Hands on the Ground

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Disclosure

- Paulo Alves is a full-time employee for MedAire
- No other conflict of interests to disclose
- Opinions are the author’s only and not necessarily represent the author's company
Topics to cover

- What are the resources?
- Communication cycle between plane and ground
- Are all airlines the same?
- How do you interact with flight crew/ volunteers?
  - How to work as a team.
- Medical volunteers- helping hands or pain in the seat?
- Real life examples
What defines an in-flight medical event (IFME)?

- Any health related event
- When a doctor/medical volunteer is needed
- When a flight attendant (or someone else) decides so
The triangle of In-Flight Medical Events

- Risk Factors
  - Pre-existing conditions
- Person
- Environment
- Time
  - Duration of Exposure
  - Window of Observation
- Medical Event
- Environmental agents
World airline traffic
The captain and medical events

- Technical assessment
- Operational factors
- Personal values
- Airline culture

Decision
A general cost/benefit model on diversions

- **Best**
  - No cost

- **Good**
  - Cost with benefit

- **Worst**
  - Big cost, no benefit

- **Bad**
  - Cost without benefit
Is There a Doctor Onboard?

- Around 70-80% of the flights have medical volunteers
- 20-30% don’t!!!
The doctor passenger
University of Illinois survey 2014*

- Never faced the situation (57.7%) or only once before (21.1%)
- Doesn’t handle emergencies often (62.3%)
- Is not familiar with the EMK (81.2%)
- Doesn’t know the correct cruising cabin altitude (61.6%)
- Not familiar or comfortable with AEDs (46%)

Pre-flight Passenger Assessment

- Pre-boarding
- Post-boarding

Destination
Ground based medical advice

Event

Contact GMBS

Decision

Origin

Diversion

Destination
MedAire YOY Casuistics

<table>
<thead>
<tr>
<th>Year</th>
<th>In-Flight</th>
<th>Pre-Flight</th>
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<tbody>
<tr>
<td>2005</td>
<td>15482</td>
<td>7618</td>
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<tr>
<td>2006</td>
<td>17310</td>
<td>9955</td>
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<td>19220</td>
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<td>49634</td>
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<tr>
<td>2018</td>
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<td>41997</td>
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Pax Coverage Comparison by Market (2018) – 90% of total global traffic

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<tr>
<th>Region</th>
<th>No-GBMS</th>
<th>GBMS</th>
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<tr>
<td>Africa</td>
<td>10%</td>
<td>90%</td>
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<tr>
<td>Asia Pacific</td>
<td>25%</td>
<td>75%</td>
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<tr>
<td>Europe</td>
<td>39%</td>
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<tr>
<td>Latin America</td>
<td>48%</td>
<td>52%</td>
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<tr>
<td>Middle East</td>
<td>61%</td>
<td>39%</td>
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<tr>
<td>North America</td>
<td>97%</td>
<td>3%</td>
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</tbody>
</table>
Air to ground communication

ARINC
Stockholm Radio

HF
VHF

Airline

SatCom
ACARS

GBMS

Landline
phone patch
Airlines compared - IFMEs

The graph shows the number of cases per million passenger-kilometers (MPax) from 2006 to 2018, comparing percentile data for various intervals (90th, 75th, 25th, 10th) using lines of different colors and styles. The y-axis represents the number of cases, ranging from 0 to 200, while the x-axis represents the years 2006 to 2018.
Airlines compared - Diversions

![Graph showing cases per MPax for different percentiles over years 2006 to 2018. The graph includes lines for Percentile 90, Percentile 75, Median, Percentile 25, and Percentile 10, with a y-axis ranging from 0 to 3.]
Telemedicine
Local / Communication / Remote
The regulatory framework
Training / Medical Kits / Crew certification

Other stakeholders

World Health Organization
International Civil Aviation Organization (ICAO)
European Aviation Safety Agency (EASA)
Global Coordinating Aviation Authorities (GCAA)
Airlines
Other countries

American College of Emergency Physicians
American Academy of Pediatrics
American Osteopathic Association

MedAire
An International SOS Company
FAA Requirements EMK

- Sphygmomanometer
- Stethoscope
- Airways, oropharyngeal (3 sizes)
- Self-inflating manual resuscitation device with 3 masks
- CPR mask (3 sizes)
- IV Admin Set: Tubing w/ 2 Y connectors
- Saline solution, 500 cc
- Analgesic, non-narcotic, tablets, 325 mg
- Antihistamine tablets, 25 mg
- Antihistamine injectable, 50 mg
- Atropine, 0.5 mg, 5 cc
- Aspirin tablets, 325 mg
- Bronchodilator, inhaled
- Dextrose, 50%/50 cc injectable
- Epinephrine 1:1000
- Epinephrine 1:10,000
- Lidocaine, 5 cc, 20 mg/ml
- Nitroglycerine tablets, 0.4 mg
What is missing?

- Airway management
  - Supraglottic?
  - ETT?
- Auto-injector?
- Anti-convulsant
- Antiemetic
- Naloxone?

- Pulse oximeter
- Electronic BP cuff
- Glucometer
- EKG
Automated External Defibrillators

- Only required in a few countries
- Adopted by most international airlines
- Frequently used as monitors (should they?)
Medical diversions
Source MedAire: 2012-2013 data
In-flight EKGs
Quality of Electrocardiograms Obtained in Flight by Airline Flight Attendants (*)

- 5-Excellent: 12 (6%)
- 4-Very good: 13 (7%)
- 3-Readable: 28 (14%)
- 2-Could extract some info: 41 (20%)
- 1-Can’t extract info: 100 (50%)
- 0-No tracing: 100 (50%)

(*) Alves et al. - Aerosp Med Hum Perform. 2019; 90(4):405-408
Case Study 1

- 52 years-old (American) male
- Chest pain radiating to left arm
- Dubai – Seattle
- 12 hours remaining in-flight
Aircraft position – Case 1
ECG Case 1
Case Study 2

- 54 years-old male
- Chest pain radiating to left arm
- Singapore – Dubai
- 2 hours remaining in-flight
Aircraft position – Case 2
ECG Case 2
Correlation between IFMEs, FTFs and Diversions
Helping the Crewmember

The passenger has:
- Chest pain
- Altered mental state
- Seizure
- Shortness of breath
- Other

Immediate actions:
- Check where complete
- Provide oxygen
- Make PAX accessible
- Note time symptoms began
- Have the AED close

PAX describes the pain as?
- Dull pressure
- Sharp
- Intermittent
- Continuous

Location in the chest?
- Left
- Middle
- Right

Does the pain radiate?
- Left arm
- Right arm
- Back

Confirm any history of:
- Fainting
- Diabetes
- Heart disease
- Seizures
- High blood pressure
- Recent surgery
- Other

Situation summary:
- PAX: 66 year old female
- Scenario: Chest pain
- Began: 18:34 Z
- Pain description: Dull, Continuous
- Pain location: Left side of chest
- Pain radiates: Left arm
- History of: Diabetes, Heart disease
- Symptoms: Paleness, Palpitations
- Medications: Blood thinners
- Last taken: 14:30 Z
- HR: 120 bpm
Helping the Medical Volunteer
Conclusions

- Medical advice from the ground became a best practice
  - Medical volunteers are still welcome (eyes / hands)

- Airlines vary significantly
  - Operational aspects / Culture / Procedures
  - Available resources on board
  - Passenger demographics

- Better assessment tools needed