



EUROPEAN CIVIL AVIATION CONFERENCE

MANUAL
ON AIR PASSENGER HEALTH ISSUES

(Adopted by Recommendation ECAC/28-1 on Air Passenger Health Issues)

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PART 1 – GENERAL

Introductory statement

1. Unless supplementary efforts are made, medical incidents affecting passengers in-flight are likely to rise in the years to come. The reason for this lies in a number of factors, including the forecast growth in air transport, the upsurge in air travel amongst older people, and the development of ultra long-haul services on wide-body aircraft which carry larger numbers of persons in flight for longer periods. The implications of these trends must be addressed on an international basis and in a co-ordinated manner.

2. Air passengers are entitled to benefit from medical advice and treatment, account being taken of the specific constraints of air travel. Operators have, over the years, made efforts to identify and either prevent or treat health problems occurring during air travel. However, the factors identified above require an increased consideration of the health requirements by the air transport industry.

3. An essential requirement is to understand better the incidence and causes of occurrences of medical incidents in air travel, and in particular to identify whether, and to what extent, there exists a causal relationship between the conditions of air travel and such occurrences. Priority should be allocated to the sharing of results of comparable statistical data collection, and the undertaking of international multi-disciplinary research using a common methodology.

4. The **provision of appropriate services**, based on the knowledge gained and shared, should be implemented in an internationally harmonised manner. In defining such harmonised services, care should be taken to strike a balance between passenger needs and air operator constraints, including financial ones.

5. Medical experts of the industry and regulators in conjunction with other relevant bodies should develop best practices or guidelines, taking into account relevant technical and economical issues, in the following areas:

- specifications for on-board medical equipment
- training of cabin crew with regard to assistance to passengers;
- use of air/ground/air communications to assist in establishing diagnosis and treatment, and in making decisions to divert the aircraft;
- guidelines regarding aircraft design and/or cabin lay-out, to facilitate medical treatment of passengers on board;
- organisation of medical assistance at the airport

6. The **legal aspects of assistance to passengers** also need to be considered, and in particular ways to facilitate the provision of emergency medical care on-board by a passenger doctor or other health professional.

7. Finally, **communication with the passengers** on health related issues should be improved, in particular by developing improved information sources. These should include a reminder of the importance of seeking medical advice prior to travelling by air, for passengers who may have relevant risk factors or who are suffering from chronic ailments.

8. The aim of the document is to provide guidance on good practice where possible, and to provide recommendations where further work is required in order to develop or refine these guidelines.

General conditions of air travel

9. Millions of passengers appreciate the possibility to cover large distances in a relatively short time and only a very few of them give a second thought before boarding an aircraft to factors that may influence their well-being during travel, such as pre-existing health conditions, age, or stress.

10. The following paragraphs provide an overview of the main conditions of air travel and health related issues based on current medical knowledge.

Cabin pressure

11. The primary difference between the aircraft environment and the ground environment relates to atmosphere. Cabin pressure in commercial aircraft depends on the phase of the flight. It reduces during the climb, reaching cabin altitudes of up to 8.000 ft¹ at cruise and is gradually brought back to the altitude of the destination during descent. The reduced barometric pressure at cruising level, with a concomitant decrease in partial pressure of oxygen (PO₂), results in a slight drop in blood oxygen saturation but healthy individuals will not be aware of the lowered blood PO₂.

12. However, the reduced PO₂ during flight could result in health problems for those passengers who have lowered blood oxygen saturation at sea level due to pre-existing medical conditions.

13. As an aircraft climbs and cabin pressure is reduced, gases will expand. At 8000 feet, gas volumes will be approximately 30% greater than at sea level. These changes are reversed on descent. On modern aircraft, these changes in gas volumes have little effect on most healthy people, as the cabin pressure is altered slowly and smoothly. However, symptoms may occur where gas becomes trapped.

- On ascent, gas expansion may lead to sinus or intestinal discomfort. More rarely, some lung conditions such as pneumothorax may lead to more serious problems. The most common problem is ear discomfort on descent (barotrauma), typically associated with an upper respiratory tract infection. However, infants and toddlers may suffer ear pain during flight because the Eustachian tube function is not yet fully developed at very young ages and they are unable to actively 'clear' their ears unless encouraged to swallow.
- Gas expansion may create problems following some surgical procedures, particularly with increasing frequency of short stay surgery. Patients should not travel by air following procedures where gas is introduced into the body, e.g. laproscopic abdominal procedures or some ophthalmologic procedures, until sufficient time has elapsed for the gas to be absorbed.

Cabin ventilation

14. The pressurized aircraft cabin is continuously ventilated, normally with a mixture of outside air (40 - 60%) and re-circulated cabin air, which has been passed

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through high efficiency particulate air filters (HEPA filters). The HEPA filters are of the same standard as those used in operating theatres and intensive care units and testing of cabin air has shown that they efficiently remove airborne pathogens. These filters have to undergo maintenance at intervals defined by the manufacturers. While the risk of spreading infectious disease via the air conditioning systems of the aircraft is extremely small, infections may pass from an infected passenger to the passengers sitting in his/her direct vicinity, as in any environment where people are close together, e.g. in buses, trains or theatres.

15. As ozone filters are recommended for all commercial aircraft, health problems resulting from ozone entering the aircraft cabin, such as eye and respiratory tract irritation, have largely been eliminated.

16. In normal operations, the cabin ventilation system maintains carbon dioxide (CO₂) levels well below the regulatory standards although there may be short-term peaks e.g. in the galleys due to use of solid CO₂ for cooling purposes.

17. Some passengers and crew have expressed concern about the possible health hazards of pyrethroids in the insecticide sprays used to dis-insect the cabin, in compliance with WHO and International Health Regulations. Research has not shown any adverse health effects in humans.

18. Fumes from other aircraft or de-icing liquid may enter the cabin via the air conditioning system while the aircraft is on the ground. However, concentrations have been found to be below toxic levels.

Cabin temperature and humidity

19. The cabin temperature is set throughout the flight to what is considered to be comfortable for the passengers. Nevertheless, some passengers complain about overheated or cold cabins, in part because the ideal temperature for the individual passenger may vary greatly and also because there are areas of cooler or warmer air within the cabin. There is no health risk involved but comfort may be reduced for some passengers.

20. Humidity in the cabin is low and ranges from 10 - 20%. This is unavoidable because the air at high altitudes is practically devoid of moisture. As a result there is a drying effect of airway passages, the cornea (particularly under contact lenses) and the skin. Although a general dehydration does not occur, passengers are advised to drink adequate amounts of non-alcoholic beverages during flights.

Cosmic Radiation

21. The raised level of ionising radiation in flight, which is affected by altitude, latitude and other factors, has caused concern amongst passengers and crew. However, extensive scientific investigation has not, as yet, demonstrated any adverse effects.

22. EU Council Directive 96/29/Euratom of 13 May 1996 requires airlines to assess the level of exposure of crew. There are no legislative requirements to assess the exposure level of passengers.

Seating and immobility

23. Seats are designed to protect the passenger as far as reasonably possible from injuries that may be caused by severe air turbulence and other high acceleration

events. Sitting for long periods is tolerable for most passengers, but for some there may be a potential for exacerbating peripheral oedema, cramp, and other circulatory problems.

24. Travel-related deep vein thrombosis (DVT) and the potential for pulmonary embolism is currently the subject of much research. Immobility is a known risk factor for DVT. Nevertheless it has to be noted that DVT rarely occurs in healthy travellers and that the risk has also been reported after car, train or bus travel.

Stress factors

25. Air travel may impose stresses on passengers. Sources of pre-flight stress include getting to the airport and then coping with the requirements at the airport itself, e.g. walking long distances carrying baggage or waiting. In-flight stresses may include crowded cabins, noise, vibration, and turbulence.

26. Some passengers try to compensate for stress with the help of alcohol and may lose control of their actions. Unruly passengers may be a safety hazard on board. It has been suggested that alcohol intoxication and/or nicotine withdrawal in heavy smokers may result in aggressive behaviour towards fellow passengers or the crew.

27. A significant proportion of the population may have a fear of flying, symptoms of which range from mere apprehension to complete avoidance of flying. Intervention ranging from simple reassurance to specific courses may allow the individuals to overcome their fear.

Jet lag

28. Crossing time zones during international flight operations causes disruption of circadian rhythms. Many body functions such as mental function, hormone levels, hunger, digestion, and sleep depend on a 24-hour cycle. Disruption of this cycle may cause considerable discomfort until re-synchronised with the local time zone at the destination. Adaptation takes about 24 hours per 1-2 hours time shift.

29. Air travellers on long-term medication should pre-plan their trip if time changes are involved. This is especially important for passengers with insulin dependant diabetes mellitus, but long distance travel should not pose significant problems if the diabetes is well controlled and the itinerary is discussed with the treating physician well before the trip.

Conclusion

30. The cabin environment and the stress involved with air travel are not health hazards in themselves and will not lead to illness. However, the well-being of some passengers may be reduced to a degree. Psychological factors have to be taken into account when managing fear of flying or passenger aggressive behaviour.

31. Passengers should be aware of the general conditions of air travel. Those with pre-existing health conditions may need to seek advice from their doctor on their fitness to fly.

PART 2 – MEDICAL INCIDENT REPORTS

Introduction

1. Medical incidents on board commercial aircraft are relatively uncommon, with estimates of the frequency of reported incidents varying from 1 in every 11,000 passengers to 1 in every 37,000 passengers. Serious incidents are rare, with only 1 in every 1000 flights being diverted because of a medical incident.

2. Most airlines require cabin crew to complete some form of report following a medical incident. Such reports have a number of potential functions:

- Maintain chain of health care by providing information to ground medical services taking over care on landing
- Provide information to airlines and regulators on the nature and outcome of medical incidents, helping to inform:
 - Recommendations for guidelines on passenger fitness to travel
 - Provision of medical kits and equipment
 - Training of cabin crew
- Record of incident and actions taken in the event of customer complaints or litigation

3. Major airlines may collect sufficient information from their own medical incident reports to meet their requirements. However, smaller airlines may not have a sufficient numbers of incidents to allow them to make decisions on medical equipment and training. Also, regulators are required to set minimum standards for medical equipment and training, but may not have access to appropriate information to help them set the requirements.

4. Standardisation of medical reporting, both in terms of the forms and the definitions used, would allow collation and comparison of data, and facilitate the treatment of the affected passenger along the health care chain.

5. The following issues should be considered in this context :

- Standardised definitions of symptoms used on reporting forms
- A common form or template for use by airlines / airport operators, including provision for maintaining the chain of health care, in a format suitable for collection in an international database
- User guidelines
- Recommendations for an international database

Reporting Forms

6. Airlines currently use a variety of forms to collect information on in-flight medical incidents. The information may go to one or several departments within the airline e.g. Medical, Safety, Cabin services, Operations, etc. In larger airlines the information usually goes to the Medical department. In smaller airlines with no medical personnel, the information may be passed to other departments, and may not be analysed at all (typically it would only be used to facilitate response to enquiries or complaints).

7. The forms used vary from entirely free text to check box style. In all cases the information has to be manually entered into a database. The interpretation of the data requires considerable medical knowledge to ensure the accuracy of the classification of events. The forms used vary from one page to 5 pages. Some airlines combine the medical forms with reporting of other events, e.g. safety, security, etc.

8. IATA has developed a Sample Medical Incident Form, which has been revised by the ECAC Working Group on Air Passenger Health Issues and endorsed by the IATA Medical Advisory Group as the internationally recommended form for collection of data concerning medical incidents in-flight.

Recommendation

9. It is recommended that airlines that do not have a suitable medical incident reporting form, or are looking to replace an existing form, should adopt the Medical Incident Form enclosed at **Attachment**.

User Guidelines

10. Main points are the training of cabin crew in reporting medical incidents, and the use of data from medical incident reports.

11. Training for cabin crew should include:

- Reasons for, and importance of, completion of forms following medical incidents
- Form contents and explanation of terms
- Necessity to complete the forms after all medical incidents where cabin crew become involved in a medical event on an aircraft
- Mock incidents requiring the completion of the form by cabin crew
- The importance of the completion, by the volunteering health professional onboard, of the two required sections of the form on pages two and three.
- Use of the tear-off slip to accompany a customer when disembarking the aircraft as a personal record of the incident and any treatment that may have been given to the customer by an onboard doctor

12. Data from medical incident reports would be used to:

- Allow the airline to carry out a risk assessment of medical incidents in its operation, which would inform decisions on its requirement for training of crew and provision of medical equipment in excess of the minimum regulatory requirement

- Allow the airline to compare its data with that of a combined incident database and to consider the reasons / implications of any differences

Recommendations

13. The reporting of medical incidents should be included in cabin crew initial and recurrent training programmes.

14. Airlines should collect, classify and analyse data from their own medical incident reports.

Common Database of Medical Incidents

[To be completed]

CABIN CREW ACTION (circle or complete as indicated)

73. Oxygen given?	YES/NO	74. If yes, did patient's condition improve?	YES/NO
75. Medication given? (specify)			
76. Was own medication or from other passenger used? (specify)			
77. Defibrillator used?	YES/NO	78. If yes, were any shocks administered?	YES/NO
79. Other onboard medical equipment used (specify)			
80. Was Cardiopulmonary Resuscitation (CPR) performed?	YES/NO	81. Pulse restored?	82. Respiration restored?
		YES/NO	YES/NO
83. Consciousness regained?	YES/NO		
85. Use of ground medical control	YES/NO	Successful/unsuccessful	Comms used: SATCOM / HF / ACARS
86. Assistance of on-board Dr or Health Professional	YES/NO	Successful/unsuccessful	
87. Attempt to contact company doctor:	YES/NO	Successful/unsuccessful	
88. Port Health Authority advised:	YES/NO		
89. Further information/comments:			

OUTCOME (tick):

Diversion	<input type="checkbox"/>	Patient recovered before landing	<input type="checkbox"/>	Patient walked off aided/unaided	<input type="checkbox"/>
Patient left aircraft by wheelchair	<input type="checkbox"/>	Patient left aircraft by stretcher	<input type="checkbox"/>	Patient died on aircraft	<input type="checkbox"/>

Treatment:	None	<input type="checkbox"/>	First Aid	<input type="checkbox"/>	Ground medical	<input type="checkbox"/>	GP/Appointed Dr	<input type="checkbox"/>	Hospital	<input type="checkbox"/>
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Crew:	Fit to operate	<input type="checkbox"/>	Fit to fly as passenger	<input type="checkbox"/>	Remained in hotel / hospital	<input type="checkbox"/>
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-----cut-off-portion-----

Transfer of Care to Ground Medical Services					
Name of Casualty:			Date and time of onset:		
Brief Details of Incident:					
Oxygen given:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	If yes, did condition improve?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Was casualty unconscious at any time?	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
Defibrillator applied?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	If yes, were any shocks given?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Medication Administered:	Drug:		Dose:	Time (GMT)	
Any other treatment given:					
Crew Member name (CAPITALS):		Staff Number:		Signature:	

PART 3 – PROVISION OF SERVICES

Introduction

1. In order to respond to medical incident occurrence in air travel, it is essential that a health care chain be in place. The necessary assistance and equipment should be available at every link in the air travel to respond immediately to the occurrence, enabling the affected passenger to be fully attended until the incident is resolved or he/she is transferred to appropriate medical facilities on the ground.
 2. This implies that all aviation partners, including airlines, airports and also aircraft manufacturers, have a key role to play in maintaining the continuity of this health care chain, by maintaining appropriate services available and having coordination arrangements in place with the other partners in the health care chain. These services should be, to the extent possible, harmonized so that a similar, effective, support be available to passengers.
 3. For the airline operator, a first requirement is to have on-board optimized first-aid and medical kits, equipped with relevant and sufficient medications and instrumentation. These kits would be adapted to respond to the wider spectrum of medical incidents, based on the conclusions of a risk assessment to be carried out by the operator according to the characteristics of its operations. The medical kit may include, as is currently the case in a majority of airline operators, an external automatic defibrillator. (see Section 1)
 4. The equipment however is useful as much as the cabin crew has the skills and experience to use it, and is regularly trained in all aspects of first-aid. It is therefore essential that their training syllabus include familiarization with medical emergencies on-board and appropriate responses, including calling for emergency assistance from a medically qualified passenger and reporting incidents. (see Section 2)
 5. Ground medical services may also provide a vital assistance to respond to medical emergency occurrence on-board. For this reason, it is essential that arrangements be taken by operators to have such assistance available during all flights. Current progress in technology furthermore allows to foresee the development of transmission of detailed medical data from the aircraft to a medical facility on the ground — trials for such telemedicine devices are underway and the harmonized development of this technique should be encouraged. (see Section 3)
 6. Consideration need also to be given to the aircraft design itself and its cabin lay-out to allow for the provision of assistance to the affected passenger within the physical constraints of aircraft. In this respect, a set of underlying principles should be taken into account by both operators and manufacturers. (see Section 4)
 7. Finally, medical assistance at the airport is an essential link in the continuity of the health care chain, where coordination and operational arrangements should be available to take care of the affected passengers in coordination with health authorities and medical facilities at, or in the proximity of, the airport. (see Section 5).
 8. The following sections detail guiding principles and best practices in each of these aspects, as a contribution to developing a unified and internationally accepted health care chain to provide necessary services to passengers.
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SECTION 1: FIRST-AID AND EMERGENCY MEDICAL KITS

1. *Regulatory Authority*

- The regulatory requirements for aircraft medical kits and equipment should be determined by health professionals, including doctors, with knowledge of the aviation environment and the provision of medical care in commercial aircraft.
- The approval and monitoring of aircraft medical kits and equipment should be determined by health professionals, including doctors; they should have knowledge of the aviation environment and of the provision of medical care in commercial aircraft

2. *Airline Risk Assessment*

- In determining its requirements for medical kits and equipment, an airline should carry out a risk assessment, taking into account factors such as the nature of its operation, flight durations, passenger numbers and demographics, and previous medical incident records.

3. *Contents of Aircraft Medical Kits*

- Recommendations for the minimum contents of aircraft medical kits are at Appendix 1. The recommendations are based on existing JAR OPS 1 guidelines, with some amendments and a general principle that the specific contents use by an airline should be based on the outcome of the airline's risk assessment.
 - Coordination should take place with the JAA, in order that the amended composition of first aid and emergency medical kits and the risk assessment approach be incorporated in the relevant section of JAR/AMCOPS.
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Attachment 1 - First-Aid Kit

<i>Number of First Aid Kits</i>	1 – 4 (depending on number of passenger seats installed)
<i>Equipment</i>	Bandages (assorted sizes)
	Burns dressings (unspecified)
	Wound dressings, large and small
	Adhesive dressings - assorted sizes
	Adhesive tape
	Adhesive wound closures
	Safety pins
	Scissors
	Antiseptic wound cleaner
	Disposable gloves
	Disposable resuscitation aid
<i>Medications</i>	Simple analgesic
	Antiemetic
	Nasal decongestant
	Gastrointestinal antacid
	Anti-diarrhoeal medication
	Note: An eye irrigator whilst not required to be carried in the first aid kit should, where possible, be available for use on ground
<i>Other</i>	First aid handbook ¹
	Medical incident report form
	Biohazard disposal bags

¹ Should be carried on the aircraft – not necessarily in the first-aid kit

Attachment 2 - Emergency Medical Kit

<i>Number of Emergency Medical Kits</i>	1 (flights in airplanes for which a flight attendant is required)
<i>Equipment</i>	Sphygmomanometer - non mercury
	Thermometer - non mercury
	Stethoscope
	Syringes and needles
	Tweezers
	Oropharyngeal airways (3 sizes)
	Intubation set ¹
	Tourniquet
	Disposable gloves
	Needle disposal box
	Urinary Catheter (2 sizes)
	Basic delivery kit
	Aspirator
	Bag-valve masks
	Blood glucose testing equipment
	Scalpel
<i>Instructions</i>	A list of contents in at least 2 languages (English and one other). This should include information on the effects and side effects of drugs carried. Basic instructions for use of the drugs (in trade names and generic names) in the kit. ACLS cards
<i>Medications</i>	Coronary vasodilator
	Antispasmodic
	Epinephrine/Adrenaline 1:1.000 and 1:10.000
	Adrenocortical steroid
	Major analgesic
	Diuretic
	Antihistamine, oral and injectable form
	Sedative/anticonvulsant, injectable and/or rectal form, oral sedative
	Medication for hypoglycaemia
	Antiemetic
	Atropine
	IV fluids, in appropriate quantity ¹
	Bronchial dilatator - injectable and inhaled form

AUTOMATED EXTERNAL DEFIBRILLATOR

<i>Automated external defibrillator</i>	It is recommended that AEDs should be carried on board appropriate aircraft ¹
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¹ Equipment to be considered, according to conclusions of risk-assessment.

SECTION 2: TRAINING OF CABIN CREW IN FIRST-AID AND EMERGENCY MEDICAL ASSISTANCE ON-BOARD

1. *Frequency of Training*

It is recommended that all cabin crew receive aviation medical and first aid training at a frequency in line with that required by JAR OPS 1:

- Initial training
- Recurrent training – annual
- Conversion and differences training – as required

2. *Content of Training*

- A suggested training syllabus is shown in the **Attachment**. It is recommended that the full syllabus be covered during initial training and that the refresher training programme should cover the full syllabus over a defined training cycle.
- Life-saving procedures, including use of the AED if carried, should be covered in initial training and at each annual refresher.
- The training should cover both theoretical and practical aspects. Where possible, practical training should be carried out in a cabin simulator.
- All cabin crew should be issued with an appropriate manual, which should cover all elements of the training syllabus.
- In determining its training requirements, an airline should carry out a risk assessment, taking into account factors such as the nature of its operation, flight durations, passenger numbers and demographics, and previous medical incident records.

3. *Trainers*

The cabin crew trainers should be appropriately qualified and have:

- Knowledge of first aid
- Knowledge of the aviation environment and its impact on medical conditions and the provision of first aid
- Knowledge of the airline's medical kits and equipment, including additional resources, e.g. use of ground to air medical advisory service
- Knowledge of training methods

4. *Testing & Supervision*

- It is recommended that all cabin crew should undergo both theoretical and practical testing following initial and refresher training. Crew who do not achieve a satisfactory standard should not be permitted to operate until they have achieved the necessary standard.

- All aviation medical and first aid training programmes (content and delivery) should be approved and monitored by the regulatory authority. Those approving and monitoring training should be competent to undertake this and this would normally require involvement of health professionals, with additional knowledge of the aviation environment.

Attachment – Suggested Cabin Crew Medical Training Syllabus

Aviation medicine

- The Atmosphere: atmospheric layers, atmospheric pressure; physical gas laws; atmosphere in flight
- Effects of flying on the body; Effects of low oxygen levels; Effects of pressure change.

Travel health

- Infectious diseases: reporting infectious disease; protection from infection; clinical waste; avoiding water/food-borne illness;
- Aircraft disinsection
- Alertness management: Fatigue; Sleep physiology; Circadian rhythm; Jetlag.

Assessing a casualty

- Surveying a casualty: Primary survey; Secondary survey;
- History of an incident;
- Looking for external clues; Measuring body functions; Examining a casualty;
- Identifying specific recognition features;
- Mechanics of lifting: Moving a casualty; passengers with disability;

Life-saving procedures

- Principles of resuscitation;
- Primary actions for adult, child and infant:
 - Opening the airway; Clearing the airway;
 - Checking breathing; Rescue breathing;
 - Checking for circulation;
 - Cardiopulmonary resuscitation; Automated external defibrillator (adult only) if carried;
 - Choking;
 - Recovery position;

Medical emergencies

- Respiratory disorders: Asthma; Hyperventilation; Chronic lung disease; Pneumothorax;
- Circulatory disorders: Ischaemic heart disease; Angina; Heart attack; Heart failure; Fainting; Deep vein thrombosis; Shock; Hypovolaemic shock;
- Abdominal problems: Nausea/Vomiting; Diarrhoea; Abdominal pain; Indigestion / heartburn; Bleeding from the digestive tract; Travel sickness and vertigo; Urinary retention;
- Nervous system disorders: Headache; Migraine; Fits and convulsions; Stroke;
- Behavioural/Psychological disorders: Irrational behaviour; Panic attacks; Alcohol intoxication;
- Other medical disorders: Diabetes; Hypoglaeemia; Anaphylaxis; Allergy; Ear and sinus pain; Nosebleed; Eye irritation; Decompression sickness; Sickle cell anaemia;

- Pregnancy and childbirth; Normal delivery; Care of the newborn; Complications of childbirth;

Trauma emergencies

- Wounds and bleeding: Protection from infection; Disposal of used sharps; Dealing with sharps injuries;
- Cuts and grazes; Severe bleeding; Indirect pressure; Amputation;
- Chest injury;
- Abdominal injury;
- Bone joint and muscle injury: Fractures; Sprains and strains; Leg/knee/foot injury; Arm wrist/hand injury;
- Head injury; Neck and back injury;
- Environmental injuries: Burns and scalds; Smoke inhalation; Electrical injuries; Frostbite; Hypothermia; Heat exhaustion; Heat stroke;
- Eye injuries: Foreign object in the eye; Chemical splash to eye; Direct injury;

Procedures and resources

- Crew coordination and teamwork
 - Medical kits and equipment on board;
 - Supplementary oxygen systems: Oxygen cylinder; Personal oxygen supply units;
 - Seeking medical advice;
 - Documentation to be completed:
 - Reasons for, and importance of, completion of forms following medical incidents;
 - Form contents and explanation of terms;
 - The importance of the completion of the relevant sections of the form by an assisting onboard health professional;
 - Use of the tear-off slip to accompany a casualty when disembarking the aircraft as a personal record of:
 - The incident;
 - Any treatment that may have been given;
 - Death on board;
 - Crew support after a medical incident.
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SECTION 3: TELECOMMUNICATIONS AND TELEMEDICINE

Overview

1. Serious in-flight medical incidents are uncommon, although it is suggested that demographic changes, with an increasing number of elderly passengers, may lead to these becoming more frequent. In addition, expectations of standards of in-flight medical care are rising.
2. Such incidents may result in aircraft diversions, with resultant expense and inconvenience to the airline, other passengers and the affected casualty. Requirements to dump fuel in order to permit a safe landing add an additional environmental cost.
3. Development of larger aircraft, carrying many more passengers and able to fly non-stop for up to 18 hours, may add to the problem – increasing the likelihood of an incident occurring during the flight and restricting the options for diversion (because of the difficulty of handling such large aircraft at smaller airports).
4. Many airlines now provide professional medical advice from the ground to crews managing onboard medical incidents, either using the airline's own medical department or via an external provider. At present, the ground medical adviser is dependent on information provided by the cabin crew, unless there is an assisting onboard health professional. This has highlighted a potential for improvements in the advice given, both in identifying serious conditions where diversion is necessary and in avoiding unnecessary diversions, if additional medical diagnostic information could be obtained and transmitted to the ground medical adviser without the need for health professional involvement.
5. Telemedicine devices are already available and have been trialed and used on commercial aircraft. However, the existing devices may not have all of the features that would be desirable or, in some cases, required by national legislation. In addition, there are currently no agreed standards or harmonised requirements for such devices.
6. Protocols for communication between ground based medical staff, cabin and flight deck crew would have to be developed. Such protocols must take into account the legal position of the commander of the aircraft in having ultimate responsibility for the safe operation of the aircraft.

Recommendations For Airline Ground To Air Medical Support

7. It is recommended that all airlines have a facility by which medical advice from the ground is available to crew at all times during flight. In considering the need for such a service, an airline should carry out a risk assessment, taking into account factors such as the nature of its operation, flight durations, passenger numbers and demographics, and previous medical incident records.
8. There are a number of ways in which such advice may be made available, including via specialist providers or from medical staff of the airline medical department, but all such services should meet the minimum specification:
 - a) available at all times when aircraft are operating
 - b) use communication systems which will allow rapid and reliable communication at all points of the airline operation

- c) be provided by health professionals who are:
- knowledgeable of the aviation environment and its impact on health problems
 - familiar with the practice of remote medicine
 - familiar with the medical kits, equipment and training of the airline
 - able to advise the crew on the facilities available at all potential diversion options, should this be necessary
 - able to arrange ground medical support and facilities at the aircraft destination
 - facilitate transfer of medical details about the incident to any receiving ground medical services
 - follow up incidents in order to provide outcome information
 - keep appropriate, confidential records of each incident
 - provide routine reports to enable the airline to monitor and audit medical incidents

Recommendations for Telemedicine Systems

9. A number of manufacturers and organisations are currently involved in research and development of telemedicine systems. It is considered essential that maximum flexibility is retained, such that:

- any such system can be used with all manufacturer's aircraft, and
- the data from the system can be readily accessed / interpreted, both by the ground to air medical advisory services and by ground medical services taking over a casualty's care.

10. This will require the development of a harmonised worldwide telemedicine framework, based on international medical and technical standards. Options for achieving this include:

- a) EU initiative, following a similar model to the Cabin Air project, within the 6th Framework research proposals
- b) Inter-governmental agreement, perhaps led by ICAO or WHO and involving:
 - industry representatives, e.g. airlines, aircraft manufacturers, telemedicine systems manufacturers, ground to air medical providers;
 - research organisations;
 - regulators, e.g. FAA, JAA
- c) Market forces – allow the market to determine which system becomes the industry standard

11. Any such standards will have to include a mechanism for continued revision, as the technology and scope of such systems develops.

12. A summary of the requirements for such systems and the areas in which standards will be required is shown in the **Attachment**.

Attachment - Considerations For Telemedicine Development, Standards And Specifications

Requirements

- Medical
 - suitable telemedicine devices / medical monitor
 - guidelines for use
 - crew training
 - transfer of medical data to receiving centre
- Technical
 - Data transmission from device to aircraft systems and from aircraft to the ground-based medical support centre
 - stable and fast communication for real-time voice, image and data transmission
 - available on 24/7 basis
 - able to be used at all points inside the cabin
 - data security
- Telemedicine devices / medical monitors
 - vital signs handling
 - data protection
 - man-machine interface
 - logging and documentation
 - adaptable to existing and future infrastructure
 - adaptable to different medical requirements
- Legal
 - data security and protection, medical documentation
- Economic
 - cost effectiveness
- Organisational
 - efficacy, efficiency, effectiveness

Standards and specifications

- Communication
 - connection in the cabin
 - protocols of communication
 - between the medical monitor and the medical support centre
- Medical Monitor
 - hardware
 - common software
 - ease of maintenance
 - hygiene control

- exchangeable consumables
- Crew
 - education and training
- Medical aspects
- Medical SOP's, guidelines, documentation

Areas of likely future development

- real-time video imaging
 - integration with electronic health records
 - integration with health professional registers
 - integral evidence-based medical protocols / guidelines / SOPs
-

SECTION 4: AIRCRAFT DESIGN / CABIN LAYOUT

Provision Of Medical Care On-Board

Principles

1. Every effort should be made to protect the dignity and privacy of the affected at all times during the flight
 2. The cabin crew and / or volunteering health professional should be able to provide their care and assistance efficiently and without disturbances
 3. Accordingly, sufficient space should be available in the aircraft cabin to provide medical care or assistance onboard to the affected passenger. A designated space should be planned for in the aircraft cabin for that use.
 4. This space should be suitably equipped with communication means allowing communication with the cockpit and the use of the aircraft telecommunication system to ensure that the required coordination with, and expert medical assistance from, the ground be provided.
 5. In planning for the appropriate space to be available to affected passengers in-flight, the operator should take into account the characteristics of the flight (in particular number of passengers on-board and duration of the flight).
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SECTION 5: EMERGENCY MEDICAL ASSISTANCE AT THE AIRPORT

1. The airport plays a key role in the health-care chain with regard to meeting the needs of sick passengers. It is the place where the passenger is taken in hand on arrival by facilities available on the ground and where the interface takes place with the health services of the country of disembarkation.
2. It is therefore essential that the necessary resources and procedures are planned and made available at airports.
3. In that respect, Recommended Practice No. 6.57 of Annex 9 (Facilitation) to the Chicago Convention should be a **reference principle** to be applied :

'6.57 Recommended Practice – There should be maintained at international airports an organised, immediately responsive staff with facilities for first aid attendance on site and appropriate arrangements should be available for expeditious referral of the occasional more serious case to pre-arranged competent medical attention.'

4. In view of the conclusions reached following the review carried out on medical assistance in European airports, the following general points can be recommended in order to ensure the effective implementation of emergency medical assistance to sick passengers.

Organisation of medical resources at the airport

5. With regard to medical means provided on the arrival of a sick passenger, the organisation of these can vary from one country to another and from one airport to another within the same country.
6. Some airports have permanent integrated medical structures within the airport's administration, while others have established procedures enabling local public health services to directly take charge of the sick passenger on his/her arrival and to treat him/her within the structures of the public health system.
7. The essential point is that the passenger should be provided **immediately upon arrival** with medical first aid and medical attendance **proportionate to the seriousness of his/her condition**. Fast, efficient and planned intervention procedures have to be in place, if necessary in cooperation with the local public health services.

Communication and coordination

8. Before the arrival of a sick passenger at the airport and in order to ensure he/she will be taken charge of, the **communication chain** has to be activated in order to mobilise the necessary medical assistance on arrival of the aircraft.
9. The message is first sent by the pilot-in-command of the arriving aircraft. The subsequent chain links can be the air traffic control services, the airport services, the airline's services (operations department, the ground medical assistance provider, internal or external, the station manager / handling agent). It is particularly important that the air traffic control services have established procedures allowing information to be relayed to the relevant medical assistance structures.

Role of authorities

10. The appropriate national authorities should ensure that the **organisation** of medical resources, and the necessary **procedures**, including those related to **communication and coordination**, are in place at airports in their constituency in order to meet the medical emergencies of arriving passengers.

11. They should also make sure that the procedures and resources provided to meet **arriving** passengers' needs may be used, as necessary, to meet the emergency medical assistance needs of **departing passengers**, or even of persons accompanying them.

PART 4 - LEGAL ASPECTS

Provision of emergency medical care on-board by a passenger doctor or other health professional

1. It is recommended to Member States that airlines in their constituency ensure that there are written procedures in place for dealing with medical emergencies on-board their aircraft. The written procedures should cover the following matters:

- a) the responsibilities of the cabin crew;
- b) the circumstances in which a call will be made for additional assistance from a ground-based medical provider and from a passenger doctor or other health professional;
- c) the steps which should be taken to verify the professional qualifications of the passenger doctor or other health professional;
- d) the circumstances in which the airline's on-board medical kit may be used and by whom;
- e) the details which must be collected regarding the sick or injured passenger and any passenger doctor or other health professional giving assistance; and
- f) the details to be provided to the passenger doctor/other health professional regarding the airline's insurance coverage and/or the insurance coverage of the ground-based medical service(as applicable).

2. It is recommended to Member States that airlines in their constituency ensure that cabin crew receive appropriate training regarding the written procedures for dealing with medical emergencies on-board their aircraft

3. It is recommended to Member States that those airlines in their constituency which do have insurance covering passenger doctors or other health professionals who provide emergency medical assistance, have a copy of a document (whether in the form of a certificate, letter, liability form or other) setting out the details of the relevant insurance cover (preferably in plain language) which can be given to any passenger doctor or other health professional called upon to provide assistance at the earliest practicable opportunity.

4. It is recommended to Member States that airlines in their constituency review their insurance policies to determine whether any insurance held in respect of liability for the acts of passenger doctors or other health professionals extends to provide coverage for the passenger doctor or other health professional as well as for the airline itself.

5. It is recommended to Member States that airlines in their constituency consider obtaining insurance which covers not only the airline's liability for acts of passenger doctors or other health professionals but also the passenger doctor's or other health professional's liability.

6. It is recommended to Member States that airlines in their constituency, whether they are involved in short haul or long haul flights, consider subscribing to a ground-based medical assistance service.

PART 5 - INFORMATION FOR THE PASSENGERS

1. Prior to travel, passengers should have access to information concerning health aspects of air transport to enable them to take any necessary precautions, including the seeking of medical advice. Such information should be readily available, accurate and up to date.

Availability of the information

2. The information should be available to *all* passengers, and would be of most benefit to passengers with known health risks.

3. The medical profession, in particular general practitioners, should have access to general information and to additional in-depth knowledge to advise passengers appropriately.

4. The information should be **available as early as possible in advance** of the flight, and especially at the point of ticket sale. There is also an element of individual responsibility for the passenger to seek the information. In addition, when passengers are obviously unwell at the boarding point, airline / airport staff should be able to notice and to act accordingly.

5. The information should also be provided on-board, complementary to that available prior to the flight, and focusing on what to do during the flight.

6. The Internet provides access to appropriate sources of information for both passengers and health advisers. Different agents should act in providing, or directing to, the relevant information:

- The **airline operator** (including cabin crew) as part of its service to the customer.
- **Medical practitioners** should be able to give personalised advice to the passenger prior to flying.

Governments should consider training medical students in the basic aspects of aviation physiology and medicine. Furthermore, Authorised Medical Examiners (AMEs) could be utilised as experts in this area. This would depend on individual governments deciding that this was an appropriate method in their country and if so, AME training courses could be expanded to include more training on passenger health issues.

- **Government departments** need to be involved in disseminating information to the travelling public. The most efficient methods may vary from state to state.

7. Information provided at the **point of ticket sale** could be promulgated in different ways, depending how the ticket is purchased.

- a) Tickets purchased from a travel agent

the travel agent should advise the purchaser that the passenger (who may not be the purchaser) should consider the health implications of flying. The travel agent should be able to provide references to sources of health information.

b) Tickets purchased electronically

An electronic link to a health information site should be visible when the ticket is purchased. This link should be provided in the language(s) of the country in which the operator is based. It is desirable that the information should also be available, through additional links if necessary, in the major international languages, such as English, French and Spanish.

c) Tickets purchased by telephone

The agent should be able to provide sources of health information to the enquirer on his/her request for such information. However, health advice would not be expected to be provided over the telephone

Information sources

a) advice for passengers

8. Primary source of advice for passengers should be the **WHO web site** entitled '**International Travel and Health**', specifically the chapter entitled '**Travel by air**'.

9. To facilitate consistency, airlines should use terminology and information from the WHO site. They should not add their own information on topics not considered on the web site e.g. moving around during flight is not recommended on the WHO site (it is not specifically mentioned). If further information is desirable, the WHO site should be updated.

10. This site should, where possible, be kept easily understandable to readers without a medical or scientific background.

11. Coordination arrangements have been established between WHO, and ICAO, ECAC, IATA, ACI and other industry representatives, to regularly review the contents of the chapter 'Travel by Air'. States should establish fora at a national level for considering passenger health issues and should liaise with the appropriate organisation.

b) reference sources for the medical profession

12. For doctors, there is no UN agency site providing the more technical, detailed, medical information which is required for health professionals who are providing health advice on air travel. The currently best available source is believed to be the **Aerospace Medical Association (AsMA) web site**, where the publication '**Medical Guidelines for Airline travel**' can be found. This is only available in English. States may choose to utilise other sites for providing information to health professionals.

13. Organisations or States that wish to recommend amendments to the AsMA publication should contact the AsMA 'Home Office' in Washington.