

Problems in Mass-Disaster Dental Identification: A Retrospective Review*

REFERENCE: Brannon RB, Kessler HP. Problems in mass-disaster dental identification: a retrospective review. *J Forensic Sci* 1999; 44(1):123–127.

ABSTRACT: A wide variety of problems may prevent or hinder a dental-identification (ID) team in its efforts to identify mass casualties. Since these problems have been infrequently reported in a comprehensive manner, the authors identified and summarized these problems to increase the awareness of dental-ID team members and to prepare them for future mass-disaster missions. The authors analyzed 50 mass disasters—ten in which the authors as members of military dental ID teams played a major role and 40 from the literature—and summarized problems that they confronted.

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

Although mass disasters have certain elements in common, each has certain problems that make it unique (1). For ID teams, these unique problems give a disaster its special or exceptional identity. They may be diverse and may hinder or prevent dental-identification (ID) teams in their efforts to identify mass casualties. Many mass-casualty papers do not delve into problems to any great degree and are often only anecdotal musings providing little data of scientific value (2). Therefore, we identified and summarized these problem areas in an effort to increase the awareness of dental ID teams and to prepare them for future mass-disaster missions.

Materials and Methods

For ten disasters in which we participated as members of military dental-ID teams, we reviewed, tabulated, and categorized data from official reports and took into consideration our own firsthand experiences in identifying mass casualties. We considered only problematic events that had a significant impact on or were uniquely associated with the dental-ID team. The Department of Aerospace Medicine and/or the Office of the Armed Forces Medical Examiner System, both components of the Armed Forces Institute of Pathology, were responsible for nine of these investigations. The Executive Agent U.S. Air Force in Europe directed the identification of

remains in the Beirut terrorist-bombing disaster. These disasters were collectively responsible for 2416 victims. Dental means identified 79% of these. The disasters included six aircraft accidents, a terrorist bombing, a mass suicide, a ferryboat mishap at sea, and wartime casualties (Table 1). Some, but not all, of the ID problems encountered in Desert Storm and the Beirut bombing have been previously reported (3,4). We also reviewed 40 mass disasters from the English-language literature from 1968 to 1996. They included 29 aircraft accidents (1,5–31), four land-based fires (27,32–34), a variety of shipping and boat mishaps (16,27,32), two oil-rig disasters (16,27), and a flash flood (35). The dental-identification problems were classified into two categories: 1) those problems that the dental-ID team usually had no authority or control over and were thus classified as external problems, and 2) those problems that originated in the dental section and that the dental-ID team had authority or control over and were thus classified as internal problems.

Results and Discussion

External Problems

Remains—In 1982 (36) and, again, in 1986 (37) Morlang warned that fragmented dental remains and inadequate antemortem (AM) dental records were constant adversaries. This proved to be true in the 50 disasters we reviewed. Indeed, common to the military mass-disaster identifications in which we participated and those reported in the literature were the problems of remains recovery, especially the lack of recovery of adequate dental structures (5,8,9,11,13,14,16,17,19,20,21,23,27–30,32,34); fragmentation and mutilation of remains (1,5,8,9,11–14,17,18–23,26–28,30,32,34); displacement of dental structures outside the oral environs; and, to a lesser degree, commingling of remains (17,18,23,28). Lack of remains recovery occurred in five of our ten disasters; fragmentation, displacement, and commingling occurred in eight, four, and two disasters respectively. These findings are to be expected since the majority of disasters in this study and in the literature were associated with excessive destructive forces. However, the use of computers in forensic dentistry has greatly facilitated fragment identification (37). Computer analysis of dental evidence was successful in the Arrow Airlines accident in Newfoundland. The emergence of and advancements in DNA-profiling technology should also further enhance the ability of an ID team to use fragmented remains for identification (38,39).

Overall, members of our military dental-ID team did not play a significant role in the search-and-recovery teams for the ten disasters in which we played a major role in identification. If they had, it would be tempting to speculate that our dental-ID success rate would be higher because the absence of dentists at the disaster

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* Presented at the 50th Annual Meeting, American Academy of Forensic Sciences, San Francisco, CA, Feb. 1998. The opinions or assertions contained herein are the private views of the authors and do not reflect the views of the U.S. Air Force, U.S. Army or the Department of Defense.

Received 15 May 1998; and in revised form 12 June 1998; accepted 12 June 1998.

TABLE 1—*Mass disasters with military dentistry participation.*

Location/Year	Disaster Type	Fatalities
1. Tenerife, Canary Islands (1977)	Pan Am 747/KLM 747	577
2. Warsaw, Poland (1980)	LOT Ilusyan-62	77
3. Ramstein, Germany (1981)	USAF C-130	9
4. Gander, Newfoundland (1985)	Arrow Airlines DC-8	256
5. Abilene, Texas (1989)	USAF KC-135	19
6. Quantico, Virginia (1992)	V-22 Osprey	7
7. Jonestown, Guyana (1978)	Mass Suicide	913
8. Beirut, Lebanon (1983)	Terrorist Bombing	239
9. Israel, Desert Shield (1990)	Boat Mishap	21
10. Iraq, Desert Storm (1991)	War	298

scene has been identified as an obstacle to accurate identification (40). In 1987, Warnick (21) and Vale and colleagues (23) advocated their use. They emphasized that dentists are much more likely to recognize dental and jaw evidence than those who are unfamiliar with dentistry.

Displacement of dental structures to other parts of the body occurs with some frequency (6,8,14,15,19,20,27). However, full-body radiographs of all victims and body parts permit dental-ID teams to identify dental remains (19,27,28). Petersen and Kogon (8) believed on-site radiography of the head and neck would have assisted them in the recovery of additional dental specimens from the 1970 Air Canada DC-8 crash in Woodbridge, Ontario, Canada. In the Gander, Newfoundland air crash, ID teams used full-body radiographs to identify dental remains. Interestingly, it was post-mortem (PM) dental radiographs of a child's mixed dentition that helped to raise the issue of commingling of remains in the collision of a Pan American 747 and a KLM 747 on the island of Tenerife. It was subsequently determined that four Dutch bodies were deposited in the Pan American plane and four American bodies in the KLM.

This transposition of the expected has occurred with possessions as well. A review of the literature found no mention of the problem of borrowed or exchanged personal effects, but it significantly complicated the identification of victims in the Jonestown mass suicide, especially in the pediatric age group. Several children were discovered to be wearing each others' labeled clothing when the AM dental radiographs did not match the "believed-to-be" victims indicated by the clothing. A similar problem with personal effects, or the lack thereof, occurred in the Beirut bombing. The vast majority of the deceased died in their sleep without military ID cards or dog tags. The absence of these personal effects slowed the ID process.

For those identifying Desert Storm casualties, the threat of booby traps, which can include plastic explosives, and the possibility of biohazardous material were chief concerns and required screening measures at the ID processing center. Fortunately neither hazard was present. The skin of the V-22 tilt-rotor experimental aircraft that plunged into the Potomac River was deemed hazardous material by the manufacturer, and those who recovered and identified the seven victims were warned not to touch commingled material. The PM dental team was able to address this problem with only minor inconveniences.

Records—Equal to the problems of remains fragmentation and lack of recovery was the acquisition of AM dental records and inadequate AM dental records. In five of our ten disasters one or more dental records were absent and were primarily disasters in which U.S. civilians and foreigners, both friend and foe, were

involved. However, in two extraordinary incidents, dental records were near or with the military personnel at the time of their deaths. In the Gander Arrow Airlines mishap the dental records were on board the aircraft. In Beirut, dental records were in the Marine headquarters building at the time of the terrorist explosion. AM dental reconstruction teams spent many hours attempting to salvage damaged dental records in these two tragedies. Some records, though, were lost. In seven of the ten reported disasters we found that one or more antemortem dental records (including radiographs) contained confusing or inadequate diagnostic information. There were many mass disasters for which AM dental records were not available for one or more victims (5–8,13,14,16,17,19,22–24, 26–30,32,35). In several instances, foreign passengers complicated the situation (7,14,16,17,23,27,28). Some victims simply did not have a dentist, or the next of kin did not know whom to contact for dental records of the deceased (14). Surprisingly, in several cases, dentists did not cooperate and release roentgenograms and dental records (6,21,24). Warnick (21) stressed the moral and ethical responsibility of the dental profession to keep adequate and accurate records. Accordingly, dentists must take that responsibility one step further and release records in a time of crisis (6).

Dentists can also be their own worst enemy. Over and over again in the mass-disaster literature, forensic dental authors admonished dentists for inaccurate, incomplete, and illegible AM dental records (5,6,8,9,12–14,16,17,19,21,23,24,26–30,34,35). One of the most frequent problems was the dentist's failure to chart existing restorations in and abnormalities of their patients. Harris (15) expressed the sentiments of investigators throughout the world when he emphasized the need for a standardized system of recording existing dental conditions and the subsequent treatment that the patient received.

Patients' dentists also fail to put patients' names or other identifying features on removable prosthetic appliances. In 1994, Clark (27) analyzed ten disasters in which British forensic odontologists participated and concluded that one of the major problems was dentures without patients' names. Haines (9) in the Rijeka air disaster, and Bastiaan (34) in the Victoria, Australia bushfire disaster, encountered similar prosthetic predicaments. Unmarked removable prosthetic appliances were also a major problem in the Tenerife Pan-Am/KLM accident. In that disaster, local authorities removed removable appliances from the victims, gave the appliances numbers different from the body numbers, and stored the appliances all together in a separate area. It is almost needless to mention the frustration that the dental-ID team experienced. A dentist spending a few minutes maintaining records and labeling a prosthetic appliance before giving it to a patient might eliminate hours or even days of needless grief if the discovery of the patient's identity depended on those simple chores.

In our review of these ten disasters we not only found inadequate AM dental-record problems with civilian U.S. and foreign victims but with military victims, too, albeit to a much lesser degree. It is certainly advantageous to have standardized military dental records. In the Tenerife and Jonestown disasters we learned firsthand the monumental task of deciphering civilian AM dental records, but during Desert Storm, we also experienced frustration with our own fallible federal AM-dental record system. For instance, in 12% of the Desert Storm cases the panograph-radiograph repository for the military had none on file or the quality of the panograph was inadequate for identification. If the panograph protocol for quality and submission had been adhered to, this loss of invaluable AM information would not have occurred.

In airline disasters there is an advantage to maintaining a flight

manifest of those alleged to be on the plane. As Dorion (41) has pointed out, with a manifest there is presumptive identification that must be confirmed. In the Tenerife disaster a passenger using another's name hindered our attempts at dental identification: the dental records for the listed passenger did not match the identified remains. Passenger-manifest inaccuracies were also reported in 1977 by Glazer and Sadowsky (1) in the crash of Eastern Airlines Flight 66 and in 1982 by Barsley and associates (17) in the crash of Pan American Flight 759. Without a doubt, in a mass-casualty disaster, an accurate manifest is imperative for fast, accurate identification.

Administration—Among the 40 mass disasters in the literature, there were several isolated administrative problems, including jurisdictional influences of foreign governments (16), poor ID-center facilities (20,21,28), and the lack of section-specific dental equipment (17). These problems also occurred in the ten disasters in which our military dental teams participated. Local authorities refused to release or delayed the release of some or all of the bodies in the Tenerife, Jonestown, and Warsaw accidents. In addition, local Warsaw officials placed our ID team on a strict timetable to complete the identification process and limited its access to the victims in the crash. Solheim and van den Bos (16) reported unsatisfactory international cooperation in three mass disasters involving victims from more than one country, and, as a result, they recommended several proposals for improvement, including sending a forensic odontologist from the country of each victim to assist in the ID. Choi and Snow (42) also stressed the need for the international exchange of identification information on victims of crime and mass disaster analogous to the system used for the international exchange of information on criminals.

Security and information breaches are always a risk for dental-ID teams in mass-disaster situations. McCarty and associates (22) described the controversy the media raised regarding the release of names of suspected victims before the completion of positive identification. Friedman and Novins (30) reported similar harassment from the media and politicians in their account of TWA Flight 800, and Hill and colleagues (24) reported pressure from the media. We experienced one incident in which the print media released names of victims in the C-130 air crash in Ramstein, Germany, while the identification process was still in progress. We assumed the media took the names from the manifest, which, fortunately, was correct. Morlang (36) has emphasized the importance of only the chief of the identification center or the public affairs officer releasing information to the media.

One problem not reported in the literature on mass disasters that we reviewed was remains bypassing the dental section in the ID process. As Bell (43) in 1989 and many other forensic odontology authorities have pointed out, all remains should be examined and tested by as many means as possible. We certainly agree with that concept—the more ways a person can be positively identified, the more likely the identification will be accurate. We offer in support of this position the fact that several authors reported one or more victims initially being misidentified by visual means (2,16,20,29). In the Lockerbie air disaster accepted methods of identification were not always convincing to loved ones, prompting Moody and Busuttill (28) to recommend using all means of identification whenever possible. They warned not to rely on one method, no matter how reliable it may be. Nevertheless, war or civil strife can put forth its own constraints. To a very minor degree, remains-identification circumvention occurred in the Beirut bombing for reasons not privy to the dental team. It also occurred at the start of Desert

Storm. In addition, huge initial projections estimating the need for 300 identifications per day resulted in the decision to release a body once it had been positively identified by either fingerprints or dental means only. This resulted in a few individuals being identified by only fingerprints before the decision was rescinded when it quickly became apparent that prewar predictions of U.S. casualties were grossly overestimated.

Ill-advised decisions by nondental authorities adversely affected standard forensic procedures and protocols in almost 15% of the 50 mass disasters that we reviewed. For example, politicians and high-ranking military officials demanded that the dental team work a 24-hour-a-day schedule at the start of the Beirut identification process before experienced forensic dental leadership arrived on the scene and questioned this order, which was resulting in numerous AM and PM charting errors. In the Gander, Newfoundland operation, high-ranking military officials quickly stopped attempts of the dental team to lessen psychological stress among its team members even though they were tasteful, acceptable methods, such as nametags with benign nicknames and soft music in the work area. In a KC-135 crash at Dyess Air Force Base (AFB), base authorities did not consult with the dental team regarding the acquisition of civilian AM dental records. They inadvertently instructed the victims' dentists to mail dental records to an incomplete address and, as a result, the records were never received. Fortunately, the civilian dentists had made copies of the records before they mailed them. Other examples of nondental authorities adversely influencing standard forensic dental protocols were the compilation of composite AM dental charts by a mortuary staff (19), the pathologists' examination of severely burned victims preceding the dental examination (24,25), pathologists performing dental charting before the dental team (41), and premature external pressure for a deadline for the termination of an investigation (8). These examples easily illustrate the need for the dental team to adhere rigorously to its protocol.

Internal Problems

Stress—The psychological stress of the dental team was seldom mentioned in the literature that we reviewed. In fact, there were only three instances in which stress was discussed (20,31,34). Although it was not addressed by Pert (14) and Harris (15), personnel involved in the recovery and identification of bodies following the 1979 Mount Erebus air crash reported experiencing some degree of stress initially, at three months after the crash, and at 20 months (47). Of note was a very vivid account by Piercy (20) of the mental anguish he experienced as a member of the dental-ID team in the Delta Airline crash at the Dallas-Fort Worth Airport in 1985. The psychological impact of mass casualties at the dental-section level can be difficult to evaluate because it is often silent or covert. We know that dysphoria in some form has afflicted military personnel in at least six of the mass disasters we are reporting. It may be more widespread. Many may have sought therapy or suffered in silence unbeknownst to dental-team leaders. McCarroll and associates (44) and Ursano and McCarroll (45) have discussed the stressors and coping strategies of disaster workers in response to the Gander, Newfoundland air crash of 1985. In the 1978 Jonestown, Guyana mass suicide, mental stress was more common in the young, African-American, enlisted workforce and those with prolonged exposure to the bodies (46). After reviewing these ten disasters we are in essential agreement with Jones (46): emotional stress is less of a problem when dental-ID teams are composed of older members with forensic experience paired with

younger members and when the teams are small in number. Jones (46) has provided detailed recommendations for support for the mental health of personnel in mass-disaster identification and include, as we've already mentioned, pairing younger team members with older, rotation of jobs, group discussions led by mental health professionals for emotional support, and the use of humor as a coping mechanism. This complex area certainly deserves more attention from dental management in future disasters.

Inexperience—Several of the internal problems we encountered occurred during short periods of time when inexperienced dentists were in charge of the dental-ID team. These problems were primarily in the 1983 Beirut, Lebanon disaster and included inappropriate dental-ID summary forms, too many volunteer dentists and dental auxiliaries, and an open area for the AM dental reconstruction room. A 24-hour-a-day schedule gave rise to charting errors even though the dental team worked in shifts. The team that worked the late-night/early-morning shift was not accustomed to the abrupt change in work habits. However, data on which shift made the most errors were not recorded. In the Arrow Airlines incident several of the dentists on the AM dental-record reconstruction team had relatively little forensic experience. The multiple-verification technique was in place but not entirely effective. Almost 40% of the first 50 composite AM forms had errors. This unsatisfactory transcribing was quickly remedied by an educational briefing. Dailey (48) has aptly warned of the dangers of inexperienced, unsupervised team members in any forensic dental subsection.

Esthetic Restorative Materials—Improvements in esthetic restorative materials have also proven to be a foe. Composite restorations have been a problem in three mass disasters (18,28,34). Methods to detect composite restorations in mass-disaster victims include extraction of teeth (28) and periapical radiographs of anterior teeth (34). Composite restorations have eluded detection at PM examinations in two of our most recent disasters, the 1989 KC-135 accident at Dyess AFB, Texas and the 1992 V-22 Osprey experimental-aircraft crash in Quantico, Virginia. Selected PM examinations had to be reaccomplished in these disasters even though a group utilizing multiple verification procedures with a dentist experienced in forensics initially charted them. The restorative dentist's gain can be the forensic dentist's loss.

Conclusions

Unfortunately, many of the problems occurring in mass disasters are unavoidable. Some, however, are avoidable. Forensic dental experts (10,15,17,21,22,33,41) have stressed that disaster preparedness serves greatly to reduce the unexpected, troublesome difficulties that dental-ID teams can encounter. Morlang (37) has emphasized preplanning, organization, and exercises as the essential keys to successful disaster management.

In summary, this retrospective analysis adds to the literature ten mass disasters in which military dentistry participated. Our conclusions were often in agreement with those already reported. For example, fragmented dental remains, unrecovered dental structures, and inadequate AM dental records are the most commonly encountered problems in mass-disaster dental identification. The dental-identification success rate in the ten disasters presented is consistent with the rate in the 40 disasters that we reviewed in the literature. On the basis of our experience and similar reports in the literature, it is essential that dentists be used for the search of dental evidence at the mass-disaster site to ensure the recovery of all

available dental structures. It is important to use all available means of identification and thus increase the validity of the identification (43). Errors caused by long hours and hurried work can be more damaging than any delay in identification. It must be made clear to those who demand quick results that the required work must take as long as necessary (25). However, untrained, inexperienced personnel and overstaffing can cause delays and a compromise in results. Manpower should be based on the size of the disaster. A small number of dentists and dental auxiliaries, preferably those with forensic experience or training, can maintain continuity (5,13). In the ten disasters in which we participated, a small well-trained team decreased errors and minimized psychological stress among dental-section participants. It is important to keep in mind, however, that the dental identification of mass casualties presents different problems during war than during peace. Uncertainties about the duration of the war and variations in the intensity of the conflict cause most of the problems. In war or peace, as so many forensic experts have stressed, advanced planning and training of all dental personnel can eliminate most of the problems that occur in mass-disaster identification. Preparedness is the key. Those who have participated in a major-disaster ID process will certainly agree with Barsley's post-disaster reflection: "There is a very important lesson to be learned from this calamity: preparedness" (17).

Acknowledgments

We wish to acknowledge the assistance of Maureen Raymond, computer services software supporter, and Michael Higgins, editorial consultant, for their assistance in the preparation of this article. Both are with the Louisiana State University School of Dentistry.

References

1. Glazer HS, Sadowsky D. The need for forensic odontology. A case in point: Eastern Airlines flight 66. *N Y State Dent J* 1977;43:341-44.
2. Clark DH. The British experience in mass-disaster dental identification. United Kingdom disasters. A historical review. *Acta Med Leg Soc (Liege)* 1990;40:159-65.
3. Gillespie TH, Brannon RB, Grayson FW, Gardner JD. Dental identification of remains from the 23 October 1983 bombing of the U.S. Marine Headquarters, Beirut, Lebanon. *Mil Med* 1985;150:635-9.
4. Kessler HP, Pemble CW. Forensic dental identification of casualties during Operation Desert Storm. *Mil Med* 1993;158:359-62.
5. Carpenter JP. Dental identification of plane crash victims. *J N C Dent Soc* 1968;51:9-12.
6. Harmeling BL, Schuh E, Humphreys HS. Dental identification of bodies in a major disaster. *S C Dent J* 1968;26:4-11.
7. Ashley KF. Identification of children in a mass-disaster by estimation of dental age. *Br Dent J* 1970;129:167-9.
8. Petersen KB, Kogon SL. Dental identification in the Woodbridge disaster. *J Can Dent Assoc* 1971;37:275-9.
9. Haines DH. Dental identification in the Rijeka air disaster. *J Forensic Sci* 1972;1:313-21.
10. Vale GL, Noguchi TT. The role of the forensic dentist in mass-disasters. *Dent Clin North Am* 1977;21:123-35.
11. Cirigliano L. Disaster! Crash victims identified by forensic dentistry. *J Calif Dent Assoc* 1978;6:29-32.
12. Schaaf JE. Dental identification after an air tragedy. *Alumni Bull Sch Dent Indiana Univ* 1978;Fall:4-6.
13. Schwartz LJ. Forensic dentistry and flight 191. *Ill Dent J* 1979;48:216-7.
14. Pert D. Dental aspects of the Mt. Erebus disaster. *N Z Dent J* 1980;76:186-93.
15. Harris R. When disaster strikes. *Aust Dent J* 1981;26:51-2.
16. Solheim T, van den Bos A. International disaster identification report. Investigative and dental aspects. *Am J Forensic Med Pathol* 1982;3:63-7.

17. Barsley RE, Carr RF, Cottone JA, Cuminale JA. Identification via dental remains: Pan American flight 759. *J Forensic Sci* 1985;30:128-36.
18. Dental identification in mass-disasters: a case study. *Miss Dent Assoc J* 1983;39:26-8.
19. Smith GA, Palian CW. Dental identification and the P-3 crash in Hawaii. *Mil Med* 1985;150:59-66.
20. Piercy JH. Memories of the crash of Delta flight 191: the reflections of a forensic dentist. *Tex Dent J* 1987;104:6-10.
21. Warnick AJ. Dentists aid in identification of crash victims. *J Mich Dent Assoc* 1987;69:553-6.
22. McCarty VO, Sohn AP, Ritzlin RS, Gauthier JH. Scene investigation, identification, and victim examination following the accident of Galaxy 203: disaster preplanning does work. *J Forensic Sci* 1987;32:983-7.
23. Vale GL, Anselmo JA, Hoffman BL. Forensic dentistry in the Ceritos air disaster. *J Am Dent Assoc* 1987;114:661-4.
24. Hill IR, Howell RD, Jarmulowicz M. Identification in the Manchester air disaster. *Br Dent J* 1988;165:445-6.
25. Ayton FD, Parfitt HN. Identification in the Manchester air disaster (Letter). *Br Dent J* 1989;166:69.
26. Crum S. Responding to tragedy in Evansville, Indiana. *Alumni Bull Sch Dent Indiana Univ* 1992;6:14-7.
27. Clark DH. An analysis of the value of forensic odontology in ten mass-disasters. *Int Dent J* 1994;44:241-50.
28. Moody GH, Busuttill A. Identification in the Lockerbie air disaster. *Am J Forensic Med Pathol* 1994;15:63-9.
29. Gregersen M, Jensen S, Knudsen PJT. The crash of the Partnair Convair 340/580 in the Skagerrak: identification of the deceased. *Aviat Space Environ Med* 1995;66:158-63.
30. Friedman BK, Novins SE. In the wake of tragedy. *N Y State Dent J* 1996;62:60-1.
31. Furnari W. When tragedy strikes. *RDH* 1992;12:34-6.
32. Waaler E. Personal identification in mass-disasters. *Bull N Y Acad Med* 1972;48:609-26.
33. Rawson RD, Nelson BA, Koot AC. Mass-disaster and the dental hygienist: the MGM fire. *Dent Hyg (Chic)* 1983;57:12,17-8.
34. Bastiaan RJ. Dental identification of the Victorian bushfire victims. *Aust Dent J* 1984;29:105-10.
35. Morlang WM, Wright LS. Lessons from the Big Thompson Canyon. *Gen Dent* 1978;26:36-9.
36. Morlang WM. Forensic dentistry. *Aviat Space Environ Med* 1982;53:27-34.
37. Morlang WM. Mass-disaster management update. *J Calif Dent Assoc* 1986;14:49-57.
38. Smith BC, Fisher DL, Weedn VW, Warnock GR, Holland MM. A systemic approach to the sampling of dental DNA. *J Forensic Sci* 1993;38:1194-209.
39. Sweet D, DiZinno JA. Personal identification through dental evidence—tooth fragments to DNA. *J Calif Dent Assoc* 1996;24:35-42.
40. Woodward JD. Identification of victims following a mass-disaster. *J Ky Dent Assoc* 1982;34:37-41.
41. Dorion RBJ. Disasters big and small. *J Can Dent Assoc* 1990;56:593-8.
42. Choi E, Snow CC. A failure to communicate: the need for standardization of procedures for the exchange of identification information of crime and mass-disaster victims. *Ann Acad Med Singapore* 1984;13:8-11.
43. Bell GL. Forensic odontology and mass-disasters. *N Y State Dent J* 1989;55:25-7.
44. McCarroll JE, Ursano RJ, Wright KM, Fullerton CS. Handling bodies after violent death: strategies for coping. *Am J Orthopsychiatry* 1993;63:209-14.
45. Ursano RH, McCarroll JE. The nature of a traumatic stressor: handling dead bodies. *J Nerv Ment Dis* 1990;178:396-8.
46. Jones DR. Secondary disaster victims: the emotional effects of recovering and identifying human remains. *Am J Psychiatry* 1985;142:303-7.
47. Taylor AJW, Frazer AG. The stress of post-disaster body handling and victim identification work. *J Human Stress* 1982;8:4-12.
48. Dailey JC. Charting errors in mass-disaster dental records: incidence, issues, and implications. In: Bowers CM, Bell GL, editors. *Manual of forensic odontology*. 3rd ed. Montpelier, VT: American Society of Forensic Odontology, 1995;250-7.

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