Fatalities in Skydiving

Anton Westman MD, PhD¹, ², ³

¹. Department of Neurobiology, Care Sciences and Society, Division of Physiotherapy, Karolinska Institutet, Stockholm, Sweden.
². Department of Physiology and Pharmacology, Section of Anaesthesiology and Intensive Care, Karolinska Institutet, Stockholm, Sweden.
³. Department of Anaesthesiology and Intensive Care, Karolinska University Hospital Huddinge, Stockholm, Sweden.

Photos courtesy of the White House, Magnus Caro, Hans Berggren, Peter Törnestam.
What is the risk of dying in skydiving?
What is the risk of dying in skydiving?

The risk of a non-fatal MAIS≥3 injury is circa one in 20,000 jumps.

Subtract modern healthcare, and several of those would have been fatalities.

---

**Table 2** Incidence rates of reported non-fatal skydiving injury events in Sweden during 1999–2003

<table>
<thead>
<tr>
<th>Jump volume</th>
<th>Reported incidents</th>
<th>Incidents per 100,000 jumps</th>
<th>Jumps per one incident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>539,885</td>
<td>257</td>
<td>48</td>
</tr>
<tr>
<td>Licensed</td>
<td>481,607</td>
<td>150</td>
<td>31</td>
</tr>
<tr>
<td>Student training*</td>
<td>58,278</td>
<td>107</td>
<td>184</td>
</tr>
<tr>
<td>Conventional</td>
<td>48,450</td>
<td>97</td>
<td>200</td>
</tr>
<tr>
<td>AFF</td>
<td>9,828</td>
<td>8</td>
<td>81</td>
</tr>
</tbody>
</table>

Equipment related†: 42,854

Serious incidents‡: 30,6, 17,996

AFF, accelerated free fall.
Tandem skydiving, military parachuting, airplane crashes and parachuting in other countries involving Swedish skydivers are excluded.
*In two cases, student training system was unknown.
†Incidence rate calculated from total jump volume. Including main parachute malfunctions, main pilot chute (the small round parachute that is deployed into the airstream to pull out the wing parachute) malfunctions, unintentional main and reserve parachute deployments, problems with the main parachute steering lines, other reasons for reserve parachute use and hard openings.
‡Maximum Abbreviated Injury Scale ≥3 severity. Incidence rate calculated from total jump volume.
What is the risk of dying in skydiving?

What is the risk of dying in skydiving?

Incidence of skydiving fatalities in Sweden 1964–2003

<table>
<thead>
<tr>
<th>Time period</th>
<th>Fatalities</th>
<th>Jumps</th>
<th>Fatalities per 100,000 jumps</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964–1973</td>
<td>5</td>
<td>58,215</td>
<td>8.6</td>
</tr>
<tr>
<td>1974–1983</td>
<td>13</td>
<td>262,037</td>
<td>5.0</td>
</tr>
<tr>
<td>1984–1993</td>
<td>10</td>
<td>703,782</td>
<td>1.4</td>
</tr>
<tr>
<td>1994–2003</td>
<td>9</td>
<td>1,126,704</td>
<td>0.80</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>37</strong></td>
<td><strong>2,150,738</strong></td>
<td><strong>1.7</strong></td>
</tr>
</tbody>
</table>


What is the risk of dying in skydiving?

Risk comparison

Skydiving in Sweden 1994–2003 suffered one fatality per 125 000 skydives.

➔ This risk is roughly comparable to maternal deaths per live birth in Sweden during the same period.

Skydiving in Sweden 1994–2003 suffered a mean annual fatality rate of 28 fatalities per 100 000 skydivers and year.

➔ This risk is roughly comparable to the motorcycle fatality rate in Sweden per registered motorcycles and year during the same period.

Swedish Road Administration, 2005.
Why do skydivers die in their sport?
Why do skydivers die in their sport?

For the year 2011, the International Parachuting Commission (IPC) registered 52 fatalities in 36 countries. The largest fatality categories were:

1. Fast Canopies - Intentional Fast landings: 29% (15 cases).

2. Canopy Collisions/Entanglements after Opening: 21% (11 cases).

3. No or Low Canopy Activation: 13% (7 cases).

4. Landing Errors 12% (6 cases).

5. Equipment Problems 10% (5 cases).

Why do skydivers die in their sport?

- 85% (44) of these fatalities happened with the skydiver having at least one good parachute on his or her back.

- 62% (32) of these fatalities occurred after successful deployment of the main parachute.

Why do skydivers die in their sport?

In conjunction with the seven (13%) cases of No or Low Canopy Activation, the following number is noted in the 2011 Report:

At least 51 lives were saved by the use of automatic reserve activation devices (AAD), if it can be assumed that an AAD firing is a life saved.

This is why several skydivers have not died in their sport:

A new generation of automatic reserve activation devices (AAD) came out on the market in the 1990s. Their reliability led to widespread acceptance and use, notably reducing the number of no-/low-pull fatalities.
Why do skydivers die in their sport?

The 1990s also saw the introduction of high performance wing parachutes, notably increasing the number of landing fatalities.

The 1990s has been called "A Decade of Landing Deaths".

But as you could see in the 2011 world statistics, the skydiving landing death epidemic still rages.

Bill Clinton and George H.W. Bush, 41st and 42nd Presidents of the United States, are shown only to illustrate the time period. Bush holds license D-20000 of the United States Parachute Association.
Why do skydivers die in their sport?

So, one short (simplified) answer to this question could be:

”Because of wing parachute pilot error”.

Those of you who attended the lecture on Injuries in Skydiving will know that flying and landing a modern wing parachute requires specialized aviator training, skills and considerations.
Why do skydivers die in their sport?

This is a pilot of a high performance aircraft. Landing speed may exceed 100 km/h.
Why do skydivers die in their sport?

- **Drownings.** Of a total 37 skydiving fatalities in Sweden 1964-2003, 5 (14%) were drownings.

- **Airplane crashes** (Recent tragedy in Finland, 8 dead).

- **Student freefall instability.** One of the 2011 worldwide fatalities occurred when a student went unstable in freefall and did not pull any handle. Of a total 37 skydiving fatalities in Sweden 1964-2003, twelve (32%) were students with freefall instability, leading to no or too low parachute activation, or entanglement with the deploying parachute.

On his second student jump, George H.W. Bush unintentionally flipped over on his back in free fall. His instructors alongside turned him back right again.

A student skydiver in a dangerously unstable body position, with a river below.
What can be done?

Recognition of the modern parachutist as pilot of a high performance aircraft.

Appropriate student training, targeting freefall (wind tunnels before actual jumping, tandem jumps, freefall instructors) and parachute flight (filmed landings, radio instruction).

Experience/skill level considerations when progressing to faster parachutes.

High-speed landings separated from other parachute traffic.

Impact energy absorbers (swoop ponds, body armor).

Further development of specialized aviation technology.
Thank You.

Questions?

anton.westman@ki.se