



FLIGHT SAFETY FOUNDATION

# CABIN CREW SAFETY

Vol. 26 No.1

*For Everyone Concerned with the Safety of Flight*

January/February 1991

## The Case for Effective Child Restraint

*Equal protection is not provided to all aircraft passengers, says the author, who appeals for new standards for infant/child restraints combined with more widespread use of such equipment.*

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by

Jeanne M. Elliott  
Cabin Safety Consultant

During the past several years, much attention has been focused on infant and child protection devices and usage in automotive vehicles. At present, all 50 U.S. states, 10 Canadian provinces, and 40 other countries have laws on use of restraints. The reason for their emphasis in automobiles can be seen in accident statistics: there are significantly more deaths and injuries related to motor vehicles than are experienced in commercial aviation.

About 27 million safety seats for children have been sold in the past five years, some of which have been identified for use in air travel as well as in automobiles. The seats are credited with saving the lives of approximately 200 children under the age of five every year.

Children make up a large portion of the U.S. population. Recent census data indicates that there are more than 48 million children under age 14 and more than 18 million under age five in the United States. In the original U.S. National Highway Traffic Safety Administration (NHTSA) notice of proposed rulemaking for child restraints, it was pointed out that approximately 1,000 children up to age five are killed, and 100,000 injured, in automobile accidents yearly. There are no similar data for aviation.

### How Children Fare During Aircraft Accidents

In aviation, the focus of child and infant restraint usage has been with respect to air carrier operations. However, airline accidents involving infants have not been numerous enough to provide a valid data base. Also, there has not been much information available on children or infants in most accidents when they have occurred. In many air carrier accidents in the past, children under two years of age, by regulation, may not occupy a revenue seat and, therefore, might not have been listed as passengers, even though they may have been sitting in a passenger seat. Additionally, there is a lack of complete human factors information and biomedical analysis for most accidents in the past.

The most tragic air disaster involving children occurred on April 4, 1975, when a military Lockheed C-5A Galaxy transport aircraft crashed while evacuating personnel from Saigon, South Vietnam, during "Operation Babylift." Of the 330 occupants — most of them children — aboard, 155 were killed. However, due to the wartime circumstances,

accurate investigation of seat positions and degree of restraint are known for very few passengers with any degree of accuracy. The injury data were primarily documented for survivors.

Further, on December 28, 1978, a United Airlines DC-8 crashed in Portland, Oregon, U.S., and three of the 10 fatalities were children under two years. A total of six "infants in arms" were involved, resulting in three fatal, one serious and two minor injuries. The severity of the crash was such that it might not have been survivable at the locations where the children were seated even if restraint devices were used.

On November 16, 1987, a Continental Airlines DC-9 crashed in Denver, Colorado, U.S., with three children and two unticketed lap-held infants aboard. One child and one infant received fatal injuries. In row five of the coach cabin, a 2 1/2-year-old was killed in the window seat, as was a six-month-old infant being held by his mother (who survived) next to him. U.S. National Transportation Safety Board (NTSB) investigators concluded that the infant was thrown against the bulkhead upon impact. The infant received multiple blunt impact injuries, including basilar skull fractures and thorax injuries.

## **Restraint Need Continues to Surface**

Recent air carrier accidents have brought attention to fatal injuries of infants and children, and the question of the need for effective child restraints has once again surfaced.

In July 1989, a crippled United Airlines DC-10 crashed on the airport during an attempted emergency landing at Sioux City, Iowa, U.S. A 23-month-old boy, who was placed on the floor and restrained only by his mother's body, was flung across the plane upon impact and ultimately died of smoke inhalation. Additionally, 111 other occupants perished.

In January 1990, Avianca Flight 52 from Colombia was scheduled to land at John F. Kennedy International Airport in New York, U.S. Instead, the airliner ran out of fuel during an approach some 15 miles away from the airport. The aircraft crashed against a hill 20 feet from a house and broke into four pieces. Of the 159 passengers, 17 were infants. Of the total, 73 occupants perished, including one infant. Six infants were also injured.

## **Inflight Turbulence Also a Danger to Youngsters**

Inflight turbulence may also pose a hazard to unrestrained

children. An example is a May 1985 incident involving an Eastern Air Lines Airbus A-300 flying 530 nautical miles north of San Juan, Puerto Rico. The aircraft flew through the top of a thunderstorm and encountered severe turbulence, resulting in two serious and 19 minor injuries. An eight-month-old infant was injured when thrown out of his mother's arms, landing 10 feet away on the floor. A six-year-old girl was also thrown to the floor, causing knee abrasions.

Other cases involving severe weather disturbances and turbulence have occurred, but are difficult to reconstruct sufficiently to determine differences in survivability or injury reduction if a child restraint had been utilized. Neither U.S. Federal Aviation Administration (FAA) or NTSB data banks have been programed in the past to factor information relating to infants and children.

Possibly the only published attempt to date to analyze increased risk for infant passengers in air carrier operations in the United States and worldwide air carrier fatal accidents was a 1981 Harvard Medical School epidemiology study of all air carrier accidents between 1976 and 1980 having survivors and fatalities. Although the data base for infants and children was limited, it concluded that infants held on the parents' laps fare worse than non-infant belted passengers; they are five times more likely to die in an aircraft accident than adults using seat belts.

## **Legislative Process Aims at Solutions**

Recent accident experience involving infants and children has brought a great deal of pressure for restrictions on infant travel. Bills proposed in the U.S. Congress last session were designed to force the FAA to require child safety seats on all air carrier flights in the United States. Although they did not pass, legislation is expected to be introduced again during the next Congress.

In February 1990, the FAA issued a notice of proposed rulemaking that would require airlines to allow parents to use child restraint devices on passenger-carrying aircraft and sought comments on whether to make the use of such restraints mandatory on all flights. The agency has revised its pamphlet encouraging voluntary use of child safety seats (see FSF *Cabin Crew Safety*, July/August 1990, page 2).

Also, in February 1990, the Air Transport Association (ATA) asked the FAA to go further in making safety seats mandatory for passengers younger than two years of age. As stated by ATA President Robert Aaronson, "If you buckle your children up at 50 miles per hour, why not at 550 miles per hour?" (see FSF *Cabin Crew Safety*, July/August, 1990, page 1).

As reported by the NTSB and included in a recent recommendation, infants strapped in their own seats are safer than those who sit in their parents' laps. With the Board's recommendation, concerns have been renewed on who will ultimately pay for the increased protection. Under the Board's recommendation, restraints would be required for all children who weigh less than 40 pounds, or who are less than 40 inches tall.

## Present Rules Present a Quandary

The FAA now recommends only that airlines allow the use of infant restraint seats when a passenger provides one. This is something most airlines already do. The FAA has stated it would consider making the seats mandatory after receiving public comments on the issue. Also, most airlines allow children under two years of age to fly free, so long as they do not occupy a seat that would have gone to a paying passenger.

It is estimated that between 5,000 and 10,000 children under age two fly on commercial aircraft every day. The FAA has expressed concern about the financial impact a mandatory seat rule would place on air travelers; the agency estimated it could cost traveling parents \$200 million if they were forced to buy infant restraint seats. Consumer groups, such as Ralph Nader's Aviation Consumer Action Project (ACAP), argue that with an industry-wide seat occupancy rate of around 60 percent, most parents still should be able to get seats for their infants free or at a reduced rate.

The Association of Flight Attendants (AFA), which has 28,000 members representing 18 air carriers, has long been in favor of child restraint devices, as have other organizations. The AFA says that the traveling public hears more about crashes than about other incidents when people are hurt.

Some flight attendants have expressed concern about allowing unrestrained children in the cabin, when their jobs require the enforcement of federal regulations to stow carry-on baggage and service items during taxi, takeoff and landing and during turbulence.

FAA Administrator James Busey has said, "Although there is only an extremely small statistical risk ... forces generated by a crash can exceed the parents' physical ability to restrain a child safely. ... In addition, it is possible that in encounters with severe air turbulence, high forces pose a potential danger to unrestrained infants."

NTSB Chairman James Kolstad expressed similar concerns when he said, "All objects must be secured during

takeoff and landing, including coffee pots and luggage ... and yet infants, our precious children, are not."

The instructions commonly provided to parents with lap-held children say to hold the infant on their lap and clasp the child in their arms. This offers virtually no protection in the impact deceleration of a crash, or even in severe inflight turbulence. The child literally is at risk to become a free-flying, unrestrained missile.

Testing by the FAA's Civil Aeromedical Institute (CAMI) into the requirement for and feasibility of child restraints applicable to air carrier operations began in the early 1970s and proved that an infant cannot be effectively restrained or protected in a brace position during a crash deceleration. Again, as stated by FAA Administrator Busey, "... forces generated by a crash can exceed the parent's physical ability to restrain a child safely." This danger also exists during severe air turbulence encounters and the threat of "clear air turbulence" adds further danger to the unrestrained child.

## A Solution Is Offered

The author presents the following specific conclusions and a suggestion to deal effectively with the situation.

- *Equal protection is not provided to all aircraft passengers.* The discrepancy can be illustrated by comparing the relative protection offered a typical flight attendant (seated, for example, in a rear-facing seat, against a bulkhead, next to an exit, secured by a four-point double shoulder harness and lap belt with inertia reel system), with the lap-held infant lacking any restraint other than the parent's arms. The infant/child population is at much greater risk when exposed to a crash impact, as well as decompression, turbulence, emergency egress or ditching. Infants and children have been called the "neglected airline population."
- *The evolution of FAA standards for infant/child restraint has been slow and behind the state-of-the-art as compared to the automotive industry.* The current certification of restraints for aircraft use provides a reasonable basis for markedly improving infant/child protection. However, unless such devices are available and are required to be used — and used correctly — the lap-held infant remains virtually unprotected. Also, the young child wearing a seat belt designed for adults may be inadequately protected and at risk.
- *A lap-held child must be considered an unrestrained "flying missile" in the event of a crash impact.* Tests have been shown that even low-level inertial

forces may be beyond the physical limits of the parent to hold the child. A lap-held child is at risk in an impact with the seat back, bulkhead or forward structures, in addition to crushing as the parent is jack-knifed over the infant. Hazardous techniques used by air carriers (infant placed under parent's lap belt, use of two children in a single belt and use of pillows) should be totally eliminated by further education of the traveling public and crew members as well.

- *Greater use of child restraints should be actively encouraged and mandated for transportation on U.S. air carriers.* The airlines, under the guidance of the ATA and the federal agencies involved, should give priority to working out effective solutions for using child restraints, including seat availability, management techniques and providing restraints to allow children the opportunity to be protected while traveling by air. This also includes cooperative efforts to insure that meaningful regulations are promulgated in a timely manner to prevent further risk of death and injury to infants and children. ♦

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## About The Author

*Jeanne M. Elliott has been involved with the aviation industry for more than 25 years in varying capacities relative to cabin safety, crew member training, inflight supervision, in-cabin inspection/surveillance, and program development and management.*

*Her career has encompassed early work with the U.S. Federal Aviation Administration (FAA) as an air carrier cabin safety specialist. This position allows the FAA a closer liaison with the airline industry in developing and enhancing the safety role of the flight attendant in the areas of crashworthiness and survivability.*

*Elliott has written about occupant/crew member safety and protection in publications distributed worldwide. She participates with industry organizations dedicated to cabin safety and occupant survival and is affiliated with a major international air carrier.*

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