

Requiring Safety Seats for Babies on Airplanes: Likely Harmful and Certainly Too Expensive



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Background

Last year, the American Academy of Pediatrics (AAP) released a series of publications (press releases, policy statements, and MJ Bull, et al., "Restraint Use on Aircraft," *Pediatrics*, 108(5):1218-1221, November 2001 [1] calling for a new regulation.

Based on epidemiologic evidence that unrestrained small children ("lap babies") are at greater risk of injury and death in plane crashes and violent turbulence, the AAP called for federal regulations that would require parents to buy a ticket for babies so they could be placed in a separate passenger seat in a safety seat, which is shown to protect babies in certain circumstances. (Currently, babies can fly for free, held on an adult's lap.) Other entities (particularly the National Transportation Safety Board) have taken similar positions.

Naive policy recommendation

The APA also called for one relatively inexpensive and reasonable change: the availability of safety seats on planes (like those used in cars), which can be used for free when an empty seat is available or the parents opt to pay a fare for the baby.

But requiring parents to pay for the extra ticket is a terrible policy:

- The result would actually be a net *increase* in infant deaths in serious injuries and additional deaths and serious injuries of adults and older children, as well as other real resource costs.
- Huge optimistic assumptions (**shown in dark blue**) can lead to the conclusion that there would be a net reduction in baby deaths, but even then, each reduced death would be at the cost of a large number of serious injuries as well as adult deaths and serious injuries.

Policy recommendations require more than finding something that reduces one risk

An action, such as a safety-promoting regulatory policy, will result in:

- Some intended benefits.

But also,

- Direct costs.
- Behavioral changes (which are always costly).

In this case, the benefits are rare (occurring only when planes experience a serious but survivable incident). The direct costs are not too troubling because they are mostly just a transfer of money (albeit from young families to the airlines). But the costs of the behavioral changes dwarf the potential benefits.

Calculation

- To calculate the net expected costs (health and other), consider a trip by a family of two adults, one older child, and a baby that would be held on an adult's lap if allowed. (If the family would have purchased a seat for the baby anyway, the regulation has no net effect assuming safety seats are available.)
- We use the high-end of Bull et al.'s relative risk figures for death or injury for an unrestrained baby (compared to a restrained adult) in a survivable incident: $RR=20$.

To fly, drive or stay at home?

- The family faces a higher total price for the trip. This is possibly a 33% increase though we will optimistically assume that they can get a 20% price break for the infant (as is sometimes currently available), for a net increase of 27%.

The increased price will cause some families to not fly.

- Bull et al. admit that critics claim that increasing the price of air travel for families will shift more families into car travel, which is more dangerous. But in the *Pediatrics* article they assert "no data support this argument."

This is simply wrong. While support for this is not available as typical epidemiologic data (probably why they made their erroneous claim), the evidence is overwhelming:

- The science of welfare economics has shown that for virtually all goods, when the price increases, consumers buy less and switch to substitutes. This alone is sufficient to invalidate blanket claim.
- There have been specific estimates of how price affects families' choices to fly and how often this leads them to a car trip.

- The best estimates in the literature are summarized in a Report of the Secretary of Transportation to the United States Congress.[2] They suggest that families have a *price elasticity* of -1.75 for flying. That is, for each 1% price increase (i.e., approximately \$6 for the family), there is a 1.75% decrease in demand for flying. So, for our family, the chance of flying is calculated as $1.75 * 27 = 47\%$, which is reflected in the decision tree.
- For the remaining 53%, the best estimate [2] is that 70% would instead drive an average of 500 miles (presenting new risk) and the rest would forgo their trip (a cost).

Chance of safety seat preventing injury

An injury/death is averted only when three conditions are met:

Condition 1.

There is an incident that could cause injury (crash, severe turbulence, hard landing) on the family's flight that would injure/kill the unrestrained baby, but is survivable (i.e., not a severe crash).

- Based on FAA's estimates of the number passengers, number of flights, and the number of deaths and serious injuries due to plane crashes, we calculated for any given flight the expected value is 1×10^{-8} deaths and serious injuries for adults and older children. Based on $RR=20$, this gives 2.04×10^{-7} deaths and serious injuries for babies.

Condition 2.

The flight would not have been full (else under milder regulation the family would have been seated next to an empty seat where the baby would be strapped in).

- Based on Department of Transportation (DOT) and FAA's seat capacity and seat utilization rates, we approximate that 70% of the flights are full; 30% not full.

Condition 3.

The safety seat would have saved the baby.

- Assume the seat would reduce the baby's risk to just that of an adult. Given the relative risk of 20, this means that 95% of the baby deaths and serious injuries would be prevented.

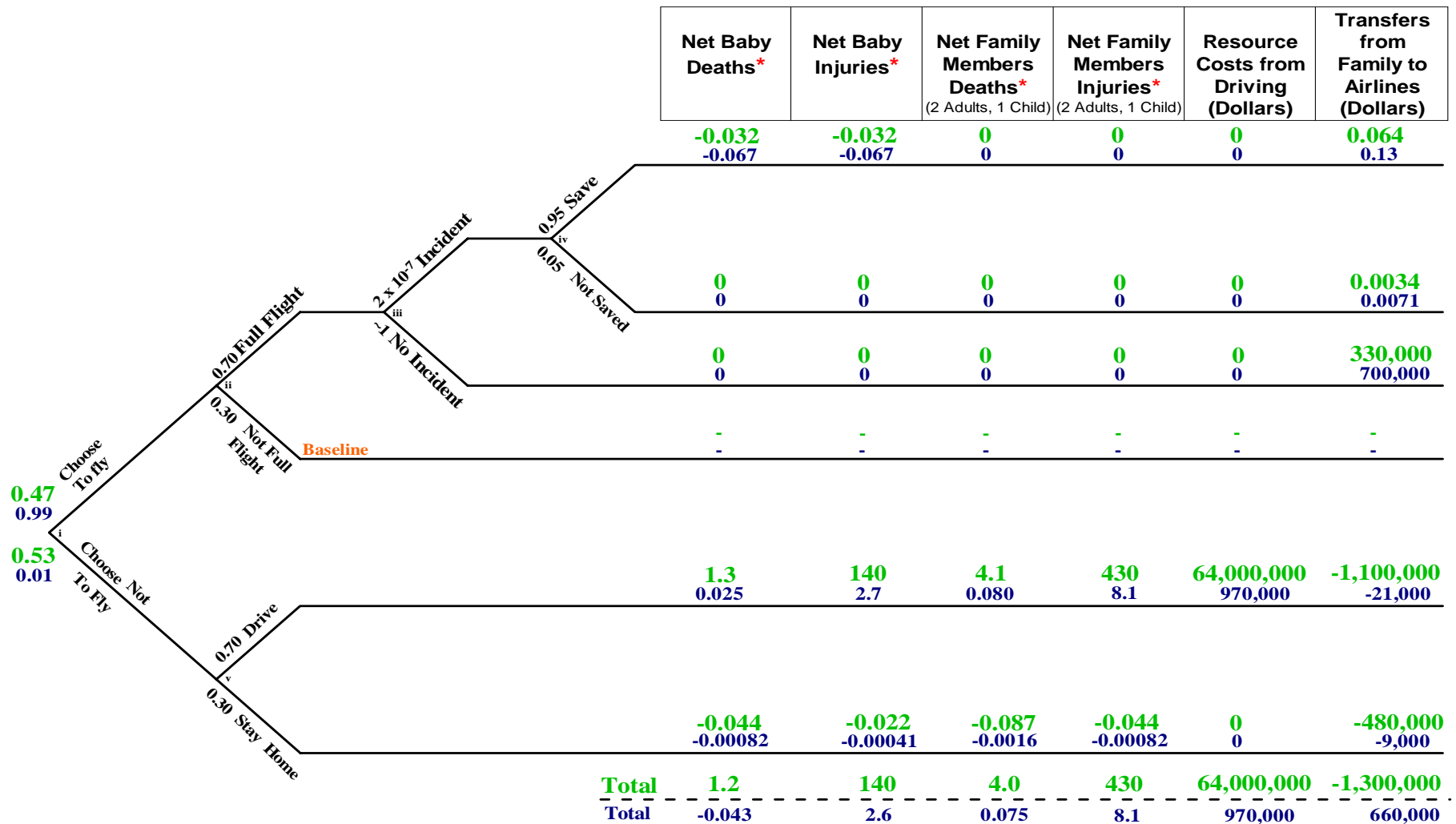
Results

- Even with several fairly charitable assumptions, the new regulation would increase babies' deaths and serious injuries, along with substantially increasing deaths and serious injuries of adults and older children.
- For 1 million flights that a family of 4 would have taken and not already buying the extra ticket for the baby, implementing the policy of requiring lap babies to be secured in a seat would cause:
 - 1.6 baby deaths (3.2×10^{-2} saved on planes; ~1.6 killed in cars).

Results

- Additional non-health costs for 1 million flights that a family of 4 would have taken and not already buying the extra ticket for the baby
 - \$64,000,000 of real resource costs from driving.
 - The family would forego 16% of planned trips, losing the benefit they would have provided.
 - Additionally, families would spend \$1,300,000 less on plane tickets (these costs are a reduced transfer from families to the airlines, no real resource costs are involved).

Per 1 million Trips for a Family of 4 (2 Adults, 1 Child, 1 Baby)



- i. See text.
- ii. P(Full flight) estimated from FAA's seat capacity and seat utilization rate.
- iii. P(Incident) estimated from FAA's surveillance statistics over the past 20 years.
- iv. P(Save) for completely eliminating the baby's excess risk of death and injury.
- v. P(Drive) for all passengers diverted to other modes of transportation for trips of less than 500 miles from the Report of the Secretary Transportation to the United States Congress.² Calculations for 500 miles round trip; except for P(Fly) = 0.99 is 400 miles round trip.

Baseline (all results net of): 2 Adults, 1 Child, 1 Baby, able to put baby in safety seat if flight not full.

*Negative means deaths and injuries prevented.

Even with *extremely* optimistic assumptions, the results are still bad

- If we ignore the economic evidence and hypothesize that behavior would only change a tiny amount, the benefit would still not justify the cost.
- Consider the second set of numbers in the decision tree (**in dark blue**). P(Fly) is increased from 47% to a minimal impact of only 1% not flying (P(Fly)=**99%**) and round trip miles for the driving trip is reduced from 500 to **400 miles**.
- With this extreme scenario, we get a slight benefit in terms of baby deaths (**0.043** saved per 1 million family trips).
- But each baby death averted comes at the expense of 2.6 serious baby injuries (because auto travel has a much higher rate of injury per death), plus 0.075 deaths and 8.1 serious injuries to others (1/3 of which happen to older children), plus a substantial transfer of wealth from young families to the airlines.

Conclusions

- It may be too obvious to be worth mentioning, but:
 - The proposed regulation is not a good idea.
 - Policy recommendations should not be made without considering costs.
- It should also be noted that the proposed regulation would require consumers to take an actions – for their own good, producing no external benefits – that they already have the option of taking. Such extreme illiberalism should always be suspect even if it seems to produce a net benefit. We should hesitate before assuming people are too stupid to decide what is best for themselves.

References

1. MJ Bull, et al., "Restraint Use on Aircraft," *Pediatrics*, 108(5):1218 1221, November 2001.
2. Report of the Secretary of Transportation to the United States Congress Pursuant to Section 522 of the Federal Aviation Administration Authorization Act of 1994, P.L. 103-105, May 1995, Volume 1, p. 2-16.