ABSTRACT

Background. Terrorist activities now can be added to the list of possible man-made and nature-induced health and safety disasters that can affect a community. There are two basic responses that people can choose to protect themselves during these events. One is to evacuate the area, the other is to shelter in place.

Conclusions. The authors provide an overview of the issues, present basic principles and increase the awareness of the dental profession to the various responses available in an emergency. The key issue is that families, dental offices and communities should plan ahead. Dentists should be cognizant of their professional role and help educate the public in regard to emergency issues.

Practice Implications. The uncertainties and stress of a potential terrorist attack can be mitigated somewhat by planning. These plans can be fairly basic, involving minimum equipment and supplies; however, they may go a long way to protect dental staff members, patients and families.

Emergency preparedness in the dental office

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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.

Fairly basic planning, involving minimum equipment and supplies, may go a long way to protect dental staff members, patients and families.

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

TABLE

PROTECTIVE ACTION CHECKLIST.*

ATTRIBUTE	SHELTER IN PLACE	EVACUATE
Chemical, Radiologic Plume	Tight housing, prepared plan	Leaky housing, unprepared
Time of Day	Night	Day
Population Size and Density	High	Low
Road Conditions	Poor, constrained	Good, flowing
Toxic Duration	Short	Long
Toxic Intensity	High	Low

* Adapted with permission of the Oak Ridge National Laboratory and the U.S. Department of Energy by Sorensen and colleagues.[5]

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 office staff members and create a written response plan. The dentist should try to assess the vulnerability of the dental facility. What are the potential emergencies other than terrorism that could affect everyone's well-being? Is the dental office in an urban or a rural setting? Dentists should be aware of the types of incidents that have occurred in their particular geographical area. Failures in technology (for example, power failures) or human error (for example, Three Mile Island) can lead to complicated and dangerous situations.

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.

The entire office staff should be familiar with the community's disaster warning signals and know how to determine the appropriate action.

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 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.[8] Good practice includes backing up computer data frequently and keeping a data storage backup off site.[2]

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).[7] He or she should include items that meet any special needs and be responsible for storing his or her container.

BOX 1

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]

BOX 2

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[2]; American Red Cross[7]; National Institutes of Health.[10]

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[7]; 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.[2,7,9]

Box 2 presents the evacuation checklist for dentists and staff members to follow when leaving the office.[2,7,10]

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.[6]

One study demonstrated that in a modern, energy-efficient building, the exposure to a chemical plume was one-tenth that of the outside dose.[5] 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,[11] or FEMA, along with most other federal agencies,

BOX 3

CHECKLIST OF BASIC STORABLE ITEMS.*

WATER One gallon per person per day (two quarts for drinking, two for food preparation/sanitation); store at least a three-day supply in solid containers	**FOOD** Granola bars, trail mix, crackers, canned meats, fruits, vegetables, canned juices, milk, soup, cookies, candy, sweetened cereals
FIRST-AID KIT Nonprescription drugs: aspirin/nonaspirin pain relievers, antidiarrheal medication, antacids, syrup of ipecac (induces vomiting), laxatives; activated charcoal (to counteract poisoning); sterile gauze; rolled bandages; hypoallergenic adhesive; tape; scissors; tweezers; moistened towelettes; antiseptics; petroleum jelly (in tube); thermometer; cleansing agent/soap; sunscreen; first-aid manual	**TOOLS AND SUPPLIES** Paper cups, plates, plastic utensils, battery-operated radio, flashlight, extra batteries, nonelectric can opener, fire extinguisher (small ABC type), pliers, screwdriver, tape, aluminum foil, storage containers, paper, pencils, signal flare, whistle, plastic sheeting, duct tape (for limited situations), sanitation items (toilet paper, soap, liquid detergent, plastic garbage bags with ties, disinfectant, bleach, plastic bucket with tight lid, personal hygiene items)
CLOTHING AND BEDDING Sturdy and comfortable shoes, rain gear, hat and gloves, blankets or sleeping bags, thermal underwear, sunglasses	**SPECIAL ITEMS** Extra prescription medication, denture supplies, contact lens supplies, baby supplies, extra pair of eyeglasses, games and books, cash/travelers' checks, important telephone numbers and documents

* Sources: American Red Cross[7]; Federal Emergency Management Agency.[11]

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.[11-13] 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).[7] 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.[11-13] Box 3 provides a checklist of basic storable items.[7,11]

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.[14]

In addition to the items included in Box 3, some agencies, including FEMA,[11] recommend a compass, matches in a waterproof container, needles and thread, medicine droppers and a shut-off wrench (to turn off gas and water).[7,12]

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.[5,6]

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.[2,11] 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.

BOX 4

SUMMARY OF SHELTER-IN-PLACE PROCEDURES.

- Listen for any announcements or warning signals
- Be sure everyone has been advised of the situation and instructed where to go to shelter
- Shut and lock all windows and doors
- Turn off all controllable heating, ventilation and air-conditioning equipment
- Take go pack
- Keep cell phone charged, with you and on at all times
- Enter the shelter area and remain there
- Monitor the radio, Internet or television for updates and further instructions
- When told it is safe to leave, open windows and doors, turn on the ventilation systems and go outside until the building's air has been ventilated

BOX 5

SUMMARY OF KEY FACTORS FOR EMERGENCY PREPAREDNESS.

GENERAL PLANS

- Know the local emergency warning signals
- Know the local telephone numbers of key people, key agencies and the significant Web sites
- Know that your go pack is complete and updated
- Know how you will keep informed
- Know how you will communicate with others

EVACUATION PLAN

- Know where to meet
- Know how and when everyone has exited the building
- Know the various escape routes

SHELTER IN PLACE

- Know the area that will be used
- Know the supplies needed
- If someone leaves, decide if he or she can return
- Decide for how long and how many people you should plan

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.[15] 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.[7] 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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