

The Role of the Dental Hygienist in Mass Disasters*

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ABSTRACT: The authors examine the specialty of dental hygiene and address its role in the identification of mass-disaster fatalities. Very little exists in the literature on what dental hygienists can offer and what they have contributed as members of dental-identification teams. To encourage forensic dentists to seek out the valuable assistance of these highly trained professionals, the authors illustrate how their services can be used in mass disasters.

KEYWORDS: forensic science, forensic odontology, dental hygienist, mass disasters, dental identification

The role of the registered dental hygienist (DH)³ in mass disasters has been inadequately addressed in the literature. In fact, only a few reports have made recommendations or have provided specifics to any significant degree on how a dental-identification team should use hygienists in a mass disaster (2–6). Others (7,8) have mentioned in general the value of hygienists in forensic dentistry though Alty (2) and Dorion (9) have warned of the limitations facing the DH in forensic work. They emphasized that the DH is required by law to work under the direct supervision of the dentist and cannot render an expert forensic-dentistry opinion. Other than the aforementioned references, only four other articles mention the participation of the DH on dental-ID teams in mass-disaster operations (10–13). These articles simply acknowledge that the DH was a member of the team but do not specify the duties of the DH. Because of the paucity of information in the literature, the authors attempt to examine and to define the dental-hygienist's role as a member of the mass-disaster forensic dental team.

Review of Literature

Though forensic dentists (9,14,15) and the American Board of Forensic Odontology (16) have recommended the use of dental hygienists on mass-disaster dental ID teams, the literature has few reports on the participation of dental hygienists in mass-disaster operations. A previous review of the literature from 1970 to 1983

corroborates this lack of reporting (4). Alty (2) in 1998 and Alsup and Adams (3) in 1982 briefly discussed the duties of the DH as a member of a mass-disaster forensic dental team. The most detailed account of a coordinated use of dentists and dental hygienists was reported by Rawson and colleagues (4). Their disaster ID team was responsible for the management of the 82 victims who perished in the 1980 MGM Grand Hotel fire. The team consisted of three dentists and four dental hygienists. The hygienists fully participated in the AM and PM sections of the operation. They also helped to procure dental records and supplemental dental information. The authors concluded that hygienists can be a valuable resource in the mass-disaster setting because of their formal dental-hygiene education and experience with radiology, dental charting, and management of people. A hygienist also assisted with the compilation of AM and PM information in the 1978 collision of a Pacific Southwest Airlines 727 jet and a Cessna 172 aircraft in San Diego, California (6). Furnari, a hygienist, concisely described her PM assignment as a member of the dental-ID team for the victims of the crash of US AIR flight 405 in 1992 (5). A total of six DHs were on the dental-ID teams of four major disasters, but their specific duties were not revealed (10–13). Without a doubt, even this scant evidence clearly illustrates the vital role that the DH can play on the dental-ID team.

Defined Forensic Duties

The following defined forensic duties of the DH is based on what we gleaned from a review of the literature and from our experience with hygienists in mass disasters. Vale and Noguchi (10) and Morlang (17) have provided excellent commentary on mass-disaster management and the basic organizational structure of the disaster-identification center complete with the forensic-dentistry-section scheme. The organizational structure of the dental-ID section for mass-casualty disasters includes a forensic dentistry chief, dental registrar, PM dental examination and dental radiology subsection, AM dental record subsection, and comparison and computer subsection (10,17). Where in this overall forensic dental scheme can the DH provide expertise? Recommendations for specific assignments of dental hygienists include the postmortem (PM) team (2,5,6,14), PM radiography (2,5,14), antemortem (AM) team (2,5,6,14), and computer assistance (2). Therefore, the tasks that the DH can perform are numerous and can be applied to virtually all areas of the dental section to some degree.

Administrative Duties

A DH has the administrative skills to serve as the dental registrar and to assume responsibilities for all AM and PM dental records and for the duplication of all dental records that other sources may need. The DH can also assume responsibility for security for sensitive areas, the provision of a chain of custody of evidence, and the

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³ The American Dental Hygienists' Association defines a DH as a preventive oral-health professional who has graduated from an accredited dental hygiene program in an institution of higher education, licensed in dental hygiene who provides educational, clinical, research, administrative, and therapeutic services supporting total health through the promotion of optimal oral health (1).

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management of dental-support personnel. The identification-center dental subsections are divided into three teams: the PM, the AM, and the records-comparison team. The dental-ID team can put to good use the talents of the DH in all of these subsections.

The PM Team

The PM team is sequentially divided into the following areas of responsibility: surgical exposure, radiography, and clinical examination of the dentition and oral cavity. If fire has caused nonviewable remains, the dentist resects facial soft tissues and jaws to facilitate examination. The DH is surely capable of providing surgical assistance in these instances and can assist with the various techniques used to gain access to teeth in viewable remains. The DH can also assist in PM radiology. The procedure for PM dental radiology, which is one of the essential tools to successful dental identification of unknown remains, are the same as those for a living patient though adaptations are sometimes necessary to produce films that are adequate for comparison to AM radiographs. Trained in radiology, the DH can expose, develop, and duplicate postmortem dental radiographs; can provide a chain of custody to avoid the loss or commingling of PM radiographs of victims; and can ensure quality control for film development. The DH can free the dentist from these time-consuming yet important duties. For the dental examination, which is the next step in the PM sequence, the teeth are gently cleansed with a solution of diluted bleach or hydrogen peroxide. The DH can easily manage this chore. During the formulation of the PM dental record, physical and mental fatigue is a constant nemesis and can easily lead to error. A system that uses multiple verifications of clinical findings and the subsequent charting of those findings reduces the possibility of fatigue-induced error. When a dental-ID team employs a multiple-verification technique, one dentist examines while another dentist records; the recorder then reviews the clinical findings, and both sign the chart (10). A dentist and DH or three dentists can also compose the team. When three compose the team, one dentist examines, the DH charts, the second dentist verifies that the first is reporting accurately and then verifies that the DH is charting correctly. The dentists would then reverse roles and examine the same victim to ensure accuracy. As Vale and Noguchi have pointed out, this method of redundancy allows for verification of findings, consultation on questionable findings, and, with the alternation of team members in the roles of examiner and recorder, fatigue reduction (10).

Since most emotional fatigue among dental-ID team members occurs on the PM team, this team can help assume responsibility for monitoring members for psychological duress. A DH with forensic training and/or experience can help identify and monitor dental-team members experiencing psychological difficulties, a frequently overlooked but common complication of disaster participation (18). Even though the DH is well qualified to participate on the dental-ID team, the DH faces the same emotional hazards that every other team member faces. A DH was active on the PM dental team in the 1992 crash of US AIR flight 405 at La Guardia airport in New York; however, despite forensic knowledge and mental preparation that the DH gained from her state forensic society, she was unprepared for the emotional stress associated with the incident (5). Piercy, a dentist, provided an intense account of the mental stress he encountered while he investigated a commercial airline crash at Dallas-Fort Worth International Airport (19). In addition, McCarrroll and associates, who studied the stressors and coping strategies of experienced and inexperienced response personnel in three major disasters, confirm that the psychological im-

pact on mass-casualty response teams is a genuine concern (20). These reports illustrate the need for the psychological monitoring of dental-ID team members. The trained hygienist can help meet this need.

The AM Team

The DH's knowledge of dental charting, dental anatomy, tooth-numbering systems, dental radiographs, and dental records in general is an automatic qualification for the AM dental-record-reconstruction team (AM Record Section). The most demanding job in the entire dental section is the reconstruction of the AM dental record. The AM team must create a record that can be easily compared with the PM dental record. This requires a standardization of forms and of terminology that matches the PM record. One of the most common problems in mass-disaster dental ID is incomplete or poor-quality AM dental records (18). Unfortunately, dental forms, methods of charting, legibility, numbering of teeth, and dental records in general greatly vary. These records are often unwieldy documents that the AM team must summarize into a reconstructed antemortem dental chart. A multiple-verification approach enhances accurate reconstruction of each victim's antemortem dental condition. Teams of two dentists or a dentist and a DH can verify each other's work. The DH, conversant in the language of dentistry, can also assist the authorities (FBI, airline officials, coroner, medical examiner) in procuring AM dental records and supplemental dental evidence, such as study models, spare prosthetic appliances, and laboratory prescriptions, which may require requesting information from family members, dental offices, and dental laboratories. When the DH pursues these duties, the forensic dentist can pursue victim identification.

Records-Comparison Team

The records-comparison team becomes more active late in the course of the ID process as the work of the PM and AM teams progresses to completion. For small mass disasters of approximately 25 or fewer victims, a manual comparison of AM to PM charts in the search for each victim's identity is manageable. For mass disasters involving large numbers of victims, a computerized comparison of records is often advantageous. Even so, dentists directly review the charts and radiographs of suggested computer-generated matches to verify identification. The DH can triage dental records for manual comparison; assist in the search for possible matches; and sort records by specific categories, such as gender, deciduous dentition, and prosthetic appliances, all of which can further facilitate the ID process.

Preparation and Education

Finally, disaster preparedness is a must for success (17). Planning requires, in part, the availability of the necessary dental supplies. The DH is well qualified to maintain forensic ID response kits and to procure the required dental materials, instruments, and equipment. Before the forensic dental team can even respond, it must be prepared, and the DH can ensure that it is. Forensic dental experts have stressed that disaster preparedness is the key to successful disaster management (4,9,10,13,17). Furthermore, it is a labile, never ending process. Dental schools with forensic curricula should encourage DH participation in them and thereby provide qualified personnel for forensic science. Forensic education at this formative stage would help establish the building blocks for a skilled and efficient mass-disaster team for the future. The Ameri-

can Society of Forensic Odontology is an excellent entry-level organization for the DH interested in forensic dentistry and a good source for continuing education. After all, it is only a matter of when and where the next mass disaster will occur (17).

Conclusions

The DH possesses skills and knowledge that can directly benefit a forensic dental team. The expertise of the DH allows the DH to assume a high level of responsibility, to provide professional assistance, and to increase the efficiency of the dental team (3). The disaster team that is not utilizing the DH is ignoring an invaluable resource (4). The identification of human remains in mass disasters is a complex, multidisciplinary challenge. The dentist-dental auxiliary approach in mass-disaster dental identification requires the most qualified dental experts, and the well-trained DH has the knowledge and experience to provide that expertise. Forensic dentists who are responsible for staffing the dental component of a disaster ID team and who incorporate the DH as an integral part of the team will greatly benefit the operation. Therefore, the authors hope that the forensic dentist will seek opportunities for the DH to join with forensic dental-ID teams at the national, state, and local level.

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