CABIN FEVER

Health emergencies on aeroplanes often make the headlines, but how common are they and what would you be expected to do if you were on the flight? **Alison Tonks** investigates

Occasionally people are born, become ill, and even die on board aircraft in flight. In July last year, Paul Keetch, Liberal Democrat member of parliament for Hereford, collapsed on a flight from London to Washington, DC. He survived a potentially lethal arrhythmia after prompt treatment with an automatic external defibrillator. Earlier this year a pilot for Air Canada developed signs of acute mental illness near the end of a transatlantic flight and had to be escorted off the rapidly diverted plane into a mental health facility in Ireland.¹ Less than a month later, copilot Michael Warren collapsed and died on a flight to Cyprus. The plane landed safely in Istanbul.²

When the worst happens, the captain often asks for help from medical professionals who happen to be on board. Doctors who answer the call must practise medicine in one of the remotest environments on earth. But here are some reassuring thoughts: despite these headline events, of the 36 million passengers carried by British Airways last year, only 375 needed a doctor while flying; and if you do offer to help a stricken passenger or crew member you will be acting as part of a team with shared responsibility for what happens. Industry experts say the risk of litigation is close to zero.

Will I be called?

It's impossible to know for certain how often medical professionals are asked to help during flights. No one keeps count for all airlines despite repeated pleas from professional bodies such as the Aerospace Medical Association. Doctors working in the industry say it's a rare event: "I've worked for airlines for years, flown many thousands of miles, and have been asked to help once," says Mark Popplestone, head of medical services at Virgin Atlantic. "I guess most doctors will encounter a medical emergency once or twice in a lifetime of travelling to and from holidays and medical conferences." Published rates of in-flight emergencies vary widely. One recent best guess puts the incidence of serious events at somewhere between 1 in 10 000 and 1 in 40 000 passengers.³

Between one in three million and one in five million passengers will die.³

Most experts agree that the chances of encountering an in-flight medical emergency are rising, although it's hard to quantify how fast.^{4,6} Passenger demographics are changing. As flying gets cheaper and easier and the population ages, older, sicker people are flying more and flying further. Bigger aircraft, such as the recently launched Airbus A380, also mean more passengers on each flight and a greater risk of medical incidents.⁷

Duties of doctors

In most countries, doctors have no legal obligation to respond to calls for help, although there are notable exceptions, such as France.⁵ They do, however, have a humanitarian duty to offer help within the limits of their competence.³ The World Medical Association's international codes of medical ethics says: "A physician shall . . . give emergency care as a humanitarian duty unless he/she is assured that others are willing and able to give such care."⁹ The General Medical Council, the UK's regulatory body, is also clear that "In an emergency, wherever it arises, you must offer assistance, taking account of your own safety, your competence, and the availability of other options for care."⁹ In theory, UK doctors who don't come forward risk their registration, although there are no reports of this happening in practice.⁵

The question of whose laws apply can be complicated. In general, aircraft are under the jurisdiction of the country where they were registered.⁴ This rule of thumb also applies to laws governing negligence and liability. Experts agree that fear of litigation should not stop doctors and other health professionals volunteering in an emergency—the risk is small. "At a conference last year, the UK Medical Protection Society said it had no record of anyone being sued for helping during an in-flight medical emergency," says Dr Popplestone. "I'm not aware of any cases worldwide."⁶ Most medical volunteers will

US AVIATION MEDICAL ASSISTANCE ACT 1998

Under individual liability, the act states: "An individual shall not be liable for damages in any action brought in a Federal or State court arising out of the acts or omissions of the individual in providing or attempting to provide assistance in the case of an in-flight medical emergency unless the individual, while rendering such assistance, is guilty of gross negligence or wilful misconduct."

WHAT SHOULD BE IN EMERGENCY MEDICAL KIT¹⁶

Drugs		
Adrenaline 1:1000 (plus 1:10 000 if there's a cardiac monitor or defibrillator on board)	Diuretic (injectable)	Urinary catheter
Antihistamine (injectable)	Drug for postpartum bleeding, eg, oxytocin	Delivery system for intravenous fluids
50% dextrose (injectable)	Sodium chloride 0.9%	Venous tourniquet
Nitroglycerin tablets or spray	Acetylsalicylic acid	Sponge gauze
Major analgesic (injectable or oral)	Oral β blocker	Tape adhesive
Sedative anticonvulsant	Equipment	Surgical mask
Antiemetic (injectable)	Stethoscope	Torch and batteries
Bronchial dilator inhaler	Sphygmomanometer	Non-mercury thermometer
Atropine (injectable)	Oropharyngeal airways	Emergency tracheal catheter
Adrenocortical steroid (injectable)	Syringes	Umbilical cord clamp
	Needles	Basic life support cards
	Intravenous catheters	Bag-valve mask
	Antiseptic wipes	Advanced life support cards
	Gloves	
	Sharps disposal box

Distribution of in-flight medical emergencies (MedLink global response service)

be protected by a combination of national “good Samaritan” legislation (United States, Australia), the airline, and their medical defence organisation.³⁻⁵

“We are always grateful to people who volunteer in emergencies,” says Bob Harris, a pilot for low cost airline Jet2.com. “Doctors, nurses, and paramedics often remain much more emotionally detached than even the best trained cabin crew, particularly if someone is unconscious or bleeding. They can also help prevent diversions, which are a costly and logistical nightmare for everyone. Any volunteer with medical experience can help, and we expect and hope that they will come forward if they feel competent.”

Doctors, nurses, and paramedics aren’t the only ones occasionally called upon to help. Airline captains have been known to ask for “people with experience in restraint” when the combination of alcohol, smoking bans, long queues for check in, and extra stress from drawn-out security measures gets too much for some passengers. Mr Harris recalls one air rage incident successfully brought under control by a psychiatric nurse, a prison officer, and a London taxi driver.

Team work

In-flight medical incidents are stressful. There’s not much light, it’s hard to lie some-one flat, the seats are cramped, and it’s noisy. Hearing anything through a stethoscope is a challenge. Low humidity dries out mucous membranes, so everyone looks dehydrated. Low air pressure in the cabin expands all air filled spaces including bowels, sinuses, middle ears, and pneumothoraces by around 30%^{3 4 10} and a low level of available oxygen drops even a healthy adult’s arterial oxygen saturation to around 90%.⁵

“The mechanics of the situation can also be serious,” says Mr Harris. “Someone may have to come on the flight deck, which breaches the security wall between the cabin and pilots. One pilot may have to abandon regular duties to call for ground based assistance. These are always significant events.”

Fortunately, medical volunteers never work alone. Most airlines have well trained cabin crew. Some even actively recruit former nurses. All Virgin Atlantic and British Airways crew have five days training including basic life support, then a yearly refresher course. They are also quizzed on emergency procedures, including medical incidents, at the start of every working day. “Calling for help from a volunteer is a last resort,” says Elizabeth Wilkinson, consultant occupational physician for British Airways Health Services. “Crews cope with around 90% of medical problems during flights. They deal with all minor problems such as headaches, faints, and sickness as well as many more serious ones such as anaphylaxis requiring an EpiPen. Last year, our crews reported 31 200 medical incidents. Three thousand were serious problems such as chest pain. They called for help from a professional on board only 375 times during the whole year.”

If there’s a defibrillator on board (and there often is on long haul flights), a senior member of the crew will know how to use it and will not expect to be elbowed out of the way by an enthusiastic volunteer. When MP Paul Keetch collapsed he was successfully defibrillated by a crew member, not the two

medical professionals on board, according to a Virgin Atlantic spokesperson.

“If the crew ask, offer your skills. But don’t take charge or try to operate the automatic external defibrillator,” says Dr Popplestone. “Senior crew are well trained to use it, and they follow protocols that passengers won’t be familiar with. Act within your competence and if you feel

out of your depth say so. We don’t expect a retired dermatologist to deal with neurological emergencies, such as strokes or epilepsy, for example.” Defibrillators attract a lot of press attention but in reality they are rarely needed. Cathay Pacific transported over 15 million passengers in 2005 and used its defibrillators only 10 times.³

Increasingly, cabin crew get expert help and advice from doctors on the ground using a satellite phone or, less commonly, a VHF radio. A commercial company called MedAire is the leading provider. The company’s MedLink global response service is based in a dedicated trauma centre in Phoenix, Arizona. More than 70 airlines use MedLink, often as a first point of contact when a passenger is injured or becomes ill.

“MedLink doctors are on duty in the emergency room just next door,” says Heidi Giles MacFarlane, vice president of global response services. “They are up to date and have taken thousands of calls from airline crew. They know exactly what’s on the plane and what it’s feasible to do in that remote environment.”

Paulo Alves, specialist in aviation medicine and MedAire’s medical director, thinks it is

IS THERE A DOCTOR ON BOARD?

**"If the crew ask,
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always useful to have a medical perspective on board. "Doctor volunteers can be our hands and eyes in any medical situation," he says. "Their professional skills and our experience make a very effective combination, allowing us to make better decisions about when and if to divert, for example."

Should I take a coat hanger?

In 1995, a professor of orthopaedics famously rescued an airline passenger from a potentially lethal tension pneumothorax using little more than a coat hanger, a urinary catheter, and a bottle of Evian water.¹¹ Fortunately, this type of genuine emergency is extremely rare. There are no industry-wide data describing the precise nature of in-flight medical incidents but various snapshots and anecdotal accounts suggest that faints, vertigo, dizziness, and other neurological problems are relatively common.¹²⁻¹⁴ So are diarrhoea and vomiting, asthma, angina, and minor injuries.¹⁵

People with pre-existing disease were most likely to get ill in one study,¹³ although Dr Wilkinson notes that passengers who have been through pre-flight screening rarely become ill during flights. "Incidents usually involve people who don't know they are ill, don't say they are ill, or accidentally pack their medication in the hold," she says. Data from MedLink show that in 2007, more than 40% of calls were about neurological problems, usually faints. About one quarter were gastrointestinal, the rest were cardiac, respiratory, and orthopaedic incidents in roughly equal proportions (figure).

Emergency medical kits vary from airline to airline and can be extensive. The Aeromedical Association's 2007 recommendations are updated regularly by expert consensus (box).¹⁶ Once again, there are no reliable data to inform their decisions. Aircraft registered in the US must carry defibrillators,⁴ and many other airlines carry them voluntarily. If you're very lucky, there may even be a telemetry device that transmits a passenger's vital signs, oxygen saturation, end tidal capnography, 12 lead electrocardio-

gram, and video footage to doctors on the ground. These devices have been on the horizon for several years and a handful of big airlines including Virgin Atlantic are experimenting with them. "Telemedicine is definitely the future for in-flight medical emergencies," says Dr Alves. "We have some experience with these devices and they can be extremely useful." More useful than a real live medical volunteer? "No. Nothing works better than another professional on the other end of the line."

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See **VIEWS & REVIEWS** p 616

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Despite his emigration to Israel more than 30 years ago, Howard Cedar's voice betrays his New York roots. A senior figure in genetics research, the Hebrew University professor is well placed to give a snapshot of current progress in this complex field, especially its application to cancer. He was an early pioneer in molecular biology, which "started a new era in medicine," he says. Instead of looking just at symptoms, molecular biology delves into the functions of the body and discovers the basis of disease.

Learning how genes are regulated has been long, slow work, and only now, after 25 years, is Cedar seeing the practical application of what he has been studying. Today, he talks about the "unbelievable" pace of genetic research. He is absolutely clear about the direction of travel for basic research to uncover the causes of disease but is frank about the "road blocks" in the way.

Cedar got his introduction to genetics during his Vietnam War draft in the early 1970s. Against that volatile backdrop, Cedar, fresh out of medical school, was "fortunate" to be sent to the National Institutes of Health in Washington, where exploration into DNA and genes was in its infancy. "I got introduced to the study of chromatin, understanding how DNA is packaged in the nucleus. That set the stage for the rest of my career. I saw how important it was in terms of biology."

Ideal research setting

Cedar and his young family arrived in Israel in 1973—just two months before the Yom Kippur war broke out. In Israel, Cedar joined the fledgling department of biochemistry at the Hebrew University, where he is now professor. It has proved a fertile ground for genetics research. "A very high proportion of geneticists are Jewish. I don't know how to explain that," he says. There is also a large number of people who come from a homogeneous source in Israel. "Ashkenazi Judaism is said to have developed from 1000 people that lived in about year 1000. So all Ashkenazi Jews are related to each other from these original 1000 people and for studying genetics that is a very useful thing. In addition, there are uniform Arab populations. A number of new genes have been discovered by studying these populations."

It also makes it easier to screen for certain genetic diseases, such as cystic fibrosis. "It is very difficult to screen for cystic fibrosis because there are about 100 different mutations that cause the disease and it is difficult to develop a test that would pick up all these mutations. But in Israel about 95% of the patients with cystic fibrosis have one of five mutations because of the uniformity of the population."

Is this mere trumpet blowing of Israeli expertise? "I don't think Israel is any better at genetics than anywhere else but there is a lot more use of