



---

---

***AMC 032 – AIR AMBULANCE GUIDELINES***

---

**GUIDE FOR AIR AMBULANCE  
OPERATIONS  
FOR  
ARUBAN OPERATORS**



## Foreword

- Purpose
- Definition
- Background
- Regulations
- Dangerous Goods Authority
- Operational Procedures
- Personnel
- Medical Considerations
- Helicopter Operations
- Safety Management
- Airworthiness
- Operator medical care level certification
- Carriage of Incubator and Stretchers
- Summary of References



## Foreword

This Guide to Air Ambulance Operations has been prepared by the DCA Airworthiness and Operations Divisions (TINS/VINS) together with the Health Department of Aruba in order to provide information and guidance material for the use of air operators, government agencies, medical institutions and others engaged in the transport of medical patients by air. This Guide is intended to be advisory in nature.

Director,  
DCA - Aruba

## Purpose

This publication provides information and guidance material for the use of air operators, government agencies, medical institutions, and others engaged in the transport of medical patients by air. It is intended to be advisory in nature and in all cases the applicable *Aviation Act of Aruba*, Air Operator Certificates with their corresponding OPS-SPECS, the Operations and Airworthiness Manuals etc. take precedence.

## Definition

The term "air ambulance" will be used throughout this application to refer to the transport of medical patients by air.

## Background

Due to the accessibility in certain parts of the island and due to the capability of the hospital in Aruba or for the transportation of any patient by air, these have led naturally to the use of air ambulances. It is estimated that some 100 patients are moved by air each year. Operators might use some type of air ambulance service, ranging from regularly scheduled air operators to dedicated aircraft with custom-built interiors and advanced life-support equipment. Also foreign operators are hired to conduct Air



Ambulance, an operation which takes a long time for them to arrive in Aruba with all consequences for the local patient. Unfortunately, rapid growth in any field, particularly one as complex as aviation, can often lead to a lowering of standards unless properly monitored. Although an air ambulance flight is, in theory, no different from any other transport flight there are a number of unique aspects which require special consideration by both the air operator and the controlling or contracting agency. Many of these lie outside the responsibility of the DCA of Aruba (DCA) and will only be referred to in this document in their relationship to aviation safety.

It is hoped that the information contained in this document will help those responsible for the planning and operational control of air ambulance systems in their task of providing the safest and most effective service possible.

## **Regulations**

An air ambulance service is considered by the DCA to be a commercial air service except where the service is wholly owned and operated by a government agency and there is no direct charge to the patient. Commercial air services are regulated by JAR-OPS 1 and 3 for Aruba.

## **Dangerous Goods Authority**

Most Air ambulance services are subject to the *Transportation of Dangerous Goods Act as per, AB 1989 GT no. 58 art. 17 and AB 2000 no. 93 art. 4* and the IATA guidelines for the *Transportation of Dangerous Goods*.

When an air ambulance transports dangerous goods without a patient the full requirements of the Act and Regulations apply.

When an air ambulance transports dangerous goods to provide, during flight, medical aid to a patient certain exemptions from the Act and Regulations may apply. This exemption need to be requested by the operator in question.

When a patient brings a medical article for personal use, including articles containing oxygen, on board as carry-on baggage that article is exempt form the Act and Regulations.

Where compressed oxygen or air cylinders are integral to the aircraft configuration such installations shall be approved by Airworthiness Division of the DCA.



## **Operational Procedures**

The Company Operations Manual should contain reference to the following as applicable for aircraft type:

- a. Communications procedures for the air ambulance flightwatch (OCC);  
(if applicable)
- b. Approved method of restraining a stretcher or incubator, patient and any medical equipment transported;
- c. Stretcher or incubator installation;
- d. Patient orientation relative to the aircraft axis;
- e. Operational procedures as applicable to each type of aircraft;
- f. Medical attendant's duties and responsibilities;
- g. Assignment of person responsible to restraint stretcher or incubator, patient and any required medical equipment in the aircraft;
- h. Assignment of a pilot to assist passengers in the cabin in the event of an emergency evacuation or in-flight incident involving fire or smoke in the cabin, or any incident threatening the safety of the aircraft or its occupant if a cabin attendant is not carried;
- i. Assignment of a crew member to ensure the safety of passengers and others approaching and department a helicopter when the rotors are turning;
- j. Procedures to ensure the following are conducted prior to flight;
  - i. Pre-flight briefing to include information on seatbelts, emergency exits, main door operation, life-jackets, passenger safety card location, and use of cabin light switches;
  - ii. A visual check to ensure adequacy of stretcher or incubator installation and restraint, as well as patient restraint;
  - iii. A visual check to ensure any required medical equipment is adequately restrained;
  - iv. Procedures respecting completion of pre-takeoff and pre-landing cabin checks by a crew member;
  - v. Procedures respecting the stowage of carry-on baggage, equipment and cargo to ensure compliance with section ..... of the Aviation Act of Aruba;
  - vi. Evacuation procedures should be established for:
    - The evacuation of patient removed from stretcher;



- The evacuation of patient whose injuries prevent his/her release from stretcher. Criteria shall be established for each aircraft type to determine if a patient and stretcher can easily be evacuated from each exit on that aircraft; and
  - Evacuation of incubator;
- vii. If it is determined that the incubator or stretcher will not fit through any one exit, such information shall be contained in the company Operations Manual and shall be included in the pre-flight briefing.

## Personnel

**Pilots** - All pilot qualifications are established by the DCA and are based on aircraft type. Pilots employed by air operators are also required to undergo specified training on a periodic basis as directed by the *Aruba Aviation Regulations*. Although most air ambulance flights are routine transfers of stabilized patients to higher care facilities, some are urgent missions with life or death consequences often conducted at night or in marginal weather. These types of operations place a great deal of stress on pilots, who require mature judgment to avoid allowing their sense of mission accomplishment to override this reason. Agencies contracting for air ambulance services may wish to specify requirements over and above the minimum required by regulation such as two pilots on all flights, additional training and experience, and the requirement for the air operator to maintain an approved list of those pilots authorized to fly aircraft supplied under the contract.

**Medical Attendants** - There are no *Aruba Aviation Regulations* specifying the conditions under which a medical attendant must be carried. Similarly, the DCA has no jurisdiction over the qualifications or training of medical attendants. The DCA, operator in conjunction with the health care organization, if applicable, should establish standards for medical personnel and clearly define the criteria for their employment. It is recommended that all air ambulance flights carry a flight or medical attendant. A medical attendant should be an able bodied person physically capable of assisting the patient to an exit in the event of an emergency and who will attend to the personal needs of the patient in flight.

There is often some confusion regarding the status of medical attendants and their responsibilities relating to the operation of the aircraft. It should be clearly understood that medical attendants are not normally crew members under the *Aruba Aviation Regulations*. They may be designated as crew members provided they receive approved flight attendant training. In this case, medical attendants may be assigned duties such as passenger briefing, evacuation, and look-out for helicopter landings, otherwise these functions remain the responsibility of the flight crew.

Training in the aviation environment is desirable for medical personnel involved in air ambulance operations. Depending on whether the attendant is part of a dedicated service or accompanies patients on an occasional basis this training will likely vary in length, but should at least include familiarity with the following:



- a. Meteorological weather conditions;
- b. Hypoxia;
- c. Hyperventilation;
- d. Effects of scuba diving;
- e. Effects of smoking and drugs;
- f. Hypothermia;
- g. G forces: positive and negative;
- h. Principles of protection against G force in an emergency landing or ditching;
- i. Patient evacuation;
- j. Turbulence problems with patient seat belt and traction devices;
- k. Effects of noise and vibration on the ill or injured;
- l. Difficulties encountered using "common" medical equipment in an aircraft environment;
- m. Helicopter emplaning and deplaning procedures;
- n. In-flight patient care: To be determined by: the management of IMSAM, BGD, and/or HOH;

**Dispatchers and Coordinators** - Air ambulances are usually controlled by a formalized system which encompasses tasking, priorities, communications, operational control, etc. One of the keys to the effectiveness of these systems is the dispatcher or coordinator, used in this context as the air ambulance dispatcher, not the air operator's operations officer, although these positions may be combined. Often, however, air ambulance dispatchers are part of the land ambulance system and may not be knowledgeable about the aviation aspects of the service. Compounding this problem, many air ambulance flights are self-dispatched; particularly those of an urgent nature, thus the additional assistance that a pilot might receive from the flight operations manager may not be available. It is, then, imperative that the decision-making process leading to the dispatch of an air ambulance be clearly defined and understood by all involved. To this end, dispatchers should receive training in the following:

- a. Weather reporting system;
- b. Weather limits for applicable aircraft types;
- c. Aircraft performance and capabilities;
- d. *Aruba Aviation Regulations* as applicable; and
- e. Air operator tasking procedures.

It is advisable for each air ambulance operator to have a medical doctor as a member of their air ambulance team, either on a permanent staff or available for consultation at any time.

## Medical Considerations

The first step leading to the assigning of an air ambulance is the decision by the medical authority, usually a physician or nurse, to move the patient by air. The changes associated with flying, however, may constitute an additional hazard for some patients. It is important that medical personnel are aware



of the effect of the aviation environment on various conditions and make their decision based on an established set of criteria. HOH, IMSAM or others should have a manual e.g. "Patient Care in Flight" for the guidance of its Medical Services Personnel and this publication, or a similar one should be available to those charged with initiating air ambulance service requests.

## Helicopter Operations

Helicopter air ambulance operations conducted between the airport and/or certified heliports are essentially no different from aeroplane operations. Operations from austere or unprepared sites, however, do require special consideration and, although not common for Aruba, some ambulance services may wish to be prepared for such an eventuality in the event of an emergency. Operations from such sites, particularly at night, require careful planning and a number of factors should be considered. United States Federal Aviation Administration Advisory Circular 135-14 entitled "Emergency Medical Services/Helicopter (EMS/H)" provides a useful summary of these factors, some of which are outlined below:

- a. A moveable search light capable of operation without the pilot having to remove his hands from the controls;
- b. Air to ground communications with persons on the landing site;
- c. Restraining devices for preventing patients from interfering with the flight controls (patients are less likely to be stabilized prior to transfer);
- d. An intercommunications system between flight crew and medical personnel
- e. A wire strike protection system;
- f. Weather minima;
- g. Landing site evaluation procedures;
- h. Training of personnel in loading and unloading the helicopter with rotors turning; and
- i. Training of at-the-scene ground personnel (involves police, ambulance attendants etc. in landing site selection and marking; weather estimation, hazards to landing, loading, etc.).

## Safety Management

The DCA encourages all air operators to establish a company aviation safety management program. This program involves a commitment to safety from all company personnel, from the Chief Executive Officer down to the newest apprentice. The key to its success is the Company Safety Officer, who is the coordinator of the program and is responsible for its implementation. Information on this program is available at the DCA.



A successful company safety management program can have a positive effect on many aspects of air ambulance operations and one of the most important is pilot judgment. Training in Pilot Decision Making (PDM) and Cockpit Resource Management (CRM) are developments in the aviation industry and are particularly applicable to the often life and death nature of the air ambulance mission.

It is recommended that all air ambulance operators have in place a viable Aviation Safety Management Program.

## **Airworthiness**

All medical equipment carried on board aircraft being operated as air ambulances is subject to DCA airworthiness approval.

## **Operator medical care level certification:**

Each operator will be certified by the DCA and the Health Department (Volksgezondheidsdienst) up to what level of Life Support they can provide the patient. For Aruba there are three levels of Life Support. These are:

- 1) Basic Life Support (BLS);
- 2) Advanced Life Support (ALS);
- 3) Intensive Care Support (ICS);

**Basic Life Support:** Aircraft must be equipped and certified for Air Ambulance services. The aircraft must be equipped with at least medical oxygen, suction, electrical supply, lighting and climate control to the patient. (To be determined by the DCA and Volksgezondheidsdienst.)  
Operator must be staffed by a minimum of one medical person who is experienced and qualified by training, certification and current competency in BLS care who practices through the orders of a physician-medical director. This medical person must be capable of recognizing respiratory and cardiac arrest, starting and maintaining the medical procedure until the patient recovers, or the medical person stops procedure, or until ALS is available. In air medical transports, BLS includes air-to-ground communications to ensure continuity of care.



**Advanced Life Support:** Aircraft must be equipped and certified for Air Ambulance services. The aircraft must be equipped with life support equipment with at least medical oxygen, suction, electrical supply, lighting, climate control and pressurization to the patient. ALS includes:

- 1) air-to-ground communications to ensure continuity of care and;
- 2) the capability of constant monitoring and life support until the patient has been delivered to a continuing care facility having CPR and ECG.  
(To be determined by the DCA and Volksgezondheidsdienst.)

Operator must be staffed by a minimum of two medical personnel who are experienced and qualified by training, certification and current competency in emergency critical care that practices through the orders of a physician-medical director. The following elements are recommended for ALS:

- 1) BLS;
- 2) Using adjunctive equipment and special techniques, such as endotracheal intubation and closed chest cardiac compression;
- 3) Cardiac monitoring for dysrhythmia recognition and treatment;
- 4) Defibrillation;
- 5) Establishing and maintaining an intravenous infusion lifeline;
- 6) Employing definitive therapy, including drug administration;
- 7) Stabilization of patient's condition;

**Intensive Care Support:** Aircraft must be equipped and certified for Air Ambulance services. The aircraft must be equipped with life support equipment with at least medical oxygen, suction, electrical supply, enough lighting, climate control and pressurization to the patient. ICS includes:

- 1) air-to-ground communications to ensure continuity of care and;
- 2) the capability of constant monitoring and life support until the patient has been delivered to a continuing care facility having CPR and ECG.  
(To be determined by the DCA and Volksgezondheidsdienst.)

3) Logbook for monitoring the certification of all medical equipment and instruments;

4) Valid 24 hour contract with Intensivists or Anesthesiologist and IC-Registered nurses and their deputies;

Operator must be at least staffed with an Intensivist or Anesthesiologists and IC-Registered nurses who are experienced and qualified by training, certification and current competency in emergency critical care that practices through the orders of a physician-medical director. The following elements are recommended for ICS:

- 1) ALS;
- 2) Using adjunctive equipment and special techniques, such as endotracheal intubation and closed chest cardiac compression;
- 3) Cardiac monitoring for dysrhythmia recognition and treatment;
- 4) Defibrillation;
- 5) Establishing and maintaining an intravenous infusion lifeline;
- 6) Employing definitive therapy, including drug administration;



7) Stabilization of patient's condition;

## **Carriage of Incubators and Stretchers.**

(For temporary installation on aircraft for med-evac purposes.)

The use of a stretcher is only to be used in cases of med-evac only. The following guidelines have been developed to assist operators:

This guide for carriage of stretchers and incubators has been written to facilitate their use on large aircraft carrying flight attendants and helicopters without flight attendants. Also taken into consideration was the fact that some flights may be operating solely on a med-evac mission, while others may be operating on regular scheduled services.

### **Stretcher or Incubator Installation**

The stretcher or incubator installation:

- a. Shall not interfere with any operation of any aircraft controls;
- b. Shall not restrict access to, or the use of, regular exits;
- c. Shall not obstruct any emergency exit, or the aisle(s) leading to an emergency exit;
- d. Shall not restrict access to emergency equipment; and
- e. Should be so arranged as to allow ready access by accompanying medical personnel to perform monitoring and therapy functions when needed.

### **Restraint Systems**

All stretcher and incubator restraint systems require DCA (Airworthiness) approval. Each restraint system, including anchorage to the primary aircraft structure, shall be designed for an average occupant weight of 170 pounds and for the maximum load factors corresponding to the specified flight and ground load conditions, including the emergency landing conditions prescribed in the applicable certification requirements such as FAA/JAA Part 21, 23, 25, 27 and 29. Refer also to AUA-RLW and JAR-OPS 1 for Aruba. A safety factor of 1.33 shall be applied to the ultimate inertia forces stated FAR/JAR 23, 25, 27, 29 article 561.

The attachment of the stretcher or incubator to the aircraft structure shall allow its rapid detachment for evacuation.

Application for approvals shall be directed to the DCA, Airworthiness Division.

### **Patient Restraint**



The patient restraint shall be designed to prevent unwanted movements of the person using it during turbulence or in an emergency landing, and to apply the restraining loads over a large area of the body.

All patient restraint systems require DCA (Airworthiness) approval. Each patient restraint system, including anchorage to the primary aircraft structure, shall be designed for an average occupant weight of 170 pounds and shall protect the patient when subjected to the maximum loads corresponding to the specified flight and ground load conditions, including the emergency landing conditions prescribed in the applicable certification requirements such as FAA/JAA Part 21, 23, 25, 27 and 29. Refer also to AUA-RLW and JAR-OPS 1 for Aruba. A safety factor of 1.33 shall be applied to the ultimate inertia forces stated FAR/JAR 23, 25, 27, 29 article 561.

Each patient restraint system shall have a quick-release means to allow its rapid detachment in an evacuation.

Some patients may be so injured that the restraint system used will be based on a medical opinion. Medical evacuations, as a rule, involve stabilized patients. An emergency situation involving a patient who is unable to be restrained on a stretcher prior to being stabilized is very rare. However, should this occur, the patient should be transported on a flight whose sole purpose is the medical evacuation.

All medical equipment shall be appropriately restrained in a manner acceptable to the DCA. Application for approvals shall be directed to the DCA, Airworthiness Division.

## **Patient Orientation**

The preferred orientation is the patient's head towards the front of the aircraft so that most of the forward loads applied by the patient restraint system are applied on the shoulder area. In an aeroplane, the patient should be placed fore and aft along the longitudinal axis. This is the preferred orientation for helicopters, as well; however, due to the different structural configuration and possible crash scenarios, this may not be feasible if warranted.

## **Medical Attendant**

While not specifically required by regulation, all patients, particularly those confined to a stretcher or babies in incubators, should be accompanied by a medical attendant. Attendants should be assigned a seat which is convenient to their patient.

## **Incubator oxygen supply and restraint**



An incubator may feature a self-contained oxygen supply capable of delivering a controllable flow rate.

An adequate supply of oxygen normally will be provided by the medical authorities. The aircraft oxygen system shall not be used.

If extra oxygen cylinders are to be carried, they shall have protective containers and be capable of being appropriately restrained in a manner acceptable to the DCA.

### **Summary of References:**

- a) Aviation Act of Aruba;
- b) JAR-OPS 1 and 3 for Aruba;
- c) In-flight patient care manual – TBD;
- d) JAA/FAA part 21, 23, 25 , 27 and 29;
- e) Aruba Dangerous Goods Regulations;
- f) IATA guidelines;
- g) FAA AC 135-14A Emergency Medical Services/Helicopter (EMS/H);
- h) FAA AC 135-15 Emergency Medical Services/Helicopter (EMS/A);