For Beginners!

# Airline Emergency Medical Kits

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## Disclosures

I have no actual or potential conflict of interest in relation to this activity or presentation.

Opinions, conclusions, and recommendations expressed or implied within are solely those of the author, and do not necessarily represent the views of the United States Army, the Department of Defense, or any other US government agency.

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## Special Thanks

Banyan International Corporation

Paulo M. Alves, MD, MSc, FAsMA
Global Medical Director, Aviation Health – MedAire

Daniel K. Berry, DO, PhD
Acting Senior Regional Flight Surgeon and RFC Central Region, FAA

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## Points of Discussion

How do you define “Doctor”?

Have you ever been involved in an inflight emergency?

Did you use the Emergency Medical Kit?

Have you ever *been* the medical emergency?

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## What are the Requirements?

And what is the authoritative source of their origin?

It’s the Law!

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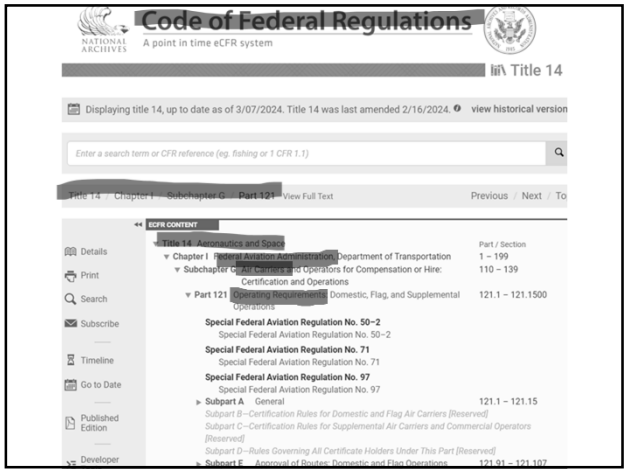


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| **Appendix A to Part 121** | | |
| First Aid Kits and Emergency Medical Kits | | |
| **Appendix B to Part 121** | | |
| Airplane Flight Recorder Specification | | |
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## Part 121 Subpart X

- **§ 121.805 Crewmember training for in-flight medical events.**
- (a) Each training program must provide the *instruction set forth* in this section with respect to each airplane type, model, and configuration, each required crewmember, and each kind of operation conducted, insofar as appropriate for each crewmember and the certificate holder.
- (b) Training must provide the following:
- (1) Instruction in emergency medical event procedures, including coordination among crewmembers.
- (2) Instruction in the location, function, and intended operation of emergency medical equipment.
- (3) Instruction to familiarize crewmembers with the content of the emergency medical kit.
- (4) Instruction to familiarize crewmembers with the content of the emergency medical kit as modified on April 12, 2004.
- (5) For each flight attendant—
- (i) Instruction, to include performance drills, in the proper use of automated external defibrillators.
- (ii) Instruction, to include performance drills, in cardiopulmonary resuscitation.
- (iii) Recurrent training, to include performance drills, in the proper use of an automated external defibrillators and in cardiopulmonary resuscitation at least once every 24 months.
- (c) 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.

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| *§§ 121.1400-121.1499 [Reserved]* | | |
| ▸ Subpart DD | Special Federal Aviation Regulations | 121.1500 |
| **Appendix A to Part 121** | | |
| First Aid Kits and Emergency Medical Kits | | |
| **Appendix B to Part 121** | | |
| Airplane Flight Recorder Specification | | |
| **Appendix C to Part 121** | | |

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## Appendix A First Aid

| No. of passenger seats | No. of first-aid kits |
|---|---|
| 0–50 | 1 |
| 51–150 | 2 |
| 151–250 | 3 |
| More than 250 | 4 |

| Contents | Quantity |
|---|---|
| Adhesive bandage compresses, 1-inch | 16 |
| Antiseptic swabs | 20 |
| Ammonia inhalants | 10 |
| Bandage compresses, 4-inch | 8 |
| Triangular bandage compresses, 40-inch | 5 |
| Arm splint, noninflatable | 1 |
| Leg splint, noninflatable | 1 |
| Roller bandage, 4-inch | 4 |
| Adhesive tape, 1-inch standard roll | 2 |
| Bandage scissors | 1 |

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## Check On Learning

According to Title 14 of the Code of Federal Regulations (14 CFR) part 121, subpart X, 121.805, An air carrier with more than 250 passenger seats is required to have how many Emergency Medical Kits?

A) 1
B) 2
C) 3
D) 4

Four First Aid Kits would be required but only **ONE** Emergency Medical Kit- They are different!

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## Appendix A EMK

| CONTENTS | QUANTITY |
|---|---|
| Sphygmomanometer | 1 |
| Stethoscope | 1 |
| Airways, oropharyngeal (3 sizes): 1 pediatric, 1 small adult, 1 large adult or equivalent | 3 |
| Self-inflating manual resuscitation device with 3 masks (1 pediatric, 1 small adult, 1 large adult or equivalent) | 1: 3 masks |
| CPR mask (3 size), 1 pediatric, 1 small adult, 1 large adult, or equivalent | 3 |
| IV Admin Set: Tubing w/ 2 Y connectors | 1 |
| Alcohol sponges | 2 |
| Adhesive tape, 1-inch standard roll adhesive | 1 |
| Tape scissors | 1 pair |
| Tourniquet | 1 |
| Saline solution, 500 cc | 1 |
| Protective nonpermeable gloves or equivalent | 1 pair |
| Needles (2-18 ga., 2-20 ga., 2-22 ga., or sizes necessary to administer required medications) | 6 |
| Syringes (1-5 cc, 2-10 cc, or sizes necessary to administer required medications) | 4 |
| Analgesic, non-narcotic, tablets, 325 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) | 2 |
| Aspirin tablets, 325 mg | 4 |
| Bronchodilator, inhaled (metered dose inhaler or equivalent) | 1 |
| Dextrose, 50%/50 cc injectable, (single dose ampule or equivalent) | 1 |
| Epinephrine 1:1000, 1 cc, injectable, (single dose ampule or equivalent) | 2 |
| Epinephrine 1:10,000, 2 cc, injectable, (single dose ampule or equivalent) | 2 |
| Lidocaine, 5 cc, 20 mg/mL injectable (single dose ampule or equivalent) | 2 |
| Nitroglycerine tablets, 0.4 mg | 10 |
| Basic instructions for use of the drugs in the kit | 1 |

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## Emergency Medical Kit


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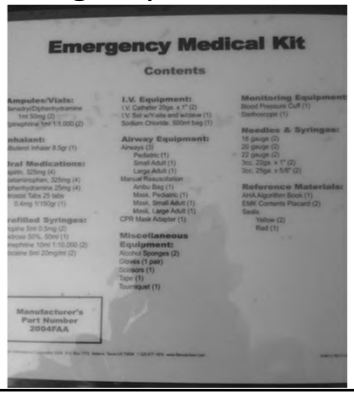
## Emergency Medical Kit

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## Emergency Medical Kit

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## Emergency Medical Kit

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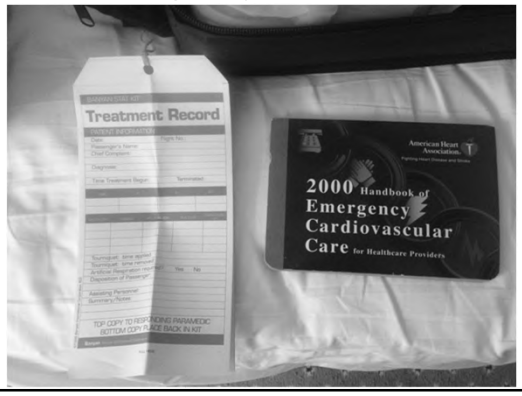
## Emergency Medical Kit

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## Emergency Medical Kit

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## Appendix A AED

**Automated External Defibrillators**
At least one approved automated external defibrillator, legally marketed in the United States in accordance with Food and Drug Administration requirements, that must:
1. Be stored in the passenger cabin.

2. After April 30, 2005:
(a) Have a power source that meets FAA Technical Standard Order requirements for power sources for electronic devices used in aviation as approved by the Administrator; or
(b) Have a power source that was manufactured before July 30, 2004, and been found by the FAA to be equivalent to a power source that meets the Technical Standard Order requirements of paragraph (a) of this section.

3. Be maintained in accordance with the manufacturer's specifications.

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## Enhanced Emergency Medical Kit

- Contains a few items "Not FAA Mandated"
  - Phenergan/Promethazine 1ml 25mg (2)
  - Glucose Gel 31gr (1)
  - Diazepam 2ml 5mg/ml (1) w/Carpuject holder
  - Thermometer, oral strips (2)
  - Insulin syringe w/needle (1)

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## Enhanced Emergency Medical Kit


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Enhanced Emergency Medical Kit


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Enhanced Emergency Medical Kit


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Enhanced Emergency Medical Kit


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Enhanced Emergency Medical Kit


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Other Kits, as needed

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Title 14 / Chapter I / Subchapter G / Part 121 / Appendix A to Part 121 — Previous / Next / Top

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Expand Table

| Contents | Quantity |
|---|---|
| Diphenhydramine HC1 injection, single dose ampule or equivalent | 2 |
| Nitroglycerin tablets | 10 |
| Basic instructions for use of the drugs in the kit | 1 |
| protective nonpermeable gloves or equivalent | 1 pair |

2. As of April 12, 2004, at least one approved emergency medical kit that must contain at least the following appropriately maintained contents in the specified quantities:

Expand Table

| Contents | Quantity |
|---|---|
| Sphygmonanometer | 1 |
| Stethoscope | 1 |
| Airways, oropharyngeal (3 sizes): 1 pediatric, 1 small adult, 1 large adult or equivalent | 3 |
| Self-inflating manual resuscitation device with 3 masks (1 pediatric, 1 small adult, 1 large adult or equivalent) | 1:3 masks |
| CPR mask (3 sizes), 1 pediatric, 1 small adult, 1 large adult, or equivalent | 3 |
| IV Admin Set: Tubing w/ 2 Y connectors | 1 |

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## EMK Last Updated 2004

Contents dictated by Congress (14 CFR, Part 121…)
EMK first appeared 1986
Last substantial changes 2004 (added AED and Cardio drugs)

Reviewed every four years…. But is it?

Aerospace Division, AOCOPM and AsMA submitting opinions to FAA to include Naloxone, Epi Autoinjector, Benzodiazepene, etc.

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## 2019 Review by AsMA

Guidance Document

*Produced by: Aerospace Medical Association Air Transport Medicine Committee*

Chair: Elizabeth Wilkinson

Special Task Force: Paulo Alves (Lead), Elizabeth Wilkinson, David Powell; Simon May; Rui Pombal; Alex Garbino; Alex Wolbrink; Justin Flatt; Jim Chung; Vincent Feuillie; Tom Bettes

**Introduction**

In December 2018, the FAA, through the Federal Air Surgeon, Dr. Michael Berry, requested the Aerospace Medical Association (AsMA) to review the current contents of the two medical kits in use for operational passenger aircraft.

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## Major Changes Proposed

Sphygmomanometer
o Electronic preferred. Background noise due to aircraft engines prevents an accurate reading of BP measurements through the conventional method using stethoscopes. Oscillometric (electronic) devices are easy to use, becoming common use for patients and care providers in the home BP monitoring setting being and accurate enough, being extensively validated.

• Supraglottic airway. They serve the same function as the oropharyngeal airways, but in addition can be used to ventilate a patient, when necessary

• Emergency tracheal catheter (or large gauge intravenous cannula)

• Epinephrine 1:1000
o When available and cost effective, auto-injectors are easier to use and can be used by cabin crew under order from ground medical advisor if there are no health professional on board. The AAP endorsed this suggestion as well as suggested its availability in pediatric dosage

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## Major Changes

• Anti-psychotic drug (e.g., haloperidol)
o Chemical restraining after physical restraint is sometimes necessary for disruptive passengers on board, particularly when a diversion is operationally impossible or in order to off-load the affected individual

• Mild to moderate analgesic/anti-thermic
o This should include pediatric formulation

• Major analgesic inj. or oral
o The Special Task Force discussed that the ideal class of substance would be opioids. However, the members realize the possible logistical challenges and sensitivities in the US nowadays. Certain anti-inflammatory drugs have potent analgesic effect and are suggested as an alternative

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## Major Changes

• Anticonvulsant inj. and oral
o Seizures are a common occurrence in-flight and a frequent reason for diversion when recurrent. Ideal drug would be a benzodiazepine (midazolam, diazepam). In long-haul flights it may be necessary to add an oral substance for long-term prevention of subsequent seizures, hence the need for oral medication besides the injectable aimed to address the acute episode. The group discussed the possible logistical problems around these controlled substances. An alternative of levatiracetam injectable and oral was suggested

• Antiemetic inj. and oral
o Vomiting is one of the most common medical events in-flight, particularly in long-haul flights. The addition of an anti-emetic is critical for symptomatic treatment of those passengers. Ondansetron is the preferred medication, particularly in its oral-dissolving form

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## Major Changes

• Bronchial dilator inhaler with spacer
o A spacer is critical equipment in case of emergency use of inhaled bronchodilators. It was one of the items suggested by the American Academy of Pediatrics (AAP). AAP Suggested the spacer should be able to be connected to a pediatric mask.

• Anti-diarrheal
o Diarrhea, although much less frequent than nausea, not infrequently requires symptomatic treatment to avoid complications. Loperamide is the most frequently utilized drug for that matter

• Opioid antagonist
o Although not frequent, cases of respiratory depression secondary to opioid overdose has been occurring in-flight in the US. Naloxone is the medication of choice to revert opioid induced respiratory depression. It was a suggested item by the American Medical Association in the joint meeting during AsMA 2016. Modern ways of administration include nasal spray and atomizers which can used to apply the regular substance intranasally as well

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## Why have the EMK?

What types of medical conditions are you likely to encounter in a Flight Medical Emergency?

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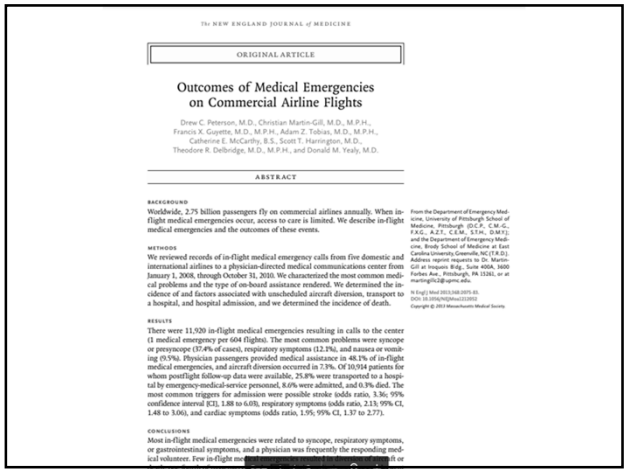

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Outcomes of Medical Emergencies on Commercial Airline Flights

Drew C. Peterson, M.D., Christian Martin-Gill, M.D., M.P.H., Francis X. Guyette, M.D., M.P.H., Adam Z. Tobias, M.D., M.P.H., Catherine E. McCarthy, B.S., Scott T. Harrington, M.D., Theodore R. Delbridge, M.D., M.P.H., and Donald M. Yealy, M.D.

ABSTRACT

BACKGROUND
Worldwide, 2.75 billion passengers fly on commercial airlines annually. When in-flight medical emergencies occur, access to care is limited. We describe in-flight medical emergencies and the outcomes of these events.

METHODS
We reviewed records of in-flight medical emergency calls from five domestic and international airlines to a physician-directed medical communications center from January 1, 2008, through October 31, 2010. We characterized the most common medical problems and the type of on-board assistance rendered. We determined the incidence of and factors associated with unscheduled aircraft diversion, transport to a hospital, and hospital admission, and we determined the incidence of death.

RESULTS
There were 11,920 in-flight medical emergencies resulting in calls to the center (1 medical emergency per 604 flights). The most common problems were syncope or presyncope (37.4% of cases), respiratory symptoms (12.3%), and nausea or vomiting (9.5%). Physician passengers provided medical assistance in 48.1% of in-flight medical emergencies, and aircraft diversion occurred in 7.3%. Of 10,914 patients for whom postflight follow-up data were available, 25.8% were transported to a hospital by emergency-medical-service personnel, 8.6% were admitted, and 0.3% died. The most common triggers for admission were possible stroke (odds ratio, 3.36; 95% confidence interval [CI], 1.88 to 6.03), respiratory symptoms (odds ratio, 2.13; 95% CI, 1.48 to 3.06), and cardiac symptoms (odds ratio, 1.95; 95% CI, 1.37 to 2.77).

CONCLUSIONS
Most in-flight medical emergencies were related to syncope, respiratory symptoms, or gastrointestinal symptoms, and a physician was frequently the responding medical volunteer. Few in-flight me[illegible]

From the Department of Emergency Medicine, University of Pittsburgh School of Medicine, Pittsburgh (D.C.P., C.M.-G., F.X.G., A.Z.T., C.E.M., S.T.H., D.M.Y.); and the Department of Emergency Medicine, Brody School of Medicine at East Carolina University, Greenville, NC (T.R.D.). Address reprint requests to Dr. Martin-Gill at Iroquois Bldg., Suite 400A, 3600 Forbes Ave., Pittsburgh, PA 15261, or at martingil2@upmc.edu.

N Engl J Med 2013;368:2075-83.
DOI: 10.1056/NEJMoa1211052



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## Study of In-Flight Medical Emergencies Involving Large Commercial Airlines

- Data Sample: Date from commercial airlines representing 10% of the global passenger flight volume from January 1, 2008, through October 31, 2010. > Thus estimate 44,000 in-flight medical emergencies occur worldwide each year.
- 11,920 in-flight medical emergencies out of 744 million airline passengers
- Rate of 16 medical emergencies per 1 million passengers.
- 7,198,118 flights with an incidence of 1 in-flight medical emergency per 604 flights.

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## Medical Emergencies in Flight

Age of the passengers with in-flight emergencies
- Range 14 days to 100 years (mean, 48±21 years)

The most common medical problems:
1. syncope or presyncope (37.4%)
2. respiratory symptoms (12.1%)
3. nausea or vomiting (9.5%)

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Table 1. **In-Flight Medical Emergencies According to Medical-Problem Category and Outcome.**

| Category | All Emergencies | Aircraft Diversion | Transport to a Hospital* | Hospital Admission† | Death |
|---|---|---|---|---|---|
| | | no./total no. (%) | | | no. |
| All categories | 11,920/11,920 (100) | 875/11,920 (7.3) | 2804/10,877 (25.8) | 901/10,482 (8.6) | 36 |
| Syncope or presyncope | 4463/11,920 (37.4) | 221/4463 (5.0) | 938/4252 (22.1) | 267/4123 (6.5) | 4 |
| Respiratory symptoms | 1447/11,920 (12.1) | 81/1447 (5.6) | 311/1371 (22.7) | 141/1336 (10.6) | 1 |
| Nausea or vomiting | 1137/11,920 (9.5) | 56/1137 (4.9) | 243/1025 (23.7) | 61/994 (6.1) | 0 |
| Cardiac symptoms | 920/11,920 (7.7) | 169/920 (18.4) | 370/813 (45.5) | 162/770 (21.0) | 0 |
| Seizures | 689/11,920 (5.8) | 83/689 (12.0) | 224/626 (35.8) | 75/602 (12.5) | 0 |
| Abdominal pain | 488/11,920 (4.1) | 50/488 (10.2) | 164/412 (39.8) | 41/391 (10.5) | 0 |
| Infectious disease | 330/11,920 (2.8) | 6/330 (1.8) | 45/239 (18.8) | 8/232 (3.4) | 0 |
| Agitation or psychiatric symptoms | 287/11,920 (2.4) | 16/287 (5.6) | 38/249 (15.3) | 17/244 (7.0) | 0 |
| Allergic reaction | 265/11,920 (2.2) | 12/265 (4.5) | 40/233 (17.2) | 8/229 (3.5) | 0 |
| Possible stroke | 238/11,920 (2.0) | 39/238 (16.4) | 92/214 (43.0) | 46/196 (23.5) | 0 |
| Trauma, not otherwise specified | 216/11,920 (1.8) | 14/216 (6.5) | 34/185 (18.4) | 5/180 (2.8) | 0 |
| Diabetic complication | 193/11,920 (1.6) | 15/193 (7.8) | 45/181 (24.9) | 13/172 (7.6) | 0 |
| Headache | 123/11,920 (1.0) | 10/123 (8.1) | 23/108 (21.3) | 4/107 (3.7) | 0 |
| Arm or leg pain or injury | 114/11,920 (1.0) | 6/114 (5.3) | 27/100 (27.0) | 4/98 (4.1) | 0 |
| Obstetrical or gynecologic symptoms | 61/11,920 (0.5) | 11/61 (18.0) | 29/53 (54.7) | 11/47 (23.4) | 0 |
| Ear pain | 49/11,920 (0.4) | 1/49 (2.0) | 2/43 (4.7) | 1/43 (2.3) | 0 |
| Cardiac arrest | 38/11,920 (0.3) | 22/38 (57.9) | 14/34 (41.2) | 1/6 (16.7) | 31 |
| Laceration | 33/11,920 (0.3) | 1/33 (3.0) | 3/26 (11.5) | 0/25 | 0 |
| Other | 821/11,920 (6.9) | 62/821 (7.6) | 162/705 (23.0) | 36/679 (5.3) | 0 |
| Unknown | 8/11,920 (0.1) | 0/8 | 0/8 | 0/8 | 0 |

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## Post Flight Analysis

- Postflight follow-up data were available for 10,914 passengers (91.6%)
- Outcomes of In-Flight Medical Emergencies.)
  - 3402 passengers (31.2%), the situation resolved sufficiently before landing so that emergency-medical-service (EMS) personnel were not requested.
  - Of the 7508 patients for whom EMS personnel were requested to meet the aircraft on landing, 2804 (37.3%) were transported to a hospital emergency department.
  - Subsequently, 901 patients (8.6% of those for whom follow-up data were available) were admitted to the hospital or left the emergency department against medical advice.

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## Providers of On-Board Medical Assistance

- Physicians (48.1%)
- Nurses (20.1%)
- EMS providers (4.4%)
- Other health care professionals (3.7%)

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## Factors Most Associated with Post Flight Hospitalization

- Use of an AED
- Possible Stroke
- Respiratory Symptoms
- Cardiac Symptoms

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## Medical Legal Issues

The 1998 Aviation Medical Assistance Act includes a Good Samaritan provision

Protecting passengers who offer medical assistance from liability, other than liability for:

- Gross Negligence or
- Willful Misconduct

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## Consultation with a physician on the ground

- FAA does not require consultation with a physician on the ground in the case of an in-flight emergency
- However, airlines partner with specific health care delivery groups to provide consistent availability of medical expertise.
- Consulting physicians on the ground are able to communicate directly with flight crew members and on-board health care volunteers or through efficient relay processes involving the pilot.
- You have back-up support – use it

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## Cardiac Symptoms

- Most can be managed with simple treatment after a focused history taking, until definitive care is available.
- Aspirin, nitrates, and oxygen are available in the emergency medical kit.
- Patients with angina or atypical chest pain can be treated and transferred to an ambulance on landing.

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## Cardiac Symptoms

- In cases in which myocardial infarction or acute dysrhythmia is suspected, monitoring with an AED may aid in diagnosis and decisions about disposition.
- Serious nonarrest cardiac events resulting in hospital admission are rare
- Of the 920 nonarrest cardiac cases, none resulted in death.

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## AED Use

- An AED was applied to 137 patients (1.3%)
- Chief symptoms were:
  - Syncope or presyncope (41.0%)
  - Chest pain (23.9%)
  - loss of consciousness 84 patients (62.7%)
  - Cardiac arrest 24 patients (17.9%)
- A shock was delivered in 5 cases.
- A return of spontaneous circulation occurred in 1 patient receiving (20%)

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## General Approach to In-Flight Medical Emergencies

Identify yourself and specify your level of medical training to the flight crew.
Patient assessment:
Identify the patient's chief problem and its duration.
Identify associated and high-risk symptoms (e.g., chest pain, shortness of breath, nausea or vomiting, or unilateral weakness or numbness).
Obtain vital signs (pulse and blood pressure). If you are unable to assess blood pressure by means of auscultation, assess it by palpating the radial pulse.
Assess the patient's mental status and determine whether there are focal neurologic deficits.
If the patient is in cardiac arrest, obtain and apply an automated external defibrillator (AED). For patients with a pulse but a suspected cardiac problem, consider using an AED if it has monitoring capabilities. (The airline may require contact with a ground-based consultant before use.)
Ask a flight attendant to obtain the emergency medical kit (EMK) and administer oxygen as needed.
Initiate consultation with the ground-based consultant if not already initiated by the flight crew.
Recommendations for interventions, such as administration of medications or intravenous fluids, should be discussed with the ground-based consultant.
Aircraft diversion, ground-based medical assistance, or both should be coordinated with ground-based consultation.
Document the clinical presentation and care rendered. This information should be provided to medical personnel on arrival at the destination with the transfer of care.

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## Conclusion

- You may be called upon to respond to an In-Flight Medical Emergency
- Most in-flight medical emergencies are self-limiting or are effectively evaluated and treated without disruption of the planned route of flight.
- Serious illness is infrequent, and death is rare.

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## Questions For You

Where do the requirements originate for the Airline Emergency Medical Kit?

a. PACT Act of 2021
b. Pilots Record Improvement Act (PRIA) of 1996
c. Northeast Interstate Low-Level Radioactive Waste Compact
d. Title 14 of the Code of Federal Regulations (14 CFR) part 121, subpart X; part 121, appendix A

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## Questions For You

Air Carriers operating under part 121 and requiring at least one flight attendant must fly with an approved AED under what circumstances?

a. If carrying more than 30 passengers.
b. At all times. AEDs are "no-go" items on the Minimal Equipment List.
c. If Flight Attendant has received CPR/BLS training.
d. Not required. Major carriers choose to exceed the FAA regulations.

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## Questions For You

According to 14 CFR 121.803 as amended effective April 12, 2004, airplanes for which a flight attendant is required must carry an FAA approved AED.

a. True
b. False
c. This is a trick question. The FDA regulates safety standards for the manufacture and use of AEDs. However, the FAA is responsible for regulating the safety of power sources used in AEDs when carried on board a passenger aircraft.
d. None of the above

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## Questions For You

According to Title 14 of the Code of Federal Regulations (14 CFR) part 121, subpart X, 121.805, the flight attendant in a declared in-flight emergency is trained to do all of the following except:

a. Initiate intravenous (IV) access with the EMK IV set.
b. Perform CPR with the EMK protective mask.
c. Perform defibrillation with the onboard AED.
d. Locate and operate EMK, AED and any other safety equipment.

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## Questions For You

What is the most common medical problem on In-Flight Emergencies?

a. Syncope or presyncope
b. Respiratory symptoms
c. Nausea or vomiting
d. Gender dysphoria

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Questions For Me?


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