (POD) exercise, 3-hour smallpox scenario, providing vaccinations as students “play” patients and providers
  4. Students in groups of 4 are required to submit a protective action plan for their future dental office for any one of the 15 DHS designated all-hazard planning scenarios. The superior plans are presented and discussed in class

Total D4: 12.0 hours

Total hours over the curriculum, 23.0 hours