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Enhanced Emergency Medical Kits Increase In-flight Care Options

U.S. Federal Aviation Regulations will require additional medications and equipment to be included in emergency medical kits in 2004. Like their European counterparts, U.S. air carriers consider passenger expectations, as well as regulatory requirements, in deciding what to include in emergency medical kits and how to train flight attendants to use the kits.

FSF Editorial Staff

Beginning April 12, 2004, U.S. Federal Aviation Regulations (FARs) will require passenger-carrying airplanes operated under FARs Part 121 with at least one flight attendant to have at least one enhanced emergency medical kit (EEMK).[1] Most major U.S. air carriers already are complying with this requirement, the U.S. Federal Aviation Administration (FAA) said in its final rule announcing the amendments.[2] Other U.S. air carriers — including most regional air carriers — currently are making plans to add medications and equipment to their emergency medical kits and to update their flight attendant training.[3]

EEMKs contain specific additional medications and equipment that are not included in the emergency medical kits currently required (see Table 1, page 2). Both types are designed primarily for in-flight use by physicians or other health care professionals within the scope of their licenses, experience and training.

The final rule also said that by April 12, 2004, at least one automated external defibrillator (AED) must be aboard Part 121 passenger airplanes that have a maximum payload capacity of more than 7,500 pounds (3,400 kilograms), approximately equivalent to a 30-passenger airplane.[4] AEDs are portable, computerized medical devices designed for operation by people who are not health care professionals. AEDs can restore the normal heartbeat of a person who has experienced sudden cardiac arrest with ventricular fibrillation, an uncoordinated, chaotic electrical activity that interferes with the natural electrical signal controlling the heart muscle.

The 2001 amendments were developed in response to the Aviation Medical Assistance Act of 1998, U.S. legislation that directed FAA to determine whether requirements for emergency medical equipment and emergency medical training for air carrier crewmembers should be updated. Several related studies in the 1990s were prompted by changing demographics of passengers (including higher incidence of medical conditions in an aging population) and advances in clinical medicine. The amendments also incorporate FAA policy decisions that influence the roles of flight attendants and others in providing in-flight medical assistance.

Upgrading a current emergency medical kit to an EEMK requires addition of the following medications:

- Oral antihistamine is used mainly to relieve symptoms associated with allergies;
- Non-narcotic analgesic (i.e., pain-reliever) is used mainly to relieve muscle aches and headaches;

Table 1
U.S. Federal Aviation Administration Emergency Medical Kit Required Items, Effective April 12, 2004[1]

Contents	Quantity
Sphygmomanometer[2]	1
Stethoscope	1
Airways, oropharyngeal (three sizes): one pediatric, one small adult, one large adult or equivalent	3
Self-inflating manual resuscitation device with three masks (one pediatric, one small adult, one large adult or equivalent)	1 device/ 3 masks
Cardiopulmonary resuscitation masks (three sizes): one pediatric, one small adult, one large adult, or equivalent	3
Intravenous [fluids] administration set:	
Tubing with two Y-connectors	1
Alcohol sponges	2
Adhesive tape, one-inch [2.5-centimeter] standard roll adhesive	1
Tape scissors	1 pair
Tourniquet	1
Saline solution, 500 cubic centimeters (cc)	1
Protective nonpermeable gloves or equivalent	1 pair
Needles (two 18 gauge, two 20 gauge, two 22 gauge, or sizes necessary to administer required medications)	6
Syringes (one 5 cc, two 10 cc, or sizes necessary to administer required medications)	4
Analgesic, non-narcotic tablets, 325 milligram (mg)	4
Antihistamine tablets, 25 mg	4
Antihistamine, injectable, 50 mg (single-dose ampule or equivalent)	2
Atropine, 0.5 mg, 5 cc (single-dose ampule or equivalent)[3]	2
Aspirin tablets, 325 mg	4
Bronchodilator, inhaled (metered-dose inhaler or equivalent)	1
Dextrose 50%, 50 cc, injectable (single-dose ampule or equivalent)[4]	1
Epinephrine 1:1000, 1 cc, injectable (single-dose ampule or equivalent)[5]	2
Epinephrine 1:10,000, 2 cc, injectable (single-dose ampule or equivalent)	2
Lidocaine 20 mg/milliliter (ml), 5 cc, injectable (single-dose ampule or equivalent)[6]	2
Nitroglycerin tablets, 0.4 mg	10
Basic instructions for use of the drugs in the kit	1

[1] Effective April 12, 2004, at least one FAA-approved emergency medical kit must contain at least these contents in the specified quantities and must be maintained appropriately. The requirement applies to the operation of passenger-carrying aircraft with at least one flight attendant under U.S. Federal Aviation Regulations Part 121. If all of the listed items do not fit into one container, more than one container may be used.

[2] A sphygmomanometer is an instrument used to measure arterial blood pressure with an inflatable cuff and gauge.

[3] Atropine is a drug that may be needed to assist a passenger who has an unstable cardiac rhythm.

[4] Dextrose is one form of glucose, a blood sugar used by cells in the body for energy, and is used, for example, to treat a person's abnormally low blood sugar level.

[5] Epinephrine is a neurohormone (also known as adrenalin) in the body and is used as a medication for heart stimulation and to treat problems such as bronchial asthma, acute allergic disorders, glaucoma and heart block.

[6] Lidocaine is a drug that is used for a person who is unresponsive to cardiac defibrillation/for the maintenance of normal heart rhythm after successful defibrillation.

Source: U.S. Federal Aviation Administration

- A bronchodilator inhaler is used to help restore normal breathing in people who have asthma;
- Aspirin, a general oral medication, is administered as directed by a physician to alleviate headache and muscle aches and, possibly, a cardiac problem;
- Atropine is a drug administered intravenously to assist a passenger who has an unstable cardiac rhythm;
- Additional epinephrine is a drug used for heart stimulation (and complements the previously required epinephrine dosage intended for use as a muscle relaxant);
- Lidocaine is a drug administered intravenously to a person who does not respond to defibrillation by the AED and possibly for the maintenance of normal heart rhythm after successful defibrillation; and,
- Saline is used for intravenous infusion of drugs (such as atropine or lidocaine, which may be needed to sustain heart function).

The EEMK also includes the following equipment:

- An intravenous fluid (IV) administration kit with connectors (and, for placing the IV line, alcohol sponges, tape, bandage scissors and a tourniquet);
- A self-inflating resuscitation device with masks, used for the continuation of respiratory support; and,
- Masks designed for cardiopulmonary resuscitation.

FAA said that the bronchodilator inhaler, oral antihistamine and non-narcotic analgesic were added because data showed that they are used frequently. Other medications and equipment were specified because of the new requirement for an AED and to follow current medical practices, FAA said.

The U.S. Regional Airline Association (RAA) has been working through its In-flight Management and Training Committee to share methods for installing EEMKs and AEDS and for providing related training, said Scott Foose, RAA vice president.[5]

"A few regional air carriers are installing AEDs and EEMKs at the present time, but they represent a substantial percentage of the U.S. regional fleet," Foose said. "We will see installations continuing now through the 2004 compliance date, but regional carriers are working to have their aircraft equipped well ahead of the regulatory deadline."

The original FARs requiring emergency medical kits, in addition to first aid kits, on commercial passenger airplanes were published in January 1986.[6] The FARs were amended in October 1994 to require protective gloves and in January 1996 to require emergency medical kits aboard commuter airplanes with 20 seats to 30 seats.

FAA's 2001 amendments comply partly with the standards and recommended practices of the International Civil Aviation Organization (ICAO), which recommend that air carriers provide "a medical kit for the use of medical doctors or other qualified persons in treating in-flight medical emergencies for airplanes authorized to carry more than 250 passengers."[7] ICAO requires that flight attendants complete training programs that ensure that they are "drilled and capable in the use of emergency and life-saving equipment required to be carried, such as … first-aid kits."[8]

The U.S. EEMK does not include all emergency medical kit items shown as "typical contents" in the ICAO recommendations. Not included are several pieces of equipment (such as hemostatic forceps, a disposable scalpel handle and blade, and sterile equipment for suturing wounds) and some types of medications (such as diuretics, steroids and sedatives). Unlike ICAO's standards and recommended practices, the FARs do not specify who is authorized to use the emergency medical kit, FAA said. (Many air carriers have policies requiring captains to restrict the use of the emergency medical kit to physicians or to health care professionals and/or crewmembers under a physician's direction.)

"FAA concurs with the recommendation that emergency medical kits be used by qualified and trained personnel only," FAA said. "Adding such a requirement to Part 121, however, would involve defining the various medical specialties and, perhaps, limiting access to the extent that the only person available to assist on a flight might not be included."

By comparison, the European Joint Aviation Requirements—Operations (JAR-OPS) 1.755, "Emergency Medical Kit," says, "the commander shall ensure that drugs are not administered except by qualified doctors, nurses or similarly qualified personnel." The JAR-OPS also specify that aircraft with seating for more than 30 passengers must carry an emergency medical kit if any point on a route is more than 60 minutes flying time at normal cruise speed from an airport with qualified medical assistance, and specify how the kit should be secured, protected from dust and moisture, inspected and replenished.

FAA's final rule was supported by the Aerospace Medical Association (ASMA), an international organization of physicians that published an Emergency Medical Kit Ad Hoc Task Force report during FAA's rulemaking, said Russell Rayman, M.D., M.P.H., ASMA executive director.[9]

"Emergency medical kits will have to be tailored by air carriers — some contents added, some taken out; we already have seen this watching Air Canada make changes based on medical kit use, for example," Rayman said. "The U.S. EEMK version is very rational and logical based on what we know, but what to carry also is a matter of professional opinion. The U.S. requirement for EEMK contents probably will be enhanced, not diminished."

Rayman said that the medical community's difficulty in reaching agreement about EEMK contents is attributed to limited quantity of data and inadequate quality of data about in-flight medical events.

In Europe, air carriers in member states of the Joint Aviation Authorities must make similar decisions about what equipment and medications to carry in emergency medical kits — including whether to provide the minimum specified by the JARs or to provide more comprehensive medications, equipment and training.

The JARs do not include an AED requirement, and JARs-compliant medications are not related specifically to the use of AEDs, said Dr. Nigel Dowdall, senior consultant occupational physician for British Airways Health Services.[10]

"British Airways, for example, for many years has had an [emergency medical kit] which exceeds the [JARs] regulatory requirement, and one or two items are carried only because of the regulatory requirement," Dowdall said. "We base the contents of our kit on our judgment of what is appropriate

for use in the aircraft environment to meet the needs of the most commonly encountered incidents — the most frequently used drugs are for nausea/vomiting and diarrhea — and the most common serious medical emergencies or life-threatening medical emergencies. The contents are reviewed continually in the light of feedback from crew reports, developments in medication/equipment and feedback from health professionals assisting crew."

Many air carriers in the United States, Europe and other regions have regulatory latitude to exceed the minimum requirements and to determine how their emergency medical kits will be used.

"British Airways is unusual in training cabin crew to administer some medications from our [emergency medical kit] in the event of an anaphylactic (severe allergic) reaction in accordance with the protocol given in their training manual," Dowdall said. "These are oral drugs only, not injectable drugs, except for the EpiPen [a device designed for use by trained nonmedical personnel for injection of epinephrine to treat a severe allergic reaction]."

Dowdall said that the company's flight attendants are trained to first obtain medical advice from a ground-based emergency-medicine physician, then to follow procedures if necessary for requesting assistance and accepting assistance from a volunteer health care professional aboard the aircraft.

"Crew training includes discussion on how to handle a situation where the crew have concerns about a volunteer's competence," he said. "Training stresses the fact that responsibility for managing the situation lies with the crew, and that the role of the health professional is to assist, not to take over control of the incident."

A challenge for many air carriers is ensuring that procedures for stowing and retrieving emergency medical kits are appropriate under tighter security precautions, said Nancy Claussen, an FAA cabin safety inspector who participated in writing the final rule about emergency medical equipment. As the result of terrorist attacks involving four U.S. passenger airplanes on Sept. 11, access to the flight deck — where some air carriers have stowed emergency medical kits — typically has been more restricted, she said.[11]

"We are now in a temporary period in which some air carriers and their FAA certificate-management teams are working out methods of compliance," Claussen said. "For example, one major airline decided to use two separate kits."

FAA's familiarization requirements vary according to air carrier procedures, she said. Flight attendants typically are expected by air carriers to know at least the following:

- Where the emergency medical kit and/or EEMK is located;
- Criteria for who may be offered use of the emergency medical kit or EEMK (including methods of informing medical professionals about the contents when they volunteer to assist);
- The process for retrieving the emergency medical kit or EEMK (including procedures for notifying the captain before using it and for opening locked compartment doors in the cabin or a locked flight-deck door); and,
- How to determine what medications are in the emergency medical kit and/or EEMK and the typical uses of both medications and equipment.

Sunshine McCarthy, director, worldwide account development, for MedAire — a U.S. company that provides in-flight medical advice — and former cabin safety manager of a major U.S. air carrier, provided the following recommendations about using EEMKs:[12]

- Placing the EEMK and AED at the same location is preferable because this allows faster response to medical emergencies (nevertheless, retrieval of the AED is the first priority if a person is unresponsive, not breathing and does not have a pulse);
- Consistent location is beneficial for flight attendants who are qualified on several aircraft types;
- The EEMK should be secured in a position that enables the flight attendant to conduct a preflight check without removing it from a locked compartment or locked bracket;
- Flight attendant training should be appropriate for the air carrier's policies and resources. If the air carrier's policy restricts the use of the EEMK to passengers — not flight attendants — who volunteer as licensed health care professionals, training typically covers kit location, release procedures, kit content and preflight procedures. If the air carrier permits use of the EEMK by flight attendants under the direction of a ground-based emergency-medicine physician, additional training typically covers more detail about medications, their uses and their location in the kit; how to use the blood pressure cuff for taking vital signs; and protocols for administration of oral medications (such as nitroglycerin) and the EpiPen under the physician's direction.

FARs Part 121.805, "Crewmember Training for In-flight Medical Events," requires the following training related to the emergency medical kit:

- "Instruction in emergency medical event procedures, including coordination among crewmembers;
- "Instruction in the location, function and intended operation of emergency medical equipment;
- "Instruction to familiarize crewmembers with the content of the emergency medical kit;

- "Instruction to familiarize crewmembers with the content of the emergency medical kit as modified on April 12, 2004; [and,]

- "The crewmember instruction, performance drills and recurrent training required under this section are not required to be equivalent to the expert level of proficiency attained by professional emergency medical personnel."

FAA's Claussen said, "Most carriers include a list of the emergency medical kit's contents in the flight attendant manual, which must be accessible. A fairly common procedure directs flight attendants first to retrieve their manual, then to show the manual's list of contents to the volunteer medical professional and to ask the medical professional if the kit would be helpful. If the medical professional wants the kit, the flight attendant will retrieve it. Typically, that is the extent of the flight attendant's responsibility under an airline's policy."

The preflight cabin check of all portable emergency equipment by flight attendants includes confirmation that the emergency medical kit is on the airplane, stowed securely and serviceable according to airline procedures.

Absence of an emergency medical kit and/or its required contents is a "no-go" item in the FARs, Claussen said, so any discrepancy involving an emergency medical kit or EEMK should be reported immediately to the captain. Air carriers have developed various approved methods of compliance with the FARs related to medical kits, such as by overstocking required medications, Claussen said. This method typically ensures that minimum required quantities are available before takeoff even if certain contents have been used during the previous flight.

An air carrier's method of organizing, labeling and certifying the contents of an emergency medical kit may affect the degree of difficulty involved in ensuring regulatory compliance and in responding to an in-flight medical emergency.

Frequently used diagnostic equipment may be carried in unsealed compartments and may be reused after disinfection without requiring recertification, said Marc Ashton, president and CEO of MedSpace, a subsidiary of MedAire that manufactures emergency medical kits.[13]

"EEMKs currently can supplement or replace the current emergency medical kits, as required by the airline," Ashton said. "Seals are present to confirm that the kit has not been used on a previous flight and to alert maintenance when the kit needs to be replaced. Informing medical volunteers of the contents, before the seal is broken, eliminates unnecessary kit usage. Most EEMKs contain an incident report form, which is completed by the flight attendant and the medical volunteer."

FAA, in its final rule, said that there should not be unrealistic expectations — among crewmembers or passengers — about EEMKs, AEDS and the level of medical care that is possible in an aircraft cabin.

"In-flight medical care, voluntarily provided, must be regarded as limited emergency treatment with no unrealistic expectations of favorable outcomes for passengers having medical events in flight," FAA said. "In-flight medical assistance will continue to be discretionary to the certificate holder and its agents. … FAA will continue to study in-flight medical emergencies, to consider any recommendations and to monitor the usage of [EEMKs]."

Joan Sullivan Garrett, president and CEO of MedAire, said that the difficulty of providing emergency medical care to a passenger inside an aircraft cabin should not be underestimated.[14]

"This scenario is nowhere close to working in a controlled medical environment with a support team, laboratory, X-ray services and other technical capability," Garrett said. "It is a very difficult situation for flight attendants, including identifying qualified medical professionals to help. Not every flight will have a qualified medical volunteer who will be knowledgeable in cardiac resuscitation and the use of the drugs in the emergency medical kit. Nevertheless, the possibility exists for trained persons to be on board and — with the support of a ground-based emergency-medicine physician — to initiate optimum treatment before reaching a qualified medical facility."

Passengers — including physicians and other health care professionals — increasingly expect that adequate medical equipment and medications will be available in the cabin to respond to common illnesses, including cardiac arrest. Differences of medical opinion, however, will continue to influence the choices made by air carriers worldwide as they comply with — or exceed — regulatory requirements for emergency medical kits and enhanced emergency medical kits.♦

Notes

1. U.S. Federal Aviation Administration (FAA). "Emergency Medical Equipment." *Federal Register* Volume 66 no. 72, Rules and Regulations, 19028. The term "EEMK" in this article means the "approved emergency medical kit as modified effective April 12, 2004" in the final rule.

2. The final rule amended U.S. Federal Aviation Regulations Part 121, "Operating Requirements: Domestic, Flag and Supplemental Operations," Appendix A, "First Aid Kits and Emergency Medical Kits," and added Part 121 Subpart X, "Emergency Medical Equipment and Training." The new subpart incorporates provisions from the former Part 121 Subpart N, "Training Program," and Part 121 Subpart O, "Crewmember Qualifications."

3. Junek, Fred. Continental Express. "Emergency Medical Equipment: Comments of Continental Express." September 2000. Junek, in comments to FAA about the proposed rule on emergency medical equipment, said that the concerns of regional air carriers included the difficulty that a single

flight attendant would encounter if expected to "attend to a stricken passenger while simultaneously performing the duties associated with approach and landing" and "training for flight attendants on the 'operation' of the enhanced emergency medical kit."

4. FAA. "Emergency Medical Equipment."

5. Foose, Scott. Telephone interview with Rosenkrans, Wayne. Alexandria, Virginia, U.S. Nov. 19, 2001. Flight Safety Foundation, Alexandria, Virginia, U.S.

6. FAA. "Emergency Medical Equipment; Proposed Rule." *Federal Register* Volume 65 no. 101, Proposed Rules, 33721.

7. International Civil Aviation Organization (ICAO). Annex 6, *Operation of Aircraft*, Part 1, Chapter 6, "Aeroplane Instruments, Equipment and Flight Documents," 6.2.2.

8. ICAO. Annex 6, Part 1, Chapter 12, "Cabin Crew," 12.4.

9. Rayman, Russell. Telephone interview with Rosenkrans, Wayne. Alexandria, Virginia, U.S. Nov. 17, 2001. Flight Safety Foundation, Alexandria, Virginia, U.S.

10. Dowdall, Nigel. E-mail communication with Rosenkrans, Wayne. Alexandria, Virginia, U.S. Nov. 15 and Nov. 16, 2001. Flight Safety Foundation, Alexandria, Virginia, U.S.

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Further Reading From FSF Publications

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FSF Editorial Staff. "In-flight Death of a Passenger Requires a Thoughtful Response From Flight Attendants." *Cabin Crew Safety* Volume 33 (July–August 1999).

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