



- Jet Blue pilot incapacitation

<http://youtu.be/mFslbrJwQ20>



AIR NEW ZEALAND 
Airline Operations & Safety



The Management of In-Flight Medical Emergencies



Dr Ben Johnston
Air NZ Aviation Medicine Unit



Overview

- Should I get involved?
- Do I have medical indemnity cover?
- What type of medical events happen on aircraft?
- What medical equipment do aeroplanes carry?
- Do I get any help up here or am I on my own?
- What is my role?
- Do I have to make the decision about diverting a flight?
- How do I work in such a cramped space?
- Take Home Messages

2 billion air travellers per annum



379 seats... 12 hours... 36,000 ft



Air New Zealand 24/7 Ops

- 590 flights
- 36,500 passengers
- 500,000 kg of bags
- 350,000 kg of cargo
- 25,000 kg of mail
- Across all time zones



- Air New Zealand
- Key Air New Zealand codeshare partners





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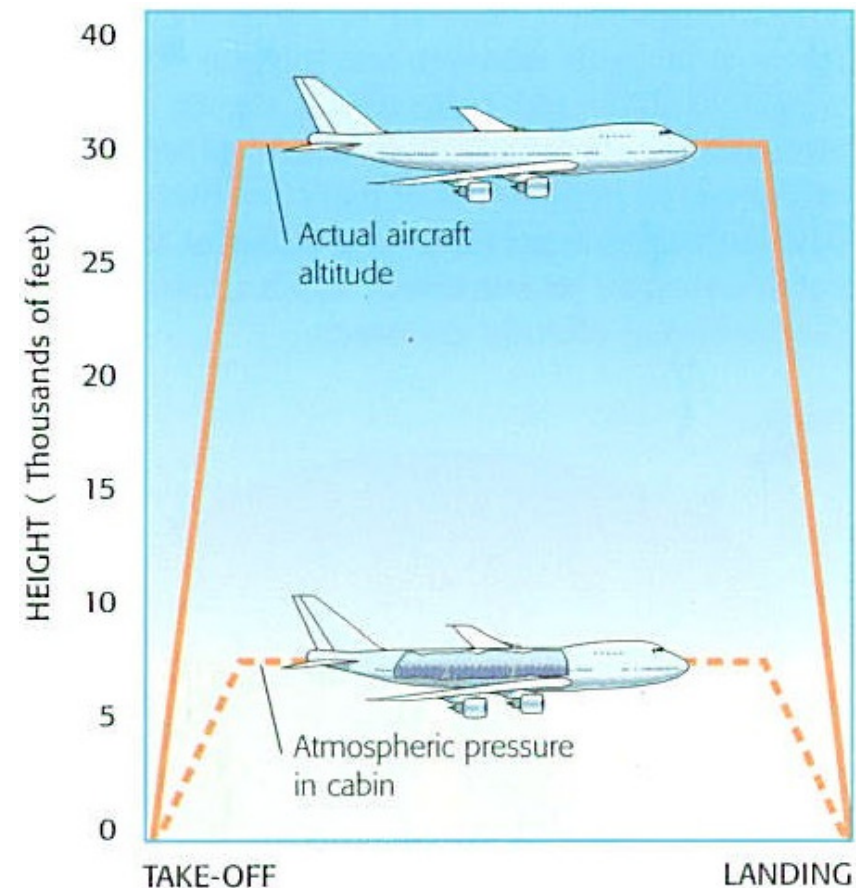
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Altitude

- Cabin altitude is approximately equivalent to breathing 15% O₂
- Gases expand and contract by 30 to 50 %





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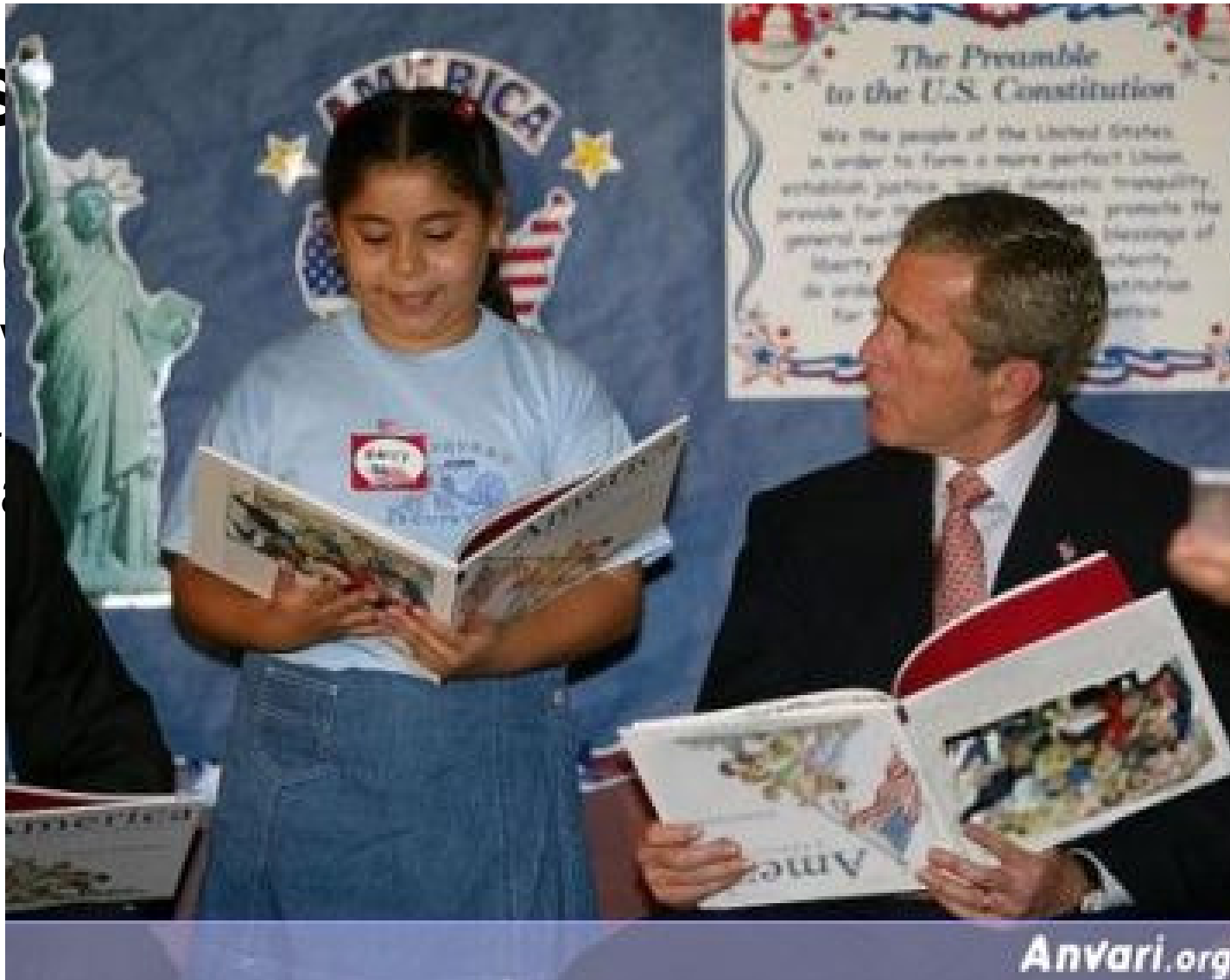
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EMT



Should I Get Involved?

*"If asked to attend a medical emergency....a doctor **must** respond.
This is both an ethical and legal obligation...
If a doctor chooses not to attend he or she may be required to
defend that decision in the event of a charge of professional
misconduct or criminal prosecution"*

*"A doctor asked to look after a person in a medical emergency has
a legal duty to provide the necessities of life to that person"*

MCNZ A Doctors Duty to Help in a Medical Emergency, Aug 2006

<http://www.mcnz.org.nz/assets/News-and-Publications/Statements/A-doctors-duty-to-help-in-a-medical-emergency.pdf>



Should I Get Involved?

"Rarely there will be times when attending a medical emergency is impossible or unsafe for the doctor or the patient"

- *Already attending another emergency*
- *Geographical location is such that someone else can respond more promptly*
- *Has been drinking alcohol or taken medication or other substances to a level that may adversely influence the doctors competence*
- *Personal safety of the doctor is at risk*

MCNZ A Doctors Duty to Help in a Medical Emergency, Aug 2006

<http://www.mcnz.org.nz/assets/News-and-Publications/Statements/A-doctors-duty-to-help-in-a-medical-emergency.pdf>



Should I Get Involved?

*“There are different levels and areas of competence and a doctor may not have the necessary skills to assist with anything more than basic first aid in a medical emergency...
If he doesn't have the appropriate skills he will present himself as a citizen with some knowledge of emergency first aid.
Nothing less would be acceptable”*

MCNZ A Doctors Duty to Help in a Medical Emergency, Aug 2006

<http://www.mcnz.org.nz/assets/News-and-Publications/Statements/A-doctors-duty-to-help-in-a-medical-emergency.pdf>



Should I Get Involved?

*"Doctors have the right, **except in an emergency**, to refuse to care for a particular patient."*



NZMA Code of Ethics for the NZ Medical Profession, May 2008
<http://www.nzma.org.nz/sites/all/files/CodeOfEthics.pdf>



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Indemnity

"In consideration of your voluntarily agreeing to provide emergency in-flight medical treatment/advice at the request of Air New Zealand, the company agrees to indemnify you against any liability, claims, suits proceedings that may arise or result from any medical malpractice, error or mistake you commit in good faith in the course of providing the emergency medical treatment/advice and which is not covered by any insurance you may maintain"



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Medical Incidents: Rates

- All medical incidents:
 - 70.4 per million RPK
 - 159 per million passengers
- Emergencies:
 - Range from 5 to 100 per million passengers



Mahoney et al, Av Sp Env Med, Dec 2011
Symptom-Based Categorization of In-Flight Passenger Medical Incidents



Medical Incidents: The 4 A's

- Altitude
- Age
- Anxiety
- Alcohol





Medical Incidents: Most Common

- Transient unconsciousness 41%
- Nausea / Vomit / Diarrhoea 20%
- Breathing difficulty 16%

Mahoney et al, Av Sp Env Med, Dec 2011
Symptom-Based Categorization of In-Flight
Passenger Medical Incidents



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Medical Incidents: Most Serious

- Unconscious with slow / no recovery 3.4%
- Chest pain 2.3%
- Seizure 1.1%
- Labour <0.1%

Mahoney et al, Av Sp Env Med, Dec 2011

*Symptom-Based Categorization of In-Flight
Passenger Medical Incidents*

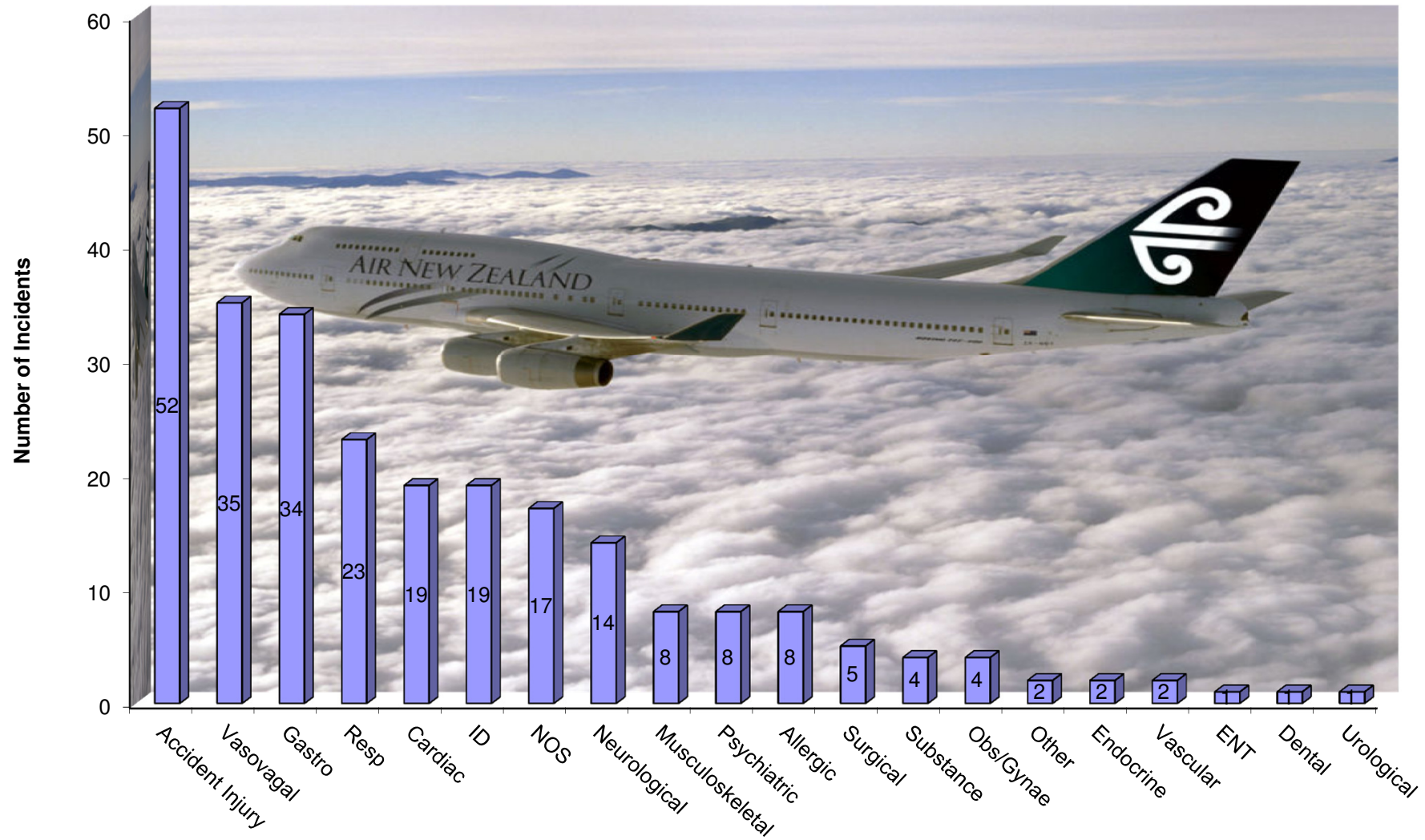


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Air New Zealand In-flight Medical Emergencies From 1 May 08 - 31 May 09



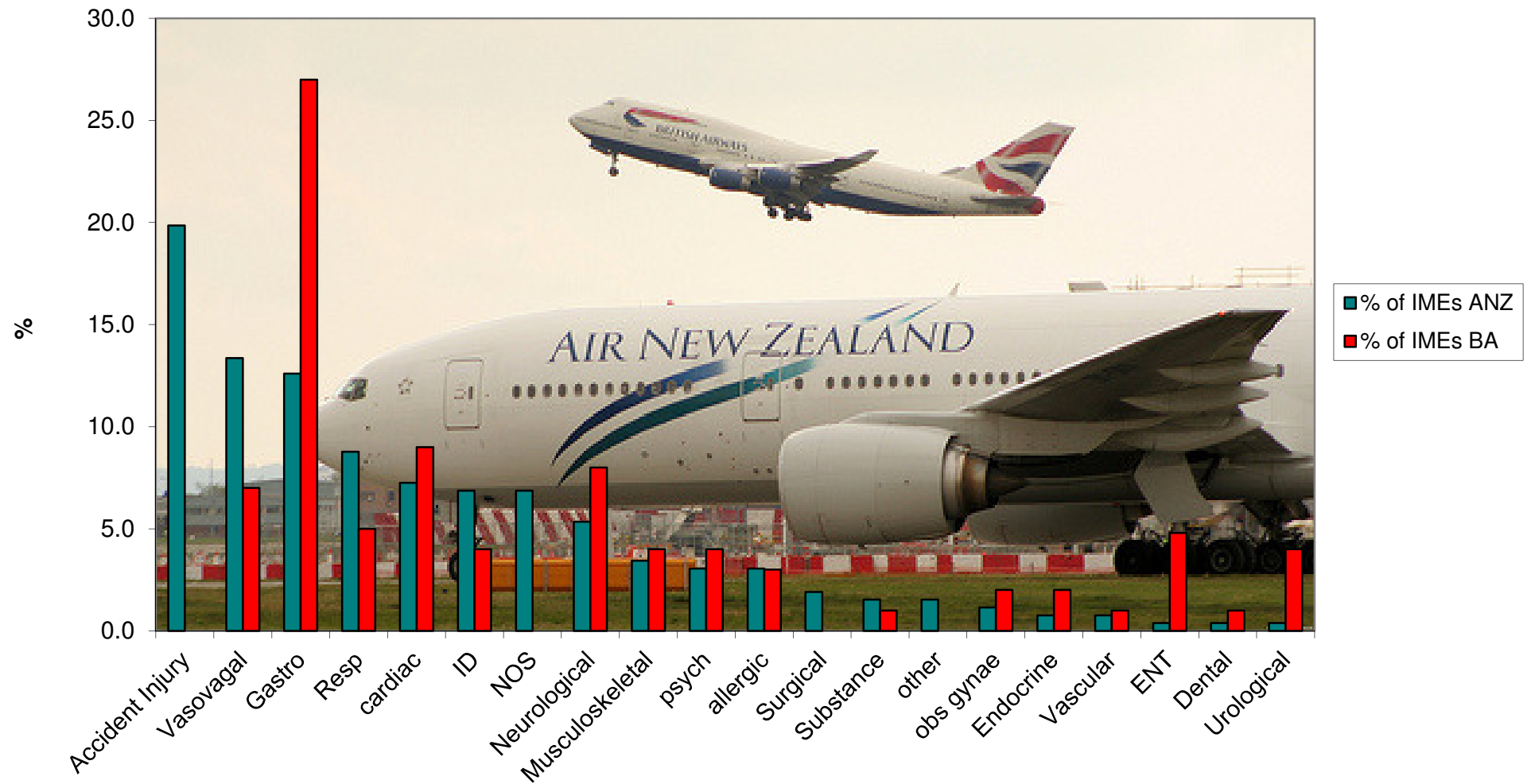


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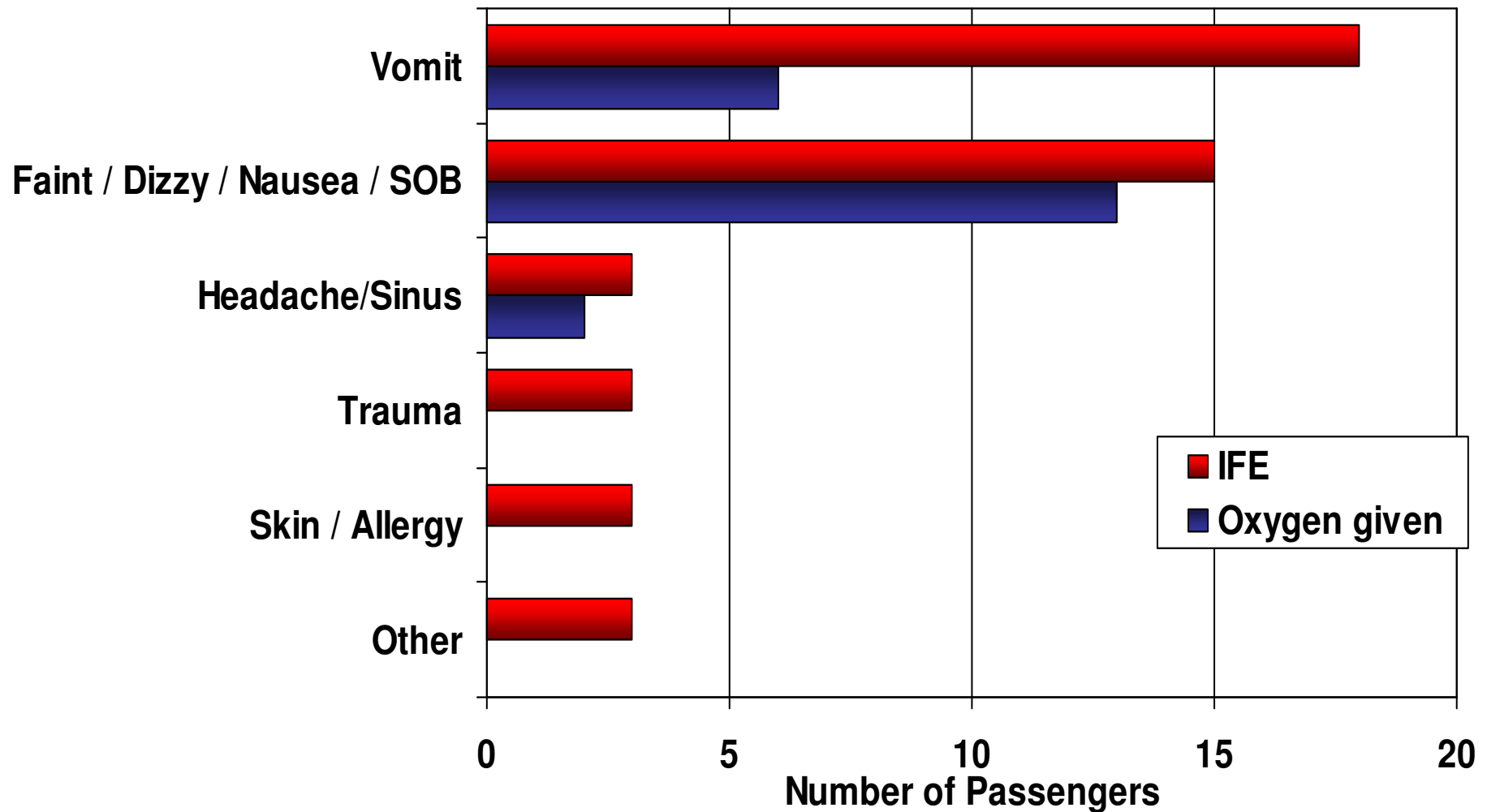


Percentage of Causes for Inflight Medical Emergencies in British Airways (2000) and Air NZ (2008-9) Flights

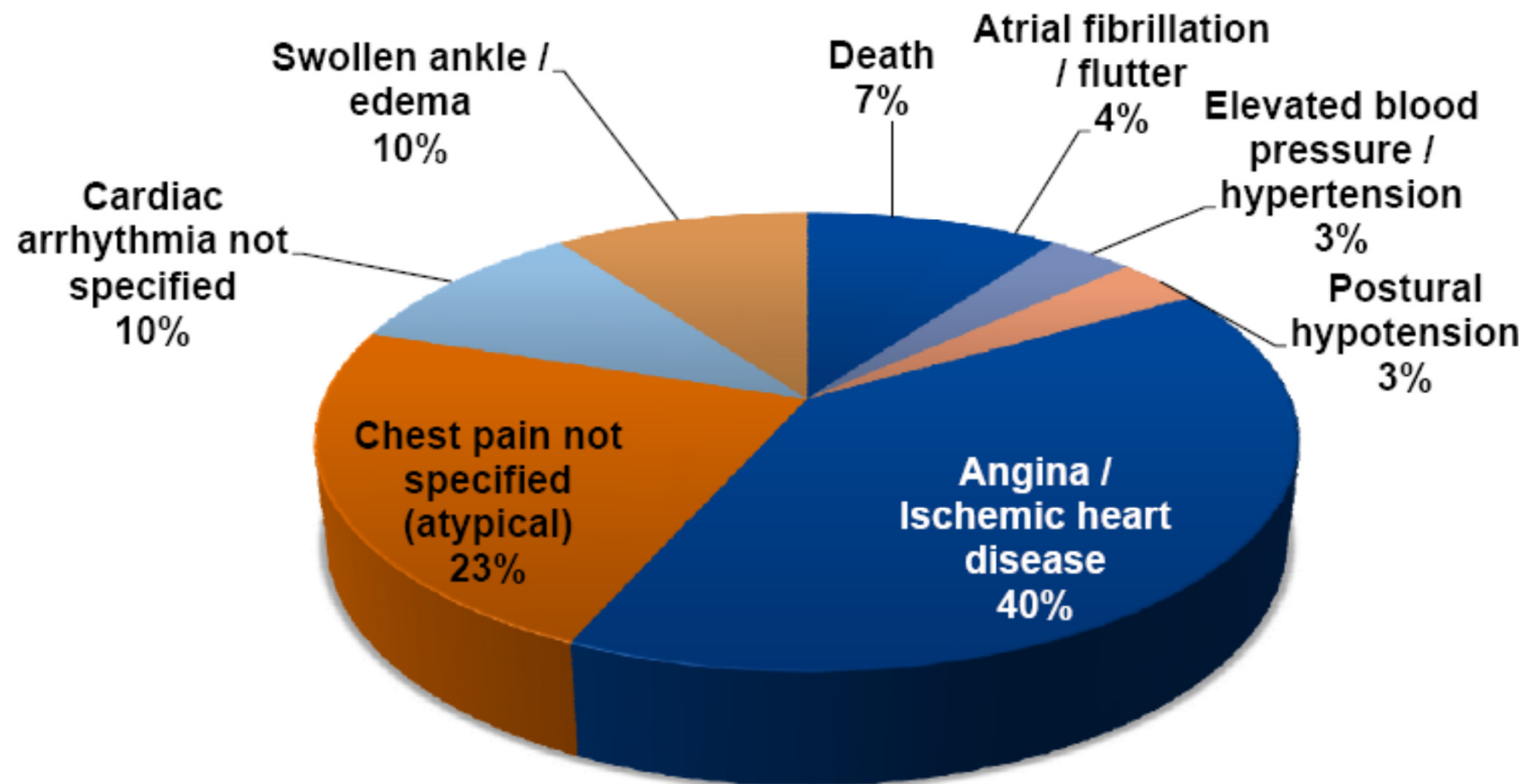




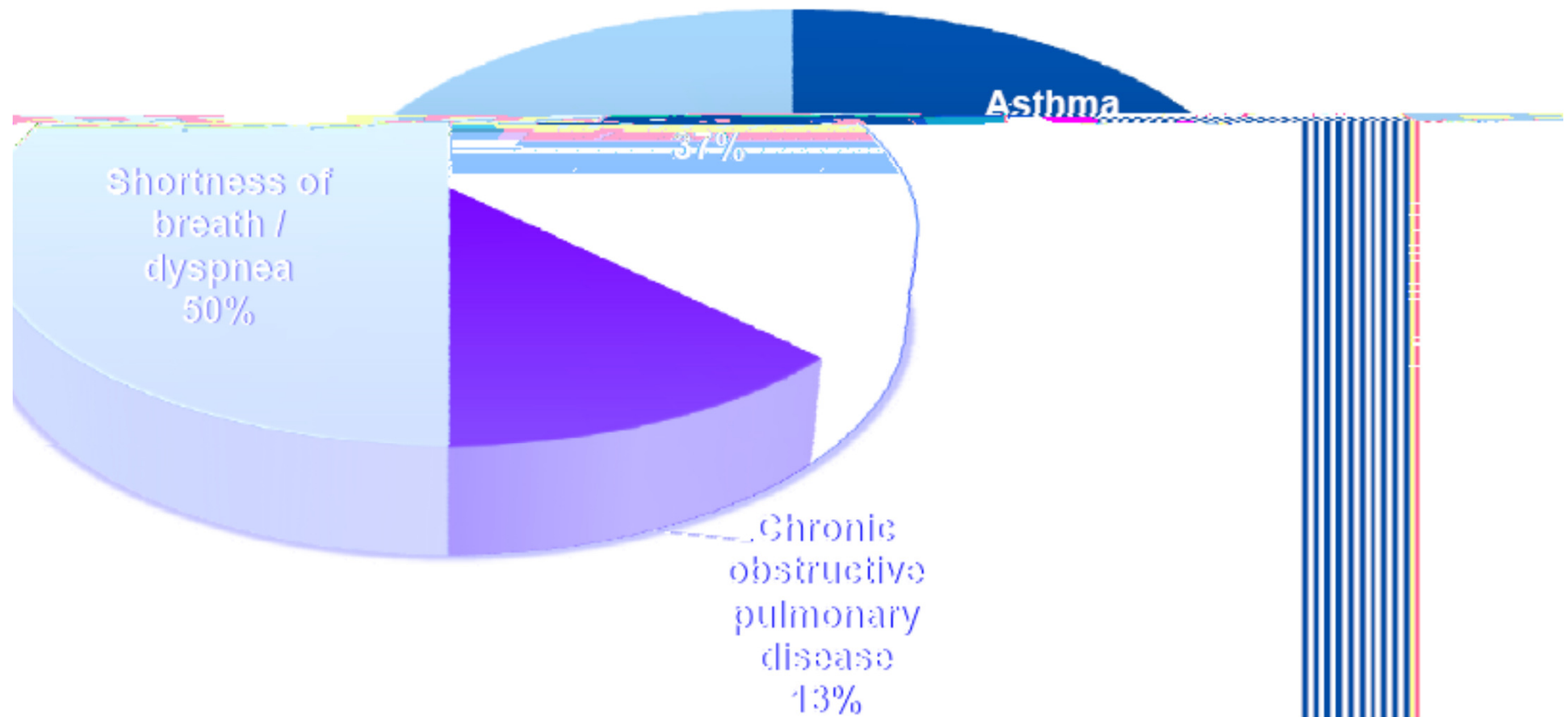
Reported In Flight Medical Incidents (one week)



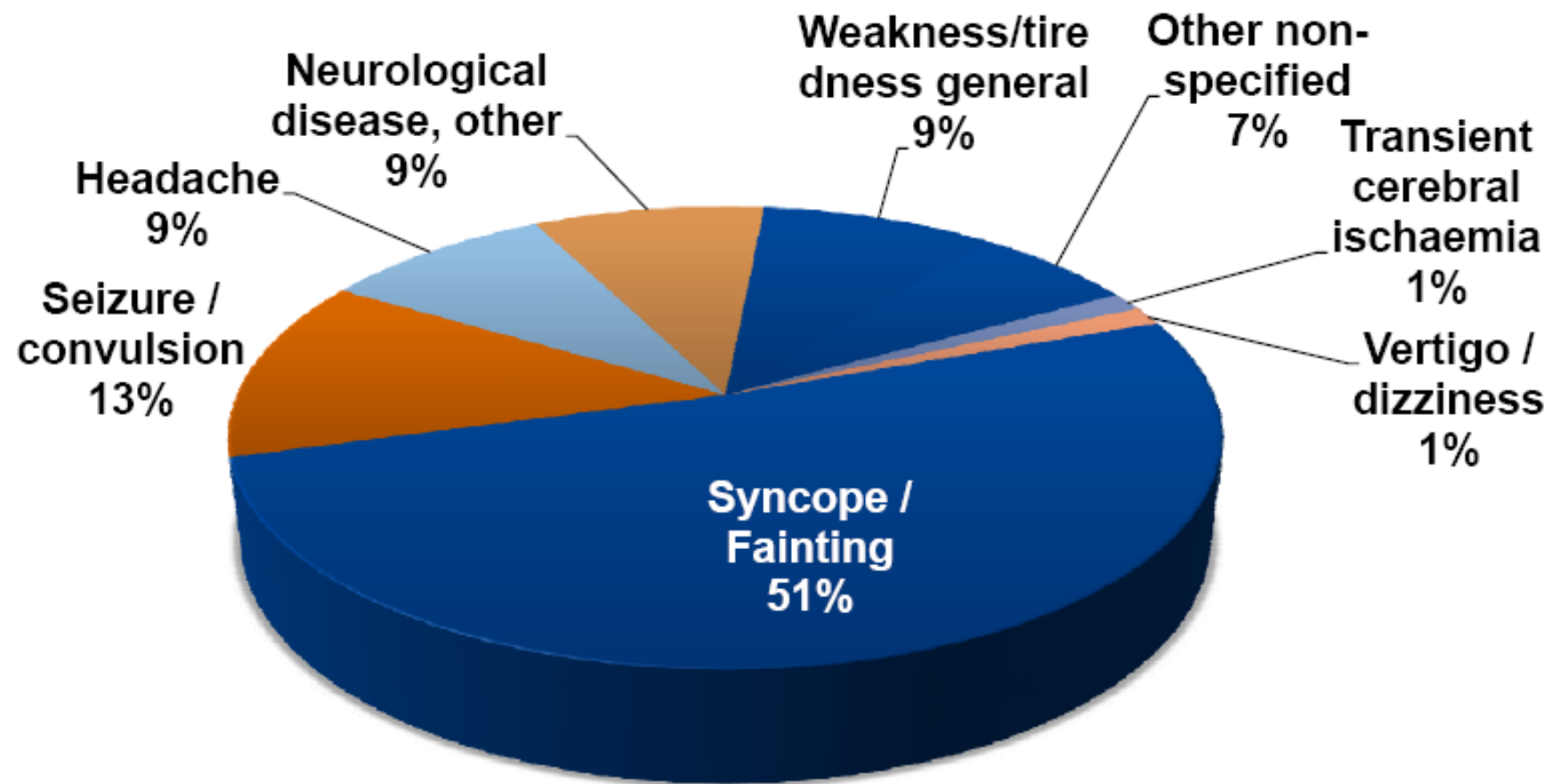
Diagnostic impressions for Cardiovascular cases (NZ)



Diagnostic impressions for Respiratory cases (NZ)



Diagnostic impressions for Neurological cases (NZ)





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What Medical Equipment is On-Board?

- Oxygen, oxygen, oxygen
- AED
- Physician's Kit
- Specific Purpose Kits
- Cabin Crew Operating Manual (First Aid)



In-flight Oxygen

Emergency oxygen supply is for flight-related emergencies

- E.g. Sudden decompression
- Must not rely on this for pax
- Limited supply of medical O₂



Supplementary O₂ must be pre-a

- Oxygen concentrators
- Nominal cost for pax
- Not provided on ground (e.g. transits)

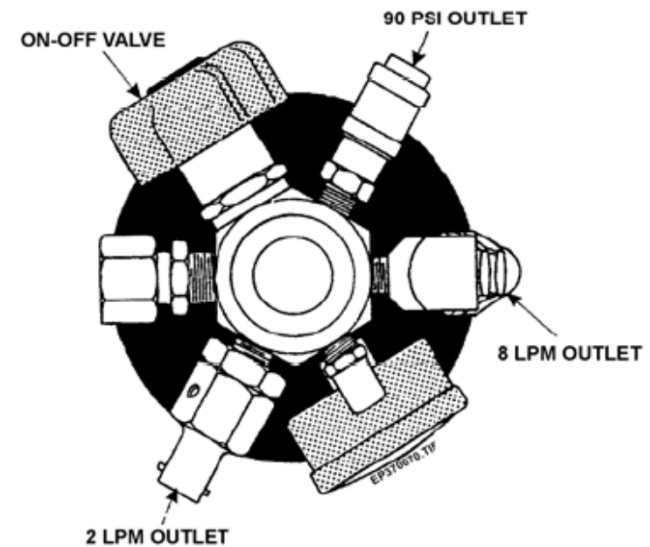




Emergency Oxygen



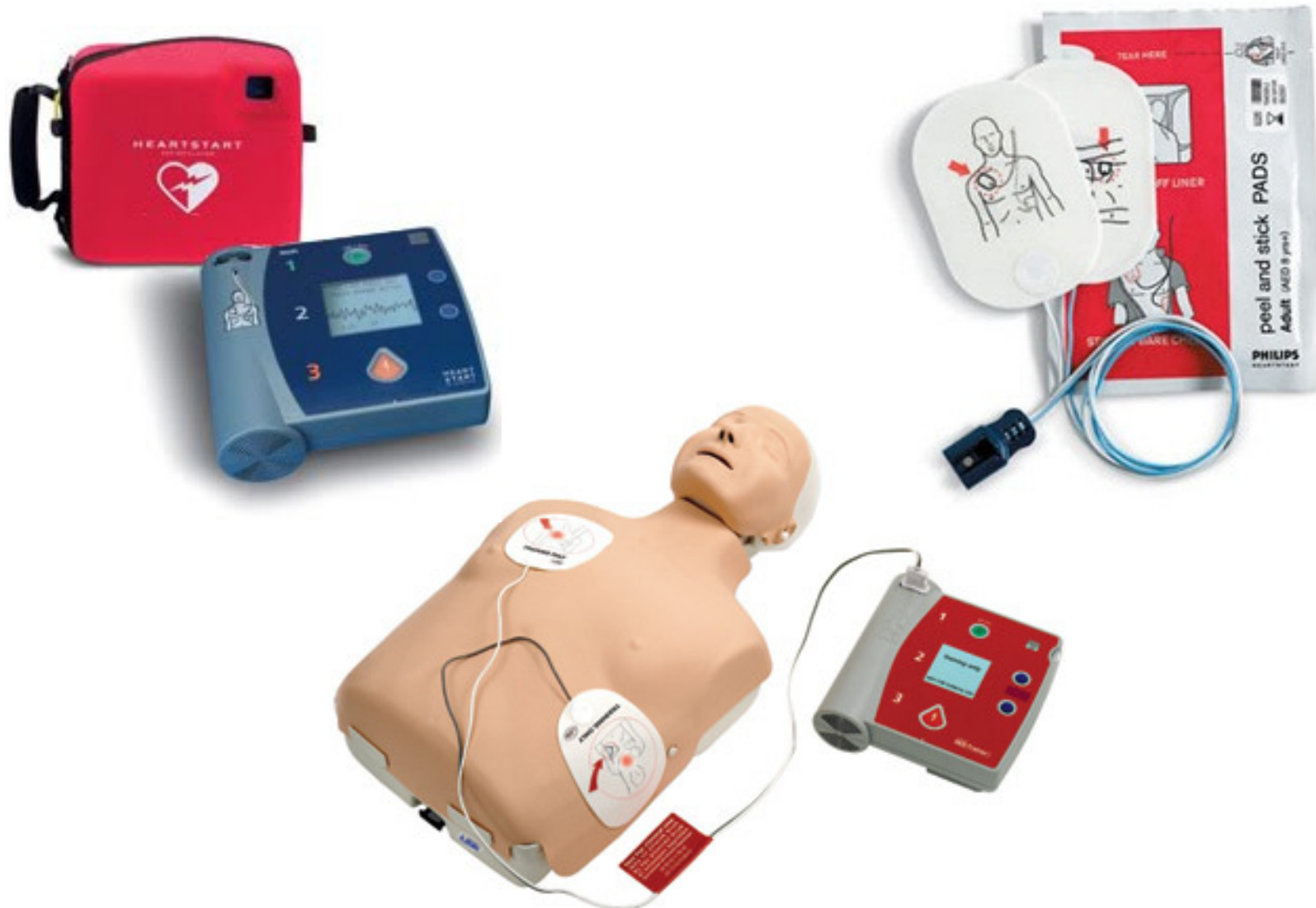
- 2 or 4 L/min
- Total 311 L





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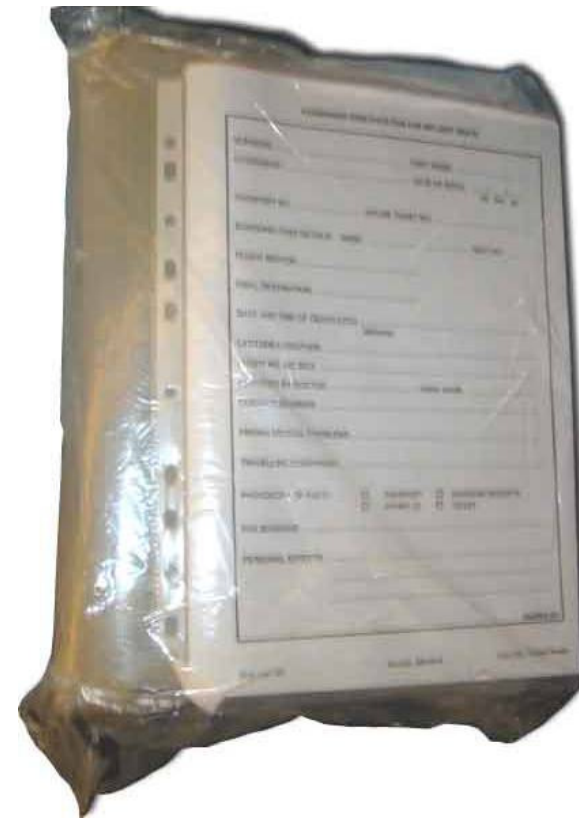
Case Date: 25/6/2009 05:28:22 PM

ECG TIME RANGE
Case ID : 090730164524





First Aid Kit



Mortality Kit



AED Defibrillator



Biohazard Kit



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Physicians Kit



- Protocols on Use
- Info Booklet
- Cabin Crew Operating Manual



Physicians Kit Contents

- 2 Unsealed Modules:
 - Syphgmo
 - Stethoscope
- 5 Sealed Modules:
 - Blue (airway support)
 - Red (iv equipment)
 - Green (asthma meds catheter, glucometer)
 - Yellow x2 (drugs)



• [Contents List](#)





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Rationale

- FAA / CAA Regulations (AED)
- Likelihood of use (salbutamol)
- Risk of doing harm (cricothyroidectomy kit)
- Lifesaving vs “Nice to have” (resus drugs)
- Logistics (no insulin)
- Weight (limited fluids)
- Purpose (manage to diversion/destination not long term care)



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What Help is Available?



- MedLink called if:
 - Oxygen administered
 - Physician's kit opened
 - Doctor called
 - Diversion possible



**MedLink:
In-flight Medical
Support Service**

**Banner
Good Samaritan
Medical Center**

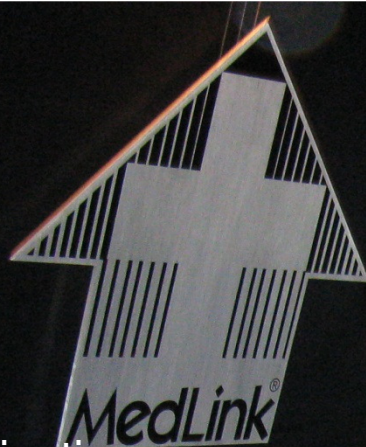
Communication specialist

Communication
specialist

Physician

Pager
phone

Phone Line to
aircraft



All of our info is just a click away

ilitary

November

: Oscar

: Papa

: Quebec

: Romeo

S: Sierra

T: Tango

U: Uniform

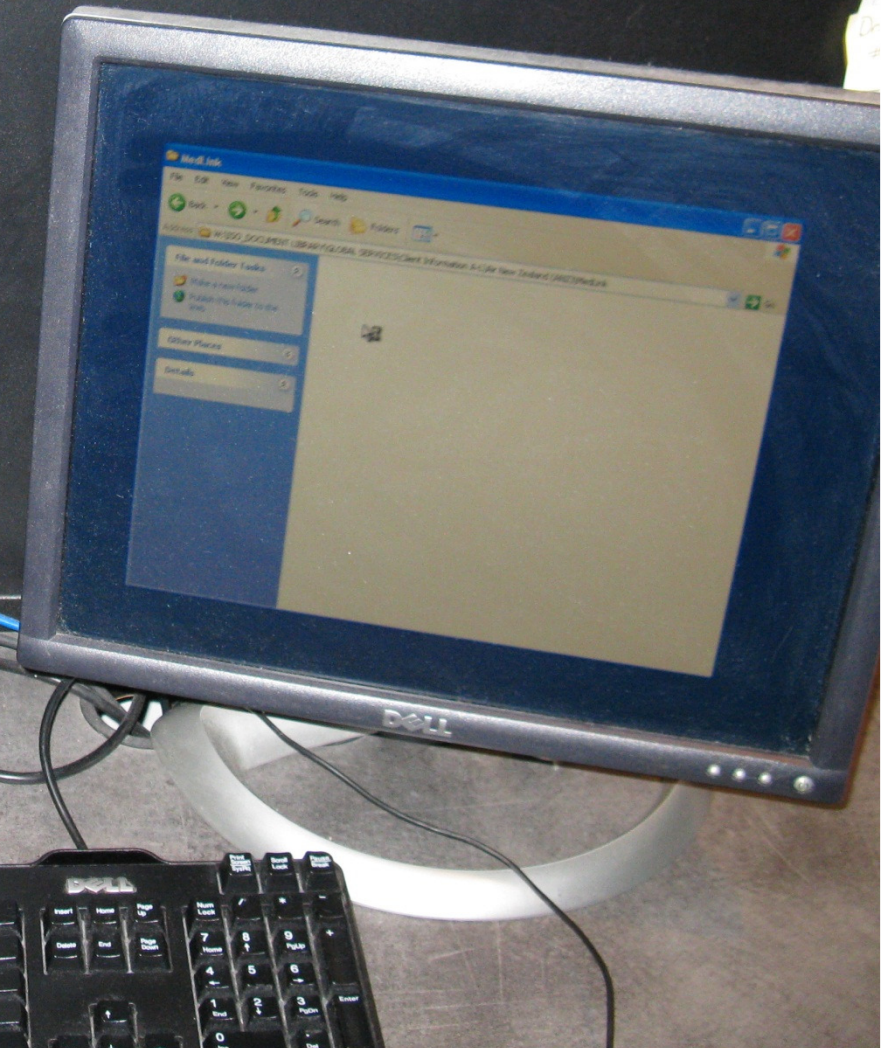
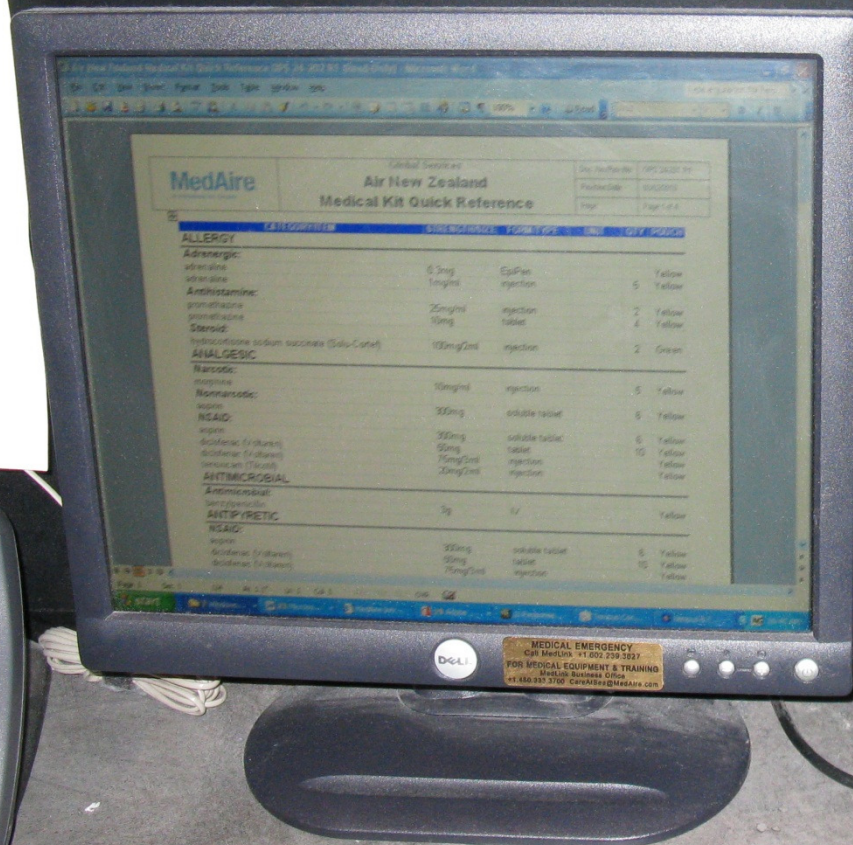
V: Victor

W: Whiskey

X: X-Ray

Y: Yankee

Z: Zulu



Keeping track.....

File Edit View Favorites Tools Help

Address <http://medweb/callcenter/WhiteboardMedLink.aspx> Go Links

Patches 4.1
Friday, May 07, 2010 17:20 Zulu
 MedLink Running (19 Patches) Switch to GRC

Row	Patch	Client	FNo	Type	ETA Zulu	Comm Spec	Status	Zulu Date	Zulu	Category	Destination
1	2010-11748	WJA	201	INFLIGHT	12:09	NJM	Check passenger status at hospital at	5/7/2010	17:00		Toronto, Ontario, Canada
2	2010-11766					TJK	Patch documentation in progress	5/7/2010	17:14		
3	2010-11756	QFA	588	INFLIGHT	15:09	JRC	Check passenger status at hospital at	5/7/2010	17:15		Brisbane, Queensland, Australia
4	2010-11762	NKS	301	INFLIGHT	16:25	OC	Check passenger status at hospital at	5/7/2010	17:40		Fort Lauderdale, Florida, USA
5	2010-11747	QFA	12	INFLIGHT	20:30	RAG	Re-contact Company OPS at	5/7/2010	19:30		Sydney, New South Wales, Australia
6	2010-11745	QFA	583	INFLIGHT	14:10	NJM	Check passenger status at hospital at	5/7/2010	19:30		Perth, Western Australia, Australia
7	2010-11744	EKA	225	INFLIGHT	21:00	JKJ	Re-contact Company OPS at	5/7/2010	19:50		San Francisco, California, USA
8	2010-11763	WJA	2670	INFLIGHT	20:53	JRC	Re-contact Company OPS at	5/7/2010	20:00		Puerto Vallarta, Jalisco, Mexico
9	2010-11765	EKA	225	INFLIGHT	20:53	JRC	Make EMS arrangements at	5/7/2010	20:00		San Francisco, California, USA
10	2010-11729	MSC	USNS Flint	SIP		JKJ	Re-patch expected at	5/8/2010	06:00		Confidential
11	2010-11708	CORP	MY Octopus	SNIP		KSK	Re-patch expected at	5/8/2010	13:00		Antibes, France
12	2010-11764	YACHT	Maltese Falcon, SY	SNIP		EMC	Follow-up with client at	5/8/2010	15:49		Not Reported
13	2010-11752		Not Reported	NOFLT		JRC	Follow-up with client at	5/8/2010	17:00		San Francisco, California, USA
14	2010-10570	CORP	Not reported	TRP-WCH		AS	Trip Watch	5/11/2010	06:54		LAX, Tel Aviv
15	2010-11612	CORP	N908VZ	TRP-WCH	19:25	KSK	Trip Watch	5/14/2010	20:00		MORRISTOWN, NEW JERSEY, USA 5/14/10
16	2010-11760	CORP	Not Reported	TRP-WCH		GB	Trip Watch	5/14/2010	23:59		Not Reported
17	2010-11164		Not Reported	TRP-WCH		GB	Trip Watch	5/15/2010	23:59		Not Reported
18	2010-11633	CORP	Not Reported	TRP-WCH		GB	Trip Watch	5/22/2010	23:59		Not Reported
19	2010-07900	CORP	Not Reported	TRP-WCH		GB	Trip Watch	7/3/2010	23:59		Not Reported

Midnight: 52 - Month to date: 566 - Year to date: 14785
 V4.1

Done

Local intranet

SONY



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MedLink DVD



Air New Zealand Patch



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Roles and Responsibilities



- Trained in FA, CPR & AED
- Can call MedLink
- Can administer GTN, Ventolin and Epipen under MedLink direction



Roles and Responsibilities



- In charge!
- Diversion decision rests with PIC alone
- Are informed when Physicians Kit used
- Can call MedLink



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- Air New Zealand
- Key Air New Zealand codeshare partners



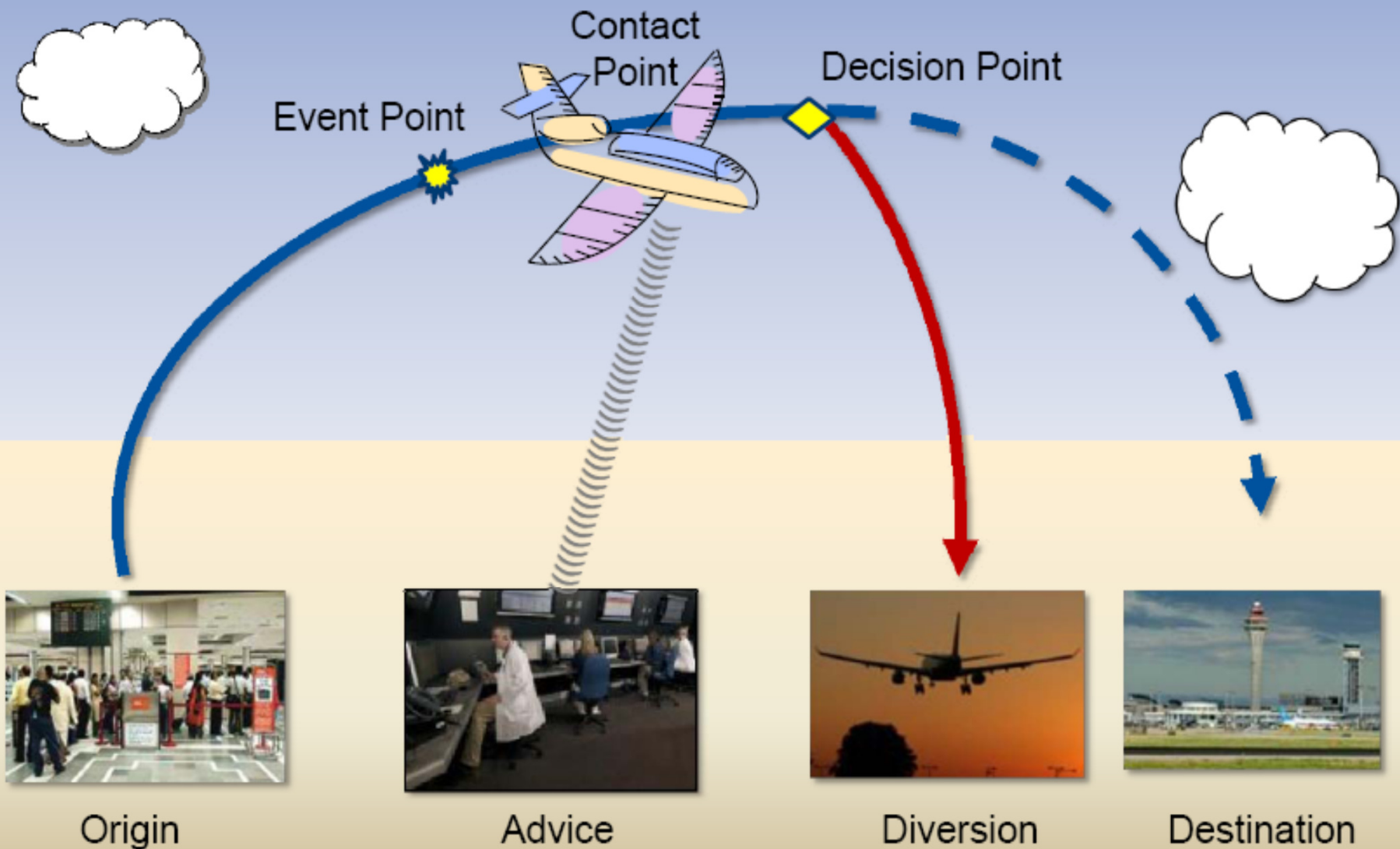


Should we Divert?

- Isolation and limited medical facilities
 - Medical outcomes poorer
- Diversions:
 - Flight safety impact
 - Location, fuel, weather, medical facilities at destination
 - Stressful
 - Disruptive to other pax
 - Costly: to the airline and other pax

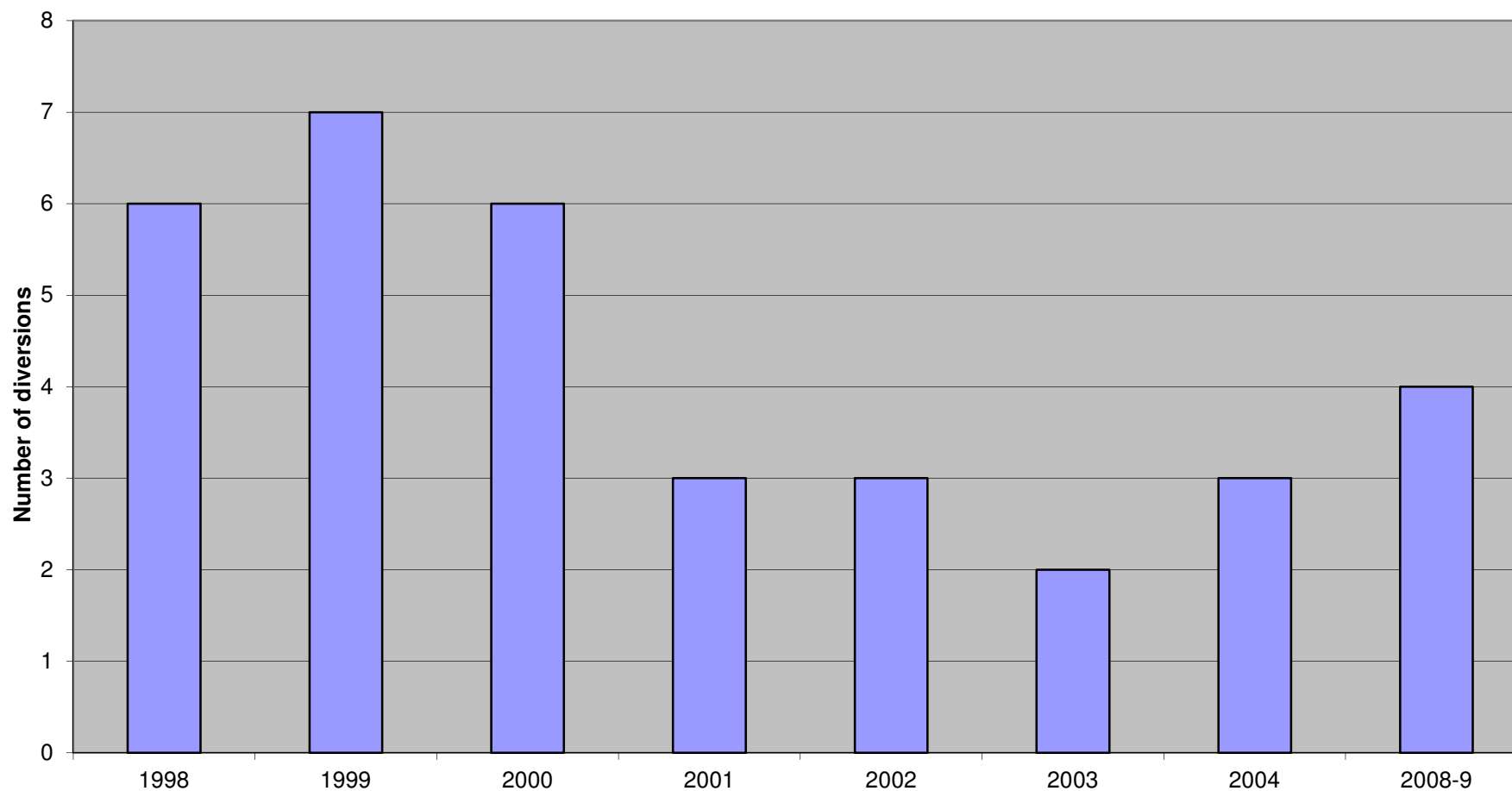


Anatomy of a Medical Event





Total Number of ANZ Medical Flight Diversions from 1998 - 2009





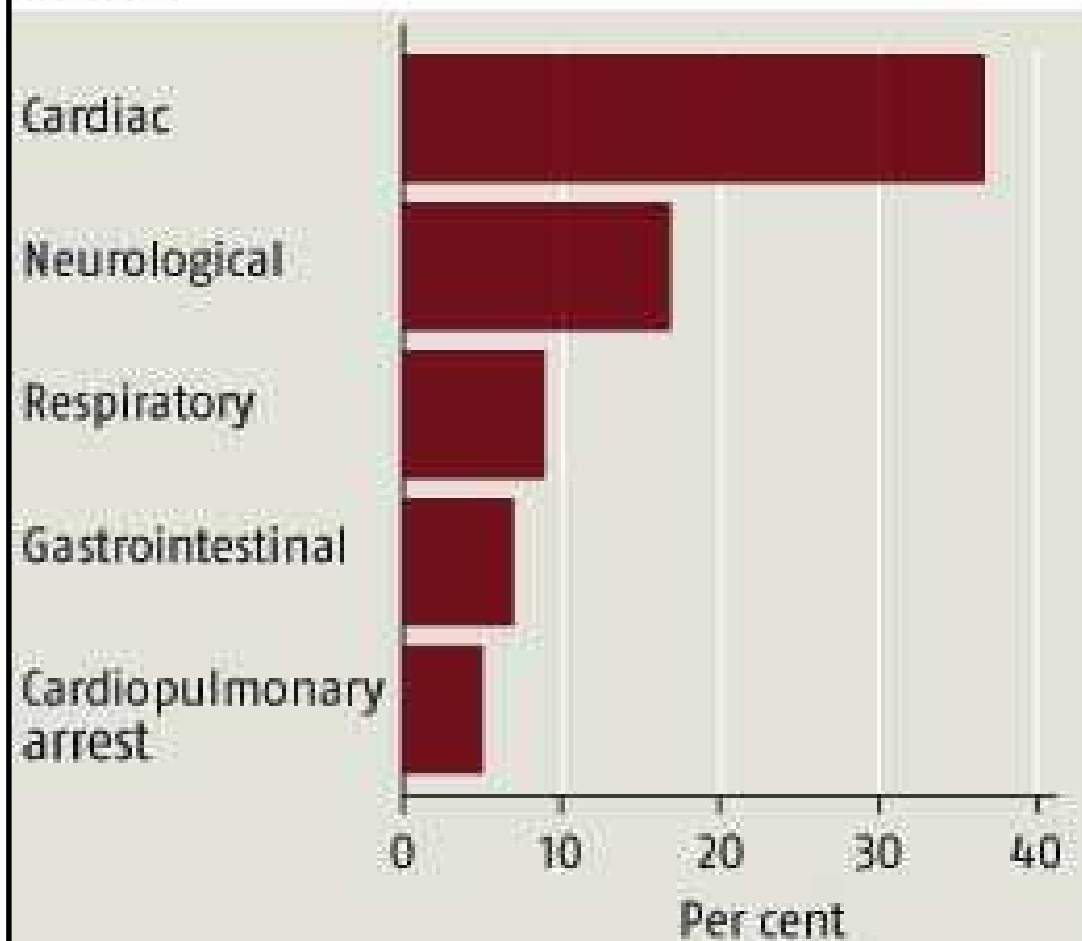
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CRISIS IN MID-AIR

Most frequent medical reasons for diverting a plane





US In-Flight Diversion Data

Category	Total No	Incidence (%)	Likelihood of diversion (%)
Neurologic	626	31	17
Cardiovascular	274	13	39
GI	201	9	10
Respiratory	173	9	17
Infection	165	8	0.1

Cost per diversion:
\$US 50k

Total cost:
\$US 8.9m

Sirven et al, "Is there a neurologist on this Flight", Neurology, 2002



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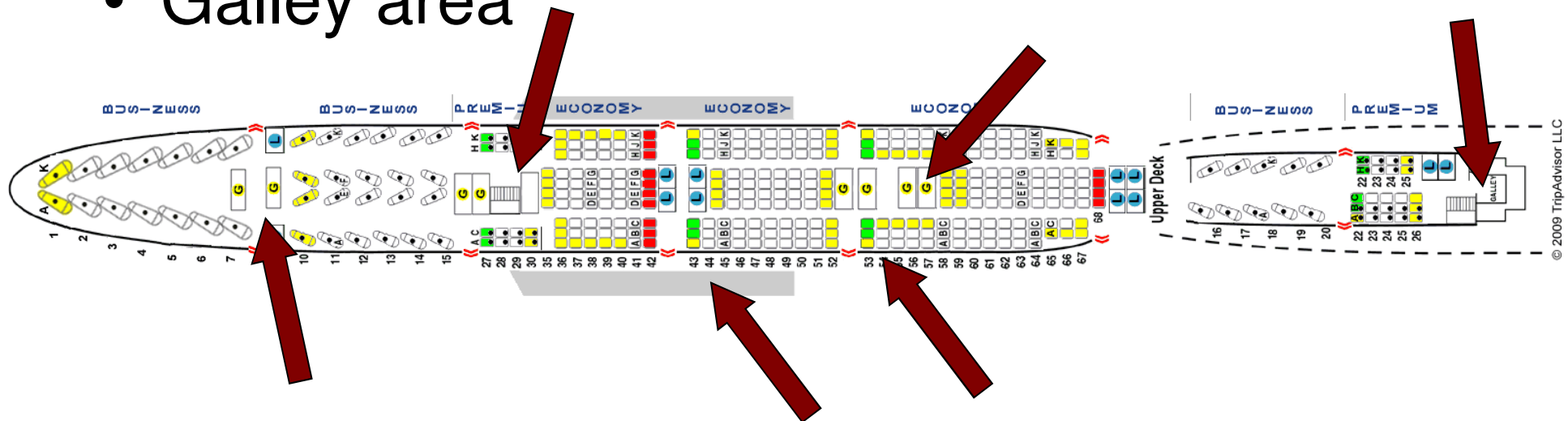
Issues with Environment





Where can you go?

- Exit row
- Galley area





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Take Home Messages

- The airline, crew and passenger appreciate your willingness to assist
- You have an ethical and professional obligation to assist
- You are indemnified by Air NZ for care given in good faith
- In-flight medical incidents are common but most are minor in nature



Take Home Messages

- A comprehensive standardised medical kit is on board all long haul aircraft
- Use the expert medical advice, available via Sat-phone
- Use the cabin crew who are trained and experienced
- Use other available spaces if required



Take Home Messages

- We value feedback on your experiences



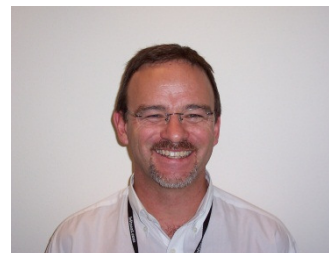
Aviation Medicine Unit





The Team

- Five doctors (3 FTE)
 - CMO Tim Sprott, Ben Johnston, Nicola Emslie, Alexandra Muthu, David Powell
- Five nurses (4 FTE, 1 in CHC)
- One administrator





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Airline Operations & Safety



Contact Details

Air NZ Aviation Medicine Unit

Phone: +64 9 256 3924

MEDA Clearance enquiries

Phone: +64 9 255 7757

Fax: +64 9 336 2856

Email: MedaClearance@airnz.co.nz

Special Handling enquiries

Phone: +64 9 255 7757

Email: SpecialHandling@airnz.co.nz



Services and Functions

- Occupational and Environmental Medicine
 - All Air New Zealand Employees
 - Crew Health
 - Passenger Health
 - Pre-travel clearances: MEDA (Paxcare, AvMed)
 - Gate clearances (MedLink)
 - In-flight medical events (MedLink, AvMed)
 - Medical emergency planning and oversight



Questions?





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Common In-Flight Emergencies and their Management

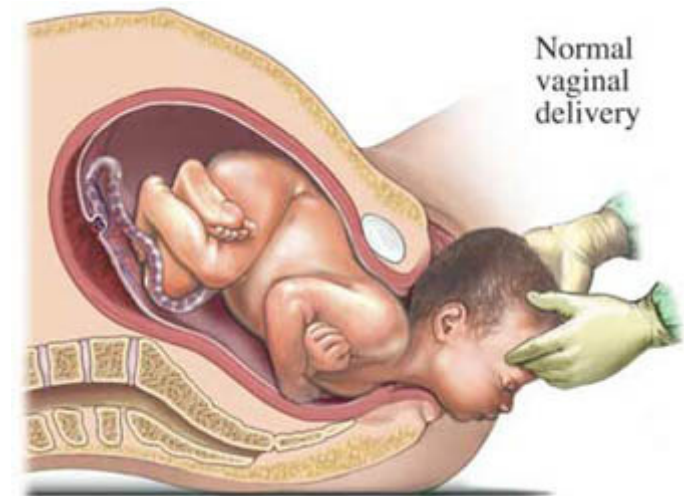
Premature Labour

- MEDA guidelines
 - >5h flight to 36⁺⁰ weeks
 - <5h flight to 38⁺⁰ weeks
- In-flight deliveries by definition therefore are likely to be premature
- More at risk of cord prolapse
 - Hypoxic baby
- Thankfully very rare!



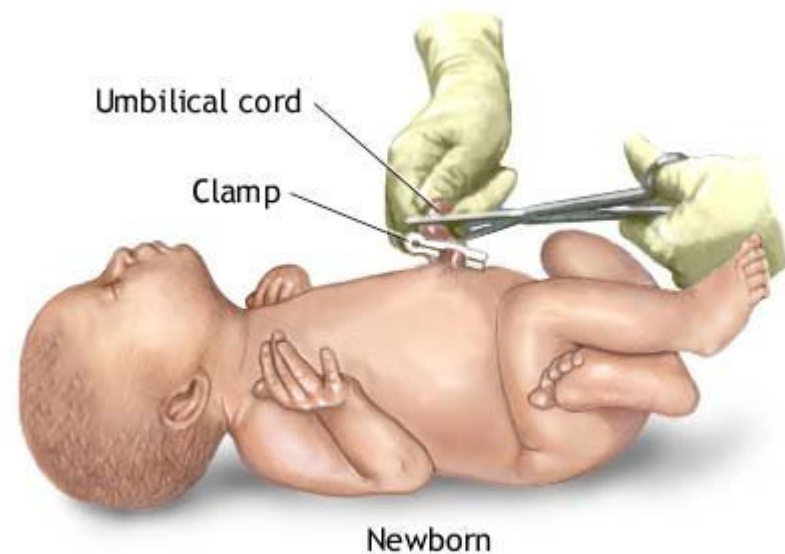
Inhibition of labour

- Salbutamol by infusion
 - 2.5mls of 0.5mg/1ml in 500ml N saline
- We will be trying very hard to put the plane down but if delivery imminent...
- Keep calm (!)
- Cord clips
 - NB CC not trained to cut cord
- Syntometrine 1ml IM (3rd stage)



Practical tips

- Plastic bag(s) on floor/chair if possible
- Placenta and birth products into biohazard bag
- Keep baby warm
- Monitor blood loss





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- Baby born on flight

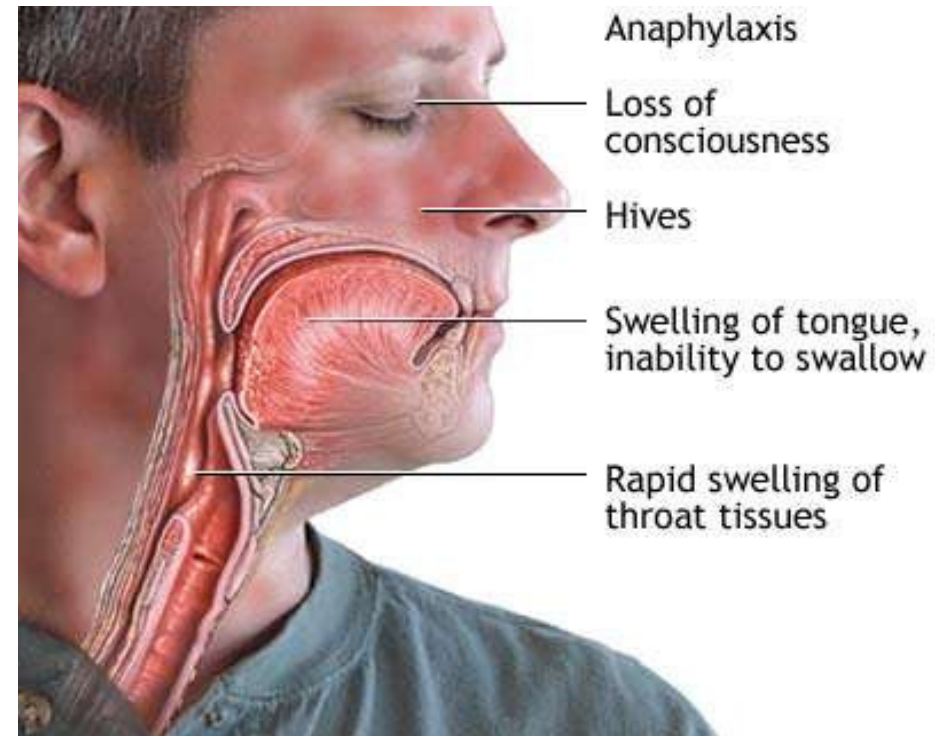
<http://youtu.be/OClrgiNfeWI>

The Medical Problems

- Serious problems
 - Seizure, Unconsciousness
 - Cardiac Arrest
 - Premature Labour
 - Anaphylaxis, Choking
- Typical Problems
 - The 4 A's: altitude, age, anxiety, alcohol
 - Collapse, Angina, SOB
 - Indigestion, motion sickness, gastroenteritis
 - Fear of Flying
 - Burns and injuries

Anaphylaxis

- Not common but very dramatic
- If allergy known pax may administer own Epipen



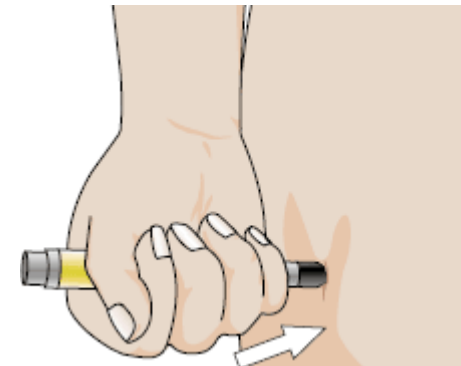
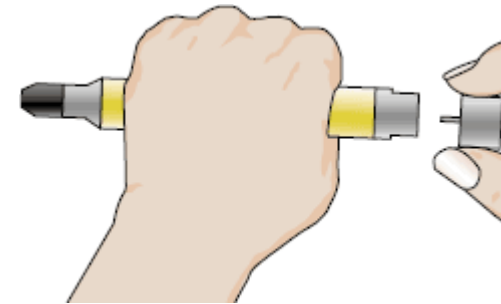


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- EpiPen
- Adrenaline 1mg/1ml
- Promethazine Inj 25mg and Tabs 10mg
- Hydrocortisone Inj 100mg/2ml (solucortef)
- Salbutamol nebulules 2.5mg



Abdominal pain

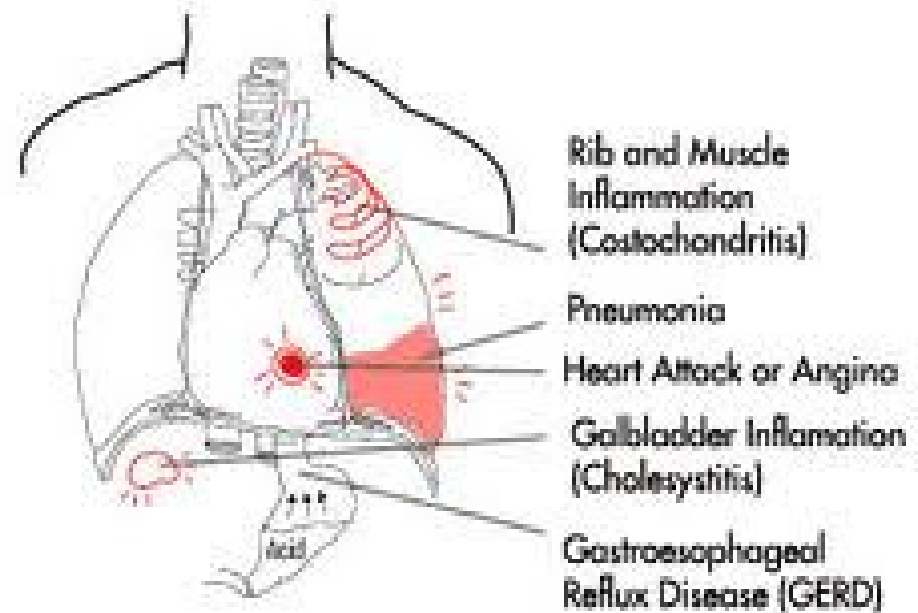
- Don't forget gas!
- Renal colic
- Females aged 10-60y consider pregnancy
- Buscopan (20mg)
- Tilcotil (20mg)
- Diclofenac (75mg)
- Morphine (10mg)



Chest Pain

Myocardial Infarction

- Oxygen
- Aspirin 300mg
- GTN spray
- Morphine
- Metoclopramide
- Have the AED handy!



CHEST PAIN

Hypoglycaemia

- Blood glucose testing equipment
- Oral glucose sachets (2)
- GlucaGen IM HypoKit (1)
- Dextrose Inj 50%/10ml (5)



Seizures

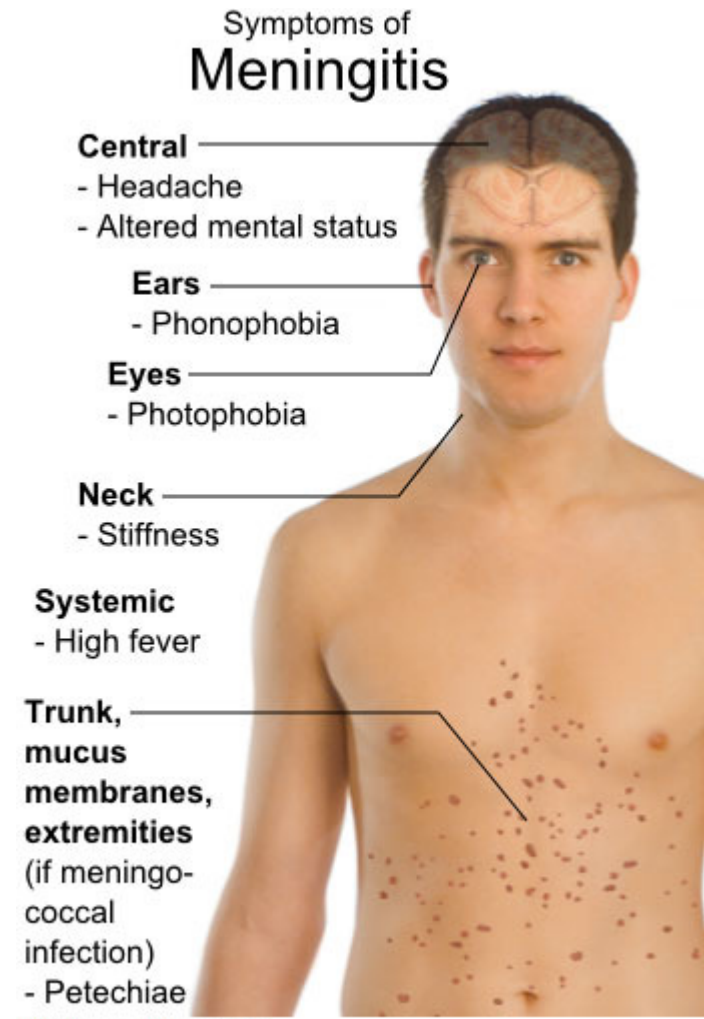


- Common
- Causes include: epilepsy, fever, hypoglycaemia, drug use, alcohol withdrawal
- Airway support equipment
- Oxygen
- Diazepam Inj 10mg/2ml
- Glucocard blood sugar monitoring



Infection

- The only infection that requires treatment prior to landing is meningitis
- Benzyl-penicillin
 - 3g stat dose (Adults)
 - 60mg/kg (Children)



Psychosis

- Diazepam Inj 10mg/2ml (5)
- Haloperidol Inj 5mg/1ml (4)



Pulmonary oedema

- Oxygen and re-breather mask
- Frusemide Inj 20mg/2ml (5)
- Morphine Inj 10mg/1ml
- Glyceryl Trinitrate spray
- Urinary catheterization set



Asthma

- Oxygen
- Salbutamol nebulas 5mg
 - also available inhaled form
- Hydrocortisone Inj 100mg/2ml (solucortef)
- Adrenaline 1mg/10ml (epinephrine)
- Spacer device

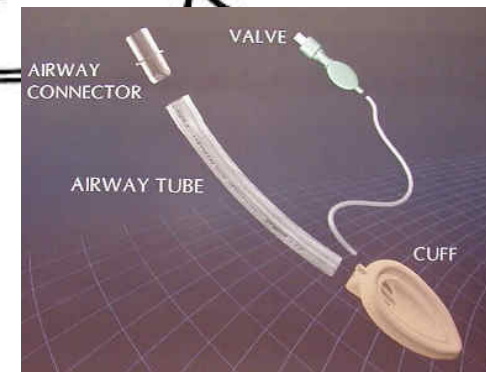


Airway management

- ***Ventilation*** more important than *Intubation*

- Position

- Bag and mask
- Guedel airways
- ETT
- LMA



LMA: tips for insertion

- Deflate
- Lubricate
- Insert
- Inflate: saline
- Ventilate



Analgesia

- Tilcotil Inj 20mg/2ml (tenoxicam)
- Diclofenac Inj 75mg/3ml or 50mg Tabs (voltaren)
- Morphine
- Hyoscine Inj 20mg/1ml (buscopan)

