What kind of onboard Medical equipment do healthcare professional volunteers use or expect in an inflight emergency?

A STUDY IN ONE AIRLINE.

Rui Pombal | 22/09/2018

6th ECAM PRAGUE 20-23 September 2018

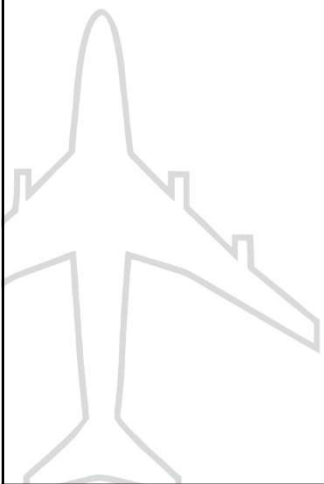### DISCLOSURE

I am Medical Director at UCS, the TAP Air Portugal Group Health Services.

Question 1 | What kind of equipment is there on board comercial airline flights and is it adequate?

Question 2 | What kind of equipament do healthcare professional use
or expect when they volunteer to help in inflight medical emergencies?

Question 3 | How can we improve?

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1 | What kind of equipment is there on board and is it adequate?

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- **FIRST AID KIT(s)**
- **UNIVERSAL PRECAUTIONS KIT**
- **EMERGENCY MEDICAL KIT**
- FIRST AID OXYGEN
- ± AED

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EASA
Safety Information Bulletin
Operations
SIB No.: 2018-03
Issued: 30 January 2018
Subject: Carriage and use of Automatic External Defibrillators

Operators should consider [...] in the **risk assessment**:
passenger demographics and number;
duration of the flight and route structure;
[...]

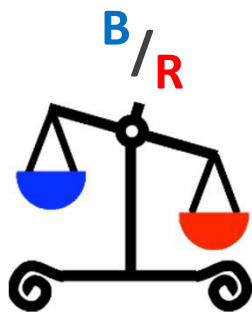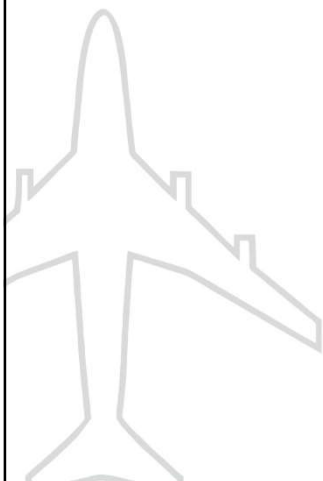## 1 | What kind of equipment is there on board and is it adequate?

The committee has maintained the philosophy that commercial aircraft are air taxis with many operational limitations, and airlines can only be expected to provide basic first aid, with a limited number of additional medications for use in the event that a physician happens to be on board. The acceptable emergency medical kit should be relatively small with a limited number of drugs that can deal with the most common serious emergencies and/or severe pain until definitive treatment becomes available after landing.

Aviation, Space and Environmental Medicine, 2007

1 | What kind of equipment is there on board and is it adequate?

B/**R**

- **CONTENT DEFINITION**
  - Applicable regulations and standards
  - Airline operational, logistical and commercial specifics
  - Evidence

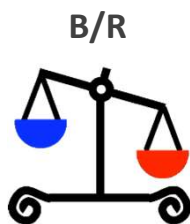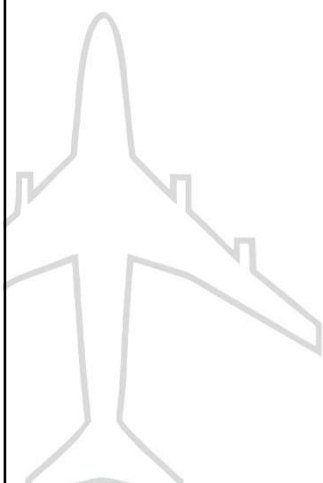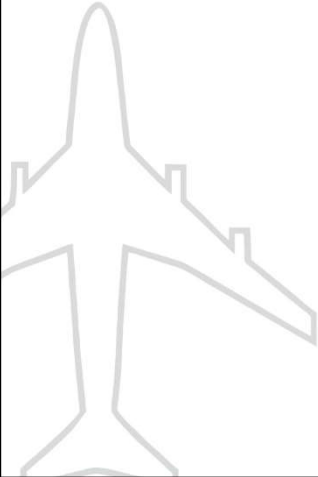## 1 | What kind of equipment is there on board and is it adequate?

B/R

- **CONTENT DEFINITION**
  - **Appplicable regulations and standards:**
    EASA,
    IATA Operational Safety Audit Standards Manual (IOSA),
    ASMA…
  - Airline operational, logistical and commercial specifics
  - Evidence

1 | What kind of equipment is there on board and is it adequate?

COMMISSION REGULATION (EU)

No 965/2012 of 5 October 2012

laying down technical requirements and administrative procedures related to air operations

ANNEX IV

COMMERCIAL AIR TRANSPORT OPERATIONS

PART-CAT

Part-CAT contains the technical rules for commercial air transport operations of aeroplanes, helicopters, sailplanes and balloons.

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1 | What kind of equipment is there on board and is it adequate?

ICAO

Manual of Civil Av Med, 3rd ed, 2012
Ch.1
→ **one or more first-aid kits […]**
→ **one universal precaution kit**
(two for aeroplanes authorized to carry more than 250 passengers)
for the use of cabin crew members in managing incidents

IOSA (IATA)

On passenger aircraft,
distributed as evenly as practicable throughout the passenger cabin(s)
and readily accessible
for use by crewmembers

CAT.IDE.A.220 First-aid kit

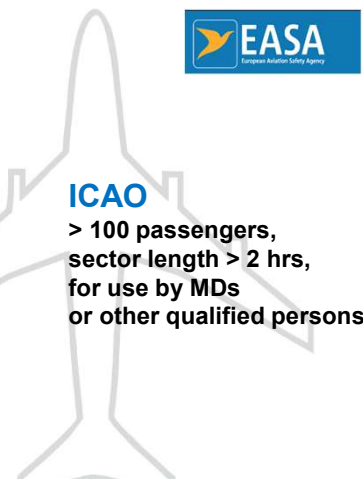(a) Aeroplanes shall be equipped with first-aid kits, in accordance with Table 1.

Table 1

Number of first-aid kits required

Number of passenger seats installed	Number of first-aid kits required
0-100	1
101-200	2
201-300	3
301-400	4
401-500	5
501 or more	6

(b) First-aid kits shall be:

(1) readily accessible for use; and

(2) kept up to date.

1 | What kind of equipment is there on board and is it adequate?

EASA
European Aviation Safety Agency

ICAO
**> 100 passengers,
sector length > 2 hrs,
for use by MDs
or other qualified persons**

CAT.IDE.A.225 Emergency medical kit

(a) Aeroplanes with an MOPSC of more than 30 shall be equipped with an emergency medical kit when any point on the planned route is more than 60 minutes flying time at normal cruising speed from an aerodrome at which qualified medical assistance could be expected to be available.

(b) The commander shall ensure that drugs are only administered by appropriately qualified persons.

(c) The emergency medical kit referred to in (a) shall be:

(1) dust and moisture proof;

(2) carried in a way that prevents unauthorised access; and

(3) kept up to date.

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1 | What kind of equipment is there on board and is it adequate?

EASA
European Aviation Safety Agency

ED Decision 2012/018/R

Acceptable Means of Compliance (AMC)

and Guidance Material (GM) to Part-CAT

Part-CAT contains the technical rules for commercial air transport operations of aeroplanes, helicopters, sailplanes and balloons.

• AMC1 a 2 CAT.IDE.A.220 **First-aid kit**

• AMC1 a 4 CAT.IDE.A.225 **Emergency medical kit**

• GM1 CAT.IDE.A.230 **First-aid oxygen**

1 | What kind of equipment is there on board and is it adequate?
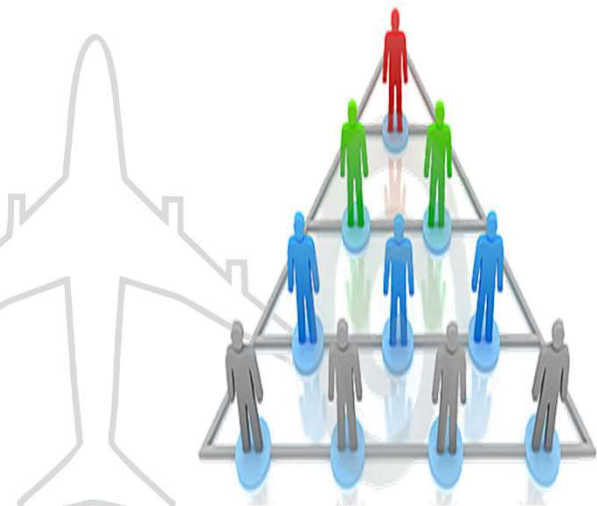
AMC1 a 4 CAT.IDE.A.225 Emergency medical kit

- ***ACCESS TO EMERGENCY MEDICAL KIT***

(a) When the actual situation on board so requires, the commander should limit access to the emergency medical kit.

(b) Drugs should be administered by medical doctors, qualified nurses, paramedics or emergency medical technicians.

(c) Medical students, student paramedics, student emergency medical technicians or nurses aids should only administer drugs if no person mentioned in (b) is on board the flight and appropriate advice has been received.

(d) Oral drugs should not be denied in medical emergency situations where no medically qualified persons are on board the flight.

1 | What kind of equipment is there on board and is it adequate?

- **CONTENT DEFINITION**

  - Appplicable regulamentions and standards (EASA, IATA/IOSA, ASMA…)

  - **Airline operational characteristics, aircraft logistical constraints, commercial specificities**

  - Evidence

1 | What kind of equipment is there on board and is it adequate?

B/R

- **CONTENT DEFINITION**
  - Appplicable regulations and standards (EASA, IATA/IOSA, ASMA…)
  - Airline operational, logistical and commercial specifics

  - **Evidence**
    - **Epidemiological studies, audits**
    - **Working parties**
    - **Feedback from all direct or indirect users:**
      - **Monitoring and review of cabin and flight reports**
      - **Healthcare volunteer and/or GBMSs feedback**
      - **Cabincrew first aid trainer and trainee feedback**
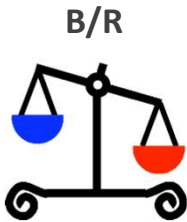
1 | What kind of equipment is there on board and is it adequate?

De John C et al, 2000: 22%
Sand M et al, 2009: 54%

**11,920
inflight "emergencies"
4 major airlines**
Peterson DC et al. NEJM, 2013

|	%
Syncope or presyncope	(37.4)
Respiratory symptoms	(12.1)
Nausea or vomiting	(9.5)
Cardiac symptoms	(7.7)
Seizures	(5.8)
Abdominal pain	(4.1)
Infectious disease	(2.8)
Agitation or psychiatric symptoms	(2.4)
Allergic reaction	(2.2)
Possible stroke	(2.0)
Trauma, not otherwise specified	(1.8)
Diabetic complication	(1.6)
Headache	(1.0)
Arm or leg pain or injury	(1.0)
Obstetrical or gynecologic symptoms	(0.5)
Ear pain	(0.4)
Cardiac arrest	(0.3)
Laceration	(0.3)
Other	(6.9)
Unknown	(0.1)

Death 0.3%

1 | What kind of equipment is there on board and is it adequate?

**Reports of deaths
to IATA 1977-1984**
Cummins RO et al. JAMA, 1988

- average rates of **0.3 per million** passengers
- majority **men** (66%) and **middle-aged** (mean age: 53.8 years)
- most (77%) **no health problems prior** to travel
- 56% seemed to be related to **cardiac** problems

1 | What kind of equipment is there on board and is it adequate?
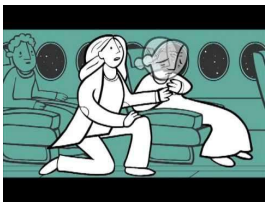
Results: Medical volunteers were available in 1439 (35.4%) of the 4068 medical events and in 39 (84.8%) of the 46 cases which required medical diversions. Suspected stroke cases, as categorized under the nonspecific category, was the most common, followed by chest pains and deaths. *Conclusions:* Medical volunteers presented more often

Hung KK et al. Aviat Space Environ Med, 2013

- **43% general IATA** Cummins RO et al. JAMA, 1988

- **85% of long-haul events** Gardeloff B. Lakartidningen, 2002

- **86% of all "medical emergencies"** Sand M et al. Crit Care, 2009

1 | What kind of equipment is there on board and is it adequate?

Cross-Sectional Survey of Physicians on Providing Volunteer Care for In-Flight Medical Events.
Chatfield E et al. Aerosp Med Hum Perform, 2017.

When asked how well they understand the "protocols" with which inflight medical events are handled, 64% (262/412) responded "not at all".

54% reported no knowledge of supplies available.

31% not aware of U.S. Good Samaritan law.

2 | What kind of equipment do healthcare professional volunteers use or expect?

a study/audit

- **Objetive**

- **Methods:** EMK use reports

  - Two split semester sample 2011/2013

  - excl: use by crew, illegible, MEDA cases, malfunction or logistics reports

2 | What kind of equipment do healthcare professional volunteers use or expect?
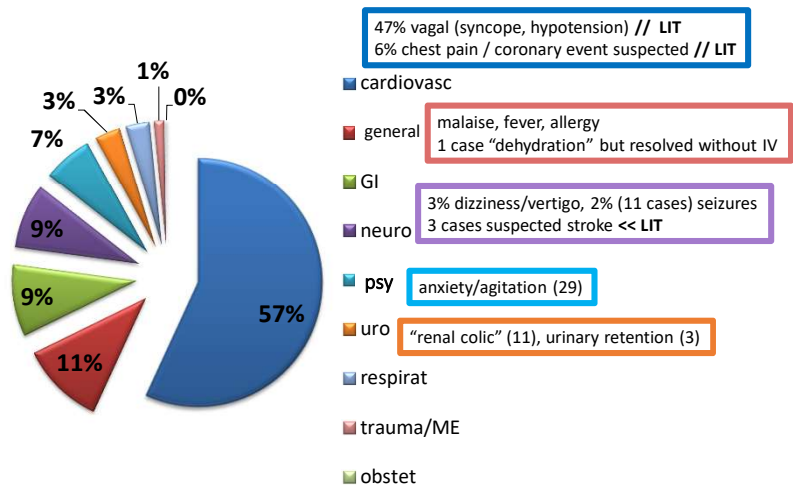
a study/audit

- 736 significant* medical events

  0.07 per 1,000 passengers

- 475 cases: **medical volunteer**
  → **65%** [lit: 35-86%]

- 462 **physicians** (97%) + 13 nurses

- **Outcome**:
  - 41% (194) improved/stabilized
  - 59% (279) not recorded ⌐?
  - 0.4% (2) worsened

* Formal description of event and/or used medication/equipment in cabin/flight report

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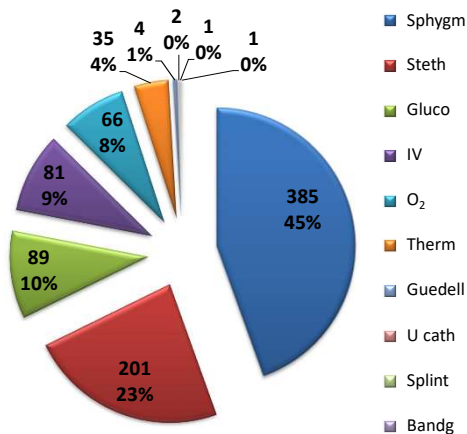## 2 | What kind of equipment do healthcare professional volunteers use or expect?

Presentation problem

Pie chart with segments: 57%, 11%, 9%, 9%, 7%, 3%, 3%, 1%, 0%

Legend:
- cardiovasc — 47% vagal (syncope, hypotension) // LIT; 6% chest pain / coronary event suspected // LIT
- general — malaise, fever, allergy; 1 case "dehydration" but resolved without IV
- GI
- neuro — 3% dizziness/vertigo, 2% (11 cases) seizures; 3 cases suspected stroke << LIT
- psy — anxiety/agitation (29)
- uro — "renal colic" (11), urinary retention (3)
- respirat
- trauma/ME
- obstet

2 | What kind of equipment do healthcare professional volunteers use or expect?

Equipment used by volunteers

- **94%** (448) requested one or more items

- Nr of items:
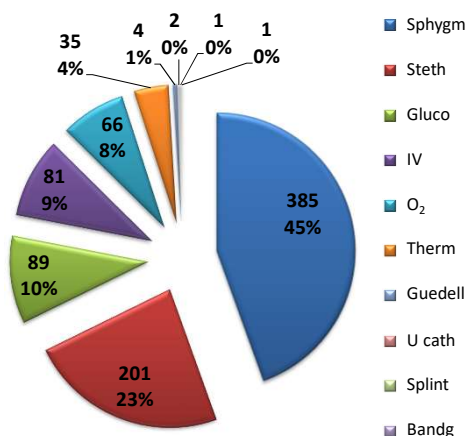
  Max: 5 **mode/median/P_{75} = 2**

Pie chart labels: 385 45%, 201 23%, 89 10%, 81 9%, 66 8%, 35 4%, 4 1%, 2 0%, 1 0%, 1 0%

Legend: Sphygm, Steth, Gluco, IV, O_2, Therm, Guedell, U cath, Splint, Bandg

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2 | What kind of equipment do healthcare professional volunteers use or expect?

Equipment suggestions

were made by volunteers in 4% (16):

oxymeter: 5
different glucometer: 4
intubation kit: 1
O_2 nasal cannula: 1
nebulizer: 1
additional disinfectant: 1
more varied vein puncture material: 1
different stethoscope: 1
manual BP measurement device: 1

Pie chart labels: 385 45%, 201 23%, 89 10%, 81 9%, 66 8%, 35 4%, 4 1%, 2 0%, 1 0%, 1 0%

Legend: Sphygm, Steth, Gluco, IV, O_2, Therm, Guedell, U cath, Splint, Bandg

2 | What kind of equipment do healthcare professional volunteers use or expect?

→ Relative hypoxia in cabin

- ○ Cabin altitude up to 8,000 ft / 2,438 m
- ○ Mean SpO2 for all flights at ground level was 97% [93–100%] and at cruising altitude **93% [85–98%]**

[Humpheys D et al. Aaesthesia, 2004]

→ Would decisions change?
→ Potential delay in BLS manoeuvres
→ Doubts in conditions of "typical" use

*Wijesinghe M et al. Routine use of oxygen in the treatment of **myocardial infarction**: Systematic review. Heart 2009.*

*Kilgannon JH et al. Emergency Medicine Shock Research Network (EMShockNet)Investigators: Association between arterial hyperoxia following resuscitation from **cardiac arrest** and in-hospital mortality. JAMA 2010.*

→ No specific recommendation (EASA, IATA, ASMA, FAA)

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2 | What kind of equipment do healthcare professional volunteers use or expect?

Como utilizar o medidor de glicemia

Pombal R, UCS - TAP Air Portugal, 2018

2 | What kind of equipment do healthcare professional volunteers use or expect?

Medication used by volunteers

- **42%** (201) requested at least one
  - **of these: 40%** (81) gave **IV/IM** meds

1%
5%
11%
25%
58%

- no drugs
- 1 drug
- 2 drugs
- 3 drugs
- 4 drugs

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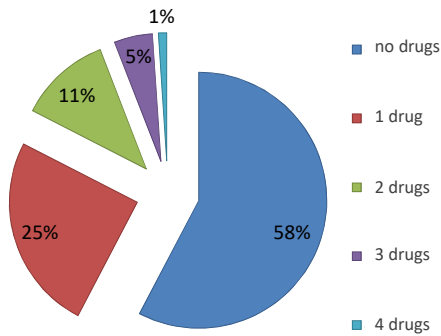
2 | What kind of equipment do healthcare professional volunteers use or expect?

Medication suggestions

were made by volunteers in **4%** (16):

AsMA/IATA: 1 L saline; EASA: 250 mL e.g, saline

> 1L → Seriousness → Divergence?

IV fluids: 6 (more saline 2, other 4)
hypertensive agent: 4
oral corticosteroid: 1
diazepam po: 1
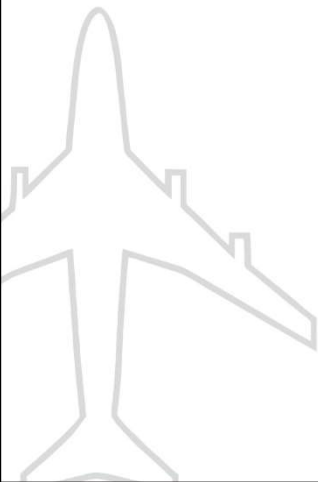paed inject antiemetic: 1
trinitrate: 1
LMWH: 1
adenosine: 1

Ethylephrine? Evidence? B/R?
Not usual/widespread clinical practice, not on any recommendation.
Main cause of inflight death is cardiovascular!

1%
5%
11%
25%
58%

- no drugs
- 1 drug
- 2 drugs
- 3 drugs
- 4 drugs

Pombal R, UCS - TAP Air Portugal, 2018

15
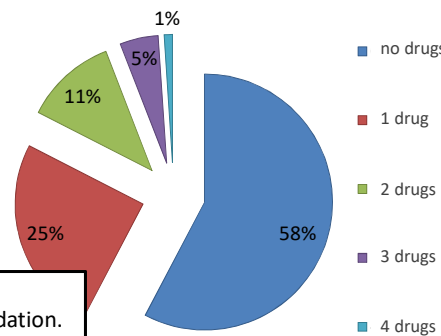
2 | What kind of equipment do healthcare professional volunteers use or expect?

Medication whose carriage on board is not justified by epidemiology of inflight events
MedAire [ASMA, 2012]

Adrenaline autoinjector
Amiodarone
Antibiotics
Buprenorfine
Eye drops
Diazepam injection
Diclofenac
Furosemide
Glucagon
Ibuprofen - paediatric
Lidocain
Oxytocin
Paracetamol - paediatric
Ringer sol.

2 | What kind of equipment do healthcare professional volunteers use or expect?
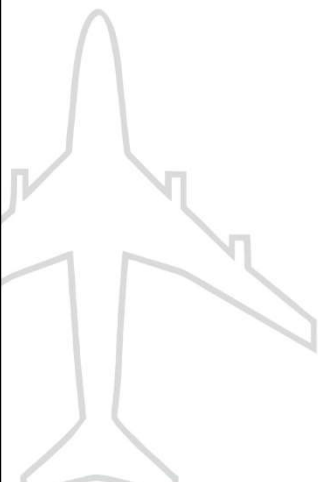
In **7% of all events** and in **17% of events where any sort of medication was taken**, the passenger's own medication or that of a fellow passenger was used.

Medication in hold! → Travel advice
Background medical conditions →MEDA case?

3 | How can we improve?

- Put conclusions from monitoring/auditting into practice
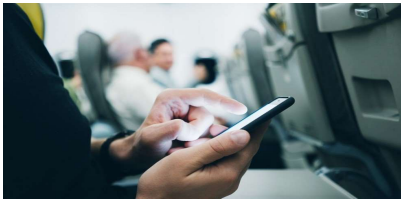- Manage expectations of volunteers and make it easier for them

3 | How can we improve?

- Increase knowledge of medical community about inflight emergencies and MEDA cases
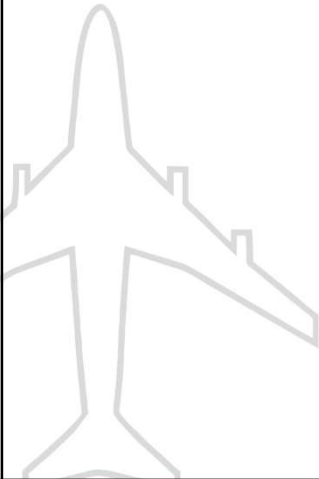 - E.g., workshops at WONCA 2014, ISTM 2015

airRx 17+
OSF Healthcare System
★★★★★ 5.0, 5 Ratings
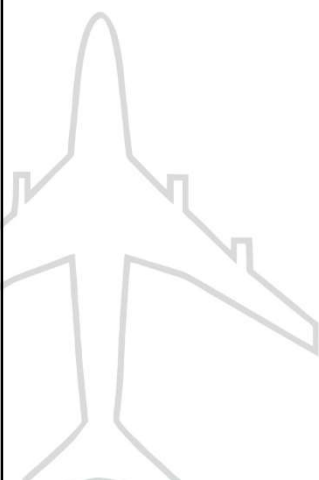Free

3 | How can we improve?

- Greater awareness of the flying public in general:

  - pre-travel advice
    - stabilized conditions
    - medication in hand luggage
    - bracelets/alert cards
    - travel companions
    - MEDA

3 | How can we improve?

- Airline medical services/advisors:

  - Monitoring, audits, epidemiological studies

  - Communication and joint risk assessment by medical services, flight ops and other strategic management

  - Relevant first aid training for cabin crew

  - GBMS

  - A recognised international aviation certification system for airlines and others who assembly/provide inflight medical kits?

Thank you

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