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Agenda item A.2)

# CHILD OCCUPANT SAFETY



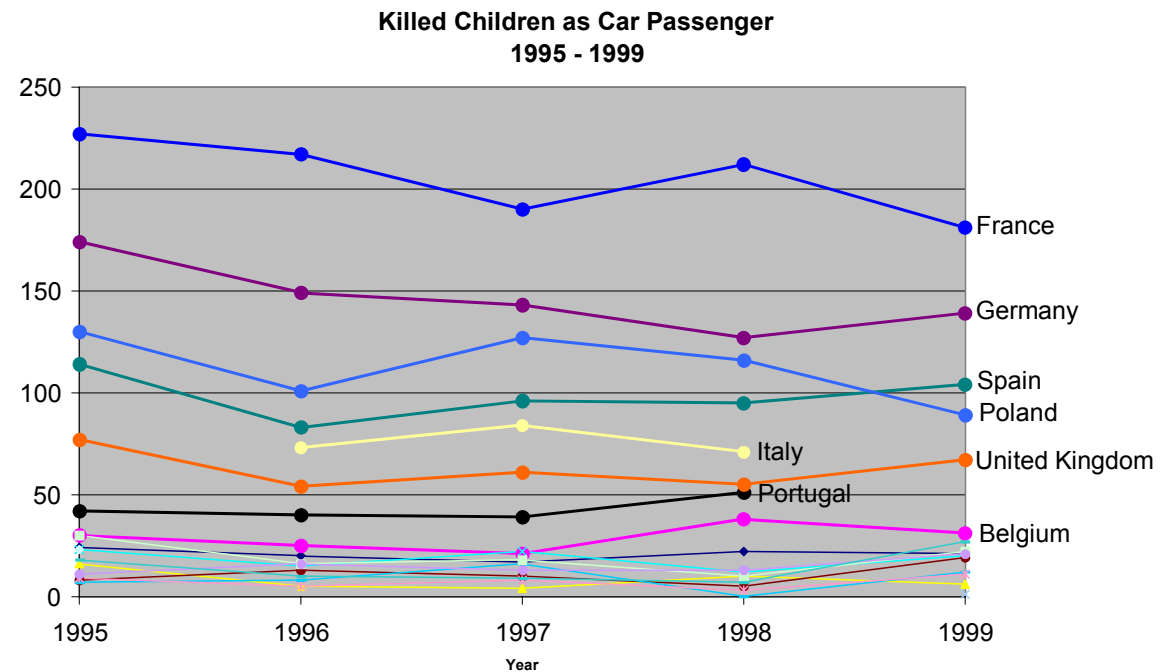
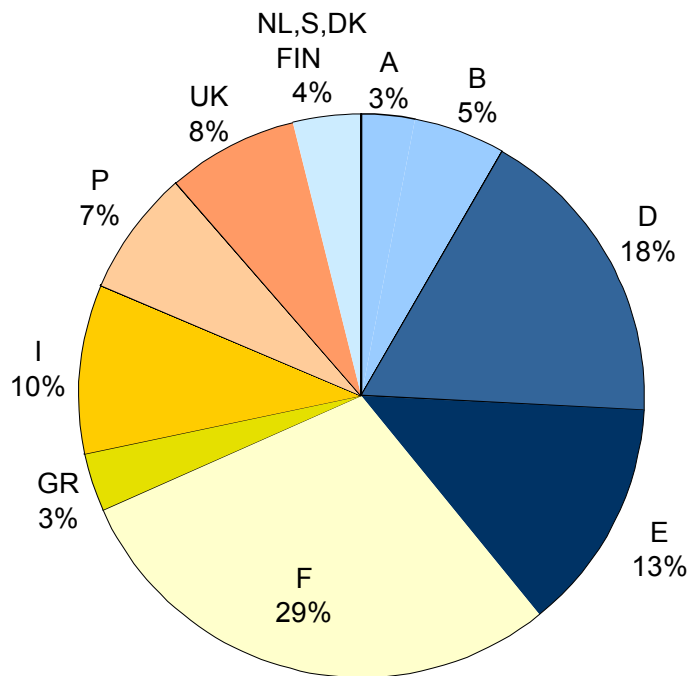
EUROPEAN ENHANCED VEHICLE-SAFETY COMMITTEE

## WORKING GROUP 18

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## ⚡ Accidentology in cars...

- In 1998 : 2 children killed each day as car passenger on European roads
- From 1995 to 1999, number of children killed or injured is decreasing, situations contrasted according to countries



## ⚡ Overview of existing databases

- European database - IRTAD
  - Global comparison between 29 countries or regions
  - No in-depth analysis
- National databases
  - Germany, France, United Kingdom, Sweden, Italy, Spain
  - No compatibility

### Results:

- International databases are not sufficiently focussed on child safety to have a clear & detailed view of the situation.
- Harmonization of accidentological data in EU to have a significant base statistically usable, credible and representative

## ⚡ Overview of existing databases

- Specific databases
  - Mainly dealing for research

- **CREST/CHILD**: 628 restrained children

Not representative of real world but focussed on severe crashes.

Very detailed for

- restraint systems,
- crash severity and configuration,
- injury description

Only frontal and side impacts.

- **CCIS**: 425 children

Not representative of real world but usefull for finding injuries.

Type of restraint not always known  
Complete medical reports available.

- **GIDAS**: 168 children

Most of the cases with severe injuries (AIS 2 +) are in the CREST database or to be input in the CHILD database.

FRONT PASSENGER SEAT			
Seat used:	YES	Load limit type:	N/A
Child restraint type:	Frontal	NA	NA
Age	Weight	Height	Sex
1;00	10	4	2
Weight	Height	Sex	Occupant category
10	4	2	2
Head/Neck Injuries	Seatbelt	Seatbelt	
Head/Neck Injuries	Seatbelt	Seatbelt	
Other	Seatbelt	Seatbelt	
Other	Seatbelt	Seatbelt	

## ⚡ Overview of existing databases

- Specific databases

- Mainly dealing for research

- **LAB gn96**: 1327 children

- Representative of car to car and car to obstacle crashes countryside crashes in France.

- Very detailed for
        - restraint systems,
        - crash severity and configuration,
        - injury description.

- Data on frontal, side, rear impacts and roll overs.

- **Questionnaire** : 230 children

- Not representative and injury level is defined by parents,  
Over-representativity of rear impacts.

- **GDV** : more than 350 children

- Most of the cases with severe injuries (AIS 2 +) are in the CRESTdb or to be input in the CHILD database.



## ⚡ General conclusions from databases

- Restrained children are better protected than unrestrained, especially when using an appropriate CRS.
- The risk of severe injuries is small for properly restrained children up to a  $\Delta V$  of 40 km/h in frontal impacts.
- Swedish experience shows good results with rearward facing systems for children up to 3 years of age
- Existing CRS have been mainly designed for protection in frontal impact.
- CRS protection in side impacts is not sufficient
- Determination of major injury mechanisms / type of CRS is possible for different type of impacts

## EEVC WG 18 points out items

- for frontal impacts :

Test bench (geometrical + properties)

Severity of test (shape of pulse)

Biofidelity and instrumentation of dummies,

Criteria based on body segments on which injuries occur.

- for side impacts :

Introduction of side requirements,

Biofidelity, instrumentation of dummies and associated criteria

## ⚡ Background and development of dummies...

- P-serie dummies are in R44 today:

- Family is complete
- They were adapted for evaluation of protection in frontal impact.
- Probably not the optimal dummies for all impact directions.
- Some criteria used are not relevant anymore.



- Q-serie dummies :

- Family is not complete:
- Q3 in production, Q1 and Q6 ready for production
- Q0 is developed (first prototypes available in CHILD)
- Q1 1/2 is under development, Q10 is possible.
- Designed for all impact directions.
- Criteria are available for some body segments in frontal impacts (research programs are working on the subject)





## ⚡ Background and development of dummies...

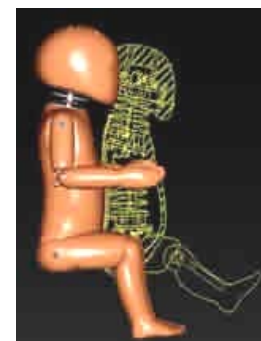
### Hybrid III family

- They are designed for evaluation of protection in frontal impact.
- H3, H6, H10
- Born in 1992, updated 1997
- Criteria are available for some body segments in frontal impacts



### CRABI dummies

- 6m, 12m, 18m
- Designed for all impact directions.
- With or without airbag interaction
- Criteria are available for some body segments in frontal impacts



## ⚡ Criteria and injury mechanisms

### **ECE R-44 :**

- Resultant thoracic acceleration and vertical component of this acceleration
- Head displacement

### **US FMWSS213 :**

- + limitation of the HIC value

### **What is new ?**

ISO/TC22/SC12/WG6

Technical report with some injury risk curves

CREST program results

CHILD program results

## ⚡ Accidentology in coaches and buses



- No official European database is available. Some countries have statistical data on situation of children in coaches and buses
- For protection of children in buses and coaches, specific legislations exist but there is no common position.
- From experts point of view:
  - Necessity to limit the number of children transported to the number of seats available in the vehicle.
  - It is better, as the major risk is the ejection, to have all children after a certain age restrained with a 3 pt belt than having them unrestrained. For younger ones the use of additional CRS should be required.
  - Retractor systems should be better than static systems

## ⚡ Main conclusions...

- Too many children are not / not properly restrained in EU. Information, misuse reduction, and police actions are necessary
- Knowledge both in accidents research and biomechanics has made a significant step these last years and this allows to think of a revision of R44 .
- Step by step introduction of dummies and criteria seems to be possible.
- Pursuit of the development of a family of biofidelic dummies, integrating biomechanical criteria when available.
- Estimate the importance and the effect of misuse, measure the impact of the introduction of ISOFIX devices on that sensible point.

