CHILD OCCUPANT SAFETY

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

![Pie chart showing percentage of children killed in different countries]

![Line graph showing trends in number of children killed in different countries from 1995 to 1999]
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 useful 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.
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-representatitivity 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.
• 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 deltaV 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.