

# ZVYŠUJÍ LAVINOVÉ ABS BATOHY PŘEŽITÍ?

– nová data –



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CLINICAL PAPER

# The impact of avalanche rescue devices on survival<sup>☆</sup>

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Peter Mair<sup>d,3</sup>, Matthias Hohlrieder<sup>d</sup>, John Ellerton<sup>e,4</sup>, Fidel Elsensohn<sup>f,5</sup>,  
Jeff Boyd<sup>g,6</sup>, Günther Sumann<sup>h,7</sup>, Markus Falk<sup>i,8</sup>

**Table 2** Avalanche survival in relation to cofactors and rescue devices

		Avalanche airbag analysis <sup>a</sup>			P (OR)
Total persons <sup>d</sup>		Survivors <sup>c</sup> 1225 (81.4%)	Non-survivors <sup>c</sup> 279 (18.6%)	Total 1504 (100%)	
Grade of burial	Completely buried	260 (51.4%)	246 (48.6%)	506 (33.6%)	<0.001 (44.23)
	Partially or non-buried	965 (96.7%)	33 (3.3%)	998 (66.4%)	
Depth of burial (cm) <sup>e</sup>		0 (0–700)	100 (0–650)	0 (0–700)	0.003
Activity	Ski tourers	769 (81.1%)	179 (18.9%)	948 (63.0%)	n.s.
	Off-piste skiers	456 (82.0%)	100 (18.0%)	556 (37.0%)	
Group	1 member	110 (74.7%)	38 (25.3%)	148 (9.8%)	n.s.
	≥2 members without guide	769 (82.2%)	167 (17.8%)	936 (62.2%)	
	≥2 members with guide	346 (82.4%)	74 (17.6%)	420 (27.9%)	
Avalanche	Width (m) (at the break) <sup>f</sup>	93.5 (137.82)	123.8 (114.02)	99.1 (134.21)	n.s.
	Length (m) <sup>f</sup>	297.9 (276.38)	513.3 (441.30)	337.8 (324.41)	<0.001
Year	1990–1994	243 (73.6%)	87 (26.4%)	330 (21.9%)	0.005
	1995–1999	534 (82.9%)	110 (17.1%)	644 (42.8%)	
	2000–2004	448 (84.5%)	82 (15.5%)	530 (35.2%)	
Country	Switzerland	1074 (82.9%)	222 (17.1%)	1296 (86.2%)	0.004 (2.11)
	Austria	151 (72.6%)	57 (27.4%)	208 (13.8%)	
Avalanche airbag	Equipped	34 (97.1)	1 (2.9%)	35 (2.3%)	0.026 (0.09, 95% CI 0.01–0.75)
	Not equipped	1191 (81.1%)	278 (18.9%)	1469 (97.7%)	
Avalanche transceiver	Used for location				
	Not used for location				



[Home EN](#) > [ABS system](#) > ABS SURVIVAL PRINCIPLES

## THE 10 ABS SURVIVAL-PRINCIPLES

What makes the ABS system such an essential piece of avalanche emergency equipment alongside the avalanche transceiver, probe and shovel? ABS is the only self-rescue system that has proven its life-saving effectiveness over the years. This is no coincidence, which is why you can inform yourself here about the 10 ABS survival principles.



**97%**  
SURVIVAL

### 1. HIGHEST SURVIVAL RATE

Out of 262 persons with activated ABS® avalanche airbag, 97% survived, and 84% were uninjured.

... ▶



### 2. GERMAN ENGINEERING

The original ABS® self-rescue system – developed, manufactured and tested by avalanche experts since 1985. Survival made in Germany.

... ▶



### 3. DOUBLE SAFETY

Double safety through two separate TwinBags. If one airbag is damaged the other will remain inflated for a sufficient length of time.

... ▶

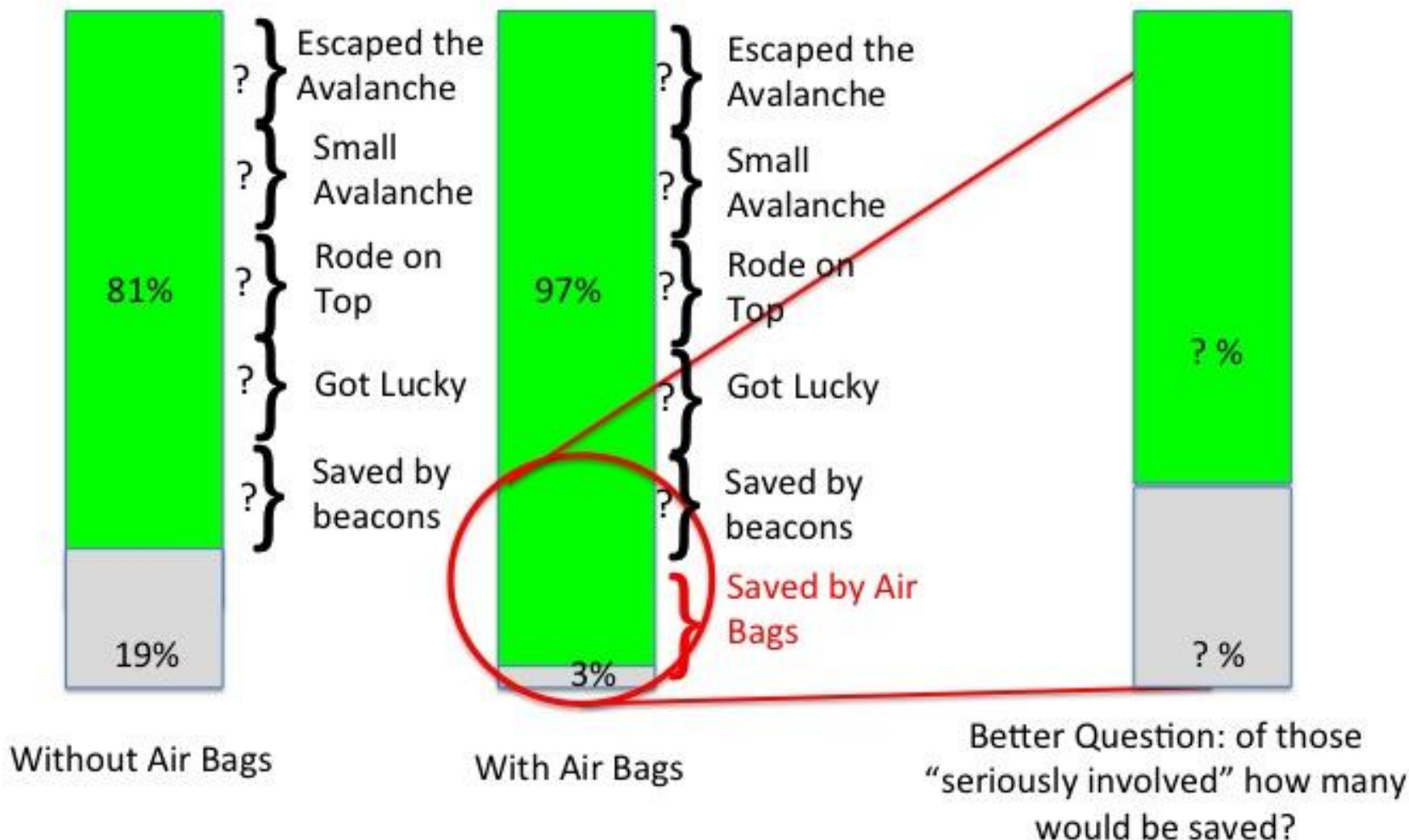
**The statistic we usually hear:**

"97% of people caught wearing avalanche air bags will survive."



**The statistic we usually don't hear:**

About 81% of people caught will survive even without avalanche air bags. (Wearing an air bag provides an increase of 16 percentage points.) From Brugger et al. (2007)



# Enhanced Avalanche Survival from Airbag Packs:

## *Why Can We Learn from the Data?*

Story by Jonathan S. Shefftz

### EXHIBIT 1: ABS Statistics

		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
		Euro ABS w/airbag inflation:			Non-ABS Partners of ABS Users	Colorado	Swiss 1980-99		Swiss & Austrian (various yrs)
		Full Only	All ABS Incidents	Partial or None		Atkins Analysis	Reported	Estimated	
(1)	Data set								
(2)	Caught skiers/riders	262	295	33	67	1224	2301		1469
(3)	Fatalities	7	17	10	17	109	523		278
(4)	Survival rate	97.3%	94.2%	69.7%	74.6%	91.1%	77.3%	87.0%	81.1%
(5)	Avoided fatalities	Caught	N/A	25	20	3	17	7	13
(6)	w/ABS out of 100:	Dead		81	77	35	75	56	70

#### NOTES:

(1) Data sets are as follows:

a, b, c, d = Compiled by SLF (through August 2010) and published on ABS Web site.

e = Compilation by Dale Atkins from CAIC data (including 205 burials).

f, g = *Avalanche Rescue Systems in Switzerland: Experience and Limitations*, Tschirky et al (2000 ISSW).

h = *The Impact of Avalanche Rescue Devices on Survival*, Brugger et al (Resuscitation 2007), net of ABS users.

(2) "Caught" as defined by data set (often not explicitly).

(3) Fatalities either in the field or after evacuation.

(4) Probability that a caught skier/rider will survive.

Fatalities that would have been avoided with ABS (at average deployment success, i.e., including both user & technical failures) out of 100:

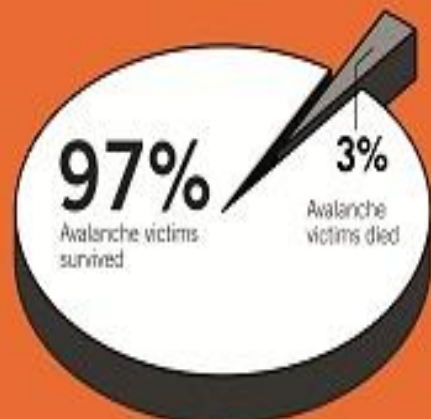
(5) ...caught skiers/riders.

(6) ...dead skiers/riders.



## WITH

262 avalanche victims with inflated  
ABS® airbag system



**255 (97%)**

Avalanche victims survived

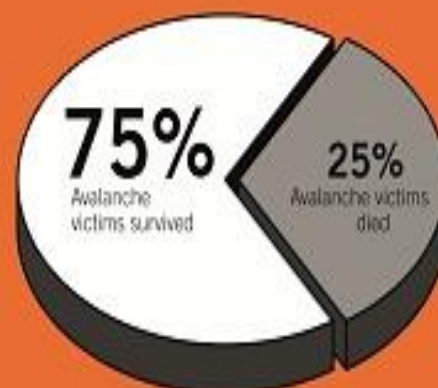
**7 (3%)**

Avalanche victims died



## WITHOUT

67 avalanche victims without ABS® airbag system  
in the same accidents



**50 (75%)**

Avalanche victims survived

**17 (25%)**

Avalanche victims died



Source: SLF documented avalanche accidents with ABS® airbag, August 2010



# ON THE EFFECTIVENESS OF AVALANCHE BALLOON PACKS IN CANADIAN AVALANCHE INCIDENTS

August 2012

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## Clinical Paper

### The effectiveness of avalanche airbags<sup>☆</sup>

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**Table 3**

Number of accidents and seriously involved victims by country (percentages in brackets).

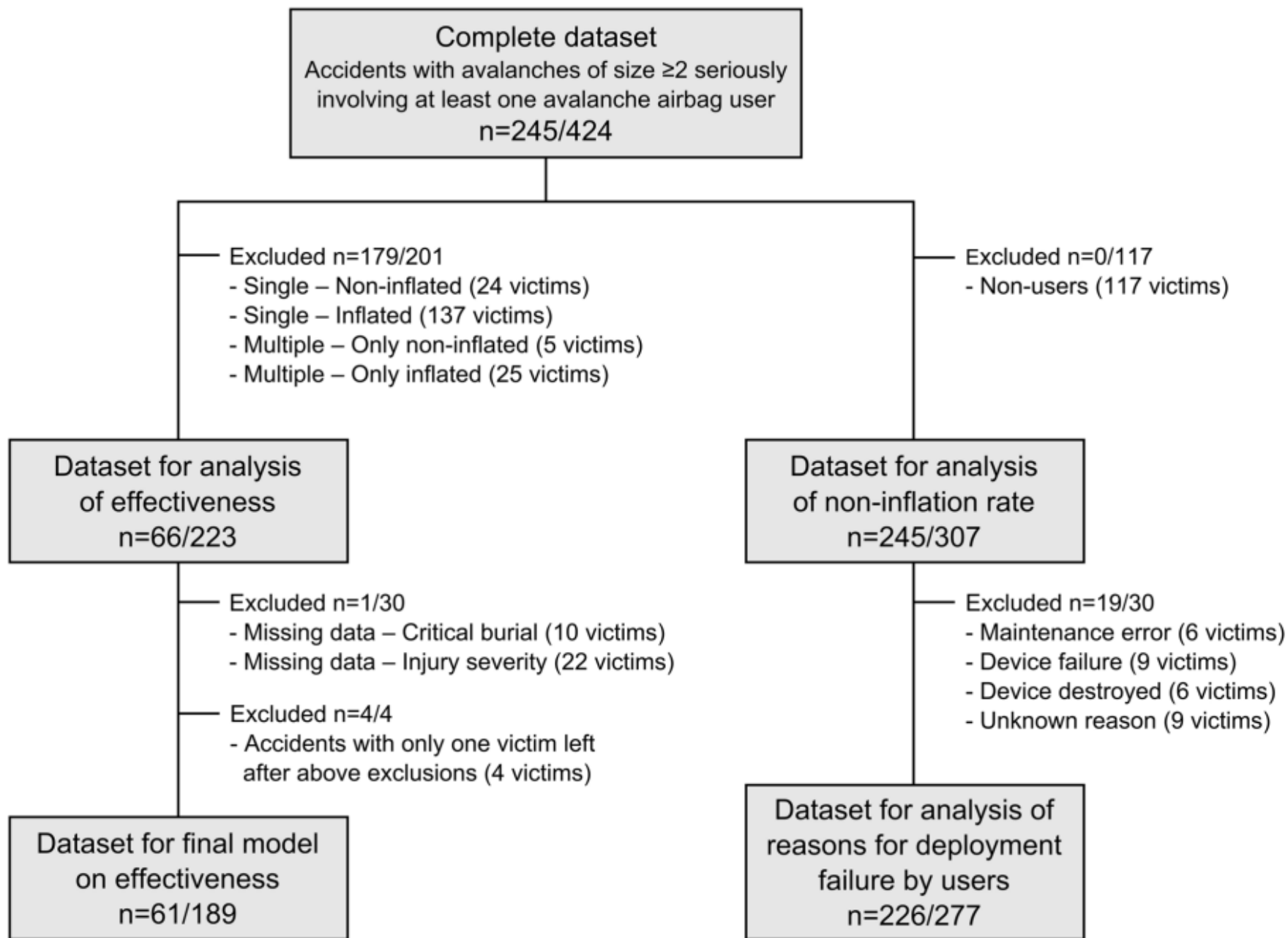
Country	Number of accidents	Number of seriously involved victims				
		Total	Non-users	Non-inflated	Inflated	Fatalities
Austria	63 (26)	110 (26)	30 (27)	14 (13)	66 (60)	13 (12)
Canada	28 (11)	62 (15)	25 (40)	15 (24)	22 (35)	19 (31)
France	74 (30)	95 (22)	7 (7)	10 (11)	78 (82)	13 (14)
Italy	12 (5)	23 (5)	9 (39)	2 (9)	12 (52)	6 (26)
Norway	4 (2)	15 (4)	9 (60)	0 (0)	6 (40)	8 (53)
Switzerland	49 (20)	93 (22)	28 (30)	17 (18)	48 (52)	15 (16)
USA	10 (4)	16 (4)	6 (38)	2 (13)	8 (50)	4 (25)
Others <sup>a</sup>	5 (2)	10 (2)	3 (30)	1 (10)	6 (60)	2 (20)
Total	245 (100)	424 (100)	117 (28)	61 (14)	246 (58)	80 (19)

<sup>a</sup> Denmark – Greenland (1 accident/1 victim), India (1/3), Russia (1/4), Slovakia (1/1) and Turkey (1/1).

## Parameters included in dataset.

Parameter	Levels
Accident information	
Country of accident location	See <a href="#">Table 3</a>
Date	1994–2012
Activity	Backcountry skiing Mechanized skiing Out-of-bounds/off-piste skiing (incl. snowboarding) Ski patrolling Snowmobile riding
Avalanche characteristics	
Avalanche size	Numeric sizes ranging from 2.0 to 4.0 (incl. half sizes; <a href="#">Table 2</a> ) according to Canadian avalanche size classification <sup>12</sup>
Characteristics of runout zone	Smooth runout Terrain trap
Victim information	
Avalanche professional	Yes (e.g., mountain guide, ski patroller) No
Use of avalanche transceiver	Yes No
Use of avalanche airbag	No Yes—non-inflated (also includes partially inflated) Yes—inflated
Reason for non-inflation	Destroyed in accident Technical device failure Deployment failure by user Maintenance error Unknown reason
Relative location when triggered	Starting zone Track or runout
Grade of burial	<b>Non-critical</b> (no impairment of airways) <b>Critical</b> (impairment of airways)
Traumatic injuries	None or minor (not requiring hospitalization) Major (requiring hospitalization)
Fatality	Yes No

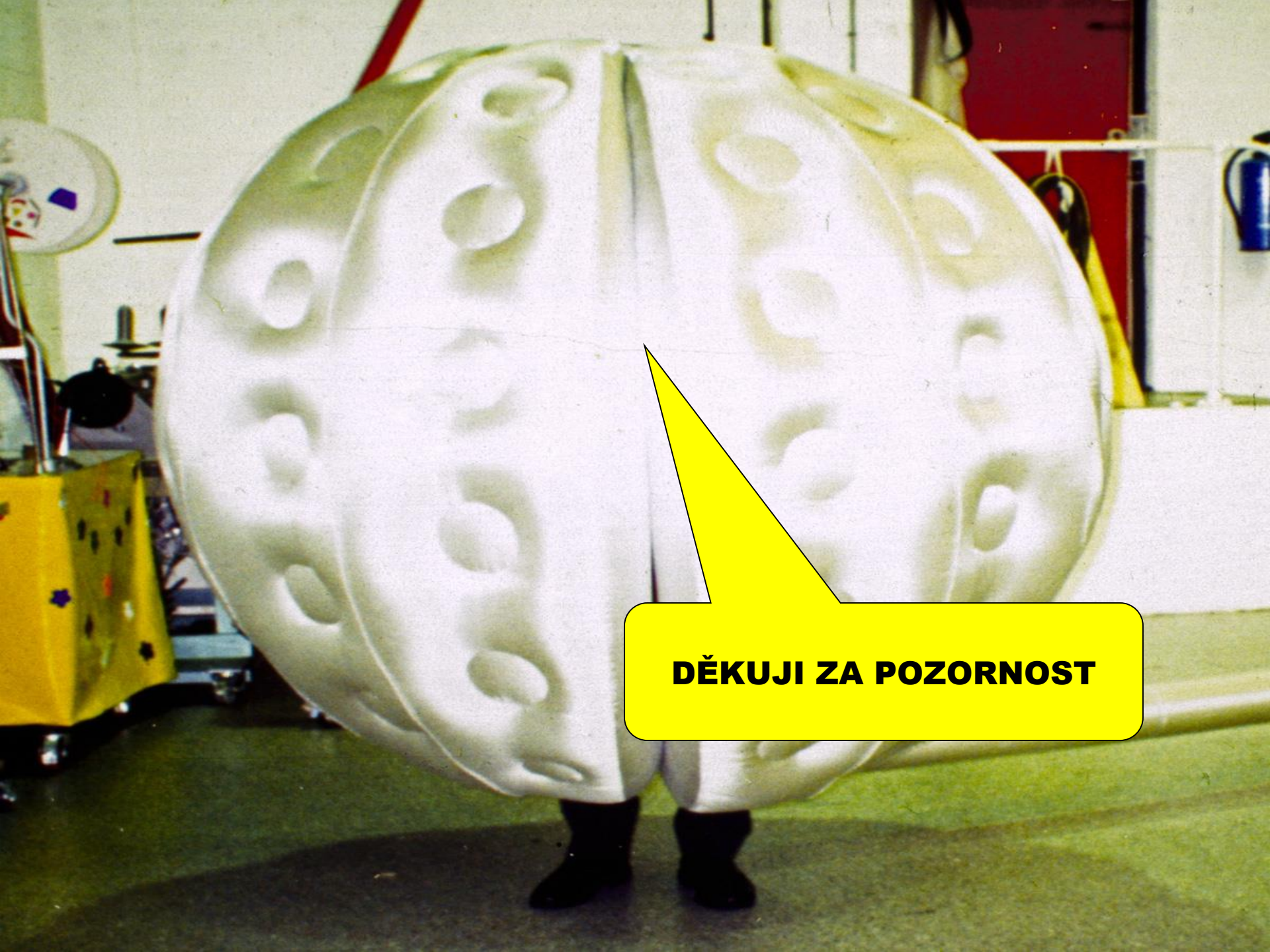




**Fig. 1.** Data included in the analysis on effectiveness and non-inflations (reported as number of accidents/number of victims).

a) Airbag use	Critical burial		Risk of critical burial	Fatality		Mortality
	No	Yes		No	Yes	
No	49	62	54%	77	40	34%
Yes – non-inflated	15	13		22	10	
Yes – inflated	60	14	19%	66	8	11%
	Absolute risk reduction		-35pp	Absolute mortality reduction		-23pp

b) Airbag use	Critical burial		Risk of critical burial	Fatality		Mortality
	No	Yes		No	Yes	
No	49	62	56%	77	40	34%
Yes – non-inflated	15	13	27%	22	10	17%
Yes – inflated	60	14		66	8	
	Absolute risk reduction		-29pp	Absolute mortality reduction		-17pp



**DĚKUJI ZA POZORNOST**