

Conference Summary

Dentistry's Role in Responding to Bioterrorism and Other Catastrophic Events

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Washington, DC

September 11, 2001 taught Americans that acts of international terrorism can happen here and are more than likely to happen again. To counter terrorism a federal Department of Homeland Security has been established, complemented by new or expanded programs at federal, state, and local levels aimed at safeguarding the country and saving lives. Toward those ends the call has gone out to America's health professionals to join the nation's biodefense efforts. Not only can health professionals help educate the public, they can contribute a broad range of technical skills and practical experience to terrorism response plans that will enable the country to meet an imminent threat or an overt catastrophe.

Precisely how *dental* professionals can respond – and are responding – was the focus of an intense and moving two-day meeting in Washington, D.C. in late March 2003, sponsored by the American Dental Association (ADA) and the United States Public Health Service.¹ It was a moving experience because so many speakers and attendees were eyewitnesses or had served at the New York City “Ground Zero” or at the Pentagon for days and weeks following the September 11 attacks. Some described the heat and fumes of still-burning fires at the World Trade Center: a heat so intense that firefighters had to discard their boots twice a day because the soles were burned through. Others described how dental volunteers irrigated the eyes of firefighters, dressed wounds, served as anesthesiologists, and ordered much-needed supplies of commodities like saline and gloves. Still others described the trailers used as temporary morgues where teams of dentists worked around the clock to identify victims, often with only severely fragmented and mutilated remains. Yes, forensics, the well-established role of dentistry in identifying victims of crimes or disasters on the basis of dental records, played a significant role in the response to the September 11 attacks--as it will in any future disasters, whether natural or manmade. But the point of the March meeting was to consider in what ways, by virtue of their training and experience, dental professionals can contribute to the detection and management of acts of bioterrorism. The meeting was a follow-up to an ADA planning workshop held in June 2002 and summarized in the September 2002 *Journal of the American Dental Association (JADA)* by the ADA's Chief Policy Advisor, Dr. Albert Guay.

¹ The Centers for Disease Control and Prevention and the National Institute of Dental and Craniofacial Research, National Institutes of Health, U.S. Public Health Service, Dept. of Health and Human Services, were the primary U.S. Public Health Service sponsors. Also, special thanks to the American Dental Education Association, the American Association for Dental Research, the Association of State and Territorial Dental Directors, the Health Resources and Service Administration, and the Departments of Defense and Veterans Affairs for their assistance in planning the conference.

Prevention is Key

As a physician whose career has forged emergency preparedness with medical care, U.S. Surgeon General Richard H. Carmona was an apt and forceful keynote speaker, complimenting dentistry for its pioneering efforts in prevention, and emphasizing the importance of using the model of prevention in relation to bioterrorism. The public—all 280 million of them—he said, must be educated about what to expect and learn not to be intimidated. But a fine line needs to be drawn: too much information, he cautioned, can build fear and anxiety. Admiral Carmona went on to discuss current government moves to augment the work of personnel in Emergency Medical Systems, the National Guard, the U.S. Commissioned Corps, and other uniformed services, in the event of a bioterrorism attack. He described the formation of a Medical Reserve Corps, composed of volunteer health professionals, including retired health professionals, and also the Metropolitan Medical Response Systems, located in over 120 cities in the country. The metropolitan units are designed to be the hub of a bioterrorism response force in defense of a given city and surrounding areas. Personnel in these units, already skilled in handling hazardous material accidents, will receive additional training on biological, nuclear, and chemical weapons. But they will not be working alone. Partnerships are essential to the success of these efforts, Admiral Carmona emphasized. Dentistry can play a significant role, but it needs to step forward, be recognized, and join in the effort.

As though in answer to Admiral Carmona's call, Dr. Michael Alfano, Dean of New York University College of Dentistry, described how the school responded on September 11th; what emergency preparedness educational programs and policies had already been under development before the attacks (discussed later in the conference); and how the nature of the dental profession—including the location, equipment, and staff of a typical dental office--can be major assets in an emergency. It was Dr. Alfano, among others, who described the work of dental volunteers at the World Trade Center, including NYU dental students.

A Hundred Years' War

Dr. Alfano spoke of the shock and horror he felt in witnessing events that took place scarcely a mile from the school. These reactions grew to feelings of depression, once the realization set in that terrorism has unleashed a new kind of warfare on the world—one without an end game. It is more like a hundred years' war, he said, which "you and me and our children and their children's children will be fighting." What can we do? What should we do? His answer was to mobilize and to catalyze activities. It's all about leadership, he said. As the dean of a dental school he saw it as a moral duty to protect staff and students; dentists have similar obligations to protect their staff, their patients, their family, their community. Plans must be put in place to deal with emergencies, whether chemical, biological, radiological, nuclear, or explosive. At a minimum, such plans must include exit strategies to evacuate personnel if necessary, or to secure the safety of the premises.

But there is more. Dentists and allied professional staff who volunteer as first responders can bring well-honed skills to an emergency. They can perform triage (as dentists have done on the battlefield in conventional wars), they can administer anesthetics, treat head and neck injuries, provide first aid, including CPR. They can assist medical personnel; they can vaccinate individuals. And they can learn to do more. Further, dental offices, equipped with air and suction lines, x-ray equipment and sterilizing capability, can be used as self-contained alternate medical sites if hospitals are under attack or are unsafe because of widespread infection associated with biological weapons. In that regard, dentists can also serve as sentinels in an early warning system for bioterrorism, if, for example, they note unexpected increases in appointment cancellations or no-shows that might signal the spread of disease in a community.

Dr. Alfano emphasized that biological pathogens are the most problematic of terrorist weapons, because they are so insidious. In the case of the anthrax attacks that occurred in the months immediately following September 11, no one was aware that deadly spores were being spread through the mail, which, given the nature of infectious disease, would entail an incubation period before symptoms would show up. When symptoms did appear, they so resembled the aches, fever, and malaise of flu that those affected delayed seeking treatment, a delay that proved fatal in some cases. In the end 22 people were infected and 5 died. The effect on the public at large was catastrophic, however. There were alarming failures in communication, which compounded the confusion, fear, and panic of the public and resulted in a rush to acquire antibiotics. To be sure, thousands of people in the buildings or postal facilities where the spore-laden mail was handled rightly received prophylactic antibiotics, but many more people who were in no danger applied to their physicians or dentists for antibiotic prescriptions. The outbreak of SARS, severe acute respiratory syndrome, is yet another cautionary tale of the extent to which an unknown and highly lethal, although in this case a naturally occurring infectious agent, succeeded in shutting down major cities in Asia and Canada, crippling economies, and disrupting the social fabric.

“Category A” Agents

Lieutenant Colonel Ross H. Pastel, Ph.D., of the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) amplified the dangers of biological weapons in his review of recent history, along with details about the six agents which the Centers for Disease Control and Prevention classifies as “Category A”:² smallpox, anthrax, plague, botulinum toxin, tularemia, and viral hemorrhagic fever (e.g., Ebola). Their “A” status is based on significant criteria; that they are easily disseminated or transmitted from person to person, have high rates of mortality or morbidity, are most likely to cause panic or social disruption—and demand public health preparedness. Aggravating the risk is the knowledge that over the past few decades huge quantities of several of these agents are known to have been produced in Russia and in Iraq (reported at the time of the Gulf War) and are rumored to be stockpiled in a number of countries in Asia, Africa, and the Middle

² Lesser threats but still serious bioterrorism agents are classified as Category B: Q fever, brucellosis, glanders, equine encephalitis, and typhus, and Category C, which includes emerging infectious diseases such as the hantaviruses.

East. As an example of potency, Dr. Pastel noted that the accidental release of a one gram of anthrax spores in the Russian city of Sverdlovsk in 1979 led to 66 human fatalities and to scores of cattle deaths from as far as 50 kilometers downwind.

Much is known about the pathogenesis of Category A diseases (with the caveat that aerosolized/weaponized forms of the agents may pose additional risks). Information on incubation times, symptoms, diagnosis, and treatment is available on the Internet and can be downloaded, free, from a number of authoritative Web sites, including USAMRIID's www.biomedtraining.org. While Dr. Pastel reviewed what is known about plague (pneumonic and bubonic), toxins like ricin and botulinum, tularemia (rabbit fever), and the viral hemorrhagic fevers, his discussion concentrated on smallpox and anthrax as the most dangerous of the A group.

Smallpox, rightly regarded as one of the most horrific of human diseases, was declared eradicated from the world in 1980 as a result of the concerted efforts of the World Health Organization to contain local outbreaks through vaccination. Only the U.S. and the U.S.S.R. were officially designated to retain stores of the virus. The disease can manifest in a mild form, *Variola minor*, which can be clinically confused with chickenpox. However, smallpox most often appears in its virulent form, *Variola major*, in which the pustules that eventually form may be discrete, confluent, or hemorrhagic, the latter two forms associated with high rates of mortality. The disease is spread from person to person through face-to-face contact and exposure to respiratory droplets, with an average incubation period of 12 days. Acute prodromal symptoms include excruciating headache and backache with occasional severe vomiting and delirium. While it is unlikely that an infected person would keep a dental appointment, dentists should be aware that smallpox lesions appear on the palate and throat before the skin rash develops, marking the stage at which the patient is infectious. The rash spreads centrifugally from hands, forearms, and face, and progresses from macules to pustules. Smallpox remains contagious until the last scab falls off, making quarantine essential. While there is a candidate drug under development, there is as yet no effective chemotherapy available, so treatment is supportive only. All those exposed to infection, even those considered at risk for vaccine side effects, such as pregnant women, those with eczema or immunocompromised individuals should be vaccinated, ideally within 24 hours. However, the vaccine may still be protective if received up to 4 days following exposure.

Dr. Pastel described an outbreak of smallpox in Yugoslavia in 1972 when a returning traveler became infected and in turn infected 38 others—including 36 healthcare workers in the hospital where he sought treatment. Once the diagnosis was made, Marshal Josip Broz Tito, the President of Yugoslavia at that time, acted immediately to close all international borders and succeeded in having all citizens vaccinated within a period of two weeks—actions that effectively forestalled an epidemic.

Unlike smallpox, Dr. Pastel noted that anthrax is not contagious. *Bacillus anthracis* spores can directly reach the lungs of an individual through inhalation (where infection leads to a widening of the mediastinum and invasion of bacteria into lymph nodes). Alternatively, the spores can reach the gastrointestinal tract as a result of eating

contaminated meat, or penetrate the skin in cutaneous anthrax. It is the cutaneous form, which leaves a blackened crust or eschar, which gives the disease its name: anthrax, derived from the Greek word for coal. The antibiotics ciprofloxacin and doxycycline are used to treat anthrax and as prophylaxis for those exposed. There is a vaccine available, composed primarily of inactivated bacterial “protective antigen.” Antibodies formed against the disease take the form of a protective antigen that prevents the bacterial toxins, lethal factor and edema factor from getting inside cells to do their damage.

Oral Manifestations

Following Dr. Pastel’s talk, Michael Glick, DMD, of the University of Medicine and Dentistry of New Jersey, addressed what is known about the oral manifestations of Category A agents. In the case of smallpox, oral signs develop 24 hours before the skin rash. Not only is the patient infectious at this time, but the highest titer of virus occurs throughout the first week of illness, with large amounts of virus in saliva. Oral signs can include tongue swelling, multiple oral mucosal vesicles, ulceration, and mucosal hemorrhaging. Oral signs are also evident in inhalation and gastro-intestinal anthrax. In oropharyngeal anthrax the mucosa appears edematous and congested; there may be neck swelling, fever, and sore throat. In cases reported from Thailand pseudomembranous-covered patches on the oropharynx were observed. Incubation periods were short in these cases and infections progressed rapidly to death within 33 hours.

There is scant information with regard to oral signs of other Category A agents. The major signs of botulism are paralysis, while with plague there is bloody sputum. (Indeed, Dr. Pastel had remarked that if you find bloody sputum in an otherwise healthy young person, think plague!). Dr. Glick reported that 4 percent of tularemia cases show necrotizing ulcerations, while viral hemorrhagic fevers will include mucosal bleeding.

More detailed characterization of oral manifestations should document the types of lesions on different oral surfaces and compare them with pharyngeal and cutaneous lesions, noting severity, number, size, and duration. Such analyses, along with much-needed epidemiologic studies could provide keys to early diagnosis and treatment. Dr. Glick stressed the need not only for more epidemiology but also for research to find oral markers of disease--with the hope of developing early diagnostic tests using oral fluids. He noted that gingival fluid could be examined for T-cells and macrophages, which may harbor viruses. Oral markers of disease progression or immune function deterioration (which have been found in the case of HIV/AIDS) would also be valuable. To expedite oral health research, he proposed the creation of Resource Centers staffed by experts with access to known and suspected cases.

The Anti-bioterrorism Research Agenda

In the meantime, Congress, well aware of the need to expand bioterrorism research, increased the FY 2003 budget of the National Institutes of Health by \$1.497 billion (primarily targeted to the National Institute of Allergy and Infectious Diseases, NIAID). Anthony S. Fauci, MD, NIAID Director and keynote speaker on the morning of the

second day of the conference, described the strategic plan and research agendas for Categories A, B, and C agents that the Institute has now developed, and provided an overview of activities underway. The bulk of the increase will be used to expand research capacity and will include the establishment of regional centers of excellence throughout the country that will be equipped with laboratories with high biological safety levels for containment of dangerous pathogens. Vaccine research commands the next highest budget amount, followed by basic research, therapeutics, and diagnostics.

Dr. Fauci discussed the re-introduction of smallpox vaccinations in light of concerns about side effects, including recent reports of heart attacks. At present, the vaccinations are mandatory for the military and are being recommended, but offered on a voluntary basis for healthcare workers, emergency personnel, and other first responders.

Vaccinations are not recommended for the general public at this point. The vaccine, Dryvax, is a dried form, which has been in storage for some time. Tests have confirmed that the vaccine in undiluted form remains highly effective, achieving success rates of over 97 percent (measured by vesicle formation at the vaccination site) but Dryvax is almost equally effective in 1:5 and 1:10 dilutions. This is good news in the event of a major public health catastrophe necessitating the vaccination of all Americans.

Production of additional stores of Dryvax has gone forward, but in light of the known risks to subsets of the population, NIAID is accelerating research to develop a new vaccine. Candidates include Modified Vaccine Ankara, which has a good safety record and is currently being assessed in a Phase I study (for safety) and “LC16m8,” which has been tested with a good safety record in over 50,000 Japanese children. There is also promise in treating smallpox or countering vaccine side effects with Cidofovir, a drug originally produced to treat cytomegalovirus infection. Also underway are studies to improve vaccines against anthrax, as well as tests of a newly developed vaccine against Ebola in a monkey model.

Advances in genomics that are allowing for the rapid mapping and sequencing of the genomes of dangerous pathogens also offer the opportunity of selecting new targets for therapy or for use as immunizing molecules. Also at the basic research level, Dr. Fauci raised tantalizing possibilities of exploiting and enhancing the body’s innate immune system (as opposed to the adaptive immunity conferred by vaccines) as an immediate defense against bioterrorism agents. Other immuno-defense mechanisms should also be explored, he added, including the development of monoclonal antibodies against smallpox.

Finally, Dr. Fauci described “Project BioShield” the Bush administration’s new three-point incentive program for industry. The program would give NIH increased authority and flexibility to expedite research and development of critical biomedical countermeasures, provide a secure funding source for NIH (not dependent on annual appropriations) to allow purchasing critical counterterrorism products, and establish an FDA Emergency Use Authorization for critical biomedical countermeasures.

Federal, State, and Local Response Planning

*From the perspective of the individual health professional, whether dentist, dental hygienist, dental assistant, physician, nurse or any other health professional who would like to volunteer in the event of a terrorist attack, the key questions are **What can I do? Whom should I contact? How do I get on board?** These questions are often followed by concerns about the need for additional training, certification, and the availability of liability insurance to cover actions performed in an emergency. The Conference addressed these issues in a number of sessions, beginning with one describing the emergency response measures and teams in place at federal, state, and local levels.*

At the Federal Level

Admiral John Babb, R.Ph., MPA, Director of the Commissioned Corps Readiness Force of the U.S. Public Health Service, began his survey of the federal response to emergencies by noting that 11 federal agencies including the Departments of Agriculture, Energy, Defense, and Health and Human Services, plus one private agency, the American Red Cross, have traditionally played a role in responding to disasters. His talk focused on the Department of Health and Human Service's Emergency Support Function (ESF), designed to supply a range of health and medical services in the event of a disaster. Several ESF responsibilities--in particular, for medical personnel, equipment and supplies, patient evacuation, hospital care, veterinary services, victim identification, and mortuary services have now been transferred to the Department of Homeland Security (DHS), established on March 1, 2003. The remaining ESF responsibilities, in such areas as mental health, public health information, health surveillance, and in food, drug, and device safety, will be coordinated out of the Office of Emergency Preparedness and the Office of the U.S. Surgeon General and carried out by federal agencies, such as the Centers for Disease Control and Prevention (CDC) and the Food and Drug Administration (FDA). A new "National Response Plan" is expected to be released in 2003.

The major resource for personnel that DHS will draw upon in an emergency is the National Disaster Medical System (NDMS). The system, established in 1984, consists of 96 teams of health professionals spread throughout the country, a force that includes 8,000 volunteers from the private sector. Some NDMS units, notably Disaster Medical Assistance Teams (DMATs), provide general medical support from units numbering about 35 individuals that include physicians, dentists, pharmacists, nurses, emergency medical technicians, and support staff. Other NDMS teams consist of specialists in such areas as burn treatment, mental health, decontamination of chemical or biological hazards, veterinary care ("veterinary medical assistance teams" or VMATS), and mortuary teams (DMORTs).

Augmenting these response teams is the Commissioned Corps Readiness Force (CCRF), established in 1994, and now coordinated out of the Office of the U.S. Surgeon General. The Force consists of trained and deployable members of the U.S. Commissioned Corps who can respond to extraordinary public health emergencies occurring domestically or abroad. Members may be asked to serve independently in smaller or larger teams or join DMATs or other NDMS teams. According to a recent directive to the Surgeon General,

at least 70 percent of the U.S. Commissioned Corps are expected to be deployable CCRF members by 2005.³ Admiral Babb devoted the remainder of his talk to dramatic photographs of NDMS and CCRF teams in action at World Trade Center and Pentagon sites. Within minutes of the attacks Health and Human Services Secretary Tommy Thompson had activated the forces, which at the World Trade Center included 5 DMATs as well as mortuary, veterinary, and chemical/biological hazard teams and 35 epidemiologists from the CDC. As much as the photos provided eloquent illustrations of the dedication and professionalism of these healthcare workers, they revealed the extremely hazardous conditions under which they worked. In Admiral Babb's words:

Experienced responders said this was the most dangerous job site they had ever seen. Broken glass, ripped steel and aluminum were everywhere, tearing at clothing, boots and bare skin. Water was everywhere. The Fire Department continued to pour water on the Pile for four weeks after the attack. Thus the water made things slippery and men fell. The temperature of the Pile was 200 degrees at the surface a full two weeks after the attack. Firemen went through two pairs of boots in a single day. We purchased hundreds of pairs of dog booties for the search dogs' feet. Particulate matter in the air could be smelled and tasted for weeks. Because heavy equipment was moving beams and debris, the Pile was always unstable and people fell. We saw lacerations, burns, broken bones, dehydration, lots of eye and respiratory problems and a couple of heart attacks. Yes, it was a dangerous place.

The World Trade Center experience provided an object lesson on the need to be better prepared and organized in the event of a future disaster. Initially, the site was overrun with volunteers pouring in from all over the city and suburbs. Clear lines of communication, coordination, command and control will be essential to meet the challenge of any future acts of terrorism.

Since September 11th CCRF teams have been dispatched in readiness at many sites, including; the Capitol, in connection with the President's State of the Union address; the Winter Olympics in Salt Lake City; and other public gatherings, especially where they may be public protests. They have also been deployed in response to emergencies, such as the Rhode Island nightclub fire, outbreaks of Newcastle Disease in the southwest, hurricanes on the Gulf Coast, and typhoons in Micronesia and Guam. Admiral Babb ended his talk with an open invitation to members of the audience to join the Public Health Service Commissioned Corps and become a member of the CCRF or volunteer for DMAT or DMORT service.

At the State Level: "People Protected—Public Health Prepared"

Speaking from the point of view of state readiness to meet bioterrorist threats was Ed Thompson, MD, MPH, Deputy Director of the Centers for Disease Control and Prevention. He emphasized that state and local public health systems are the key elements in response to bioterrorism agents, where, in the absence of an explosive blast or flash, early detection is difficult and crucial to an effective response. By the mid-1990s former biowarfare scientists were voicing alarm at the potential of a covert

³ A memo from the Secretary, HHS, released on July 3, 2003, now stipulates that 100 percent of the U.S. Commissioned Corps are to be deployable CCRF members by 2005. Press release available at: <http://www.hhs.gov/news/press/2003pres/20030703.html>. Accessed August 2003.

bioweapons attack. This led to congressional hearings in 1998, and resulted in bioterrorism funding for state and local health departments in 1999. Current FY 2003 funding for these departments is \$935 million. A Health Alert Network (HAN), a Laboratory Response Network (LRN), and a Strategic National Stockpile of medicines are additional measures that have been put in place. HAN is a communication system that uses Internet connections to reach U.S. counties. By October 2002, 89 percent of counties were directly connected and another 7 percent could be reached indirectly. The Lab network, numbering 118 laboratories in FY 2002, is responsible for identifying disease agents. Finally, the strategic stockpile has expanded to a dozen 12-hour “push-packs,” stores of drugs and vaccines that can be air-cargoed to reach any site in the country within 12 hours. In keeping with the CDC’s Office of Terrorism Preparedness and Emergency Response motto “People Protected-Public Health Prepared,” Dr. Thompson noted that the government initiated its new smallpox immunization campaign on December 13, 2002, with the aforementioned recommendations that public health response teams, clinical care response teams, and any additional responders volunteer to be vaccinated, but not recommending vaccinations for the general public at this time.

Surveillance as Key. None of the new counter-bioterrorism measures can be effective, Dr. Thompson emphasized, unless local health practitioners are vigilant in observing and reporting a possible disease outbreak. Such surveillance—knowing what to look for and whom to report to—is critical—and applies not only to suspected bioterrorist agents, but to a list of reportable diseases which has grown to include such entities as West Nile virus and Severe Acute Respiratory Syndrome (SARS.) Dr. Thompson’s slide of a telephone was a reminder that calls to the local and state health departments are still the most rapid, simple, and direct routes to getting the information transmitted and for obtaining feedback. As part of programs to educate practitioners, the CDC has developed quick reference guides in the form of laminated charts for that provide basic information and case illustrations of category A diseases for health care providers: <http://www.bt.cdc.gov/index.asp>. The CDC also prepared a mailing to health professionals on smallpox detection and information concerning the smallpox vaccine. The agency worked with the ADA to make this information available to all U.S. dentists. This information was provided to the conference attendees⁴ in advance of the general mailing

At the Local Level

With Sigurds O. Krolls’ presentation of responses to bioterrorism at the local level, the impetus for action turned to the private sector. Dr. Krolls, DDS, MS, MS Ed, Professor emeritus of the University of Mississippi Medical Center School of Dentistry, described how the university, working with local and state dental societies, has elaborated a disaster response plan that will enable dental volunteers to cooperate with federal and state agencies and public health teams to meet an emergency—whether fire, flood, hurricane, or terrorism attack. The state has been divided into six geographic districts, with dental volunteers in each district constituting a corps response group. In addition to maintaining

⁴ Information included in the distributed packet is available from the CDC at <http://www.bt.cdc.gov/agent/smallpox/index.asp>. Accessed August 2003.

contact with state and local health departments, the corps leaders have established links to the Department of Veterans Affairs and to Air Force, Army, and Navy bases in the state, and within those resources, such dental personnel as oral pathologists and forensic dentists. In the event that the Governor declares an emergency, the State Health Department will be notified. They in turn are responsible for informing the Dental Society, and, depending on the extent of the disaster, dental corps members in the one or more districts will be notified. Dr. Krolls mentioned that the Mississippi Hospital Association is also actively involved and able to alert hospitals to initiate a uniform response. Given the number of players recruited in a disaster response, Dr. Krolls stressed the importance of communication and the need for redundant systems—phone, fax, email, satellite, even walkie-talkies to keep all parties informed. He also recommended that however dental volunteer groups are organized in a state, the leadership should maintain regular contact with their government/public health partner agencies, perhaps calling once a month, to remind them that a dental volunteer corps is ready, willing, and able to serve in an emergency.

Equally important is education: Most of the non-dental organizations Dr. Krolls has made contact with asked, “Can dentists recognize signs and systems of contagious diseases?” Dr. Krolls stressed that pre-doctoral and continuing education courses are essential. Finally, he added his thoughts on how in the ordinary course of practice, dentists may pick up telltale information about what is happening in the community. After all, he commented, dentists spend more time with their patients than any other health specialty so they just might learn about some sickness in the family or in the community that might not be typical.

Forensic Dentistry

While the major focus of the conference was on the non-traditional roles that dental professionals can play in an emergency, the time-honored area of forensic dentistry was well-represented by Jeffrey Burkes, DDS, Chief Forensic Dentist in the Office of the Chief Medical Examiner, New York City. As many at the conference had emphasized, Dr. Burkes also stressed the importance of having close working relationships with colleagues—with the local medical examiner in the case of forensic dentists--and with other members of emergency service teams. As a forensic dentist he is committed to 24-hour availability and to keeping emergency team members informed as new technology is integrated into forensic science. From his point of view, an additional value of having dentists as first responders is that they can help to safeguard dental evidence. As it was, the tasks that fell to the mortuary teams at the World Trade Center were formidable. Of the 19,000 body bags of assembled remains, there were only 293 intact bodies. For the rest, the teams had to contend with fragmented, burned, skeletonized, crushed, and decomposed remains. Except in the cases where the deceased was a uniformed police officer or fireman, the body bags brought to the mortuary trailers were accompanied by an FBI agent and a policeman, since the disaster was under criminal investigation.

The forensic work was conducted by teams of antemortem, postmortem, and comparative experts. The antemortem specialists made as accurate a dental chart of a presumed

victim as possible, based on x-rays and written narratives in dental files. This was often a challenging task because of illegible records, inadequate x-rays, and lack of uniform charting and numbering systems, not to mention the difficulty of obtaining dental records in the first place. To allow for comparisons, dental x-rays were obtained from the disaster victims before the forensic examinations, which were conducted by postmortem specialists working in teams of three: a dentist who physically examined the remains and reported findings orally, a recorder who took notes and charted the findings, and an observer who served as a second witness to ensure that what the dentist said matched the observation.

Dr. Burkes noted that the final task of ante- and postmortem comparison does not rely on some minimum number of similarities. While the more similarities the better, in some cases a single distinctive feature might be enough. “Overall, the ability to make a positive identification depends as much on the experience of the forensic specialist as the evidence presented,” he commented.

Communication, Communication...

The recurrent theme of the need for rapid and accurate communication for the public, clinicians, and first responders came up for special attention in the talk by Lewis Radonovich, MD, from the Center for Civilian Biodefense Strategies at Johns Hopkins University. Again, the anthrax incidents served as an object lesson, which Dr. Radonovich illustrated by a number of telling quotes: “There have been occasions in the last 10 days when I have felt out of the loop,” said Ivan Walks, the Chief Health Officer of the District of Columbia. “I learned about the ultimate characterization of the anthrax spores from the media several days after the postal service was notified.” John Auerbach, Executive Director of the Boston Board of Health commented, “We needed information...we were getting [it] from journalists... There simply wasn’t a good, accurate, timely internal communication system.” And from former *New England Journal of Medicine* Editor-in-Chief Jerome Kassirer, “...newspapers and cable news networks were far more helpful than any coordinated medical information network in informing physicians...”

This is not to say that there are no reliable sources. Dr. Radonovich reported that the CDC fielded over 11,000 bioterrorism-related calls between October 8 and November 11, 2001, which was certainly useful for the individual callers. Systems like HAN (which relays health information to counties), the Epidemic Information Exchange (Epi-X) a secure Internet-based link to public health officials providing epidemic information, the CDC’s own Morbidity and Mortality Weekly Report (MMWR), systems using broadcast faxes (multiple faxes to a variety of clinicians’ office and health agencies), as well as e-mail, regular mail, and even conference calls, can relay relevant and accurate information, but at this time these approaches are unlikely to have as complete or as timely information as is needed and they are limited in the number of outlets they can reach. A further difficulty relates to the input side of information. Practitioners need to be made aware of the necessity of reporting communicable diseases or unusual cases.

Improvements can be made in all of these systems, but the possibility of creating a nationwide network for the exchange of bioterrorism information among clinicians has inspired the Johns Hopkins group to develop the *Clinicians Biodefense Network*. This is a free and secure e-mail and web-based system allowing subscribers to receive information in the form of biodefense *briefs*, providing concise descriptions of developments in biodefense relevant to clinicians, and biodefense *alerts*, providing timely diagnostic and treatment data in the event of a bioterrorism attack. The system relies on cadres of clinical leaders (approximately 150) and affiliated experts (100) as information sources. Dr. Radonovich described the mechanics of the system, emphasizing features that are designed to minimize congestion and maximize speed. (Note: Prior to this conference, a general e-mail invitation to subscribe had been sent out, and the first briefs—including information on the smallpox vaccine and side effects had been prepared.)

What to Communicate: The Role of Surveillance

Following on Dr. Radonovich's talk, Daniel H. Sosin, MD, MPH, Director of the Division of Public Health Surveillance and Informatics at the CDC described how surveillance systems work, defining surveillance as “ongoing, systematic collection, analysis, and interpretation of health-related data and dissemination for use in planning, implementation, and evaluation of public health practice.” The state decides what diseases are reportable and it is the responsibility of healthcare practitioners and laboratories to report cases through a bottom-up chain of communication: practitioners report to the county health department, the county reports to the State health department, and the state reports to the CDC, which supports states in setting national standards and sharing data. Dentists are equal partners in this reporting system so need to know which are the reportable diseases and their oral signs. They can also contribute to bioterrorism surveillance by similarly providing timely reports if they detect oral signs suggestive of a bioterrorism agent. Dr. Sosin laid out a scenario chronicling the course of a reportable disease from no symptoms, to the use of over-the-counter drugs for nonspecific symptoms, to absence from work and further deterioration, to seeking care, and to a final progression to respiratory failure and a report of death. His advice to the dental community was to “stay alert and stay connected.”

Dental Surveillance

How to stay alert, what to look for, what and when to report, and to whom, were further delineated by Louis G. DePaola, DDS, MS, of the University of Maryland, Baltimore School of Dentistry, who emphasized that dentists can contribute to bioterrorism surveillance by being alert to clues that might indicate a bioterrorist attack. Such surveillance would note if there is an influx of people seeking medical attention with non-traumatic conditions and flu-like or possibly neurological or paralytic symptoms...or even specific signs of a bioterrorist agent. Patterns of school or work absence, appointment cancellations or failures to appear, could also be indicators. Dr. DePaola acknowledged that in the case of a limited release bioterrorist agent as in the anthrax letters, dental surveillance would have little to offer, but a widespread attack can certainly

tap into dental professional skills in recognition, isolation, and management. Again, because dental offices present a cross-section of the local community, dentists are in a position to serve as sentinels with their eyes and ears open to information on unusual syndromes in the community as well as unusual clinical presentations and indicators of increased employee absenteeism and cancellations. Dentists should report their suspicions to the local or state health department--as well as to local and state dental societies, Dr. DePaola said. In that way information reported from groups of dentists in a community or larger area can be captured, maintained, and monitored in dental society databases. Indeed, he recommended that data from existing dental databases for patient cancellations/failures be reviewed to determine their predictive value (e.g., for past occurrences of influenza outbreaks). In addition to establishing data reporting and monitoring systems, Dr. DePaola also encouraged state and local dental societies to establish emergency response networks whose members would work in partnership with state and local health departments. Needless to say, for dental surveillance to be effective, Dr. DePaola and many other presenters spoke to the need to establish a bioterrorism education and training program for dentistry, a theme that was developed at length in one of the final sessions of the conference.

The Department of Homeland Security

George A. Alexander, MD, then-Director for Medical and Public Health Security in the White House Office of Homeland Security⁵ provided details of its organization, the proposed FY 2004 budget of the new U.S. Department of Homeland Security (\$37.7 billion) [need to check what the final figure is] and current planning activities, as a luncheon speaker on the second day of the conference. The three main objectives of the Department are to prevent terrorist attacks, reduce the nation's vulnerability, and minimize damage/speed recovery in the event of an attack. Dr. Alexander outlined six critical functions to achieve those ends: intelligence, border and transportation security, domestic counter-terrorism, infrastructure security, defense against catastrophe, and emergency preparedness and response. Advising the Department (which evolved from the White House Office of Homeland Security) is a Homeland Security Council headed by President Bush. A "National Strategic Plan" elaborating roles and responsibilities in four principal areas: information, science and technology, border and transportation, and emergency preparedness and response, is expected to be released in 2003.

Communicating Risk

Not only can dentists and allied dental professionals contribute their technical skills in the event of a bioterrorism emergency, they are well-positioned as respected authority figures in the community, to alert and counsel the public about the risks involved—whether in the face of an actual or conjectured event. But it is not simply a matter of *educating* the public, said Peter M. Sandman, Ph.D. a specialist in risk communication training and research in Princeton, N.J. Dr. Sandman, currently a consultant to CDC, addressed the conference after lunch on the second day. There is a disconnect in the way experts and

⁵ The White House Office of Homeland Security was eliminated in April 2003, following the establishment of the U.S. Department of Homeland Security.

the public view risk, he emphasized. The experts respond to “hazard,” rationally weighing the odds, say, of a nuclear attack in terms of expected mortality multiplied by the probability of an attack. The public responds to outrage. For them, risk means becoming upset and emotionally charged with anger, or in the extreme, with fear and misery. Here, Dr. Sandman quoted former New York Mayor Rudolph Giuliani when asked how many people died at the World Trade Center. He said it was “more than we can bear.” His answer showed that he was clearly bearing it--and bearing it with difficulty--but also coping, showing leadership, and taking action. “Action makes fear bearable,” Dr. Sandman noted, and the evident willingness of conference attendees to learn how to communicate risk he saw as not only benefiting the public, but also helping themselves in coping with disaster.

Combining the rational approach of the experts with the emotional responses of the public, Dr. Sandman defined risk as a sum (or function) of hazard and outrage. What makes risk communication problematic, he emphasized, is that people are afraid of the wrong risks. The risks that kill people are completely different from the risks that upset people. Indeed, if hazards are rank ordered according to expected annual mortality and then rank ordered according to how upsetting they are, the correlation between hazard and outrage is only 0.2. As a result, Dr. Sandman said that much of his work involves scaring people who are inappropriately apathetic and reassuring people who are inappropriately terrified. Moreover, it appears that it is the emotional charge that is the determining factor: people think a situation is dangerous *because they are upset* and alternatively, they think a situation is safe *because they feel calm*. There are a variety of factors contributing to people’s judgments about whether a given event is safe or risky such as whether it is voluntary (like driving a car), familiar, natural, etc., vs. whether it is controlled by others, unknowable, or dreaded. Rather than dwell on these issues, the point Dr. Sandman made was that if you want to want to manage risk you have to manage the outrage.

He illustrated how to do this in relation to a graph plotting outrage (from low to high) along the x-axis and hazard (from low to high) on the y axis, and then describing four typical scenarios:

Scenario 1: High hazard, low outrage. This typifies the task of public relations and health education professionals. The audience is apathetic and the task is to use brief messages to persuade or move the audience toward the desired goals. “For serious hazards this usually means provoking more outrage.”

Scenarios 2: Medium hazard, medium outrage. The audience is interested and attentive and not too upset. This is ideal but not usual. The task is to discuss the issues openly and rationally, explaining your views and responding to questions and concerns. You should aim to transform the other scenarios into this one.

Scenario 3: Low hazard, high outrage. The audience is angry and it’s all your fault (or the agency you are associated with). Your task is to reduce outrage by listening, apologizing, sharing control and credit, letting the audience members talk.

Scenario 4: High hazard, high outrage. This is crisis communication. Bioterrorism. The audience is huge and very upset—but not at you. The outrage is mostly fear and misery, not anger. If it becomes unbearable, it can escalate to denial, terror and depression, terribly dysfunctional outcomes. The task is to help the audience make the fear bearable. You most definitely must avoid over-reassurance; you must be human and empathic, share dilemmas, and acknowledge uncertainty.

On ambivalence. Risk communication all too often involves situations of uncertainty and ambivalence, for which Dr. Sandman invoked the “principle of the see-saw:” When people see both sides of an issue and believe in both sides, communication happens on a see-saw, in which the audience will generally focus on the side of the see-saw you ignore. Thus, if you want the audience to move toward your preferred position it is useful to stress the opposite side. In the case of getting a smallpox vaccination, if you say that the probability of a smallpox attack is low, your audience will say but the event could be catastrophic—and vice-versa. Or, in relation to adverse effects of the vaccine, if you say these are of low probability, your audience will emphasize their high magnitude. In such situations it is the role of the communicator to get the public to recognize their ambivalence, move toward the fulcrum of the see-saw, and admit that there are good arguments on both sides.

Dr. Sandman concluded with a discussion of general strategies to be employed in crisis communication, again stressing the need *not* to over-reassure—this is all but guaranteed to push ambivalent people toward the alarm side of the see-saw. Equally important is to acknowledge uncertainty. Far better to say what you know, what you don’t know, and what you are doing to learn more, and with that, also offering people things they can do, again following the principle that action makes fear bearable.

Education and Continuing Education

Dianne Rekow, DDS, Ph.D, is Chair of the Catastrophe Preparedness Task force of the NYU College of Dentistry. The NYU faculty, under the leadership of the Dean, had already begun planning for catastrophe preparedness before September 11 and had already considered the skills (e.g., radiography, surgery, infection control, injections, sutures) that dental teams could bring to an emergency, along with potential demands, such as mass inoculations and management of emerging diseases, that could be placed on them. They have used these insights to design a curriculum that incorporates bioterrorism courses in each of the four years of pre-doctoral education. In the first year, students will learn to prepare for an emergency response. The goal is to inform students of what to do to maintain safe operations if the school is faced with such contingencies as the need to fight fire, control infection, establish a “shelter in place,” or implement evacuation procedures. In the second year, knowledge of bioterrorism agents is integrated into the general pathology and infectious diseases lectures, with an additional focused conference on bioterrorism agents. The third year incorporates bioterrorism information into the oral medicine curriculum, including oral signs and symptoms, differential diagnosis, and availability and policies pertaining to vaccines and antidotes.

Bioterrorism preparation in the last year consists of four lectures in connection with practice management that cover assessment of risk, potential agents, likely modes of dissemination, signs and symptoms, information for patients and the community, and the role the practicing dentists can play in local, state, and national preparedness and response. The bioterrorism curriculum for all four years is scheduled to begin in September 2003 and the information will also be available on a DVD in the near future. Since NYU graduates 8 percent of the nation's pool of new dentists every year, the Task Force is hopeful that the program will grow in impact over time.

Dr. Rekow went on to describe other efforts to expand bioterrorism education programs as well as worries and challenges that confront educators, not the least of which are limited resources and budget cuts. She proposed that a larger Task Force composed of dental faculty members from selected schools convene to develop the components of a bioterrorism curriculum. Ideally the group could work under the auspices of the American Dental Education Association, the American Association for Dental Research, and the U.S. Public Health Service. Continuing education is also a must, with programs to reinforce and update bacteriology and virology knowledge with emphasis on the probable/possible bioterrorism agents. At present, CDC, USAMRIID, and the Academy of General Dentistry are among groups offering courses related to bioterrorism. (A computer search yielded 26,000 hits on bioterrorism training!) Among dental schools offering CDE programs are NYU (a four-hour bioterrorism program) and two programs conducted by Louis DePaola at the University of Maryland, Baltimore School of Dentistry: one on dentistry's role in recognizing and responding to the threat, the other on emerging and re-emerging diseases in relation to bioterrorism and their impact on dentistry.

Written materials are also rapidly accumulating: journal articles, charts that can be displayed in dental offices, and detailed reference guides, such as the AMA's bioweapons reference guide, which was sent to 10,000 NYU dental school alumni. But Dr. Rekow voiced concern on a number of issues: the need for sustainability of these programs with the necessary experts on faculty to update the state of the science as it evolves. Decisions also need to be made on which preparedness programs, if any, should be mandatory, while for those who want additional training as first responders, there needs to be a resolution to issues concerning certification with periodic renewals/updates, supply authorization, travel rights. Whatever we do, she emphasized, we must continue to work to eliminate health disparities and ensure that our programs in emergency preparedness reach out to all racial and ethnic groups. She concluded with a theme that had been earlier introduced by Dr. Alfano. In contrast to the so-called "sleeper cells" created by terrorists for their covert operations, he proposed forming "wake-up cells" in a community. These would be groups formed of local dentists with physician and public health colleagues meeting periodically so that information could be exchanged, knowledge shared, and activities/responsibilities related to emergency response plans could be spelled out.

The ADA Plan

Many at the conference acknowledged the forward thinking of the American Dental Association in organizing the 2002 bioterrorism workshop, publicizing a consensus statement on dentistry's role in *JADA*, and taking the next steps in putting together this larger conference in collaboration with the U.S. Public Health Service. Dr. Robert Brandjord, an ADA trustee from Minnesota and Chairman of the ADA Bioterrorism Workgroup, described the activities of the Workgroup. Again, the anthrax events—and what they revealed in terms of shortcomings—proved to be the spur that drove the ADA to develop its plan, which is organized around five themes: preparedness, detection and surveillance, diagnosis, response, and communication. Dr. Brandjord elaborated on how the ADA would assist in each of these areas. With regard to preparedness and detection and surveillance, the ADA on its own is providing bioterrorism information through its Website and publications, and clearly supports professional education for dental students and practicing dentists, in collaboration with medical and public health communities as well as international dental organizations. In terms of response, the ADA is preparing information to assist local dental societies in developing their plans, emphasizing that the impetus for their development must come from the local and state level, based on considerations of community conditions and resources.

Additional special education and training of dentists may encompass victim triage, immunizations, decontamination, augmenting medical care, and detection of disease. The ADA believes that “Good Samaritan” laws are not reliable to cover such non-traditional actions on the part of dentists and new emergency exemption legislation is necessary. With regard to certification, ADA does not believe this is practical for first responders, but would be appropriate for organized activities or groups.

Reiterating what had emerged as a major theme of the conference, Dr. Brandjord stressed the importance of bioterrorism communication at all levels and on an ongoing basis. Thus surveillance reporting and getting information out to practicing dentists, as well as the general public, using all appropriate media, is essential. His concluding slide was both a summary and a call to action: Bioterrorism imposes awesome responsibilities on the healthcare community. Dentistry must answer the call were it to come. This will require preparation. Dentists will step forward.

Dental Supplies and Emergency Demands

The last speaker before a final recapping of the conference by the organizers was Hal Muller, Vice President for the Corporate Accounts Group and Medical Preparedness Initiatives at Henry Schein, Inc., the major dental and medical supply firm. He confirmed what previous speakers had said about the need for careful planning, communication, and collaboration by way of illustration of what happened on 9/11. Because Schein had developed an emergency preparedness plan in collaboration with New York and New Jersey authorities, the company was able to get medical supplies to New York area hospitals and to the Ground Zero site expeditiously, granted access to tunnels and bridges into the city which had been closed to other traffic.

Dentists need to discuss emergency plans with their staff, decide what their comfort level is, and act accordingly, including conducting practice drills. Muller listed activities—such as inoculations, dispensing medication under supervision, conducting first aid and CPR—that could be performed by dental professional volunteers in an emergency. For its part, Schein can provide “Doctor’s response packs” for dental office responders. Certain generic supplies would be available for a Day 1 response (e.g., eye wash, airway tubes, bandages and suture supplies, protective jump suits, Nitrile gloves, high filtration mask or respirator masks), with the dental office on the list to receive a Day 2 event-specific response pack. His message for the dental community was: “Be prepared—not scared.”

Where to Go from Here: Next Steps

The conference concluded with perspectives on what had been said and next steps that can be taken as seen by three of the organizers: Dr. Albert Guay, who spoke from the point of view of the private practitioner, Admiral Dushanka Kleinman, Assistant Surgeon General and Chief Dental Officer, U.S. Public Health Service, speaking from the point of view of the public health community, and Dr. Michael Alfano, speaking from the standpoint of a dental educator.

Be prepared. Dr. Guay’s strong message was that the dental community has a significant role to play in biodefense, but faces the challenge of a new arena of participation that requires serious and coordinated preparation. No one group—whether private practitioners, public health, or educator communities—can do it alone. His advice to dentists was to get involved, and include staff. Contact the local and state dental societies as resources for information and ongoing communication, with the understanding that the society will be the contact point in an emergency, coordinating with other emergency response agencies and assuring them of the readiness of trained dentists to participate. (He noted that 75 percent of practicing dentists belong to a dental society so establishing communication should not be a problem.)

There are hurdles to be overcome. While the public health community may recognize what dentists can do, the medical community needs educating, as do emergency systems personnel. The only way dentists will be accepted is if they can show they have acquired the basic knowledge. This means a basic change in mindset—it means dentists preparing themselves to becoming active and willing participants. It also means having plans in place. But this should follow from practitioners’ commitments to planning for the security of their family and their office staff in the event of a disaster. The ADA can help by providing prototypical plans that can be adapted to suit local community needs and resources, including the use of dental offices as alternate medical sites. ADA and many others can also help in the necessary educational preparation. However, Dr. Guay cautioned that dentists are unlikely to prepare as first responders unless they know beforehand that their liability will not be jeopardized. Assured of that, Dr. Guay concluded that dental professionals *can* respond; what’s more they have an *ethical/moral obligation* to respond; and he urged that preparation start *now*, for time is short.

Partnering/ planning/ evaluating. Admiral Kleinman also emphasized the need to change the perceptions of other healthcare practitioners on what dentists can do. However, the more that dentists partner with colleagues in public health or medicine in biodefense preparation and planning, the sooner those changes in perception can come about. She acknowledged this can be traumatic, since many of us are not used to the give and take and compromises that are necessary when working with multiple partners. It will mean learning new languages, she said, and establishing new linkages, not only across disciplines in the health sector, but also across sectors, such as working with social and environmental interest groups. The point is that public health preparedness is not just the responsibility of government agencies. To be sure, she said, we need to increase government public health infrastructure--especially for surveillance and outbreak response, and we need to do this both domestically and globally. But public health preparedness also requires the support of research and education, whether privately or publicly supported, and the active promotion of public health/private practitioner partnerships. These ideas are embodied in 7 action steps she proposed that dental professionals take in order to get involved in biodefense preparedness:

1. Join existing and emerging systems and programs. Become familiar with local or state bioterrorism plans, as well as organizations already involved or that can provide help (e.g., the Association of State and Territorial Health Officers; the American Public Health Association). Consider volunteering as a member of an emergency response team such as DMATs.
2. Partake in planning. The basic steps involved in public health planning--assessment, policy development, assurance--are comparable to what dentists routinely do in developing a treatment plan for a patient.
3. Identify and prepare for the response roles you see for the profession as well as for yourself. Include in this effort attention to record-keeping and coding systems.
4. Remove barriers (such as the need to change perceptions and to resolve liability issues).
5. Accelerate knowledge transfer. This means not only educating yourself, but your patients, staff, and the public at large; it means learning how to communicate risk, and linking your efforts with existing educational and training efforts.
6. Partner. The emphasis here is on dental professionals being "at the table," integrating and learning from other disciplines and groups and maintaining flexibility.
7. Evaluate. Develop ways to measure the effectiveness of your efforts, identify problems, make mid-course corrections, and revise plans in the face of new information/contingencies.

Admiral Kleinman called for a plan of action for the profession, emphasizing not only bioterrorism preparedness, but bioterrorism prevention. The role that dentistry is embarking on now will serve the profession well in the future--as an evidence-based, accountable health discipline, integrated and allied with partners across other healthcare sectors. So, she concluded, "Let's roll!"

A Galvanizing Issue. In addressing educational needs for bioterrorism preparedness, Dr. Alfano repeated his concerns that we are faced with a hundred years' war because religious fundamentalists are teaching their children to hate generationally. This is a galvanizing issue that demands that "we do it differently this time!" We need to make changes in what we teach and make them happen quickly. He felt that the dental schools lagged behind the ADA in leading the effort to engage the profession in emergency preparedness and was disappointed that there were few dental educators in the audience. The bioterrorism curriculum that had been developed for NYU dental students was a "work-in-progress," he added. To achieve any kind of widespread adoption by dental schools will take some sort of consensus curriculum (perhaps of the kind that could be developed by a committee as Dr. Rekow had suggested).

Not that there need be major changes, indeed, students and practicing dentists can only benefit from broadening their backgrounds in microbiology and immunology, not only because of bioterrorism agents, but because we live in a world of emerging and re-emerging infectious diseases. He also emphasized the value to the profession of having knowledgeable dentists interacting with physicians and other health specialists as emergency responders, quoting New York State Health Commissioner Antonia Novello that in this way they will learn "that dentists have brains and not just a set of fingers."

Dr. Alfano's message for curriculum reform was to make it relevant. We don't need another symposium to ponder what needs to be done. But we do need some guidelines and some prototypical curricula. We do need to get the dental deans to the table. Practically speaking, we need to take a hard look at the kinds of questions that are still being asked on the Boards. In particular, he cited an exam question on pushing ATP molecules through the Krebs' cycle as irrelevant. Instead, we ought to have some bioterrorism questions-- that would be one way to ensure they were part of the curriculum!

He also suggested putting some forensic science back into the curriculum and enriching practice management course material. For example, what would constitute an evacuation pack for a dental office to ensure that staff could get home safely? Alternatively, what would be required to shelter them in place—for those who chose to stay? And what would constitute a "go-pack" for the dentist and other staff members who volunteered as responders?

Dr. Alfano concluded his remarks with a sobering reminiscence of 9/11. The NYU Dental School is on First Avenue in Manhattan, situated in the midst of five major hospitals. On any given day the piercing scream of ambulance sirens is a constant occurrence. On 9/11 there were "too few."