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The Medical Examiner in War

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ABSTRACT: Loss of human life is one of the tragic costs of war. While combat deaths are expected, non-combat deaths during a military operation often come as a surprise to military planners and the public. During Operation Desert Storm, all United States deaths related to the Gulf War were classified according to circumstances as either hostile or non-hostile. We reviewed all deaths classified as non-hostile during Operation Desert Storm, from January 16, 1991 through April 17, 1991. These deaths were compared with the death rate recorded for all Armed Forces personnel during a recent year (Fiscal Year 1989) in which there was no hostile activity. The emphasis is on cause and manner of death. Representative cases are briefly discussed.

KEYWORDS: pathology and biology, Desert Storm, war-related fatalities, non-hostile

At the conclusion of Operation Desert Storm, most authorities in the United States considered the Operation successful because the stated objective was attained in only three months with the loss of only 271 American lives. The Office of the Armed Forces Medical Examiner reviewed all U.S. military fatalities that occurred in support of Operation Desert Storm, between January 16 and April 17, 1991. Almost half of these deaths (124 or 46%) were unrelated to combat and classified as non-hostile. All available investigative reports, photographs and postmortem medical examination protocols pertaining to these non-hostile deaths were reviewed. In each case, demographics, circumstances of death, injury patterns, and cause and manner of death were recorded, along with any other available data.

Demographics

The non-hostile fatalities included 118 males (95%) and 6 females (5%). Most were caucasian (79%). Black Americans

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accounted for 18% of the deaths, and 3% were of other racial groups. Seventy percent of all Desert Storm fatalities were in the 18 to 30 year age group, with ages ranging from 18 to 57 years and averaging 27 years. Sixty eight percent of the deaths were Army, 21% Marine Corps, 5% Navy, and 5% Air Force. By rank there were 96 enlisted personnel (77%), eight warrant officers (6%) and 18 officers (15%). Among the fatalities there were also two civilians (2%) working for the Department of Defense.

Cause and Manner of Death

The majority of non-hostile deaths (83%) were classified accidents. Natural deaths, homicides and suicides accounted for 8%, 3% and 4%, respectively. In two cases the manner of death was undetermined (Table 1).

Accidental Deaths

Sixty-six of the 103 accidental deaths (64%) occurred in vehicular accidents. Blast injuries, often associated with improper handling of unexploded ordnance, accounted for 18 deaths (17%). The collapse of bunkers and building materials contributed seven fatalities (7%), including four from asphyxia and three from crushing injuries. There were only two accidental deaths associated with firearms (2%). The remaining ten deaths included two drownings, two drug overdoses, a fall from a height, a rotor blade injury, a choking death, and a death due to thermal injuries. There were two cases in which the cause of death was undetermined; these involved a B-52 bomber that crashed into the Indian Ocean with three persons aboard, two of whom were never recovered (Table 2).

The vast majority of the vehicular deaths were caused by blunt force injuries. Exceptions were the two unrecovered B-52 crewmen (undetermined cause of death) and six victims of motor vehicle accidents who died from asphyxia (four cases), drowning (1 case) and thermal injuries (1 case).

Sixty-seven of all 103 accidental deaths (66%) were due to blunt force injuries, including 58 vehicular deaths, four crushing deaths,

TABLE 1—Classification of all non-hostile Desert Storm fatalities according to manner of death.

| Manner of Death | Number | Percent |
|-----------------|--------|---------|
| Accident | 103 | 83 |
| Suicide | 5 | 4 |
| Homicide | 4 | 3 |
| Natural | 10 | 8 |
| Undetermined | 2 | 2 |
| Total | 124 | 100 |

TABLE 2—Classification of all non-hostile accidental Desert Storm fatalities according to circumstances of death.

| Circumstances | Number | Percent |
|---------------|--------|---------|
| Vehicular | 66 | 64 |
| Ground | 36 | 35 |
| Aircraft | 30 | 29 |
| Explosives | 18 | 17 |
| Crush | 7 | 7 |
| Firearms | 2 | 2 |
| Other | 10 | 10 |

one death by explosion, the fall from height, and the rotor blade death.

Other Manners of Death

All five suicide deaths were caused by gunshot wounds. There were four homicides, three by gunshot wounds and one by cluster bomb. Five of the ten natural deaths were attributed to coronary artery disease.

Vehicular Accidents

Aircraft Accidents

Thirty (29%) of the 103 accidental deaths were caused by aircraft accidents. Helicopter mishaps claimed 25 of the 30 aircraft accident fatalities during Operation Desert Storm. Army helicopters contributed six mishaps and 19 fatalities. Five of these mishaps occurred at night (twelve deaths). The sixth occurred while flying under low visibility conditions (seven deaths). Three of the mishaps involved UH-60 Black Hawk helicopters on medical evacuation missions. One of these struck the ground while attempting to land at an evacuation hospital helipad, fatally injuring the unrestrained medic. The two crew and four patients were restrained and survived the crash. Another UH-60, on a night medical transport mission, struck the ground, fatally injuring all occupants including four crew members. The helicopter was transporting two foreign national patients who were not listed as fatalities in our data base. Adverse weather may have contributed to the accident. Finally, seven died when a medical evacuation helicopter struck the ground while flying under in bad weather (instrument meteorological conditions). There were two helicopter mishaps involving night passenger missions. A CH-47D Chinook struck a tower, killing four of five occupants, and an OH-58C Kiowa struck the ground, killing both occupants. Another fatality occurred when a UH-1 Iroquois helicopter struck a 10 foot high berm, fatally injuring a pilot. The other pilot and three passengers survived. The US Marine Corps had two helicopter mishaps and six fatalities.

Blunt force injuries caused all of the helicopter deaths. Thermal injuries were listed as a contributing cause of death in only one case.

There were five fatalities due to fixed-wing aircraft accidents. Four of these involved Air Force personnel. Three crew members died when a B-52 bomber crashed on approach to Diego Garcia in the Indian Ocean upon returning from a bombing mission in Iraq. The bodies of two crew members were not recovered. The recovered crew member was found underwater attached to his parachute and life raft. He sustained fatal blunt force injuries to the head, neck, torso, and extremities. The other Air Force mishap involved the pilot of a F-16 fighter jet. According to witness accounts, while returning from a night mission with his squadron,

he became disoriented and flew into the ground. Lastly, the crash of an F-18 fighter jet in Saudi Arabia caused the death of a Marine Corps pilot.

Motor Vehicle Accidents

There were 36 deaths (35%) caused by motor vehicle accidents. In 15 cases the circumstances were not well documented. In the 21 cases with better documentation, there were twelve collision deaths, five single vehicle crashes, three pedestrian deaths and one drowning. Of the collision deaths, four were head-on collisions and two involved instances in which the driver of one of the vehicles was ejected and crushed under the other vehicle. The single vehicle crashes included two cases in which the driver and/or passengers remained trapped in their vehicle, and three cases in which they were ejected and pinned underneath. One individual was crushed between two trucks when one of the trucks lurched forward. Another sustained fatal chest injuries when a truck, passing through the victim's stopped convoy during the night, accidentally ran over him while he slept. There was one instance in which a pedestrian was struck by a passing truck, and another involving a forklift operator who accidentally drove off a pier and drowned. Six of these deaths involved High Mobility Multi-Wheeled Vehicles (HMMWV) and eleven involved trucks.

The cause of death in these ground vehicle accidents was usually blunt force injuries (83%), but there were four deaths (11%) from mechanical asphyxia and single cases of drowning and of thermal injuries.

Explosions

There were 18 deaths caused by accidental explosions. In four cases, the circumstances were recorded; two were caused by grenades and the other two by land mines. Blast and fragment injuries were found in all cases except one in which the cause of death was blunt force injuries.

One typical case involved a 37-year-old male who found three "bomblets" in the desert during a convoy break. Assuming they were expended, he took them back to his HMMWV as souvenirs, placing them at his feet on the front passenger floorboard. Ten minutes later, one of the bomblets exploded, causing blast and fragment injuries to the victim's legs, right hand and face. The driver and right rear passenger were unharmed. The remaining souvenir bomblets exploded when they were thrown out of the vehicle and hit the ground. The injury pattern clearly documented that the victim was seated and that the bomblet exploded at his feet.

Firearm Injuries

There were only two firearm deaths certified as accidental. In one incident, a 26-year-old Army officer shot himself in the forehead while demonstrating to other members of his unit the safety features of a .45 caliber semi-automatic pistol. He was demonstrating that the weapon would not fire with the slide and barrel improperly aligned. He first pressed the weapon against his hand and pulled the trigger. He successfully repeated the maneuver with the barrel pressed against his right temple. He tried a third time with the barrel pointed at his forehead, and the weapon fired. The concentric stippling pattern around the entrance wound demonstrated that the weapon discharged at intermediate range. Postmortem toxicology was positive for ethanol (blood 0.05% and urine 0.20%) and the death was classified as an accident. The deceased

was known to consume excessive amounts of alcohol and to exhibit reckless behavior when intoxicated.

The second incident involved a 19-year-old soldier on a reconnaissance mission near the Iraqi border. According to witnesses, when his team stopped their vehicle to plot grid coordinates, he remained seated in the back, holding his M-16 rifle between his legs with the muzzle pressed against his chest. The weapon discharged for unknown reasons. The bullet entered his left chest and several fragments exited his back, causing massive injuries. A single round was found chambered in violation of orders. Military investigative agencies reported no evidence of suicidal intent and classified this death an accident.

Asphyxial Deaths

There were ten asphyxial deaths. Three soldiers died from mechanical asphyxia and suffocation after their bunker collapsed. Three other soldiers were trapped under particle board they were unloading from a van. One of the soldiers died of mechanical asphyxia. The other two died of blunt force injuries. One military member, while on liberty, died in the back of a taxi from a combination of alcohol intoxication and positional asphyxia. Three asphyxial deaths and a drowning occurred as a result of motor vehicle accidents.

Another drowning victim, a 24-year-old sailor on liberty was swimming with several friends, all reportedly excellent swimmers. They were body surfing 75 to 200 feet from shore when they encountered strong currents. As the group struggled to return to shore, the deceased was caught in an undertow and drowned. His body, recovered two days later, showed striking evidence of postmortem depredation by marine life. Toxicology studies were negative for ethanol and drugs of abuse.

Drug Overdoses

Only two drug overdose cases were recorded during Operation Desert Storm. In both instances, death was caused by the simultaneous ingestion of multiple drugs. In one case, postmortem toxicologic examinations were positive for orphenadrine, diphenylhydramine, isoflurane, and salicylates.

The second case involved a 25-year-old Marine found dead in his hospital bed in Wiesbaden, Germany after medical evacuation from Saudi Arabia because of tension headaches. Postmortem toxicologic studies disclosed lethal concentrations of barbiturates, benzodiazepines, and opiates in blood. Investigation disclosed that he found a box of medical supplies containing diazepam-filled syringes when souvenir hunting near Kuwait airport. He reportedly injected some of the diazepam into his canteen and drank the contents. Other service members reportedly also saw him using a syringe to inject himself. He had a long history of drug abuse and drug-seeking behavior.

Homicides

There were four homicides. Three were caused by gunshot wounds, and one by blast injuries.

One incident occurred in the basement of the main terminal of the King Fahd Military Airport in Saudi Arabia. Two soldiers were playing cards when a unit member entered the area and made a joking remark that irritated one of the card players. The irate card player removed his pistol from its holster, aimed it at the joker and shot him in the head. Postmortem toxicologic studies for ethanol and drugs of abuse were negative.

In another case, the victim was sitting on the roof of his HMMWV. The gunner's hatch was open and a fellow soldier, seated inside, was cleaning his .45 caliber semi-automatic pistol, when the weapon accidentally fired. The bullet entered the victim's right lower back near the midline and exited through the left chest wall, injuring the small intestine, stomach, heart and left lung during its upward course. The soldier and the victim had been on friendly terms.

Another weapon cleaning incident occurred inside a tent. A soldier, while cleaning his M-16 rifle, accidentally shot the individual on the next cot. The victim was fatally wounded in the chest.

One soldier sustained fatal head injuries from a cluster bomb during field activities. A fellow unit member tossed the cluster bomb at him to frighten him, thinking it was some kind of flare. The victim's injuries included comminuted skull fractures, pulpectomy of the brain and transection of the brainstem.

Suicides

There were five suicides, all involved caucasians, four males and one female, aged 20 to 36 years. In all five cases, death was due to contact or near contact range gunshot wounds to the head. In four of these deaths the weapon used was an M-16 rifle, and in one case the type of weapon was not documented.

One soldier sustained two near contact range gunshot wounds to the left face and left temple. He was found lying in the desert a short distance from his unit. His absence was noted when he failed to return from his lunch break at the assigned time. His rifle, set in the automatic firing mode, was clutched in his left hand. Witnesses disclosed that he had been despondent and withdrawn.

Another soldier was found in the driver's seat of his utility truck, with his M-16 rifle between his legs, the butt of the weapon on the footwell and his left hand clutching the sling. Powder burns were present on his right hand, and there was a contact bullet wound of the mid-forehead. Several handwritten suicide notes were found in the vehicle.

The three remaining deaths were due to self-inflicted gunshot wounds to the mouth, to the underside of the chin and to the bridge of the nose, respectively. Postmortem toxicologic studies were negative in all five cases.

Natural Deaths

Ten of the Desert Storm deaths were attributed to natural causes. There were five cases in which significant coronary artery disease was documented on postmortem examination. All were males, three caucasian and one black, aged 31 to 44 years. In one of these cases the left anterior descending coronary artery was occluded by thrombus. Two deaths were due to infection. One was a confirmed case of meningococcemia and in the other case bronchopneumonia was documented at autopsy. One 29-year-old individual was found dead in his sleeping bag in the rear of his truck. Postmortem examination revealed cardiac valvulopathy. One death was due to spontaneous rupture of aneurysm a cerebral artery and another was due to an intestinal volvulus.

Discussion

The mere deployment of a massive military force, consisting of largely unacclimatized troops, to an unfamiliar and possibly hostile area should be expected to increase the risk and incidence of violent and unexpected deaths.

Most of the three months of Operation Desert Storm was devoted

to an air war. Since only aircrews and perimeter ground forces were directly exposed to combat, the number of combat-related deaths was low (147 of 271). The relatively high number of non-hostile deaths (124 of 271) was consequently thought to reflect the complex activities involved in moving a force of 541,425 active duty military members² and sustaining them at a desert located more than 8000 miles from the United States.

Although the number of non-hostile deaths (124 of 271 fatalities) seems excessive, the death rate is in fact not significantly higher than what might be expected among active duty military members in peacetime. During fiscal year 1989, for example, a year in which no hostile deaths were recorded, 1,678 of 2,130,229 (79/100,000) active duty military service members died [1]. During Operation Desert Storm there were 124 non-hostile deaths among the 541,425 deployed (23/100,000). The death rate during this three month time period thus corresponds to slightly less than a third (30%) of that occurring during FY 1989.

When comparing the death rates due to accident, homicide, suicide and natural illness during Operation Desert Storm and during FY 1989, a similar distribution was noted (Table 3). Accidental deaths were more frequent during Desert Storm (84.4% vs. 63% in 1989), possibly as a result of increased vehicular activity in unfamiliar terrain. When comparing non-hostile deaths and combat casualties at weekly intervals during the three month period, the

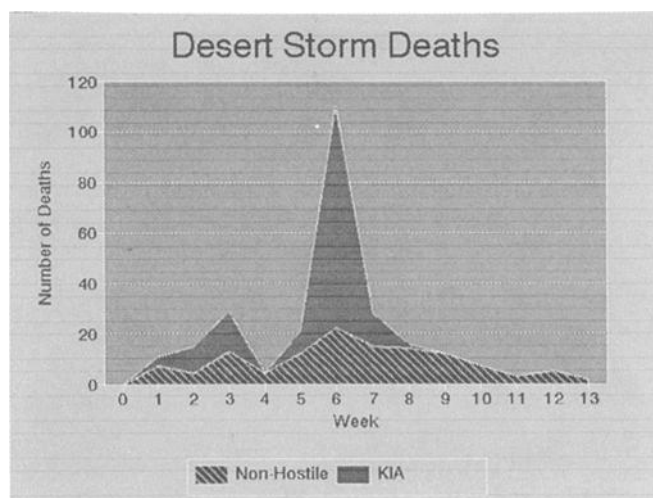


FIG. 1—Incidence of non-hostile deaths during Operation Desert Storm.

incidence of non-hostile deaths, mostly accidents, varied with ongoing military activity (Fig. 1). Conversely, natural deaths and suicides appear to have been more frequent in peacetime (18% and 13% respectively vs. 8.2% and 4.1% during Desert Storm). This may reflect the better overall medical condition and psychological frame of mind of troops sent to the Gulf. Interestingly, the incidence of homicidal deaths was similar (3.5% in 1989 and 3.3% during Desert Storm).

Reference

- [1] Department of Defense: "Worldwide US Active Duty Military Personnel Casualties: October 1, 1979 through March 31, 1992," Washington Headquarters Services, Directorate of Information, Operations and Reports, Washington D.C. (DTIC/NTIS Identification number DIOR/Mo7-92/02).

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TABLE 3—Comparison between non-hostile deaths during Operation Desert Storm and worldwide US military deaths in peacetime during fiscal year 1989.

| Death Rate/100,000 | Non-Hostile | |
|--------------------|----------------|---------------|
| | Gulf War 23 | FY 1989 79 |
| Manner of Death | | |
| Accident | 83% | 63% |
| Natural | 8% | 18% |
| Suicide | 4% | 13% |
| Homicide | 3% | 3.5% |
| Undetermined | 2% | 2.5% |

²Office of the Secretary of Defense for Public Affairs via US Central Command, personal communication.