

ICAO Action

These two recommendations essentially address the same issue, which is for ICAO to develop Standards in Annex 6 — *Operation of Aircraft* requiring all carriers to equip their aircraft with Automated External Defibrillators (AED) and to require training for crew members in the proper use of AEDs.

“The rationale for carrying an AED on-board passenger aircraft has been the topic of much discussion at international aeromedical meetings during the past decade. During this period, AEDs have become smaller, lighter, cheaper and, more importantly, easier and safer to use. Today several major international airlines carry AEDs on all long-haul flights and a database of inflight (or in-aircraft) use of AEDs is slowly building up. However, the clinical usefulness of on-board AEDs in commercial passenger aircraft remains debatable.

“As a therapeutic tool, defibrillators are used to treat Ventricular Fibrillation (VF), the most common form of treatable cardiac arrest. VF is a common occurrence, and the survival rate is good if the shock is applied very soon after the arrest, preferably within four minutes. After the initial four minutes, cardio-pulmonary resuscitation (CPR) becomes the priority in order to prevent brain damage. However, survival decreases rapidly with time, the usual figure quoted is 10 per cent decrease per minute delay. After seven to nine minutes, the survival rate is low and the amount of brain damage caused by lack of blood to the brain is likely to make survival less desirable.

“Air passengers with VF rarely survive. CPR without shock is not particularly effective and diversion to the nearest airport and transport to a hospital will normally take an hour or more, often much longer. Defibrillation without delay is by far the best treatment. Since around 1990, an increasing number of airlines have added defibrillators to their on-board medical kit. At the same time, there has been another interesting trend towards medical telemetry which allows, for instance, an ECG from a sick passenger to be read and evaluated by a specialist on the ground and medical advice sent back to the aircraft for application in flight.

“The composition of air passengers is changing towards older people, and people with more frailties and medical conditions, simply because the population in the western world is getting older and flying has become cheaper, so that even retired people can afford to fly. In addition, aircraft are becoming larger and flights longer. Because of these developments, it will become increasingly difficult to find an airport nearby to which a medical diversion can be made when needed. Consequently, many airlines have now invested in medical telemetry (teleconsultation), enhanced their medical kits, and installed AEDs for inflight use. In May 2004, the United States implemented a law requiring an AED on board all passenger carrying aircraft over a certain size.

“On the basis of medical data available from British Airways, one in 11 000 passengers will have an inflight medical emergency. One in three million will die on board. One in 440 000 will be the cause of a medical diversion. Virgin Atlantic have eight times as many medical emergencies per million passengers and twice as many diversions, perhaps due to differences in passenger populations, differences in company policies, routings or reporting. With respect to the use of the on-board medical kit, statistics from British Airways and Tacoma Airport in the United States indicate that one in 34 000 passengers requires it. On average, the medical kit is used once in 227 flights, not an everyday occurrence in the life of a cabin attendant. When statistics (mostly from 1997-1999) from various United States and United Kingdom and other sources are reviewed, it appears reasonable to expect three heart attacks per ten billion passenger-kilometres or about 635 inflight heart attacks per year worldwide. Of these about 7 per cent are likely to be VF. That is forty-five cases per year in the world where use of an AED is indicated.

“A study conducted by a major airline in the United States between 1997 and 1999, covering two full years, showed that where AED shock was given to thirteen passengers in cardiac arrest, the survival rate from shock to discharge from hospital was about 40 per cent. Similar studies have been done by an Australian airline and by other United States airlines with results ranging from 26 per cent to 62 per cent survivors. In preparation for legislation, the Federal Aviation Administration (FAA) in the United States began collecting data in 1998, specifically asking for reports of events of cardiac origin

where death would be a likely outcome. Fifteen airlines participated corresponding to 85 per cent of all domestic flights in the United States. In one year, there were 177 inflight events. Of these, 119 were cardiac. Out of these, there were seventeen events where an AED was used – four patients survived (24 per cent).

“Based on these statistics, primarily from the United States, extrapolated to the entire world and applied to the 18 billion passengers who are expected to fly during the next ten years, it can be calculated that 224 human lives can be saved by installing AEDs with enhanced medical kits in ALL commercial passenger-carrying aircraft in the world. The cost would be around US \$300 million for a ten-year period, or about US \$1.3 million per life saved. It goes without saying that the saved lives will be of people with an average age well over 60 years and with serious pre-existing cardio-vascular disease. Not all will get through this experience without some degree of brain damage and reduced life quality and few will still be alive five years after the shock, perhaps 15 per cent.

“It is difficult to determine whether the Irish incident would have had a better outcome if the aircraft in question had been equipped with an AED. Having a defibrillator on board might have improved the outcome for the captain if he could have been shocked early. As outlined above, defibrillation needs to be undertaken as a priority within four minutes after the cardiac arrest. After ten minutes, defibrillation becomes largely ineffective. This suggests using the AED whilst the pilot is in his seat (to save time). Getting a dead pilot, in many cases weighing over 200 pounds, out of his seat poses serious flight safety questions. Three people struggling with a heavy dead pilot in the confined area of the flight deck whilst the other pilot tries to negotiate a return to the airport, descent and landing, single handed, is not a nice scenario. It would be less problematic in cruise but still not easy. I think that airlines need to consider the scenario and review their incapacitation procedures, whether or not an AED is carried on board. The emphasis needs to be on flight safety; simply writing a procedure like RyanAir have done seems inappropriate as there is inadequate advice for the remaining pilot as to what his priorities should be.

“Carrying (or not carrying) AEDs on board aircraft needs to be driven by whether or not the passengers would benefit. The advantage to the flight crew is small and flight safety is protected by incapacitation procedures (which have been demonstrated to be adequate because there has not been a fatal accident in two-pilot public transport operations worldwide with cardiac incapacitation as a cause for over twenty years). If an AED is carried for passenger benefit, airlines should also consider their incapacitation procedures in the light of this.

“Should airlines be mandated to carry AEDs? I have always maintained that they should not. However, that position was influenced by the lack of AEDs in other public places (airports, shopping malls, train stations, etc.), a situation that is now changing, at least in the ‘developed’ world. Also, the equipment is now less expensive, an AED costs less than US \$3 000 today, and it has become lighter. The case in favour of carrying them is therefore now stronger than it used to be. However, I don't think their carriage should be mandated as the FAA have done. A recommendation is as far as ICAO should go, perhaps just a note or an amendment of Attachment B, supplementary to 6.2.2 a) in Annex 6, Part I, would do. As is the case with the medical kits, AEDs should be limited to larger aircraft (with more than a certain number of passenger seats). Operational limitations, such as carrying AEDs on long-haul routes only, are not relevant, as the time factor in getting to an airport can be disregarded in a situation where minutes are vital.”

As the response of the ICAO Medical Section indicates, the subject of the carriage of AEDs on board passenger aircraft, has been, and is under active consideration in ICAO.