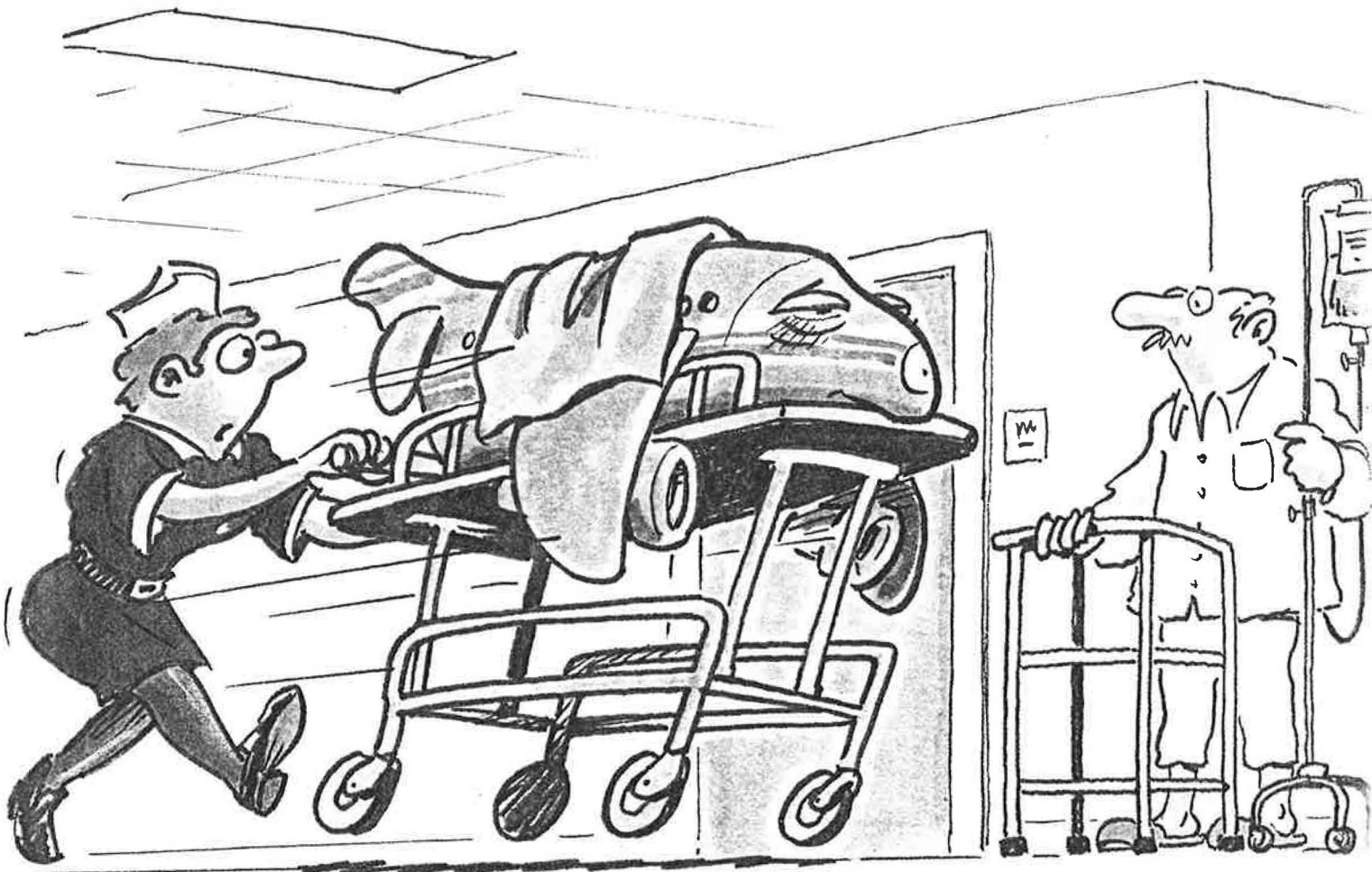


Air sick - getting fresh

Statistics indicate that flying is the safest way to travel, but a trip on a plane could be more hazardous to your health than you might imagine. **Carolynne Dear** reports.



Fatigue, dizziness, drowsiness, headaches, nausea, eye and ear irritation and respiratory problems - sound familiar? It's good old Sick Building Syndrome again, you might say, but you'd be wrong. It's SBS in the air! More and more passengers are complaining of these symptoms after flying and, up until now, jet lag and pressure changes have taken the rap. But now attention is switching to a lack of fresh air and the increasing use of recycled air on commercial aircraft.

Cosmic

Unhealthy levels of carbon dioxide, carbon monoxide, ozone and cosmic radiation, not to mention cocktails of bacteria and viruses, are all, according

to recent media reports, freely circulating around commercial aircraft cabins.

The decline in the amount of fresh air used is causing the major stir. Over the last twenty years, the amount of fresh air circulated within aircraft cabins has been dramatically reduced from 100% to a 50/50 mix of fresh and recycled air. This move has been blamed on cost cutting exercises implemented by airlines following the oil crisis in the 1970s to counteract the massive rise in fuel costs. Fresh air is bled from the engine, a process that requires more engine power and therefore more fuel. A report issued to many of the major airlines in 1980 stated that 62,000 gallons of fuel could be saved annually on a DC-10 by halving the fresh air supply. It is

also claimed that pilots are encouraged to keep down fuel costs by shutting off air packs if the flight is not full.

So just how important is fresh air and is the health of passengers and crew really being compromised? Airline companies and airline manufacturers stoically defend their actions, pointing out that they are well within legal recommendations. However, their critics believe that the efficacy of legislation is in itself suspect due to insufficient independent research into the subject. A recent study conducted by Boeing confirmed, unsurprisingly, that 'Boeing airplanes exceed all applicable regulatory and industry health standards for air quality in the passenger cabin,' and that 'Boeing believes that the more frequent com-

on board



delayed on the ground with engine trouble. All other reports, according to a spokesperson at the UK's Civil Aviation Authority (CAA), are 'anecdotal'.

British Airways says it is happy with the ventilation systems provided by manufacturers such as Boeing and Airbus, which, as BA points out, have passed both US Federal Aviation Authority (FAA) and CAA standards, and if BA crew believed they were contracting illnesses unnecessarily, the company would soon know about it, either directly or through the unions. The Transport and General Workers Union says it is 'concerned', but unfortunately not concerned enough to be able to elaborate any further.

However, in the US both ASHRAE and The National Institute of Occupational Safety and Health (NIOSH) have decided that the increasing 'anecdotal' evidence is worth further investigation and are now attempting to directly link symptoms reported by passengers and crew with cabin air quality.

Under wraps

NIOSH has, prior to this, reviewed no less than five studies assessing the potential risks of cabin air. ASHRAE is additionally hoping to produce a standard addressing the issue, along with specifications for more uniform testing of air quality. Findings are presently under wraps, but NIOSH plans to release its results at the ASHRAE Winter Meeting in Chicago next January.

Many of the present recommendations relate to crew members only. For example, JAR 25.831 section (a) states that 'each crew compartment must have enough fresh air to enable crew members to do their duty...CO2 in excess of 3% by volume is considered hazardous in the case of crew members.' Statements such as these do little to protect the passenger.

Airlines and airline manufacturers claim that the amount of fresh air provided (10 cubic feet per minute (cfm) and above per passenger) exceeds the minimum for essential oxygen supply and provides large margins for CO2 removal. According to the US Federal Register, 'oxygen

plaints associated with cabin air quality, nausea, headaches, eye and nose irritation, etc., are due to complex interactions of combinations of stressors, i.e. low relative humidity, motion sickness, cabin altitude, etc.'

On the face of it, the case for linking air quality with illness is fairly tenuous. There is only one officially documented case where illness could be directly linked to poor ventilation and this occurred under exceptional circumstances. It involved a flight carrying 54 passengers, one of whom was infected

with influenza. Within 3 days, 72% of the passengers had fallen ill with the same maladie. Significantly, the ventilation system had actually been switched off for 3 hours while the plane was



levels for sedentary adults can be met with a fresh air ventilation rate of only 0.24 cfm per person'. However, ASHRAE believes that fresh air changes of at least 20cfm should be introduced.

Claims have also been made that oxygen levels in aircraft are below those which are considered acceptable in other sealed environments, such as offices and other buildings. BA admits that using a 50/50 mix of air is economically advantageous, but adds that although the fresh air intake has been halved, the oxygen content is actually better than that in the average office because air taken from the stratosphere is much purer than at ground level. Boeing also points out that if the quantity of fresh air was increased, so would the concentration of ozone.

Carbon monoxide emissions on flights are due entirely to cigarette smoke. However, the increasing trend towards total smoking bans on flights has come under attack as being an attempt to reduce the requirement for fresh air. BA admits that although the smoking ban introduced on all BA aircraft in March of this year is economically advantageous in that there is less wear and tear to filter equipment, the rule was mainly brought about in response to consumer demand.

Nausea

Excessive carbon dioxide levels cause fatigue, drowsiness and even nausea. In an aircraft, CO₂ emissions are produced by humans and the vaporisation of dry ice which is used to keep food chilled in the galleys. Bodies such as ASHRAE are now recommending that levels of CO₂ should be reduced. Fatigue following a long flight is normally blamed on jet lag, but it has now been suggested that this could be due to unhealthy levels of CO₂. Following a recommendation by the National Academy of Sciences, in 1996, the US Federal Aviation Administration (FAA) revised standards for maximum allowable CO₂ levels within US aircraft from 3% (30,000 parts per million) to 0.5% (the level recommended for buildings). However, ASHRAE recommends an even lower limit of 0.25% and a Proposed Indoor Air Quality Standard prepared for the Air Force Occupational and Environ-

mental Health Laboratory in Texas goes so far as to recommend levels below 0.06% (600ppm), in order to minimise sleepiness, fatigue, poor concentration and stuffiness.

newspaper articles is found to be without justification.' This is hardly an earth shattering revelation given that Airbus engineers conducted the survey, but independent bodies have also found in favour of current cabin ventilation quality.

Dr Macmillan, of the RAF School of Aviation Medicine, stated in 1995 that 'as the efficiency of filters increases, it is less likely that cabin air quality can be held responsible for the reduction in well being associated with air travel.' In fact, mixing recycled air with cold fresh air is actually beneficial in that it adds moisture where

humidity is non-existent and fresh air extremely dry.

Opinion is obviously very much divided. The results of the ASHRAE and NIOSH studies should make interesting reading, although it is by no means certain that stricter legislation will be implemented as a result, if indeed it is proved that illnesses can be linked to poor air quality. It may also be worth bearing in mind that any increase in costs to meet stricter legislation will no doubt ultimately be met by the consumer.

Many would see it as a price worth paying.

Enquiry No 202

Benefits

The FAA contests demands for limits below 0.5% on the grounds that 'there are no documented safety or health benefits associated with the establishment of a lower value' (*US Federal Register, Vol. 1*). According to the DETR, UK legislation continues to recommend levels of no more than 3%.

Obviously, the more the fresh air levels are cut, the more it becomes necessary to recycle, a process that is increasingly coming under fire for the transmission of bacteria. But, as there is only one officially documented case directly linking illness with poor ventilation and that took place over twenty years ago while the ventilation system was switched off, are current ventilation methods really a cause for concern?

BA points out that all air, which equates to around one tonne in a 747, is completely replaced every 6-10 minutes. Modern aircraft use HEPA (high efficiency particulate filter) filters which have an efficiency up to 99.9%, similar to filtration levels in hospital operating theatres. A study by Airbus found that 'the mean particle concentration, within the recirculation air is found to be lower than or equal to the fresh air concentration for all ground and flight cases' for two of its aircraft, the A310 and the A340. Furthermore, the study concluded that 'the supposed health considerations published in several

