PSI-01-11

Accident Data: Side Impacts with Poles

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on behalf of
EEVC WG 13 and WG 21

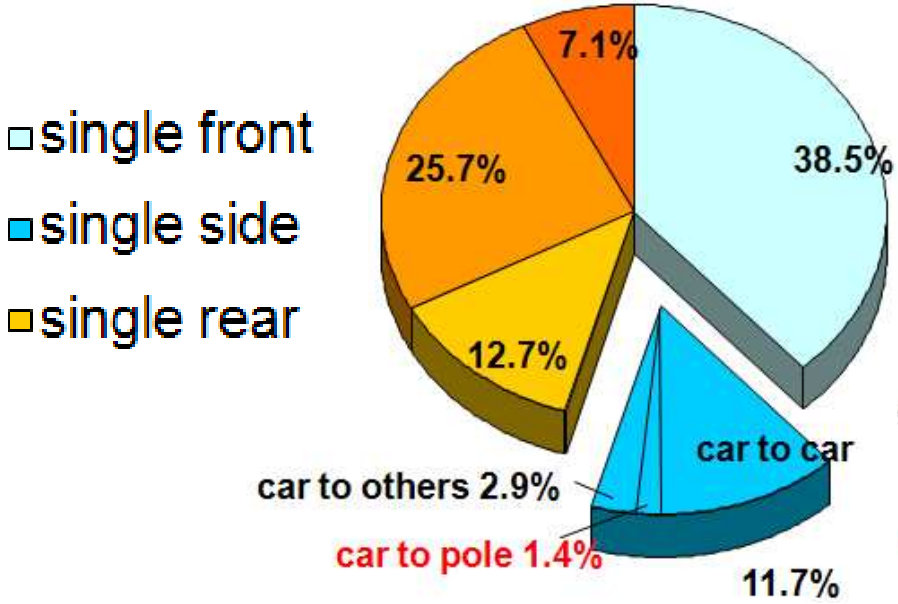
Informal Group on a Pole Side Impact GTR (PSI)
Nov. 2010

Questions on pole side impact:

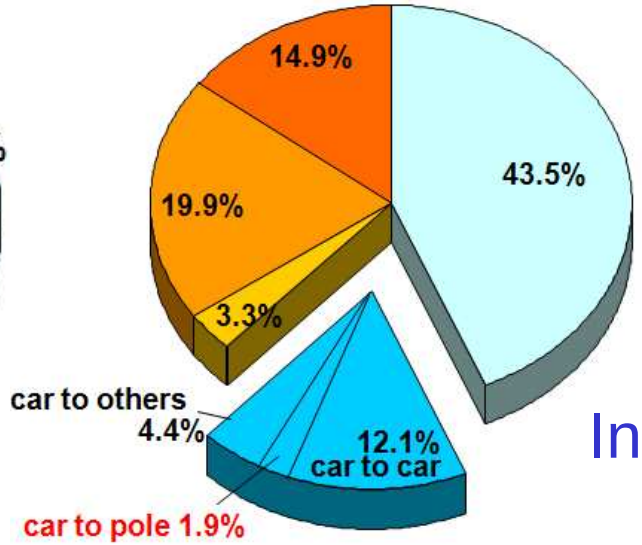
- **Frequency of pole side impact?**
- **Severity of pole side impact?**
- **Injured body regions?**
- **Impact speed?**
- **Direction of force (including severity)?**
- **Diameter of pole?**
- **Damage area in pole side impacts?**
- **Occupant age distribution in pole side impacts?**
- **Effect of ESC?**

Frequency of pole side impact

GIDAS - Passenger car accidents by impact type, n=10.644, accidents to vulnerable road users excluded



CCIS - Passenger car accidents by impact type n=10.377

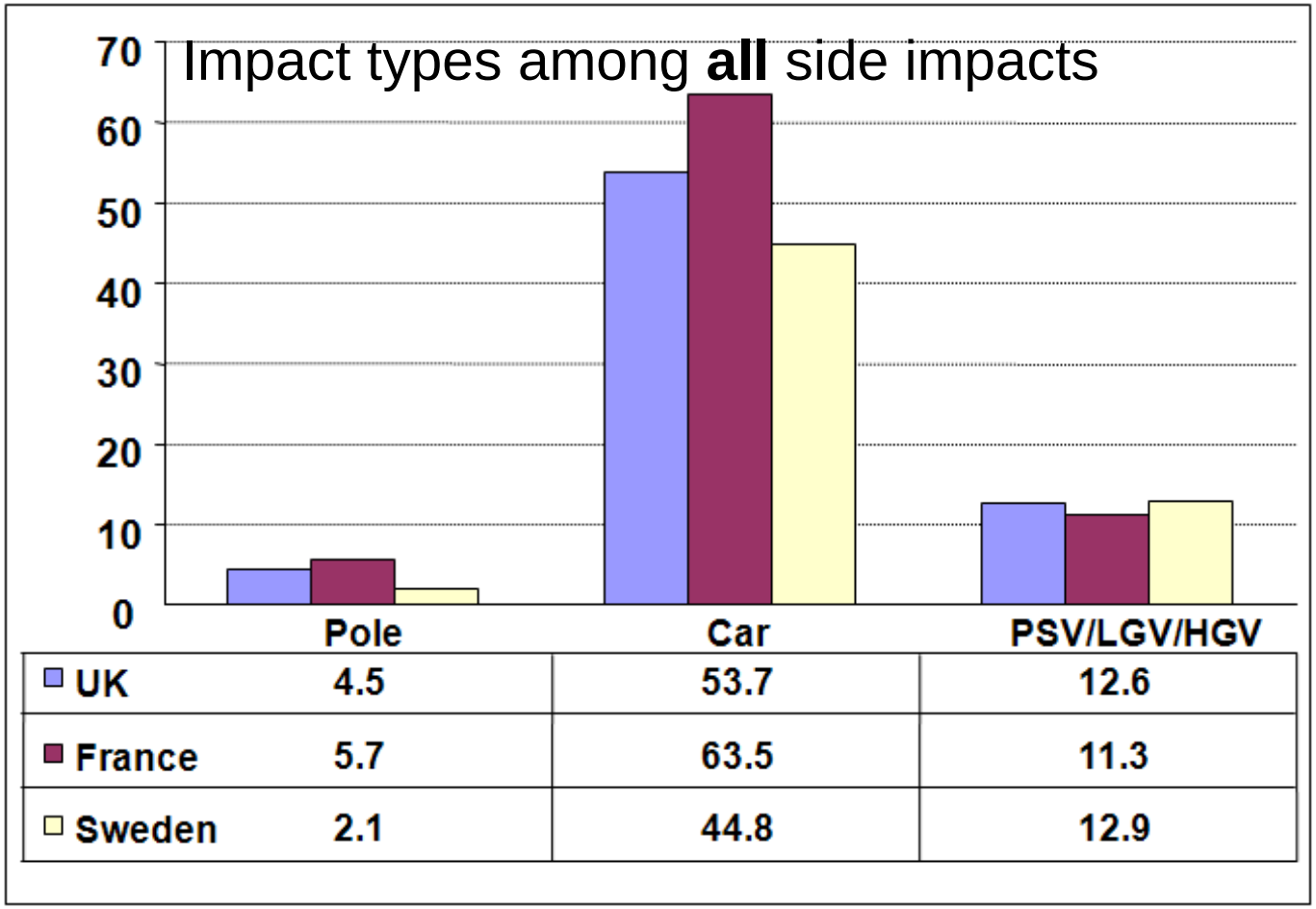


In depth data

Result:

Pole impacts are not very frequent

Frequency of pole side impact



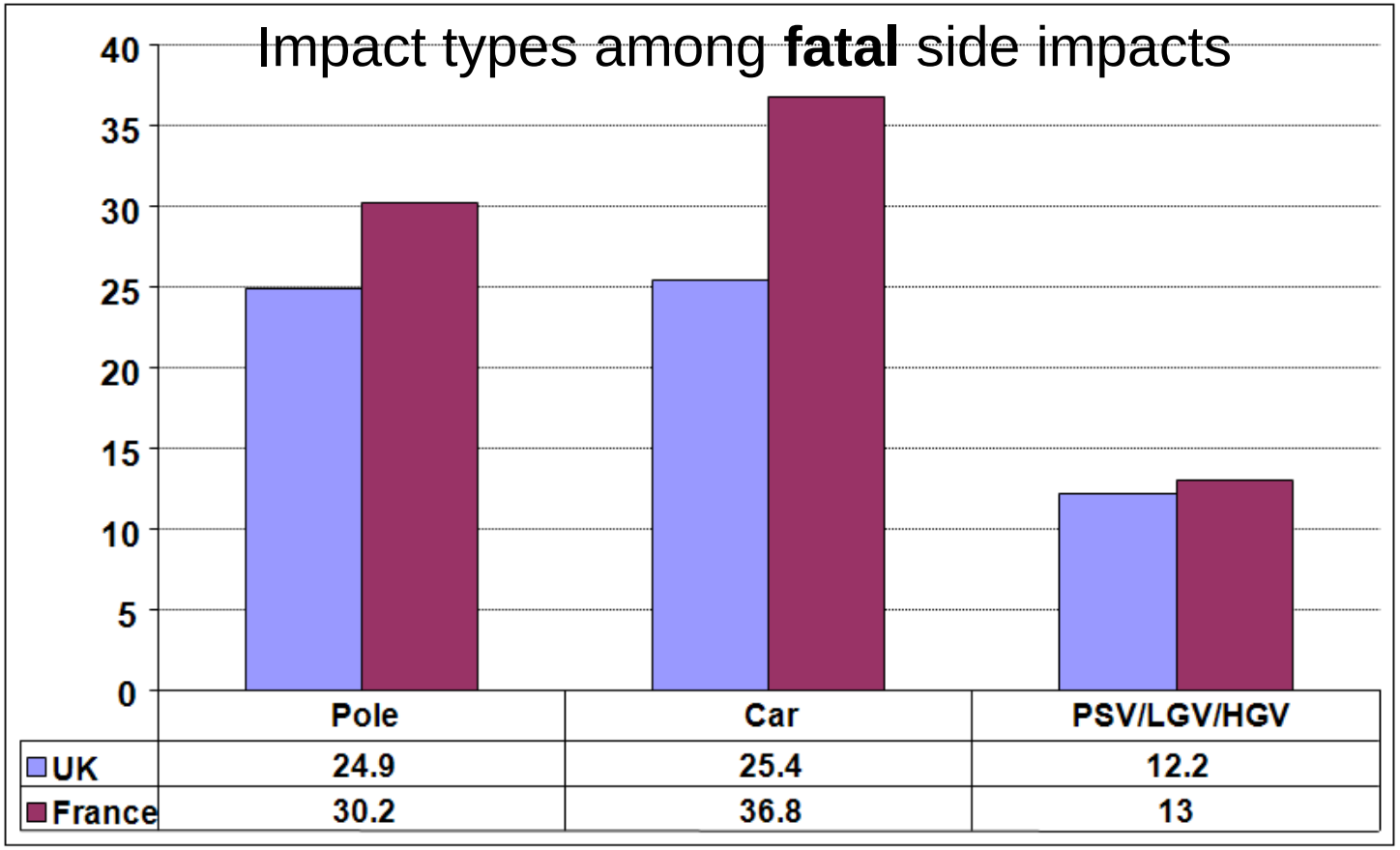
	Pole	Car	PSV/LGV/HGV
UK	4.5	53.7	12.6
France	5.7	63.5	11.3
Sweden	2.1	44.8	12.9

National data

Result:

Pole impacts are not very frequent

Severity of pole side impact



	Pole	Car	PSV/LGV/HGV
UK	24.9	25.4	12.2
France	30.2	36.8	13

National data

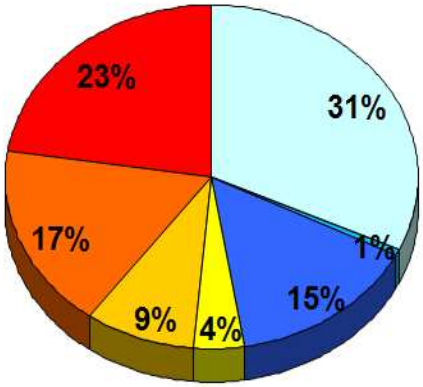
Result:

Pole impacts are very severe.

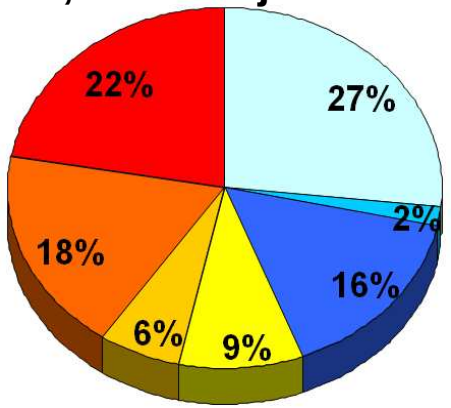
In UK similar amount of fatalities in “car to pole” as in “car to car”

Injured body regions

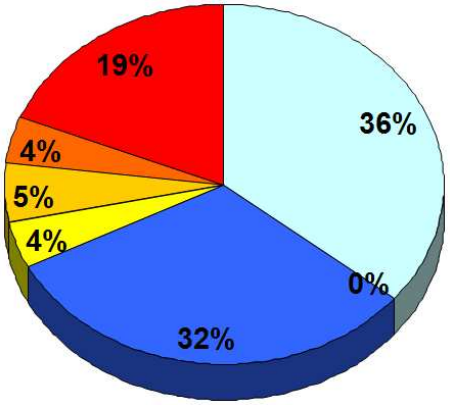
GIDAS - AIS1+ injuries by body regions, belted occupants, n=420 injuries



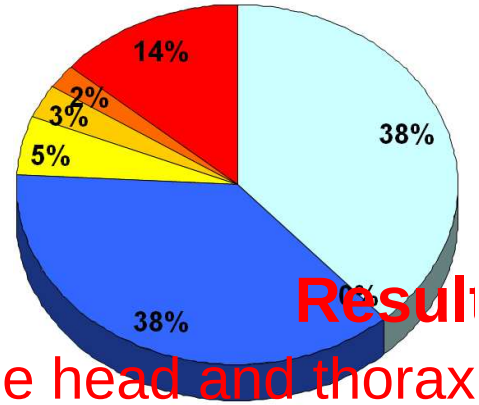
CCIS - AIS1+ injuries by body regions, belted occupants, n=980 injuries



GIDAS - AIS3+ injuries by body regions, belted occupants, n=95 injuries



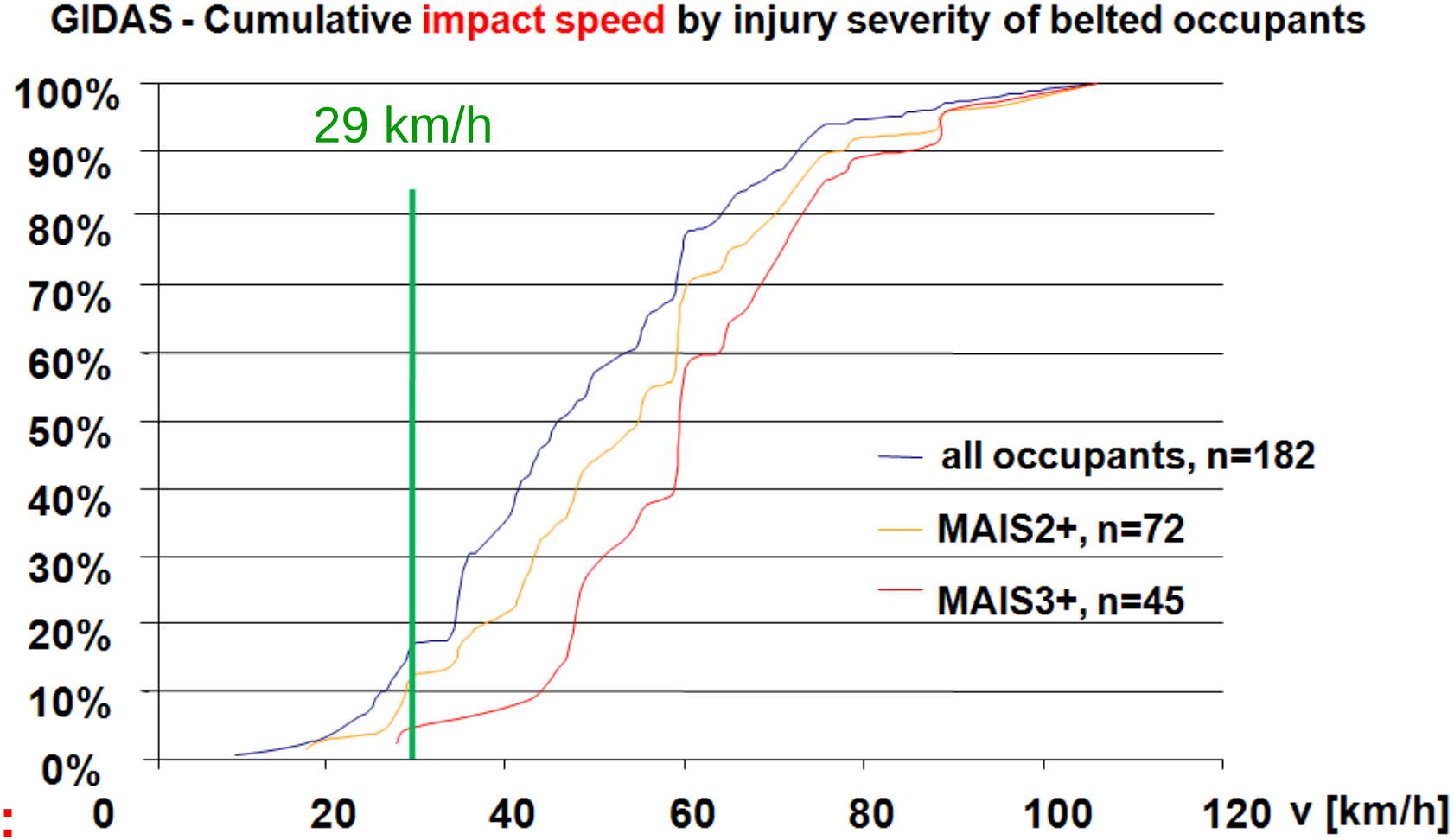
CCIS - AIS3+ injuries by body regions, belted occupants, n=233 injuries



Result

For all injury severities the head and thorax injuries are very dominant, for low severities also the spine is of importance

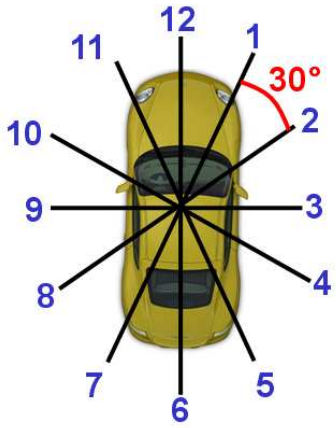
Impact speed

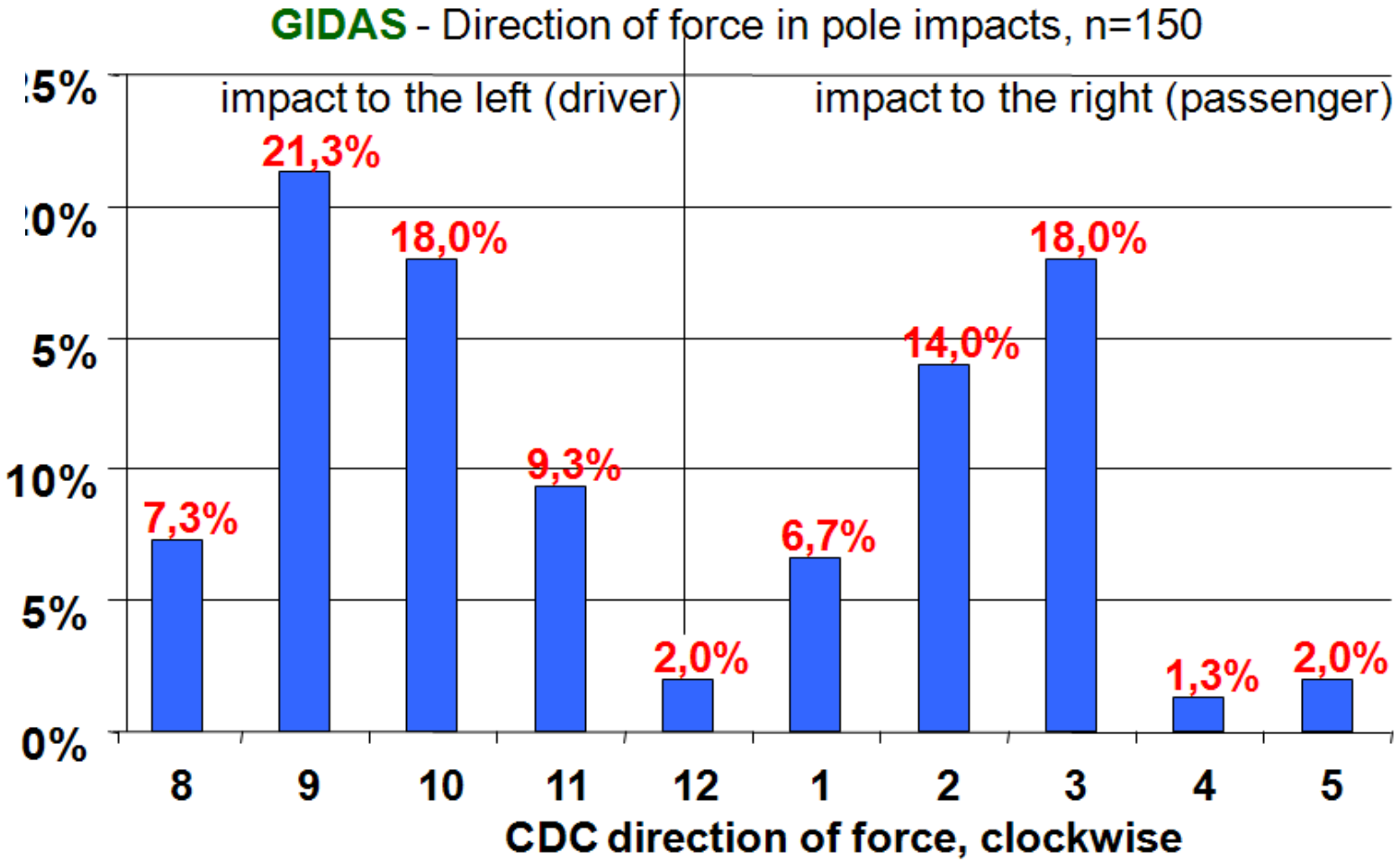


Result:

- 50% of the occupants had a side to pole impact with an impact speed below 46 km/h
- 14 cases represent an impact configuration comparable to the Euro-NCAP pole test

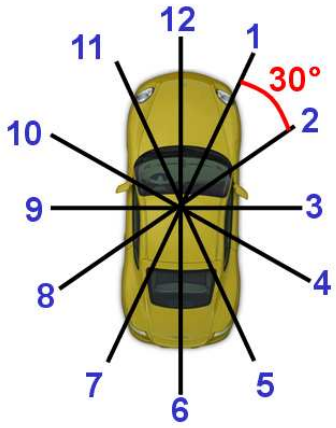
Direction of force

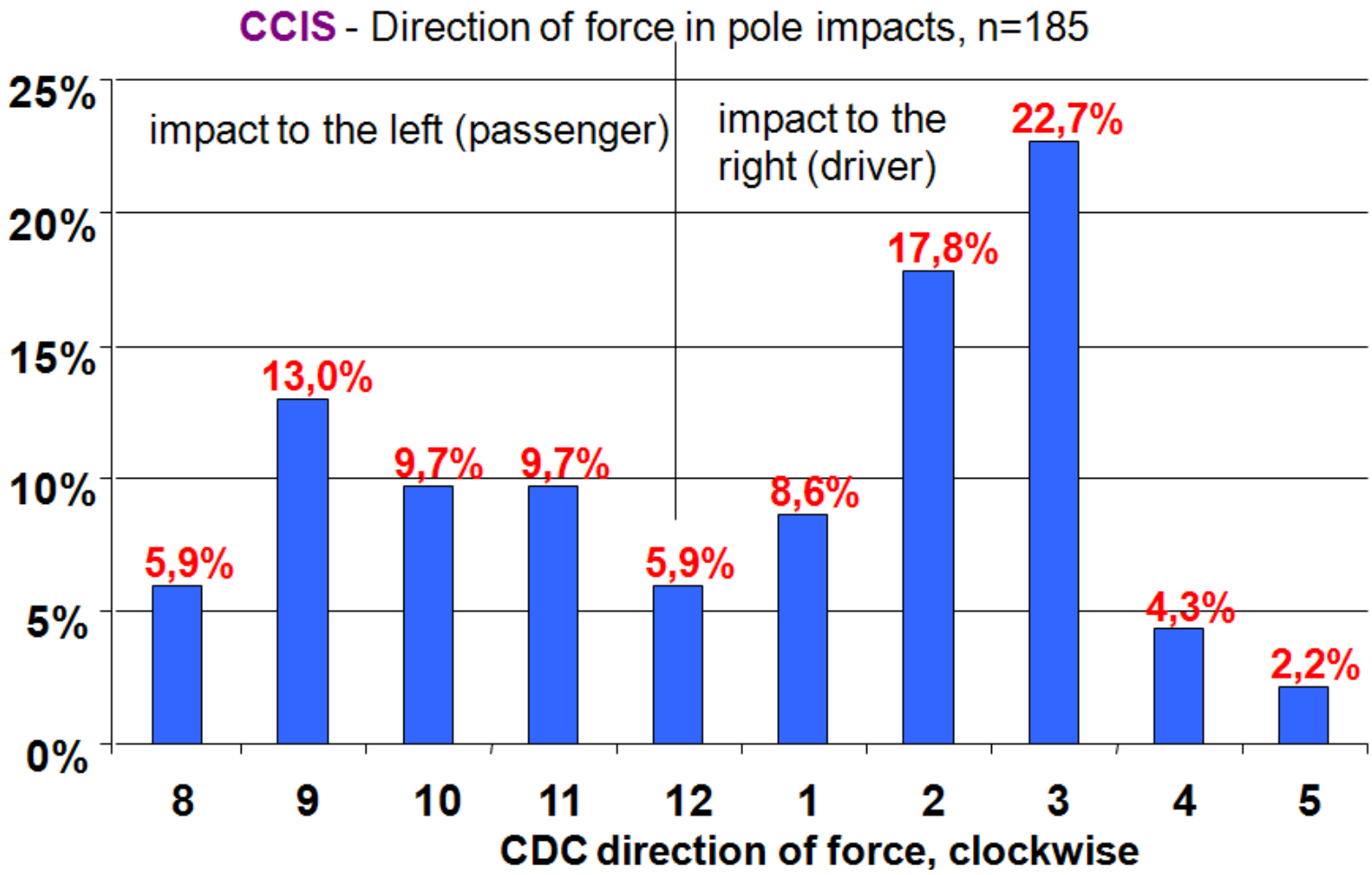




Result: Perpendicular is the most frequent impact direction

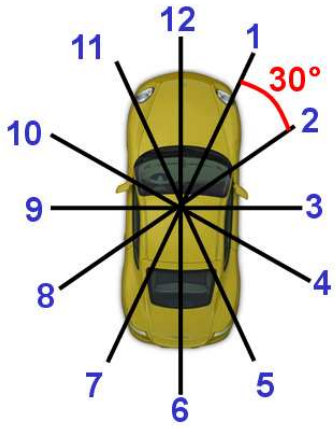
Direction of force

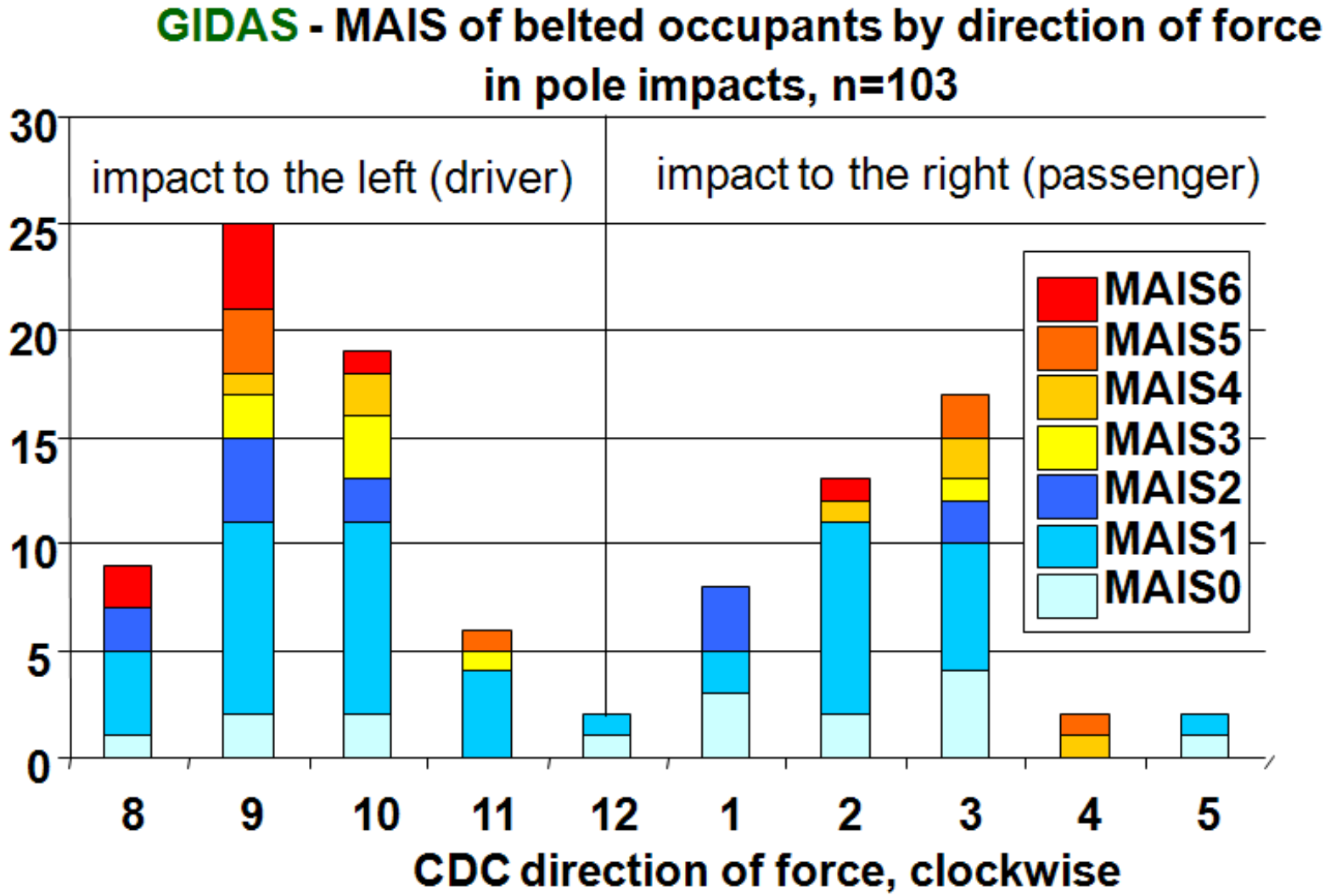




Result: Perpendicular is the most frequent impact direction

Direction of force including severity

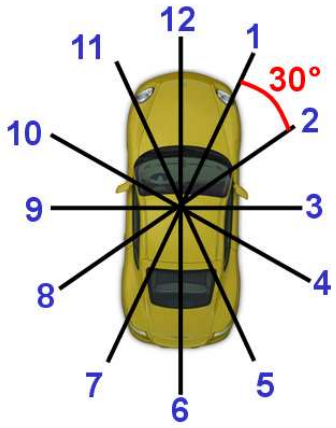


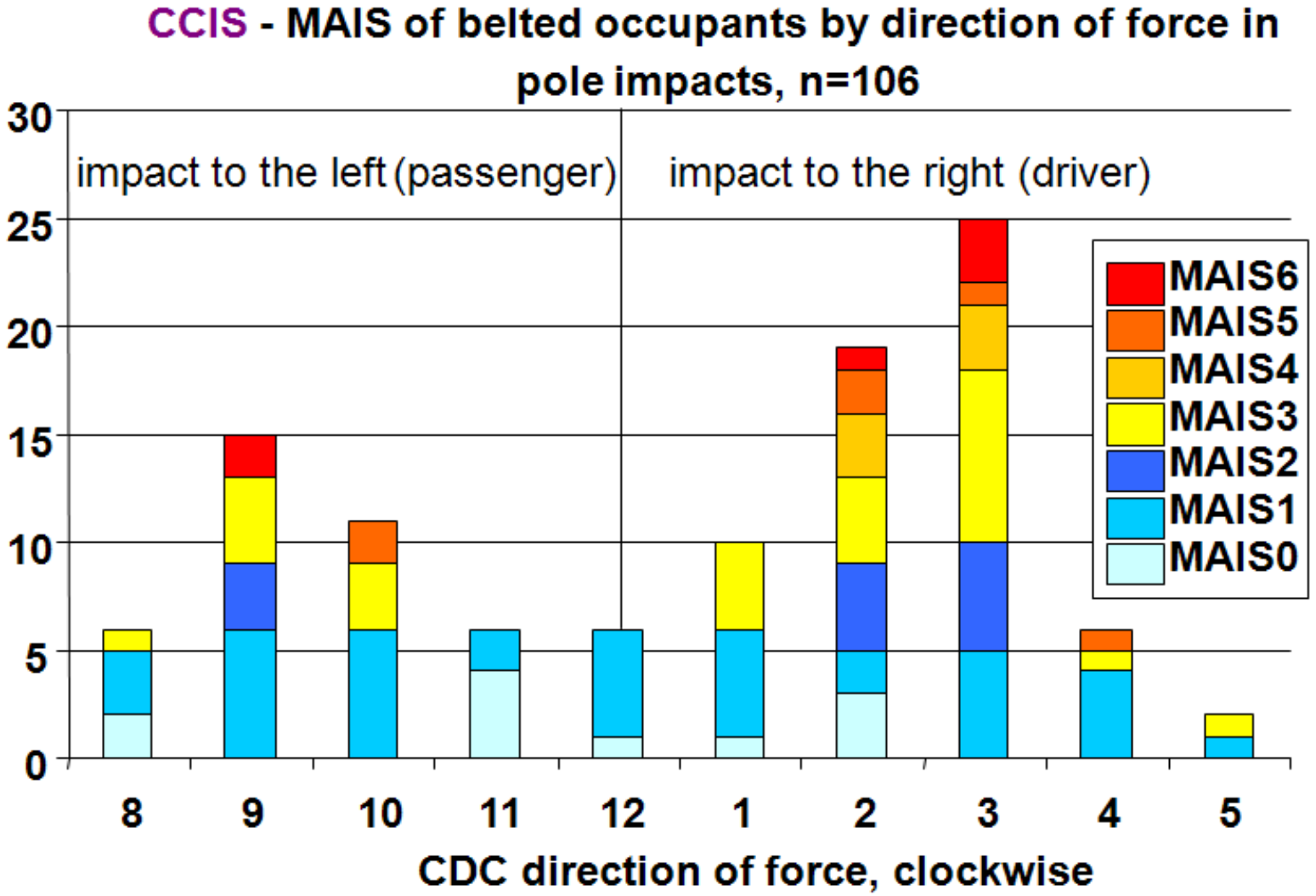


Result:

Perpendicular is the most frequent **AND** most severe impact direction

Direction of force including severity

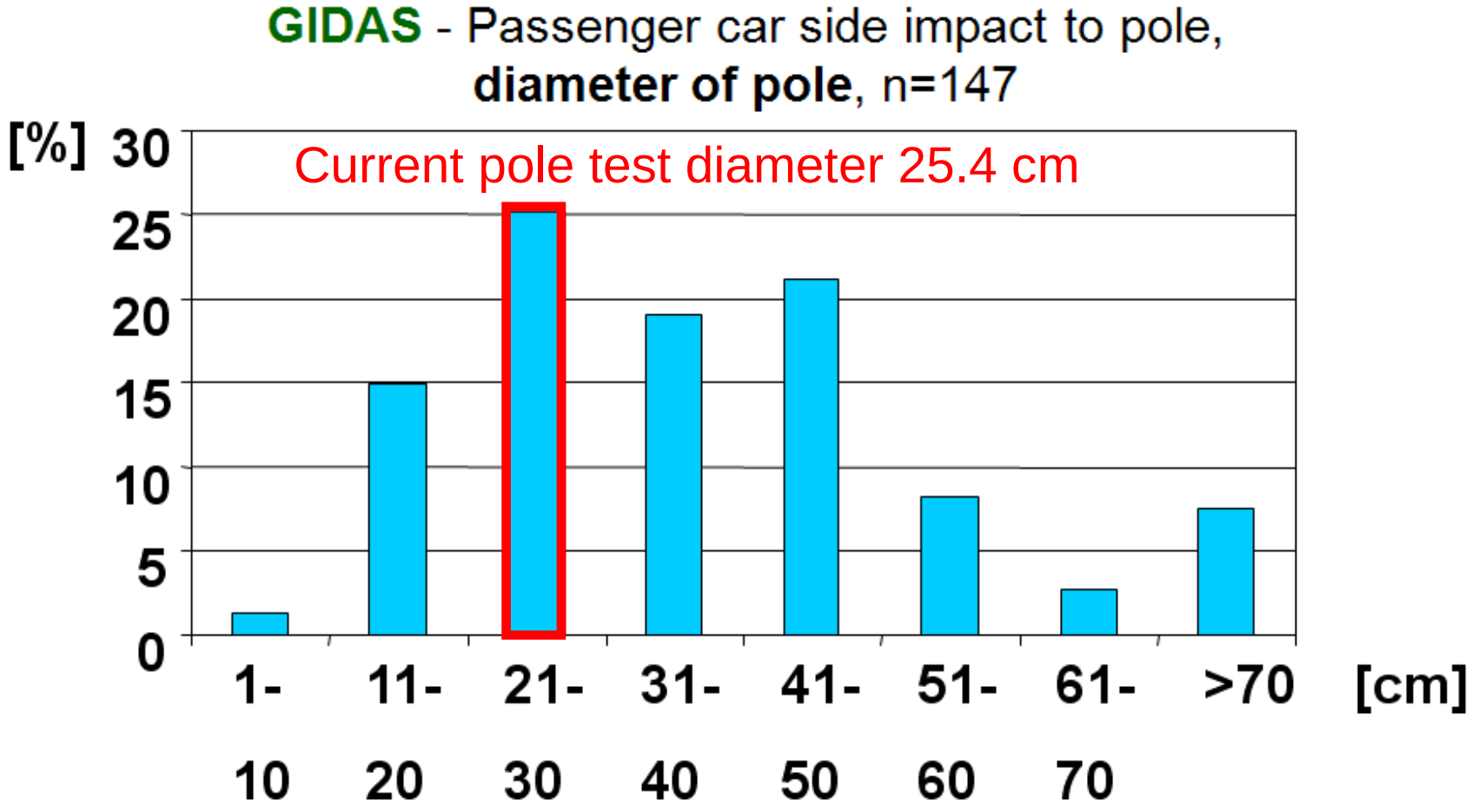




Result:

Perpendicular is the most frequent **AND** most severe impact direction

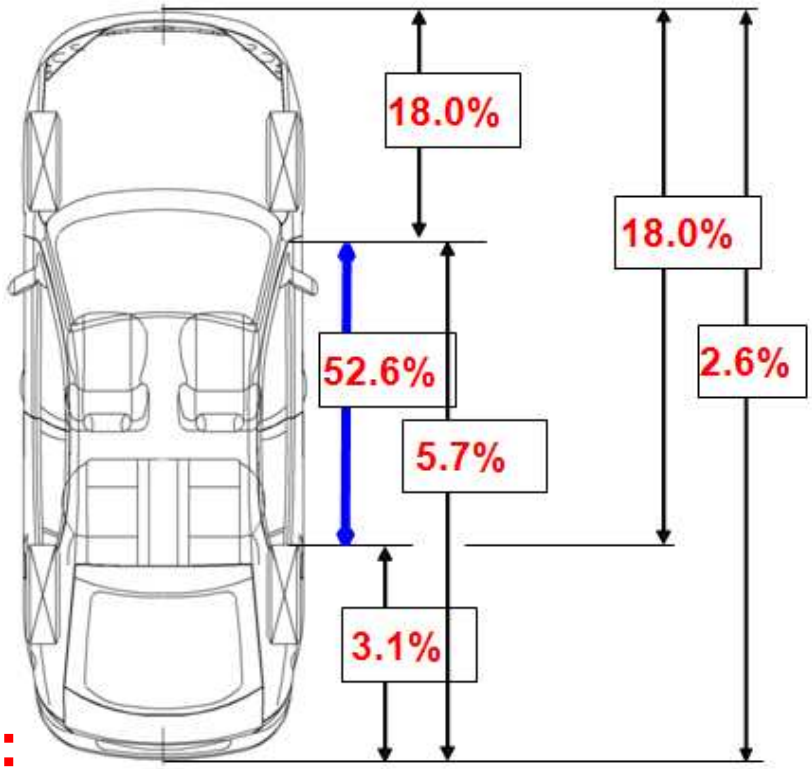
Diameter of Pole



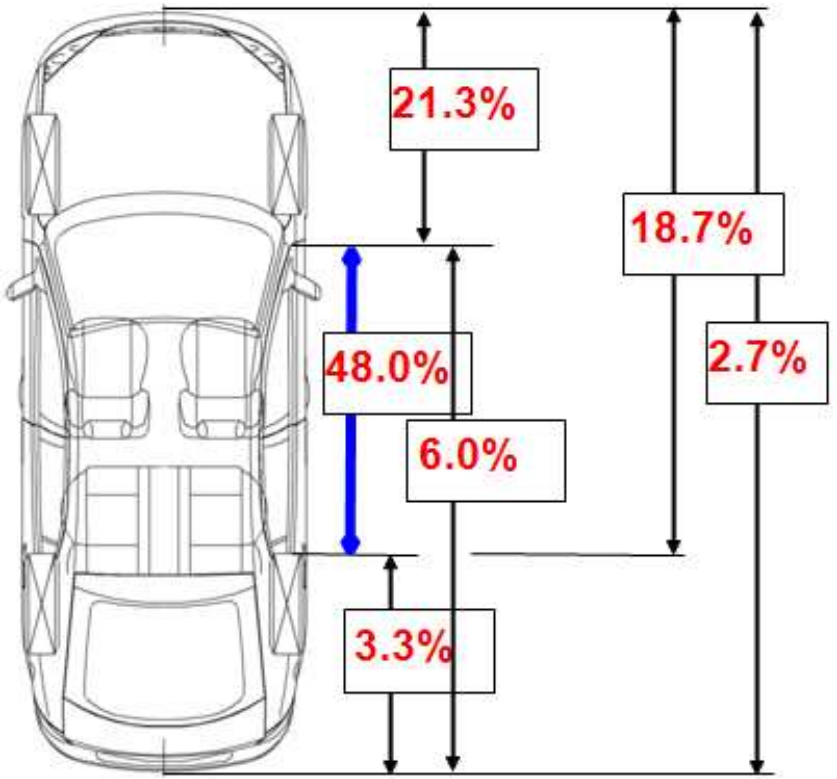
Result: The pole diameter in current legislation seems appropriate

Damage area in pole side impacts

GIDAS - Damage area, n=150



CCIS- Damage area, n=194



Result:

- The by far highest proportion (50%) of all pole impacted vehicles show damages exclusively in the passenger compartment.

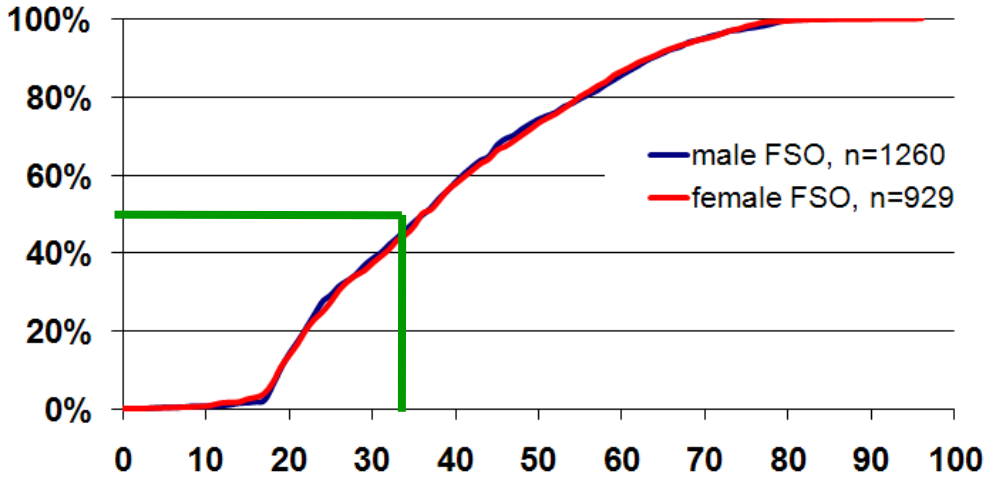
- Fatal injuries normally only occur when passenger compartment is damaged.

Occupant age distribution in single side impacts

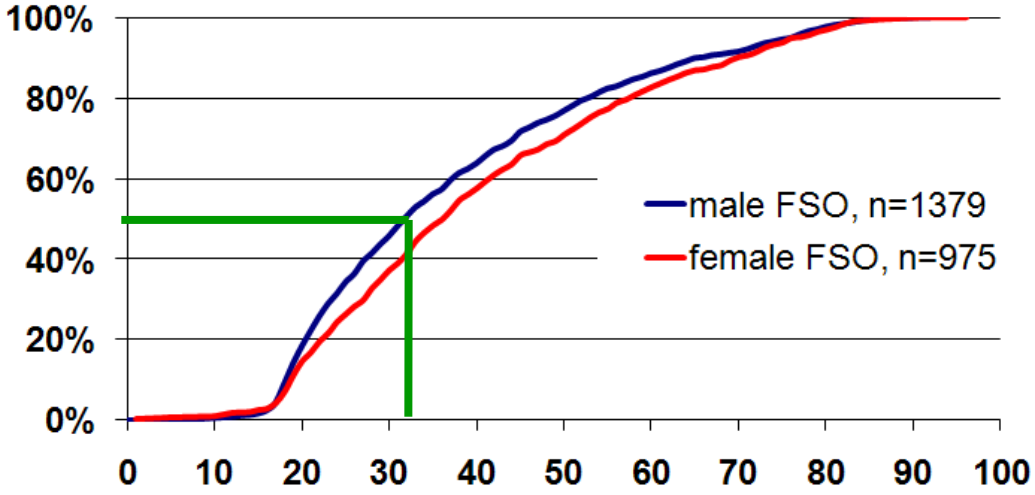
Result:

Marginal difference between male and female in CCIS, in GIDAS no difference between male and female

GIDAS – Age distribution in passenger cars with single side impact



CCIS– Age distribution in passenger cars with single side impact



Result:

The 50% value is at about 32 years

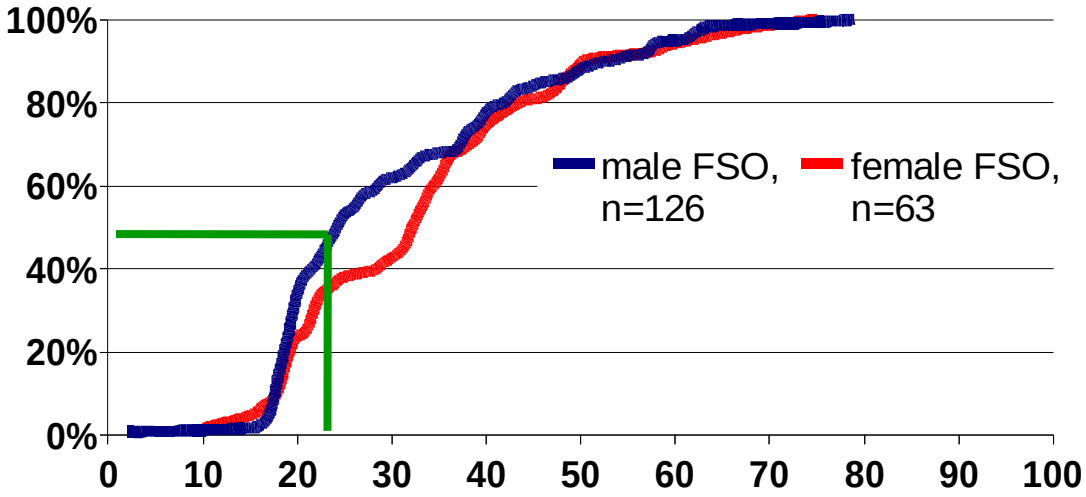
FSO = Front seating occupant

Occupant age distribution in pole side impacts

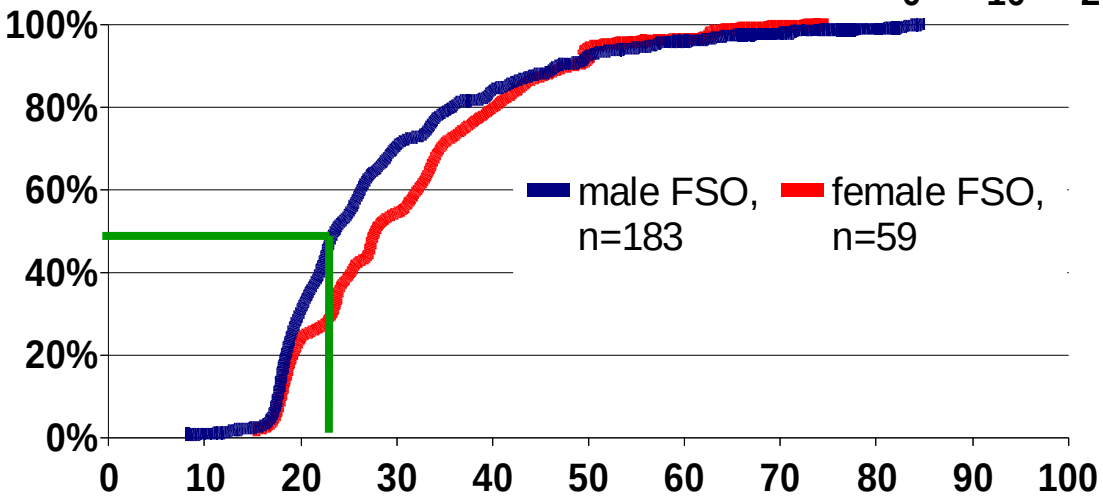
Result:

Young man are most dominate in side to pole impacts

GIDAS – Age distribution in passenger cars with single side to pole



CCIS– Age distribution in passenger cars with single side to pole

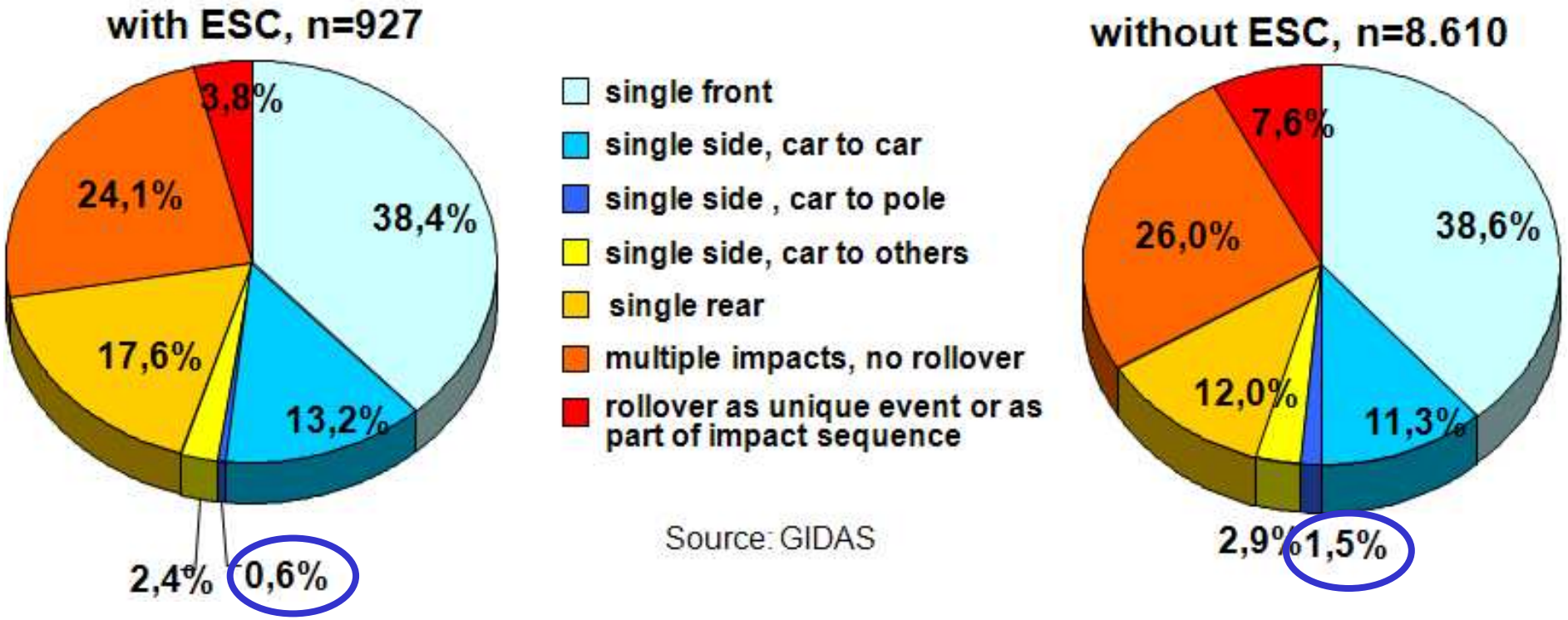


Result:

The 50% value decreases from 32 years in all side impacts down to 24 years in pole side impacts

FSO = Front seating occupant

Effect of ESC



Result:

- Pole side impacts are reduced from 1.5 to 0.6% of all accidents
- Further analysis showed that ESC seems not to reduce the injury severity once an accident has happened

Questions and answers on pole side impact:

- **Frequency of pole side impact?**

  Rare

- **Severity of pole side impact?**

  Very severe => therefore of importance

- **Injured body regions?**

  Mainly head and thorax, also spine for low severity

- **Impact speed?**

  Often higher speeds but a speed around 30km/h seems reasonable

- **Direction of force (including severity)?**

  Perpendicular impacts occur with highest frequency AND highest severity

Questions and answers on pole side impact:

- **Diameter of pole?**

  254 mm seems reasonable (most frequent diameter in side pole impacts is between 210mm and 300 mm)

- **Damage area in pole side impacts?**

  Passenger compartment for 50% of all impacts and nearly for 100% of fatal injured occupants

- **Occupant age distribution in pole side impacts?**

  Young man have significantly often side pole impacts

- **Effect of ESC?**

  Number is small but some benefit is visible. If accident happens, ESC has no influence on injury severity.

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Thank you for your attention