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## **In-flight Death of a Passenger Requires a Thoughtful Response from Flight Attendants**

*New studies of passenger deaths during flight will help airlines to update policies and procedures in light of data that are more accurate and current. The probability of the in-flight death of a passenger on any specific flight is low. Nevertheless, given the volume of passengers and changing demographics, a cabin crewmember could be called upon to respond appropriately if a death occurs.*

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*FSF Editorial Staff*

For flight attendants, the possibility of the apparent in-flight death of an airline passenger may be difficult to contemplate. This situation falls outside the scope of everyday experience, yet involves medical, legal, social and cultural issues. Moreover, background and experiences shape personal knowledge and attitudes about death at a profound emotional level. Nevertheless, cabin crewmembers could be called upon to perform specific duties if an in-flight death occurs.

(“Apparent in-flight death” means that some of the signs of death may be observed by a flight attendant, but no physician officially has pronounced the person dead and signed a death certificate. This situation is common among in-flight deaths; that is, emergency medical personnel typically remove the passenger from the aircraft upon arrival, and a physician later pronounces death at a medical facility.)

The primary problems during flight for a passenger with a life-threatening medical problem are isolation from ground-based services and time required to reach a medical facility that can provide advanced life support. Some studies have



calculated that a medical diversion from cruising altitude over the United States requires an average of 40 minutes.<sup>1</sup>

But several studies also have concluded that many air carriers can provide an ideal location for rapid resuscitation because their aircraft have:

- A controlled environment with passengers under nearly constant observation;
- Trained personnel and appropriate equipment;
- Capability of administering cardiopulmonary resuscitation (CPR) and, at an increasing number of airlines, capability of using an automated external defibrillator (AED; AEDs are devices that can be used by trained cabin crewmembers to restore the normal heartbeat of a person who has experienced cardiac arrest with ventricular fibrillation, an abnormal condition in which electrical impulses controlling the heart muscle are uncoordinated. Death will occur in minutes unless the normal heartbeat is restored.);<sup>2</sup>

- Capability to communicate with emergency-medicine physicians;
- Passengers on many flights — licensed as physicians, nurses, emergency medical technicians or other medical professions — who might volunteer to assist during an in-flight medical emergency; and,
- Good crowd control, adequate lighting and climate control suitable for providing first aid.

Other studies have focused on the difficulties of providing adequate care with the relatively limited resources aboard aircraft, and on the need for primary-care physicians (and other health-care professionals) to discourage air travel by passengers whose medical problems could become life threatening.

A 1988 report, describing how physicians should evaluate an ill patient’s medical condition for purposes of travel, said, “One of the absolute contraindications to air travel is the likelihood that the individual will not survive the flight.”<sup>3</sup>

In-flight passenger deaths from the 1940s through the 1980s have been the subject of several studies, directly or indirectly. For example, one 1983 study<sup>4</sup> of earlier research said, “Of 90 deaths reported in [British Overseas Airways Corporation (BOAC)] passengers from 1947 to 1967, 34 were due to myocardial infarction [heart attack], six to heart failure, seven to cerebrovascular accidents [stroke], 13 to cancer; three to leukemia, three to renal failure, two to pulmonary embolism [blocked artery in the lung] and two to cirrhosis of the liver. This distribution of diagnoses is very similar to a series of 25 deaths reported by Qantas between 1975 and 1979. Nine [of the BOAC deaths] could not have been prevented wherever they had occurred, and a further two were likely to have been fatal if they occurred anywhere outside a hospital environment.”

A 1988 study said, “Relative to the millions of passengers carried each year, in-flight deaths are extremely rare and probably occur at a frequency less than what would be expected on the basis of the numbers alone.”<sup>5</sup>

A report by the U.S. Federal Aviation Administration (FAA) in 1997 suggested two reasons for an increase in the number of medically at-risk passengers from 1990 to 1993 in the United States<sup>6</sup> that are related to the Americans with Disabilities Act of 1990 (ADA), which prohibits discrimination in public transportation on the basis of disability.

“The act forbids eligibility criteria that screen out individuals with disabilities and defines a failure to make reasonable modifications in policies, practices or procedures as discrimination,” said the study. Second, the law prompted research into methods of decreasing risk to passengers with various medical conditions and improving safety for them

during air travel. This research led to technical advances (for example, in providing portable oxygen containers) and increased travel by disabled passengers.

## **SOPs Override Emotions of In-flight Death**

No universal standard operating procedures (SOPs) have been adopted by the world’s air carriers for in-flight medical emergencies, including in-flight death. Worldwide, however, airlines have analyzed the limited number of industry studies and their proprietary in-flight death data to provide better medical assistance to passengers.

Claude Thibeault, M.D., medical director of Air Canada and chairman of the Airline Transport Medicine Committee of the Aerospace Medical Association (AsMA), said, “Individual airlines in the International Air Transport Association [IATA] develop their own procedures for in-flight death depending on their facilities. We talk, but there is no written guideline anywhere. In the United States, people are much more conscious of the legal aspects of medical incidents than in Canada or Europe, for example, but that doesn’t change guidelines; basic principles apply everywhere.”

IATA published in-flight death data — voluntarily submitted by member airlines — in annual reports from the early 1960s to the mid-1980s. The FAA currently is analyzing one year of data on in-flight deaths from U.S. major air carriers<sup>7</sup> — from July 1, 1998, through June 30, 1999 — and, separately, data collected by MedAire<sup>8</sup> from five airlines that operate under U.S. Federal Aviation Regulations (FARs) Part 121 regarding 1,132 in-flight medical emergencies — from October 1996 through September 1997. Except for these soon-to-be-released studies, said Thibeault, virtually no significant amount of data concerning in-flight medical emergencies has been published since the 1980s.

“We are not saying that a problem of in-flight medical emergencies, including in-flight deaths, exists or does not exist — we really don’t have data to speak intelligently about this,” said Thibeault. “We need to get some appropriate data, which we don’t have right now. What I want to do now is standardize the data collection for any medical incident on board aircraft so that we will get an idea of what we are dealing with. If AsMA and airline medical directors could get 10 to 15 big carriers involved, we would get a tremendous amount of data in a few years. Then we could see what is happening — and be in a much better position to provide guidelines for crews.

“It’s very difficult to get airlines to participate [in standardizing collected data] because they have their own ways of doing this. Right now, a lot of what is being discussed involves numbers that have been picked out of a hat [that is, unscientific data].”

If a death occurs on an aircraft, the flight crew must consider that if they divert, the authorities in the country where they land will determine the actions that should be taken, he said.

“In my experience, local laws and requirements have not been much of a problem in the last 15 years,” said Thibeault. “There used to be concern that the aircraft would be impounded and that local authorities would ask a lot of questions. Practically speaking, if an aircraft is diverted for a medical reason and the outcome happens to be a death, with no obvious foul play, the local people simply will do what they need to do, and the aircraft and crew will proceed to their destination.”

Actions taken by flight attendants in response to an in-flight medical emergency have significant consequences for the flight. CPR training and AED training, based on guidelines of the American Heart Association, for example, provide guidance on when to use these resuscitation methods.

“A flight attendant who begins performing CPR should continue CPR until told to stop by a person who has medical authority,” said Thibeault. “Once flight attendants decide to begin administering CPR, they are obligated to continue as long as they can. But if they decide to begin CPR, the flight crew automatically will divert the aircraft. If there is no physician-passenger on board and no one on the ground who will pronounce the person dead, flight attendants are in difficulty. They would have to take turns to continue CPR.”

While the flight attendants are responding to the passenger during a medical emergency, many other things typically are happening.

“The purser [lead flight attendant] and the captain will be talking and looking for the best solution that exists,” said Thibeault. “Today, it is very rare for them to reach someone on the ground — other than a dispatcher, airline medical staff or physicians who provide medical advice — during in-flight medical emergencies. It would be very rare for aircraft crewmembers to contact a passenger’s family on the ground, for example. Still, there is the possibility of an in-flight medical emergency occurring on an aircraft with no physician-passenger on board and no prearranged source of medical advice.” Then a crewmember may contact a flight service specialist or the dispatcher, who will arrange a communication link to a hospital emergency room, he said.

In-flight deaths require advance planning and improvisation concerning resources on the aircraft.

“Sometimes a flight attendant finds someone who is presumed dead,” said Thibeault. “The person is not breathing, the skin is cold, there is no pulse. The person apparently went to sleep, for example, while the cabin lights were off, and was not discovered until lights were turned on. Some cases are quite obvious, but there is nothing written as to what a physician-passenger should do in these situations.

“Experience tells us that a physician-passenger on board sometimes will pronounce death. On another flight, a different physician-passenger might not be willing to do that.”

Typically, flight attendants consider the option of relocating the body of a passenger who has died.

“Relocation to a place less conspicuous — such as a crew-rest compartment — has a tendency to be much less traumatic for other passengers,” said Thibeault. “Normally there are specific things in the SOPs related to [stowing the body of a dead passenger].”

David Streitwieser, M.D., medical director of the group of emergency-medicine physicians that provides MedAire’s MedLink medical-advice service to aircraft crewmembers, said that two basic scenarios for in-flight death are the most common.

“One scenario is the apparent heart attack in which others see a person collapse and gasp for breath, for example,” said Streitwieser. “That’s the patient for whom, if appropriate and immediate care is provided, there is a chance for survival. You begin CPR and if there is access to an AED, you use it. Some air carriers have advanced cardiac life support drugs in their medical kits, but use of these drugs requires specific medical training. The next step is to alert ground physicians who can assist in use of medications, make arrangements for the airplane to divert, and arrange for emergency medical personnel to meet the airplane.”

The second scenario is a passenger who may not be traveling with anyone else. Typically a flight attendant or a passenger notices that the person seems to be asleep.

“If you encounter someone who is not breathing, has no pulse and is cool to the touch, then you have an apparent death,” Streitwieser said. “There aren’t any published guidelines for physicians on how to pronounce death remotely [that is, when the physician is not present with the patient]. There are some very specific circumstances in which certain nonphysicians, such as emergency medical technicians, can pronounce death under various state laws in the United States, but the standards are rigorous. For example, criteria might include a body that has been decapitated, or where dependent lividity [pooling of blood in tissues caused by gravity] is apparent or there is rigor mortis [stiffening of muscles after death]. If these specific criteria have occurred, the person is dead. If not, it is difficult to pronounce death outside a hospital.”

Streitwieser said, “Most of the time, the situation requires a physician to pronounce death. Emergency-medicine physicians prefer to have asystole [no electrical activity from the heart displayed on a cardiac monitor]. Usually you can’t see asystole in a remote-care situation so pronouncing death is more difficult. Some AEDs have a cardiac-monitor capability that may assist physician-passengers aboard the aircraft and physicians on the ground in their diagnosis.

“No time guidelines exist for ceasing CPR. There is no strict protocol from the American Heart Association, for example, because circumstances vary so much. What can be done in flight depends on factors such as the number of trained personnel available, medical equipment on the aircraft and where the aircraft is located [relative to medical facilities that have advanced life-support capability].”

In providing ground-based medical advice to aircraft crews, MedLink physicians are very reluctant to pronounce someone dead during flight.

Streitwieser said, “Maybe 30 minutes of CPR has been provided without detectable pulse or breathing, but sometimes there is no chance to reach advanced life support for hours. We may recommend stopping resuscitation, but the patient still could have cardiac activity. Our physician simply will tell the crew ‘I am not going to pronounce this person dead.’ Even if the cabin crew finds someone who appears dead, our physicians won’t declare the person dead because there are medical conditions in which a person may appear to be dead — but is not dead.”

Even though a physician-passenger aboard the aircraft may volunteer to assist, aircraft crewmembers should realize that most physicians don’t pronounce people dead in their medical practices, said Streitwieser. Hospital-based physicians in a few specialties more typically determine death as a routine part of their medical practice.

“There are no definitive sources of information on when to cease resuscitation efforts. In general, people are taught that if they begin CPR, they should continue CPR until a person with higher medical qualifications tells them to stop,” said Streitwieser. “Only when a physician or other person with medical authority gives this advice should CPR be discontinued.”

Although the underlying reasons are complex, the distinction between apparent death and death pronounced by a physician can be understood in simple terms.

“Just because you stop CPR or withhold CPR, you are not pronouncing the person dead,” said Streitwieser.

From his experience, Streitwieser believes that training of flight attendants to handle in-flight medical emergencies — including death — generally is adequate for most situations that cabin crews are likely to encounter. Advanced training — for example, use of AEDs and advanced medical kits — provides more preparation than first-aid training, he said.

Streitwieser said that on short flights or domestic airline flights, aircraft typically do not carry special equipment for responding to in-flight deaths. He said that such equipment would be valuable in some cases.

Universal precautions used by flight attendants (and health-care professionals) in providing health care also are adequate when working with a person who has died, said Streitwieser.

“The flight might have a ‘messy death’ as opposed to a ‘clean death,’ but there are not many of them,” said Streitwieser. “For example, a person who dies from intestinal hemorrhage might have heavy bleeding. From my knowledge of infectious disease, the risk of infection from a dead body is low. The primary body fluid of concern is blood. Transmission of serious infection because of performing mouth-to-mouth CPR is extremely rare. A more common scenario might be that the person has moved their bowels or urinated involuntarily, but that’s not a big problem because people are clothed.”

Training in first aid, universal precautions and the use of spill kits — the same skills and equipment used to assist ill passengers — sufficiently prepares flight attendants to handle such clean-up tasks appropriately, he said. (Spill kits, also called pick-up kits or clean-up kits, typically contain a biohazard bag, latex gloves, surgical masks, spatula and a solution to absorb potentially infectious substances.)

If a decision is made to move a passenger’s body to another part of the aircraft after an in-flight death, cabin crewmembers should take two safety precautions: Apply training in lifting techniques to prevent injury to themselves, and consider that the body is a heavy object that must be secured properly — fastened into a seat with a seat belt, for example.

Streitwieser said, “In most circumstances, it is adequate for the [body] to remain secured in the seat.”

“In general, we will arrange for the paramedic response to the aircraft,” said Streitwieser. “When the paramedics respond, the local issues regarding reporting of death fall into their jurisdiction.

“Typically there is no pressure from family members or traveling companions to change our medical advice — for example, concerning resuscitation,” said Streitwieser. “Often the airline already will have initiated diversion of the flight when we get the call.”

Streitwieser said a practical, but unofficial, standard for diverting a flight is that if someone has become seriously ill and is receiving CPR, for example, diversion is appropriate when the flight crew can land safely at a location where appropriate emergency medical care will be available within a reasonable time.

Petra Illig, M.D., regional medical director for Delta Air Lines in Salt Lake City, Utah, U.S., said that most larger airlines are contracting for ground-based medical consultation. Delta, for example, uses emergency-medicine physicians at the University of Pittsburgh Medical Center (UPMC; Pennsylvania, U.S.) to provide 24-hour medical advice for

aircraft crews. Some other airlines have ground-based physicians on call.

“One of my main interests is providing emergency medical advice during preboarding, boarding and after departure,” said Illig. “This includes changing the way that we contact UPMC from the airplane. Most in-flight medical emergencies are non-life-threatening events, and more times than not, I need the ground-based physician simply to talk the cabin crew through the event.

“All this information has been flowing through the flight deck with a potential for mistranslation of information. During dozens of recent interviews, pilots typically said, ‘I don’t know how to spell Procardia or nitroglycerin [heart medications]. ... Just tell me if I need to divert and where.’”

The airline is approaching this problem by taking the pilots out of the medical-communication loop when possible by using seat-back telephones. Cabin crewmembers will be trained to use a quickly remembered telephone number to connect directly with medical advice from ground-based resources, she said.

“We will need to teach cabin crewmembers to use good judgment as new procedures and technology are adopted,” said Illig. “For example, they will be taught that if a person is pulseless, the first action is to perform CPR and use the AED — not to reach for a telephone. We’re moving away from asking passengers, ‘Is there a doctor on board?’ when there is time available to figure things out.” An emergency-trained physician on the ground has a wealth of information to aid decision making, such as knowledge of the best medical facilities at diversion sites, she said.

The airline’s position is that in a life-threatening emergency, passengers should be treated at the most appropriate medical facility.

“If the diagnosis is an obvious stroke in evolution, for example, we don’t want the patient to be transferred to an ambulance that will drive another hour to reach an emergency medical facility that can give the patient clot-busting medications,” said Illig. Minutes would count in such a situation to prevent permanent injury or death, she said.

Cabin crewmembers also should consider what would happen if a flight attendant or a pilot became incapacitated, she said. On a recent flight, for example, a flight attendant was resuscitated with the AED by other cabin crewmembers who were trained to use the device.

Illig said that critical-incident-response training, increasingly provided to cabin crews, helps to familiarize them and prepare them for the type of psychological stress that might accompany the in-flight death of a passenger. Typically, training presents a variety of scenarios, ranging from in-flight medical

emergencies (an individual death, for example) to the traumatic stress of aircraft accidents. Employee assistance programs also provide resources to help airline employees cope with critical-incident stress, she said.

## **Most In-flight Deaths Caused by Cardiac Arrest**

One aircraft diversion in seven occurred in response to an in-flight death, according to a 1988 report.<sup>9</sup> The report showed that the majority of in-flight deaths were caused by sudden cardiac arrest occurring among apparently healthy people — not among previously ill people. The report said that if boarding had been denied to ill passengers, about 20 percent of the in-flight deaths would have been eliminated from the data.

“Exclusion of [terminally ill passengers traveling to obtain better medical care or to visit a homeland, family members or a religious shrine] from international travel would not only be unrealistic and controversial, but inappropriate,” said the report.

The 1988 report also showed a variety of causes of in-flight death, ranging from complications of previously diagnosed illnesses and preflight trauma (in which passengers were traveling to receive medical care for these conditions) to trauma during flight, overdoses of medications and one occurrence in which a passenger bled to death from self-inflicted laceration of blood vessels in his neck in an aircraft lavatory.

An in-flight passenger death occurred in 1998 after the passenger attacked the aircraft captain and several other passengers.<sup>10</sup> The passenger was trussed into a seat by the captain and other passengers, and a physician-passenger aboard the flight injected the passenger with a sedative medication from the on-board medical kit. The passenger stopped breathing and could not be resuscitated with CPR.

## **Studies Show Causes Of In-flight Death**

Studies of in-flight deaths during commercial air travel have included the following:

- A study of long-distance airline passengers from February 1979 to January 1982 at London Heathrow Airport, England, found that fatal pulmonary embolism [blocked artery in the lung] caused 18 percent of 61 in-flight passenger deaths, with 82 percent of deaths occurring among females.<sup>11</sup> Fifty-seven of the deaths involved passengers older than 40. Eleven deaths were attributed to pulmonary embolism following calf-vein blood clots (73 percent with no prior medical history of this disease), and 43 in-flight passenger deaths were attributed to ischemic heart disease (disease involving inadequate blood supply);

- During a one-year study<sup>12</sup> of medical emergencies among travelers at the Seattle-Tacoma (Washington, U.S.) International Airport, five airline passengers were diagnosed with cardiac arrest, one aboard an aircraft on the ground. In that case, the 69-year-old female passenger, who received CPR performed by bystanders, was treated for ventricular fibrillation by paramedics within three minutes, and she survived after medical treatment. The survey was conducted from September 1986 through August 1987. The study, summarizing the published medical data to date, said, “Sudden cardiac death in apparently normal travelers is the most frequent cause of death during commercial air travel, though death during air travel remains extremely rare”;

- During a one-year study<sup>13</sup> of in-flight medical emergencies (specifically those involving use of an enhanced medical kit required by FAA in 1986) at United Airlines — July 1987 to June 1988 — the researchers had difficulty determining accurate death data. Five passenger deaths were studied (two in-flight passenger deaths were documented; one death was classified as an in-flight death because it occurred on an aircraft prior to takeoff; the others did not occur on aircraft). “All three in-flight deaths were presumed to be cardiac in nature,” said the study;

- Researchers studied in-flight death data that were reported voluntarily to IATA by 42 airlines (among 120 member airlines at the time) for the years 1977 through 1984.<sup>14</sup> The study said that 382 of 577 in-flight deaths (66 percent) occurred among men whose average age was 54. In 399 (77 percent) of 515 in-flight deaths, no health problems were reported prior to travel. Physician-passengers aboard the flights gave assistance in 247 (43 percent) of 577 in-flight passenger deaths. No assistance was provided for 196 (34 percent) of 577 passengers who died in flight (“a reflection of the suddenness of the deaths that occurred in flight,” said the study). Eighty-two aircraft diversions were conducted after in-flight passenger deaths. Cardiac problems were cited in 326 (56 percent) of 577 in-flight deaths and among apparently healthy passengers, sudden unexpected cardiac death was the cause of 253 (63 percent) of 399 in-flight deaths. Thus, sudden unexpected cardiac death seemed to be the major type of in-flight death, said the study;

The study said that analysis of the data, however, showed major errors of incomplete reporting and diagnostic inaccuracy. For example, data fields for cause of death contained no data for 73 deaths, and other data fields included imprecise terms such as “collapsed and died” (67 passengers); and “sick” (three passengers) and “found dead” or “natural causes” (23 passengers). Despite such problems, the data showed a minimum

number of in-flight deaths known to have occurred in that period, and the researchers assumed that the actual number was greater;

- American Airlines reported in 1999 that in-flight deaths increased from fewer than 20 in 1993 to more than 40 in 1996.<sup>15</sup> The airline’s report said, “Although in the past, we did not track outcomes of medical events on board, we define ‘deaths’ as cases where the customer had no pulse, no breathing and was unresponsive, and the flight attendant administers mouth-to-mouth resuscitation and closed-chest compression. ... Sudden cardiac events are the most common in-flight medical event and are a major cause of medical diversions. ... Sudden cardiac arrest may be the first and only sign of cardiovascular disease. ... The odds of surviving a sudden cardiac arrest are less than one in 10, with most persons dying before reaching a hospital. Those people who do survive a cardiac arrest have a good chance of living many more years. Approximately 80 percent are alive at one year, and as many as 57 percent are alive at five years.” AEDs were used 39 times in a seven-month period, and five deaths occurred among these cases, said the report;

- A 1989 study of in-flight medical emergencies among airline passengers arriving at Los Angeles (California, U.S.) International Airport — from October 1985 through March 1986 — said that seven passengers among 8,735,000 passenger arrivals experienced “fatal events” in flight.<sup>16</sup> “Six passengers suffered fatal cardiac arrests, and one passenger suffered a fatal cerebrovascular accident [stroke] while in flight,” said the report;

- A 1986 report said that estimates of annual in-flight deaths ranged from 20 deaths to 100 deaths in the United States.<sup>17</sup> The report also advised physician-passengers to be aware that “vibration and background noise inherent during flight make subtle diagnosis by use of a stethoscope or sphygmomanometer [device to measure blood pressure] difficult. Furthermore, blood pressure readings at cruising altitudes are not highly accurate”; and ,

- FAA reported 33 in-flight deaths on air carriers operating under FARs Part 121 during a two-year period — August 1986 through July 1988 — including nine deaths in the first 12 months and 24 deaths in the second 12 months of a mandatory reporting period.<sup>18</sup> “We estimate that approximately 48 percent of the 33 deaths were apparently related to cardiac etiology, 6 percent to accidental causes, another 6 percent to terminal cancer consequences, 3 percent to an allergic etiology, 3 percent to [acquired immune deficiency syndrome (AIDS)], and the remaining 33 percent to unknown reasons,” said the report.

## Definitions of Death Vary

Death has many meanings. In the aircraft cabin environment, however, the medical facts of death — and associated legal issues and cultural expectations — primarily shape the practices of flight attendants.

From a medical standpoint, death has been called “natural and necessary and inextricably tied to life.”<sup>1</sup> Even the definition of death in biological terms, however, involves decisions made by a specific culture at a specific time.<sup>2</sup>

Criteria for determining death in many countries currently comprise several factors, some of which are considered when life-support technologies have been used to prolong life. Over the years, medical advances such as artificial respirators and cardiopulmonary resuscitation (CPR) have required reconsideration of these criteria. Changes of criteria involve debates that extend beyond the scientific community.

The purpose of death criteria<sup>3</sup> is to give society a moral consensus and ethically acceptable basis for the determination of death. One ethicist — drawing upon criteria developed by the Ad Hoc Committee of the Harvard Medical School to Examine the Definition of Brain Death (1968), the President’s Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research (1981) and recent recommendations of ethics scholars — proposed the following universal statute in 1992:<sup>4</sup>

- “An individual who has sustained either (1) irreversible cessation of circulatory [functions] and respiratory functions, or (2) irreversible cessation of all functions of the entire brain, including the brain stem; or (3) irreversible cessation of higher brain functions is dead. [The first two criteria had been adopted as of 1992 in 31 state laws in the United States.];<sup>5</sup>
- “Competent adults, using advance directives, may opt for either one of these criteria; proxy decision making is not accepted, except in cases of parents deciding for minor children. In the absence of advance directives, the irreversible cessation of all function of the entire brain, including the brain stem, will signify death; [and,]
- “Given global cultural diversity and different legal and religious traditions, [countries], in promoting their interest in protecting the life and dignity of their citizens in accordance with widely held values within their constituency, may, as a matter of public policy, define different death criteria, such as those based on cessation of functions of the entire body or the heart, but should provide a conscience clause for individual choice. A determination of death must be made in accordance with accepted medical standards.”

Use of such criteria gives physicians and society grounds to cease or to withhold medical care, including heroic measures to prolong life; to discontinue costly extension of “brain-dead” life in a body; and to remove human organs for transplantation (after fulfilling legal requirements).

From a clinical standpoint, application of such criteria in the cabin of an aircraft can be very difficult. The Ad Hoc Committee criteria, for example, specified tests for clinical signs that a physician can perform when electroencephalographic (brain wave) monitoring is not available to judge that “an organ, brain or other, that no longer functions and has no possibility of functioning again, is for all practical purposes dead.”<sup>6</sup>

Depending on the equipment available and the environmental conditions, the following signs might be checked (following Ad Hoc Committee criteria or other criteria where the physician practices medicine): absence of circulation detectable in the retinal blood vessels; absence of cardiac activity; no movement or breathing for a specified period; no response to pain, touch, sound or light; no reflexes; and flat electroencephalogram. Such tests presume that there is no hypothermia — body temperature below 90 degrees Fahrenheit (F; 32 degrees Celsius [C]) — and that there are no central nervous system depressants present (such as barbiturates); both situations complicate the determination of death. Thus, circumstances make it difficult for a physician-passenger in an aircraft cabin, or for a physician providing medical advice from the ground, to pronounce death; this action most often is deferred until the apparently dead person is delivered to a medical facility.

From a legal standpoint, the manner and time of a person’s death are extremely important. In civil law, for example, details of death have implications for inheritance, transfer of estate and property, insurance proceeds, obligations under contracts and liability for delayed death of a person who was the victim of an accident or assault.<sup>7</sup> The possibility of criminal wrongdoing in a death also must be determined by local authorities. Thus, pronouncing death and estimating the time of death have significant consequences for society.

Policies and procedures for the preparation of a body after death vary among hospitals. Nevertheless, some common practices generally are followed.<sup>8</sup> Hospitals expect personnel who provide postmortem care to behave in a sensitive manner, to prepare the body promptly and to avoid disfiguring tissue. Prompt action is important because of physical changes that occur after death.

Typical procedures may include placing the body face up, positioning the hands palms down at the side or across the abdomen, placing a small pillow or folded towel under the head and a rolled towel under the chin, holding the eyelids closed for a few seconds (if open), inserting dentures, cleaning soiled body parts, removing medical

devices as required by policy, placing pads in position to absorb feces or urine, dressing the body in a clean gown, grooming the hair, attaching identification information as required by policy, and wrapping the body in a body bag with additional identification on the outside. Policies also govern custody of the body and personal effects (and related recordkeeping, typically in the deceased person's medical record).

Relocation of a body typically is done with unobtrusive methods (such as a covered cart) for reasons of privacy and to prevent discomfort for other people.

Such postmortem care procedures are performed, in part, because of the following changes that occur in a human body after death:

- The body's muscles relax at the time of death, possibly causing involuntary urination or bowel movement. Then muscles become stiff (a condition called rigor mortis) during a period that begins two hours to six hours after death, affecting all muscles within four hours to six hours, and lasting from 24 hours to several days.<sup>9</sup> Individual factors and temperature affect rigor mortis. The body cools, and internal breakdown of cells gradually occurs unless the body is frozen. Without control of muscles, the shape of the skin changes, altering the appearance of the deceased person;
- After the heart stops, blood throughout the body settles in the lower parts of the body, causing the skin on upper surfaces of the body to become pale, and the skin on the lower parts of the body to become purple-red during the first eight hours to 12 hours after death — and possibly minutes after death;<sup>10</sup>
- Decomposition of a body involves two biological processes: putrefaction (anaerobic degradation) and decay (aerobic degradation).<sup>11</sup> Moisture and moderate temperatures are requirements for putrefaction; the process stops, however, if a body is cooled to 39 degrees F; 4 degrees C. Dessication (drying) — rather than putrefaction — occurs when ambient humidity is extremely low; and,
- Bacterial decomposition occurs most rapidly if temperatures are between 60 degrees F and 95 degrees F (15 degrees C and 37 degrees C) and moisture is present. Many external factors affect the rate, however, including the difference between the body temperature and the ambient temperature. Putrefaction of a body — at moderate temperatures and without embalming — normally does not begin until one day or two days after death; however, some bacterial infections before death might cause putrefaction to begin in nine hours to 12 hours. The

decay process might begin about five days after death under these conditions.<sup>12</sup>

Based on the science of death, flight attendants might expect that over a period of hours — in the environment of a pressurized and air-conditioned aircraft cabin — the body of a deceased passenger fastened in a seat would become cool; visible skin would become pale (with blood moving to the lower extremities); and there could be some incontinence in which most fluids likely would be absorbed by clothing. Given the typical temperature, low humidity, ample air circulation and the maximum time frame of a flight, visible signs or noticeable odors of decomposition probably would not occur.♦

— FSF Editorial Staff

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## Airline Adopts Mortality Kit For Long-haul Flight Environment

In 1996, Air New Zealand published a report on the development of an on-board mortality kit, related SOPs and training for flight attendants.<sup>19</sup> The need for the mortality kit emerged from a few cabin crew experiences of in-flight passenger deaths during ultra-long-haul flights between cities in Australasia, Europe and North America.

“The average age of our passengers is rising, and a reluctance to heed medical advice before travel is evident,” said the report. “As a result, we encounter older passengers who perceive this journey as easy, and sometimes they have little regard [for the] effects of long-haul flying on their health. Much of this flying is over water with few suitable diversion opportunities if somebody becomes seriously ill.”

An internal work group studied the issue for three months in 1995, and management adopted the group’s recommendations for in-flight medical emergencies in general, including in-flight deaths. The following SOPs and equipment are in use:

- The mortality kit provides cabin crewmembers SOPs for use of the kit; a directory of outstation requirements for the importation of a body; printed forms for documenting and reporting an in-flight death to local authorities; two disposable paper coats; two pairs of disposable latex gloves (medium size and large size); two plastic aprons; one deodorant spray; one body bag with a zipper; and one incontinence sheet (absorbent pad for lining the body bag);
- Training includes use of universal precautions that have become standard in all types of health care; the precautions include wearing latex gloves, plastic aprons and disposable paper coats to prevent contact with blood-borne pathogens, vomit and other body fluids;
- If a physician-passenger pronounces a passenger dead — or the decision has been taken to cease resuscitation efforts — flight attendants discuss with family members or traveling companions, if possible, what has occurred and what measures should be taken under the circumstances;
- Training emphasizes that, “in breaking bad news ... a sympathetic but matter-of-fact approach is the best way. It is always necessary to keep in mind the family’s grief while going about our business, and a crewmember can be assigned the task of [assisting] the family ... in an appropriate manner”;
- The airline expects crewmembers, during communication with family members or traveling companions, to act professionally but acknowledge their own feelings; to speak in a straightforward and caring manner; to provide as much practical information as possible about assistance that will be provided to them; to offer emotional support and to ask how the cabin crew can provide help; and to involve people in making their own decisions;
- The SOPs indicate that options for stowing a passenger’s body after in-flight death depend on aircraft type, configuration and passenger load in each class of service on the flight; possible locations on each aircraft have been predetermined;
- Cabin crewmembers are taught that “a passenger seat is the best place to [stow] a body, [because a seat] is one of the few places that is certified to contain mass in the cabin”;
- The SOPs instruct the cabin crew that, if it is necessary to move the body, they must “discreetly remove the body to the area of eventual stowage with the use of the aircraft wheelchair [and an] oxygen mask ... kept on the [dead passenger’s face] for transit to the rear of the cabin.” The wheelchair is moved backward down the aisle to minimize visibility of the deceased passenger to other passengers;
- The protocol for preparing the body at the stowage location is to unzip the body bag on all three sides; position the body on the open bag with the head at the open end; close the eyes if necessary; place a rolled towel under the chin to support the jaw; remove personal effects (such as a watch, jewelry, wallet, cash, passport or tickets) and document these items on the supplied form with the signature of a witness; zip the bag closed to chest level; fold the bag around the head so that the head remains exposed; secure the body with a seat belt; and carefully shield the body from the view of other passengers with blankets and/or curtains. The body remains in this position until removed by local authorities;
- If the deceased person was traveling alone, the SOPs instruct flight attendants to complete immigration documents and customs documents for the deceased person if necessary; and,
- The airline also provides critical-incident stress counseling for cabin crewmembers involved in an in-flight passenger death.

Grant Howard, health and safety advisor for In-Flight Services-International at Air New Zealand, said that the airline’s SOPs for responding to an in-flight passenger death have been revised to incorporate the use of satellite-based telephone technology (SATCOM). An announcement on Air New Zealand’s deployment of AEDs is expected soon, he said.

“SATCOM ensures that the cabin crew can [communicate with] a ground-based medical group that provides in-flight

medical advice anytime during ultra-long-haul flights that have a nonstop flight time as long as 15 hours,” said Howard.

Since the airline installed mortality kits aboard its long-haul aircraft, some of the kits’ standard contents have been used by flight attendants in response to in-flight passenger deaths. The body bag has not been used on any flight, however, mainly because each of the deaths, since kits were installed, occurred either shortly before the end of a flight or in the context of a diversion.

“On very long flights, we’ve needed — for public hygiene — to have the ability to contain a body fairly well; that is when the body bag might be used,” said Howard. “Our protocol is that we would not zip up the body bag; these measures would be taken reasonably tastefully. Regarding stowage of a body after in-flight death, we have a list of preferred positions in the aircraft — the most preferred position being one set of seats that can be curtained off for privacy. Our policy has been that we would not stow a body in any crew quarters for reasons of access after arrival and respect for the cultural values of aircraft crewmembers.”

## **U.S. Law Clarifies Civil Liability, Requires In-flight Death Reports**

In the United States, the Aviation Medical Assistance Act of 1998 has clarified the liability of air carriers and individuals during in-flight medical emergencies.<sup>20</sup> The law said, “(a) Liability of Air Carriers — An air carrier shall not be liable for damages in any action brought in a federal or state court arising out of the performance of the air carrier in obtaining or attempting to obtain the assistance of a passenger in an in-flight medical emergency, or out of the acts or omissions of the passenger rendering the assistance, if the passenger is not an employee or agent of the carrier and the carrier in good faith believes that the passenger is a medically qualified individual. (b) Liability of Individuals — An individual shall not be liable for damages in any action brought in a federal or state court arising out of the acts or omissions of the individual in providing or attempting to provide assistance in the case of an in-flight medical emergency unless the individual, while rendering assistance, is guilty of gross negligence or willful misconduct.”

Under the law, major air carriers<sup>21</sup> were required to report the following information to the FAA administrator for a one-year period that ended July 31, 1999:

- “The number of persons who died on aircraft of the air carrier, including any person who was declared dead after being removed from such an aircraft as a result of a medical incident that occurred on such aircraft;
- “The age of each such person;

- “Any information concerning the cause of death that is available at the time such person died on the aircraft or is removed from the aircraft, or that subsequently becomes known to the air carrier;
- “Whether or not the aircraft was diverted as a result of the death or incident; and,
- “Such information as the [FAA] Administrator may request as necessary to aid in a decision as to whether or not to require [AEDs] in airports or on aircraft operated by air carriers, or both.”

## **Nursing Field Provides Model Of Compassionate Response to Death**

The professional training of nurses<sup>22</sup> typically combines a clinical understanding of death with skills and knowledge that enable nurses to respond to human needs related to loss and grief. There is recognition, for example, that even the most advanced medical technology cannot always ensure a patient’s survival — and that how well a care-giver can support others depends in part on the care-giver’s experience and values.

During an in-flight medical emergency — including cases in which a passenger has died — some parallels exist between the aircraft cabin and a hospital environment. For example, people experiencing a medical crisis in flight give up their privacy, may lose control of their bodily functions, may forego modesty and may have feelings of fear, anxiety and heightened awareness of their mortality.

Cabin crewmembers typically are not associated with a deceased passenger’s family or traveling companions long enough to provide support throughout the grieving process. Nevertheless, the principles that flight attendants use — for example, in providing first aid or reassurance to passengers in other situations — also help prepare flight attendants to listen, speak and act appropriately when confronted with an in-flight death.

The following concepts from contemporary nursing practice — particularly grief theory — also may be valuable:

- Several studies underlying contemporary grief theory found that numbing, denial and disbelief are normal initial reactions when a death occurs. Cabin crewmembers typically would encounter family members or traveling companions experiencing these sensations and emotions. The feeling of being “stunned” or in a state of “unreality” might be especially strong when an in-flight death occurs suddenly and unexpectedly;
- In a hospital setting, health-care professionals will help a dying person, family members and others through a

grieving process that begins before death and enables the dying person to say goodbye to others and to complete personally important tasks. When in-flight death occurs, such a grief process might be much more difficult, and any practical support that flight attendants can provide will help traveling companions or family members to cope. Sudden deaths also are associated frequently with a longer grieving process;

- People providing support to others after an in-flight death might be able to help most by listening, showing empathy, taking time to understand the significance of the loss to a person, and giving attention to perceptions of the situation by providing correct information in a timely manner. Typically, the connection to someone who cares — even if the connection is temporary — is more important to a person than something said or done;
- Nurses recognize that being in the presence of a person who is dying or has died can be frightening to others; thus, they shift their focus of care from the deceased person to the needs of the living;
- Nurses learn that they have an ethical duty to respect a person's modesty, dignity, physical integrity and confidentiality of information while providing care; and,
- The grief process is therapeutic; that is, over time, most people will adapt to the changes that someone's death brings to their lives.

### **Flight Attendants Have Primary Role in Responding to Death**

When a medical emergency occurs on transport category aircraft, flight attendants have immediate responsibility for the safety and welfare of passengers, and they have several options. They can respond to the problems themselves, ask for assistance from any medically trained passengers on the flight, or communicate with ground-based resources.

A 1989 report said that selected flight attendants in Europe, especially in Great Britain, were receiving special training in patient assessment, triage and immediate in-flight treatment of several medical emergencies, including cardiac arrest.

“These proposals to train selected flight attendants to a higher level of skill — for example, to the level of a basic emergency medical technician, merit serious consideration,”<sup>23</sup> said the report.

A 1988 report said, “With so many people in the air, deaths during air travel can be expected on the basis of sheer numbers alone. In addition, some passengers who board the airplane in ill health may die when they experience deterioration of their conditions.”<sup>24</sup>◆

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