

Children & Crashes



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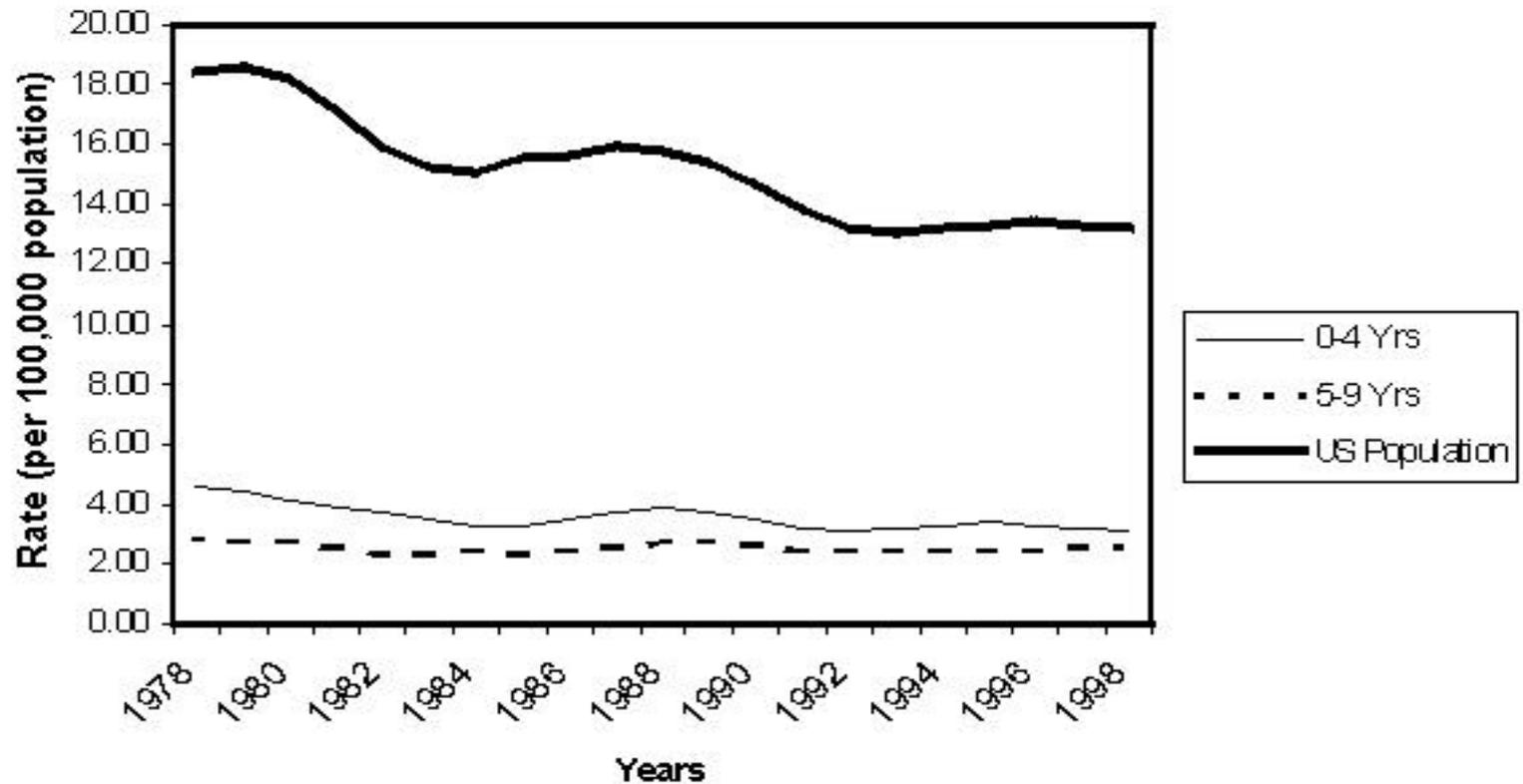
Crash Injury Research and
Engineering Network - CIREN Seattle

Harborview Injury Prevention and Research Center



Death Rates Among Children

Figure 1. Occupant Fatality Rates by Age



Traffic Safety Facts

Pediatric Motor Vehicle Deaths

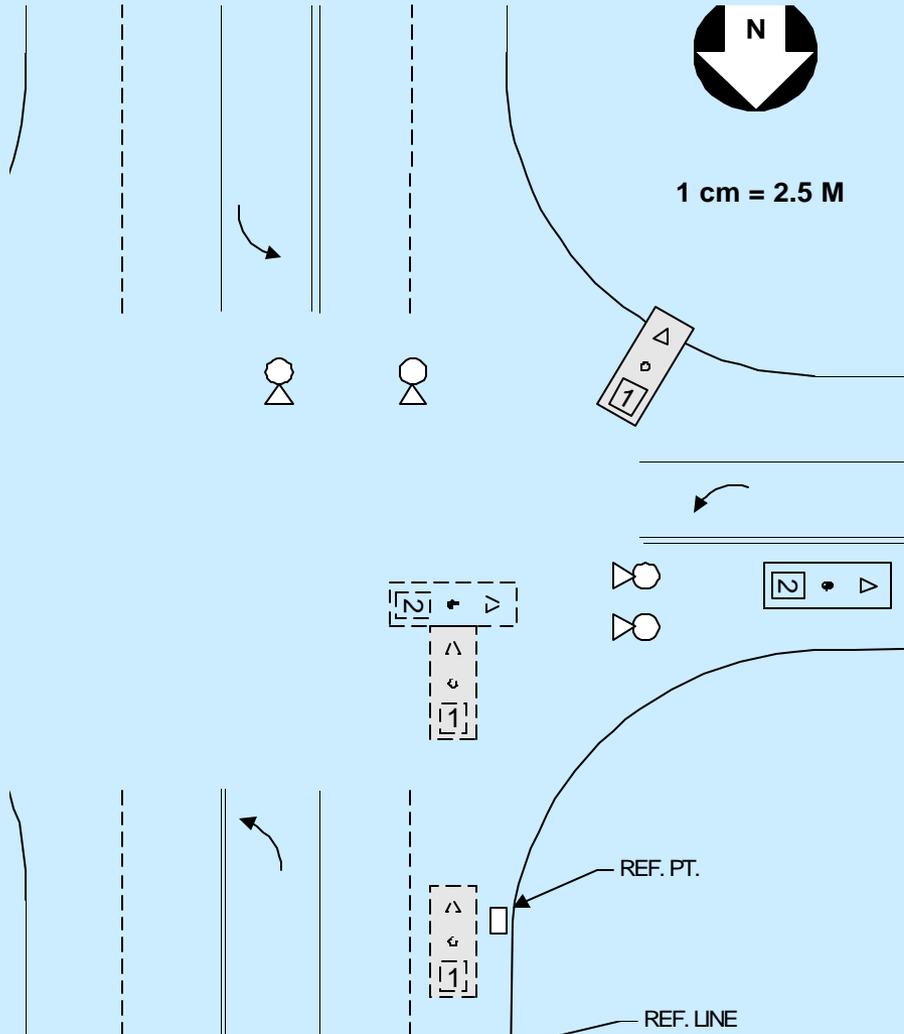
- Motor vehicle crashes are leading cause of death and injury hospitalization for 4-8 year olds.
- Premature graduation to seatbelts
- No decrease in 4-8 yr child occupant death rates between 1994-99.
- Recent 2000 fatality data reports for ages 0-15 dropped to lowest level.
(0-4 down 3.9% and 5-15 down 4.6%)

Child Seat Misuse

Case Review



1 cm = 2.5 M



Compact Sedan

Delta V = 12 mph

PDOF = -60 or 10 o'clock

Case Review



Infant - Female

Child seat not belted,
placed in seat only



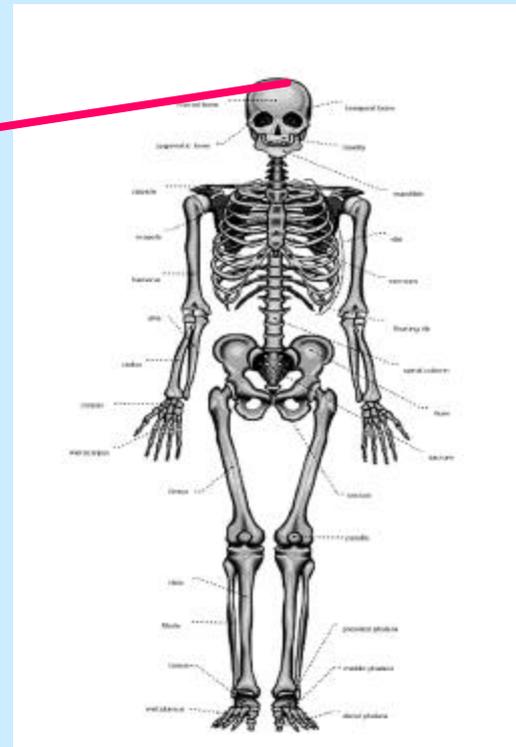
Interior contacts



Unrestrained child seat flew forward into center instrument panel

Injuries

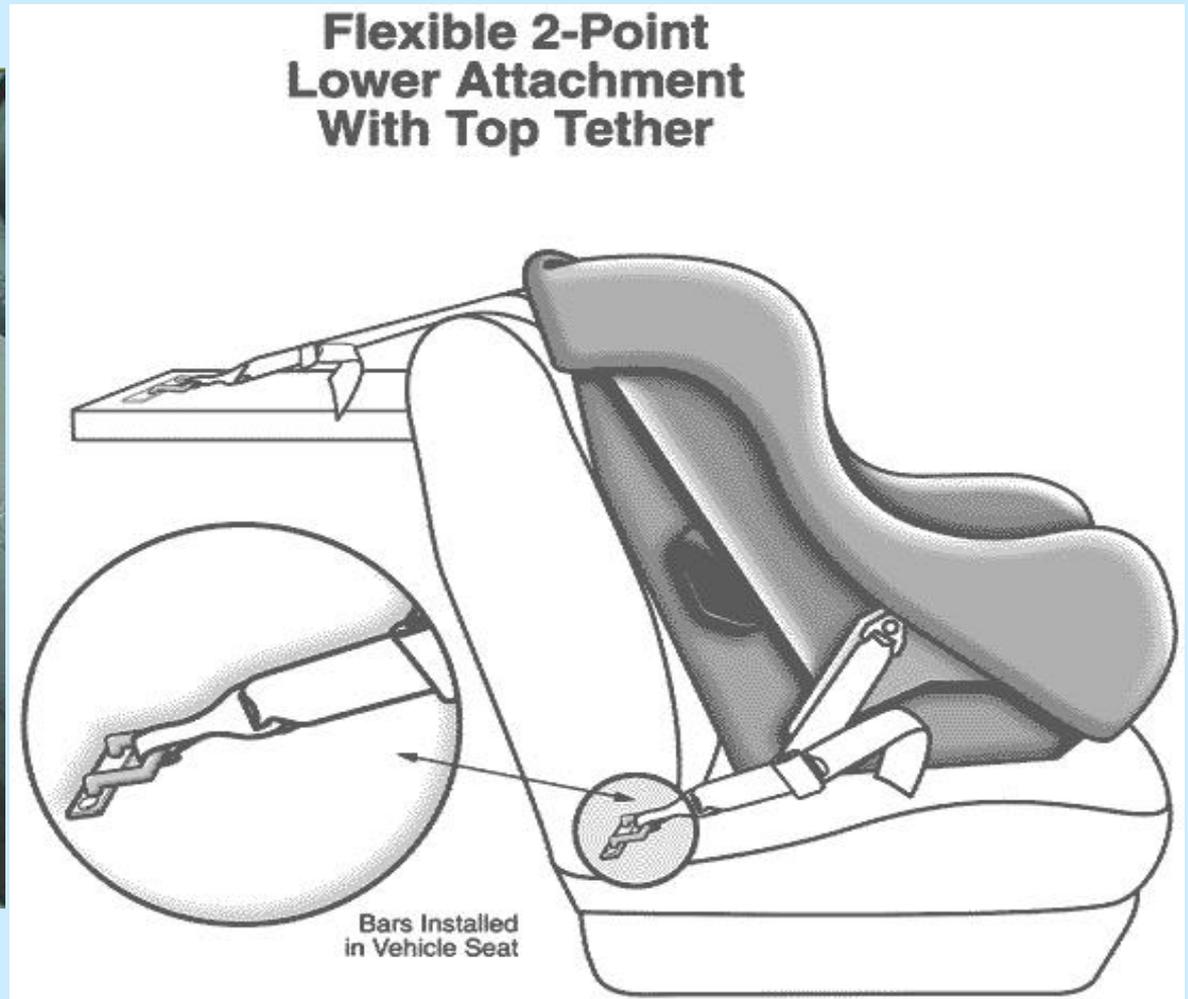
Left occipital skull fracture minimally depressed with subgaleal hematoma



Addressing Car Seat Issues

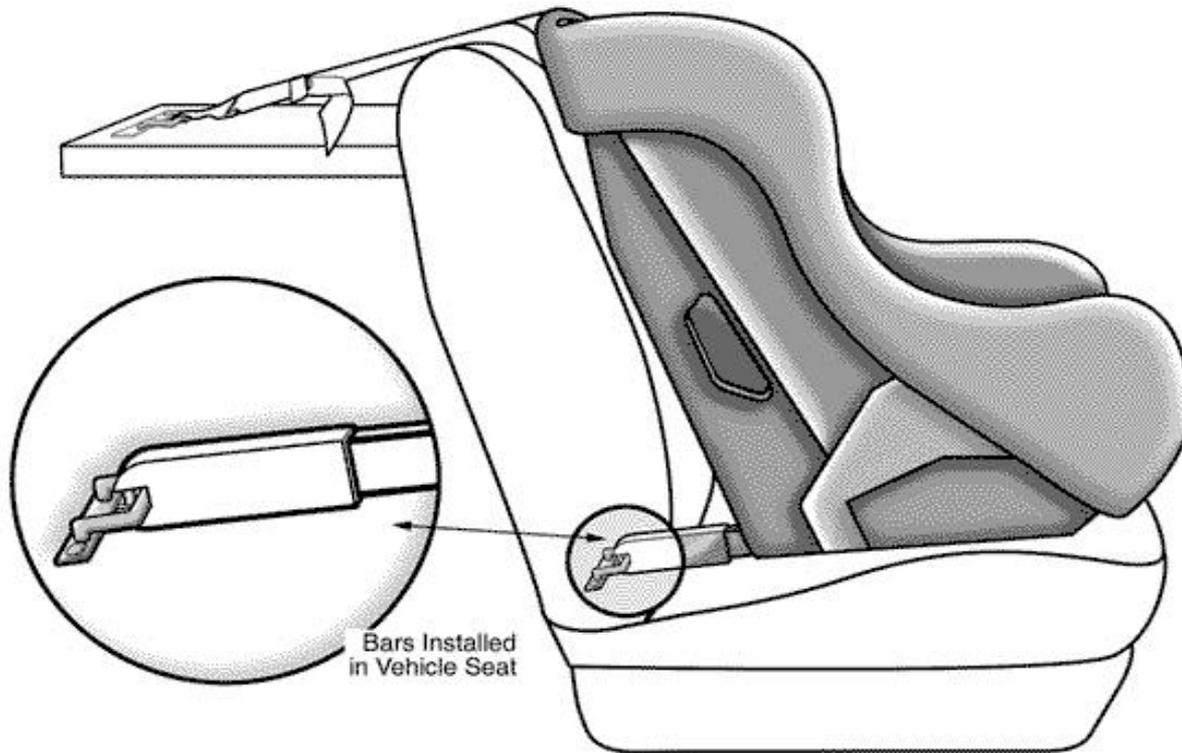
- Incompatibility and incorrect usage
 - New universal LATCH anchorage system a compromise from the ISOFIX debate
 - Rigid vs. flexible anchorage systems
- 100 % of vehicles manufactured on or after Sept. 2002 must have lower anchorage
- Sept. 2000 - 100% tether anchorage required

LATCH Flexible System



LATCH Rigid System

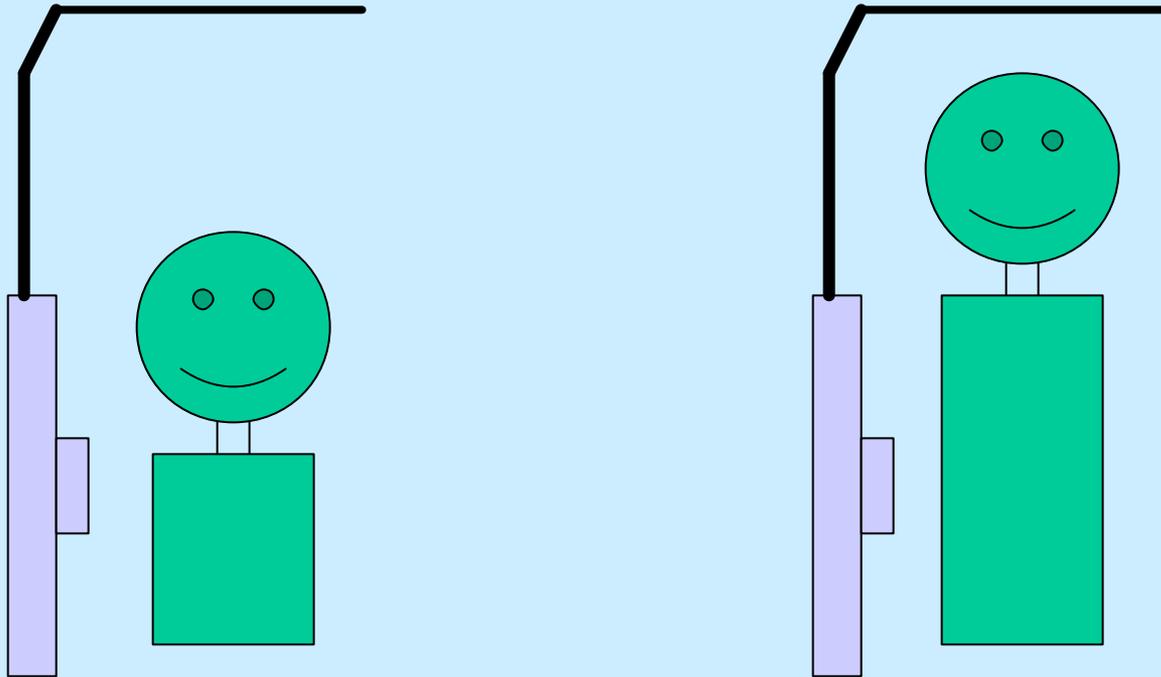
Rigid 2-Point Lower Attachment With Top Tether



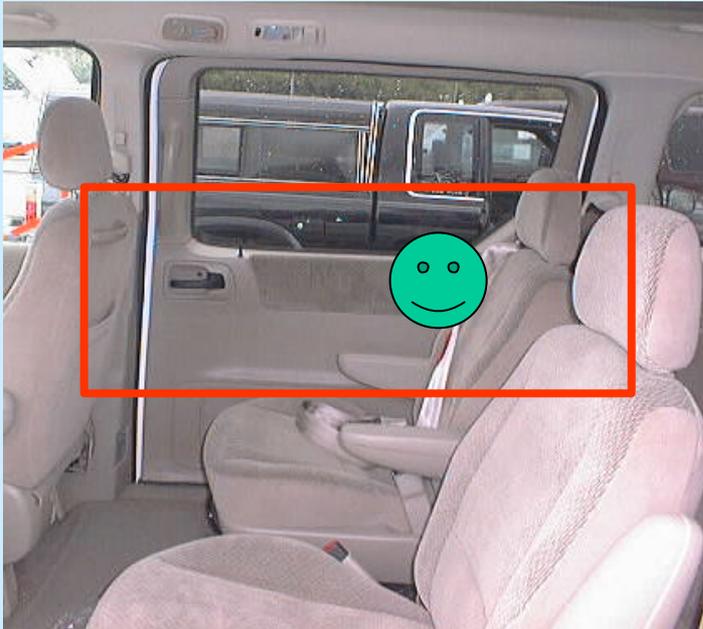
Children in Side Impacts

Head Injuries

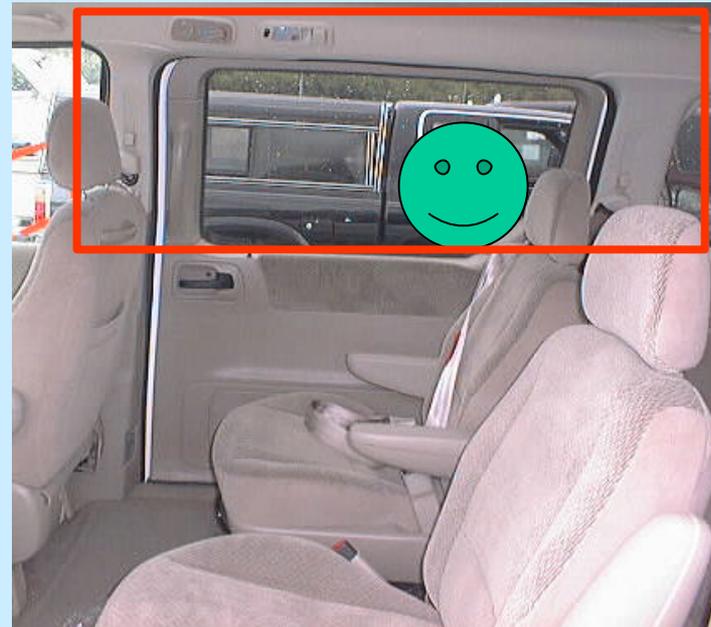
Remember that children are exposed to more surface area for head contact in crashes.



Children that are seated in vehicles expose themselves to more surface area for head contacts



Adults head contacts will occur to the greenhouse structure (roof and roof pillars)



Case review



4 yrs., Female

Front right passenger

Manual lap, motorized
shoulder belt used

Case review



Compact Sedan

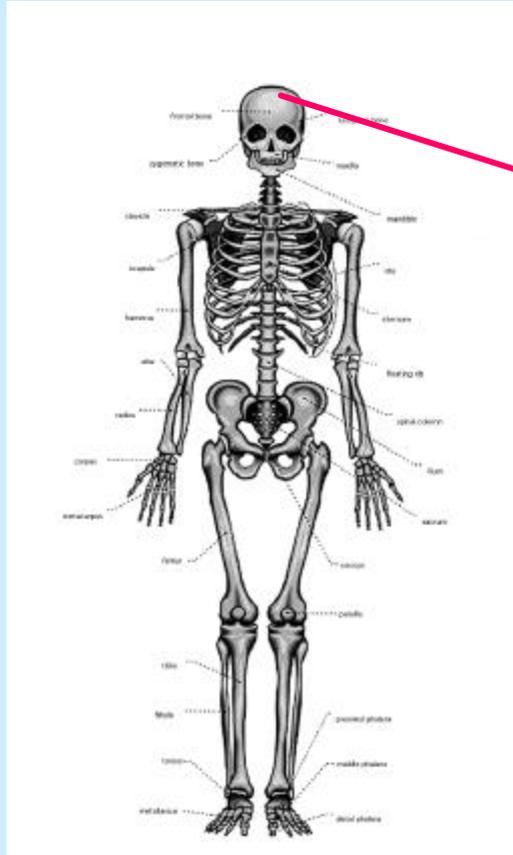
10 mph Delta V

PDOF = 100

Interior Contacts



Injuries



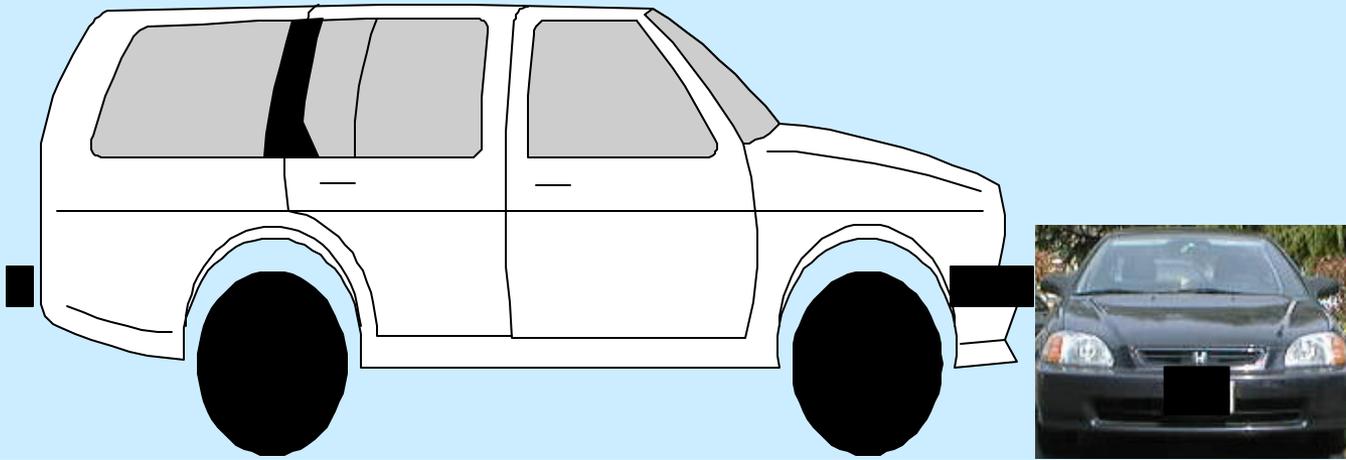
Head Injury

- TBI, Intraventricular hemorrhage

- AIS = 4

Recovered uneventfully

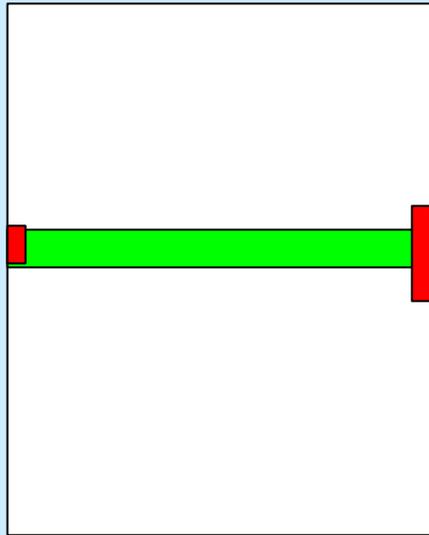
More Worries for Parents Larger Vehicle and Side Impacts



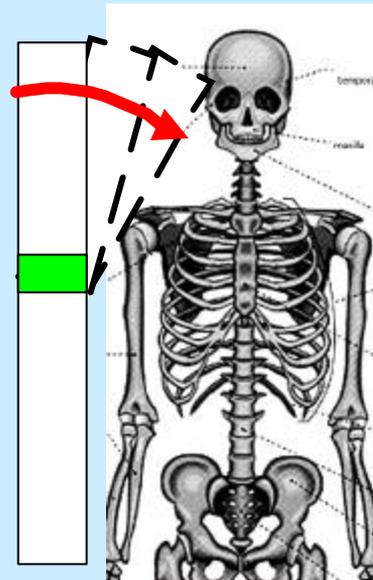
Large vehicle types vs. compact/economical

Some bumper heights are overriding the side impact supports

This becomes head contacts for children



Side View



End View

CIREN Case Review



Compact Sedan

20 mph Delta V

PDOF = 60

Struck by large pickup

Case review



8 yr., Male

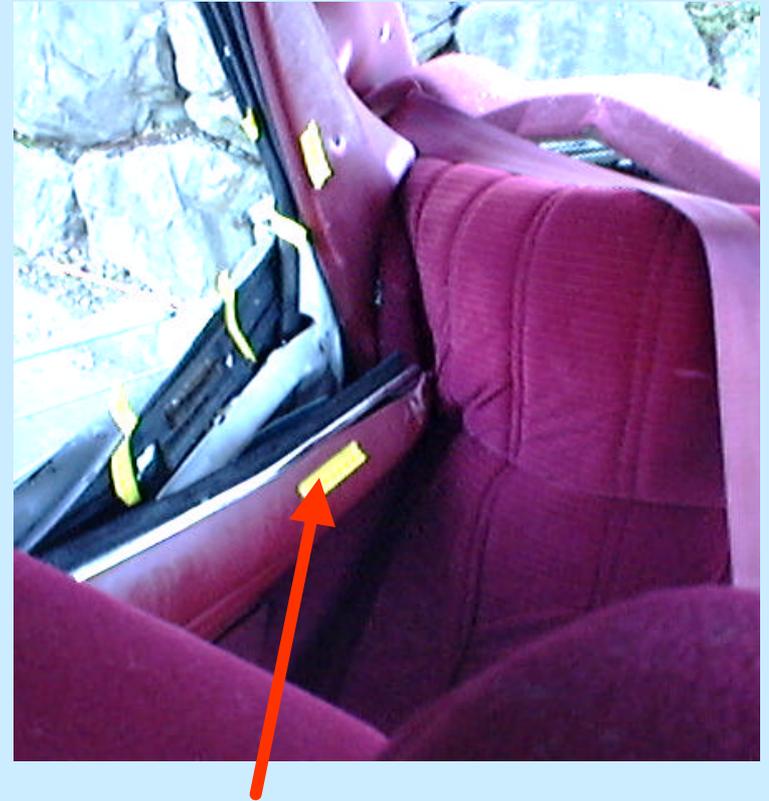
Back right seat - fully restrained

Sleeping with head against the door panel

Interior Contacts

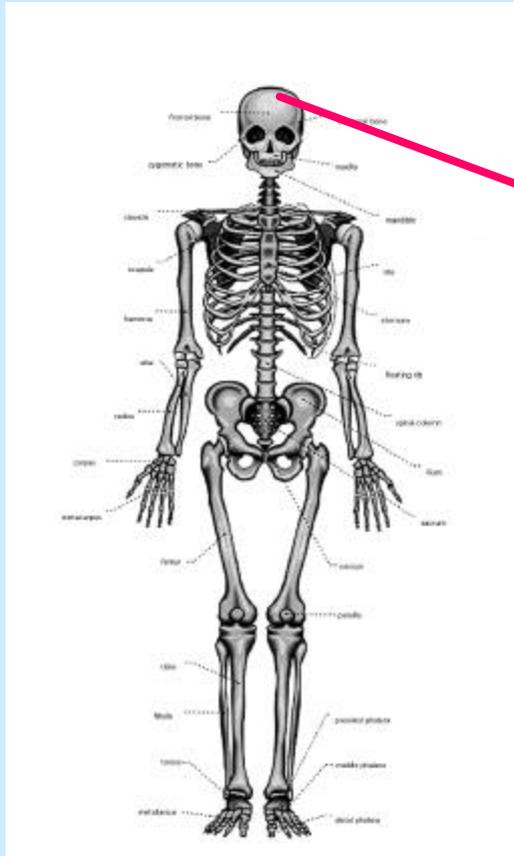


40 cm of intrusion at door panel, window sill



Location of child head contact

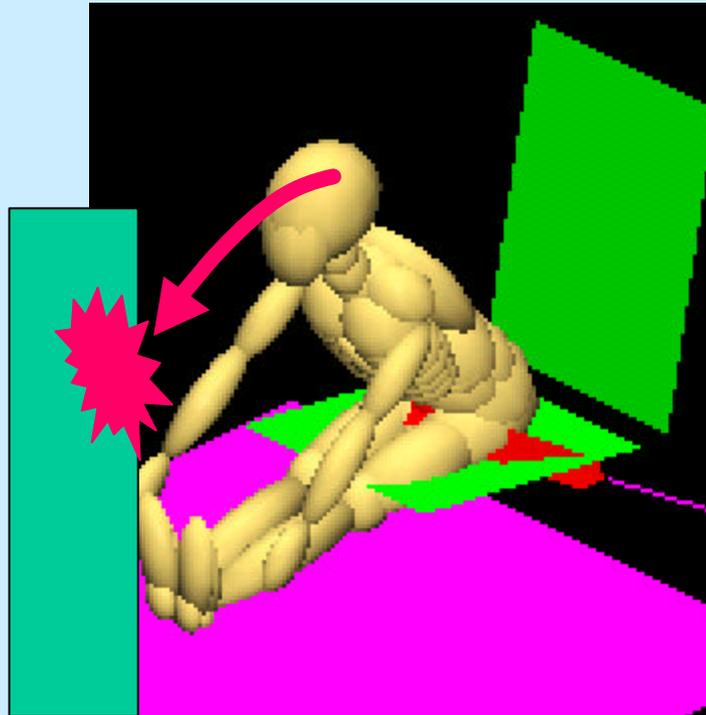
Injuries



Severe Head Injury

AIS = 5

Lap only restraint for children or shoulder belt behind back



**Body buckles forward and head face contact
interior surface in front of seating position**

Subject Vehicle



Compact Sedan



Smash Oldmiss DV = 17 mph

PDOF = 10

8 yrs. Female



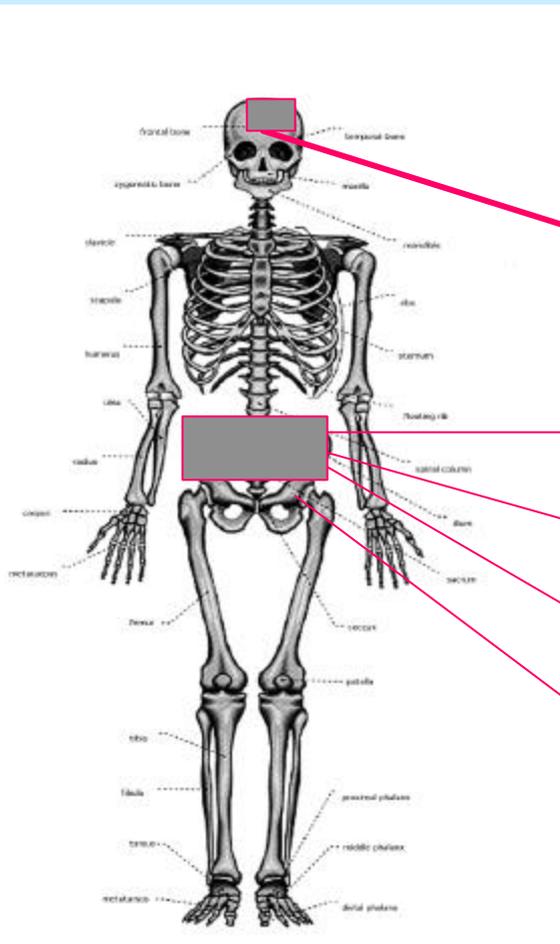
Possible
head contact



Injuries



AIS



2

6.5 cm V-shaped forehead avulsion

2

Ascending Colon deserosalization

2

Mesenteric tear

2

Mesenteric hematoma

1

Lower abdomen contusion

In need of booster seats

- Seatbelt use, while safer than no restraint, can lead to “seatbelt syndrome”
- Inappropriate seatbelt use:
(shoulder belt behind back)
 - 3.5 times risk of serious injury
 - 4.2 times risk of head injury
- Booster seat use <10% nationally

Belt Positioning Booster Seats

- Recommended for children 4-8 years old; 40-80 pounds
- Moves belt down off abdomen and neck
- Decrease the risk of head contacts and injury

CIREN Case Review

Booster Seat Success Story



Compact Wagon

Delta V = 27 mph

Subaru

4 yr. Female, 2nd Left
Booster w/ L/S

Booster Seat Success



4 yr. Old Female

Booster Seat w/
Lap/Shoulder belt



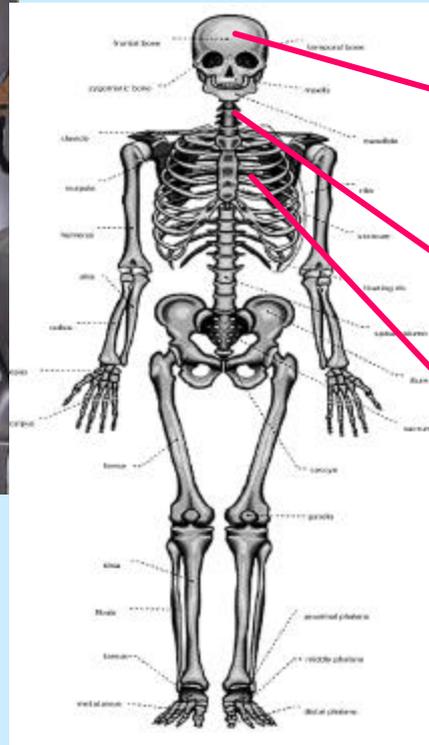
Booster Seat

Minor Injuries



4 yr. Old Female

Booster Seat w/
Lap/Shoulder belt



Minor TBI with
+LOC/concussion

Cervical Strain

L anterior chest wall
contusion

HIPRC Booster Seat Campaign

- Joint effort with Washington Traffic Safety Commission
- Increased booster seat usage from 13% to 25% in local region.
- Campaign efforts helped initiate the child booster seat law (up to 6yrs-60lbs) in Washington state beginning 7/1/02.

Everyone Please Buckle Up
our Children!

Thank you.