EPIDEMIOLOGICAL ANALYSIS OF FAR-SIDE CRASHES FROM RECENT NASS-CDS DATABASES

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1991 – Mackay
  • UK → 193 far-side crashes
  • Head, abdominal, and thoracic injuries
1998/99 – Frampton
  • Study examined influence of other occupants
  • Injury influenced by angle and intrusion
  • Head most injured
2000 – Augenstei
  • Head injuries → Higher severity
  • Chest & abdomen → Lower severity
2005 – Gabler
  • Head & chest most injured
  • DeltaV and damage extent → injuries
  • > 24 km/h
2006 – Pintar
  • Matched paired PMHS, WorldSID and THOR sled tests
2010 – Fildes & Digges
  • Passenger Vehicles Occupants → Chest and head injuries
Near Side V. Far Side

Near Side

Far Side
Inclusion Criteria

- US NASS-CDS database
- 2000-2013
- Model Years 2000-2013
- Outboard, adult far-side front seat occupants
- Impact to opposite side of occupant
- Rollovers and ejected occupants excluded.

⇒ 2M weighted cases
“Oblique” crash test

-50 msec
“Oblique” crash test
Occupant injury numbers
Age/Height/Gender

Gender

- Male
- Female
- Unknown

Odds vs. MAIS2+ and MAIS3+

- Age (per year)
- Height (per cm)

Odds vs. MAIS2+ and MAIS3+

- Male
- Female
Vehicle type

- Passenger: 63%
- SUV/Truck: 34%
Vehicle Type

![Bar chart comparing odds for Passenger and SUV/Truck categories with MAIS2+ and MAIS3+ categories.](image)
Seat location

Occupant Location

- 73% for Driver
- 27% for Passenger

- Driver
- Passenger
Contact location

![Contact Location Chart]

- Restraint/Seat back
- Driver Side
- Center
- Passenger Side
- Other occupant/veh

- MAIS2+
- MAIS3+
Countermeasures

- 1995 – Patent issued – center air bag deploys from roof
- 1996 – Patent issued – air bag at inboard side of seat
- 2011 – GM announces “first front center air bag”
- 2013 – GM crossover models offer center airbag
Injured Body Region

![Bar chart showing the distribution of injuries by body region.](chart.png)
Intrusion (Occupant Space)
Data subsets

1\textsuperscript{st} subset
- Removed 6 and 12 o’clock impacts
- 1.7 M weighted cases

2\textsuperscript{nd} subset
- Limited to 2-3 and 9-10 o’clock
- 1.0 M weighted cases

Similar numbers
Conclusions

- **Broad/general search** → ~ 2 M Far-Side impacts 2000-2013
- **Driver position** → 73% crashes
  - Occupant in driver position
- **Passenger vehicle** → 63% crashes ; Truck/SUV 33%
  - Passenger vehicle 1.6 times more likely MAIS 2+
  - 2 times MAIS 3+
  - Interior occupant environment
- **58% Occupants either Normal or Overweight**
  - 50% male good model for preliminary analysis
- **DeltaV**
  - 24-40 kmph impacts ~ 5 times more likely MAIS 2+ than <24 kmph
  - Target range for experiments
Conclusion

- **Intrusion**
  - 15-60 cm 40-50% MAIS 2+, 30-40% 3+
  - Starting point for placement of vehicle structures
- **Injured body location**
  - Head injuries $\rightarrow$ impact
- **Injury location in vehicle**
  - Opposite sides structures
Next steps in current effort

- Link injuries to injury sources in vehicle
- On-going parametric studies with GHBMC
- Design sled test series
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