



**Are we there yet?
Seatbelt related injuries in
children aged <13 years**

Yvonne Zurynski

On behalf of the APSU Seatbelt Injuries Study Group

- 
- **Australia 1st country to adopt mandatory seatbelt laws (1970)**
 - **Rate of seatbelt use ~92%**

2006/7

- **~ 1000 children injured each year in crashes
(Australian Transport Safety Bureau, 2006)**
- **20% of all passenger deaths are children**



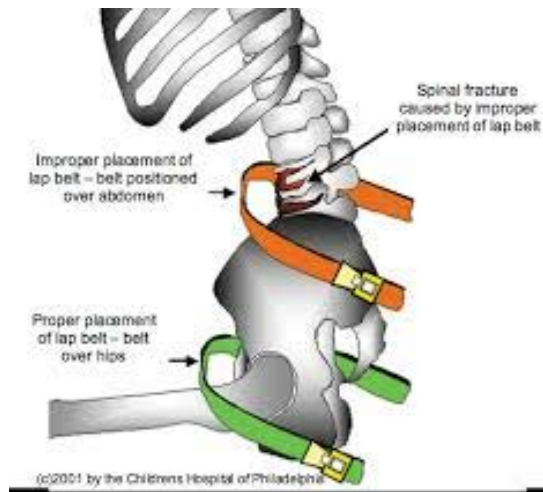
Australian Child Restraint Laws before 2009

- Children aged 0 to 12 months
 - mandatory restraint - in an AS approved child restraint
- Children aged 1 to 15years:
 - Mandatory restraint - either an adult seatbelt or child restraint/booster is legal

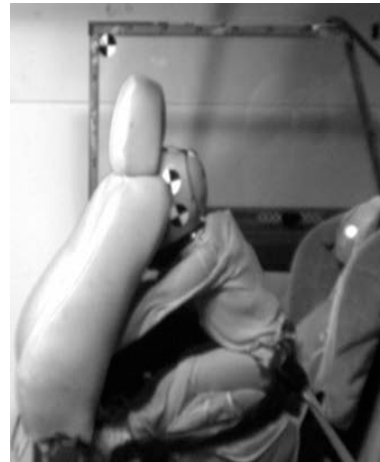
- Canadian Paediatric Surveillance Program published on **Lap Belt syndrome**

Santschi M, Lemoine C, Cyr C. The spectrum of seat belt syndrome among Canadian children: Results of a two-year population surveillance. Paediatr Child Health. 2008;13:279–83.

- **Abdominal**
- **Head**
- **Cervical spine**
- **Thorax**
- **Lumbar spine - up to 25% paraplegia**



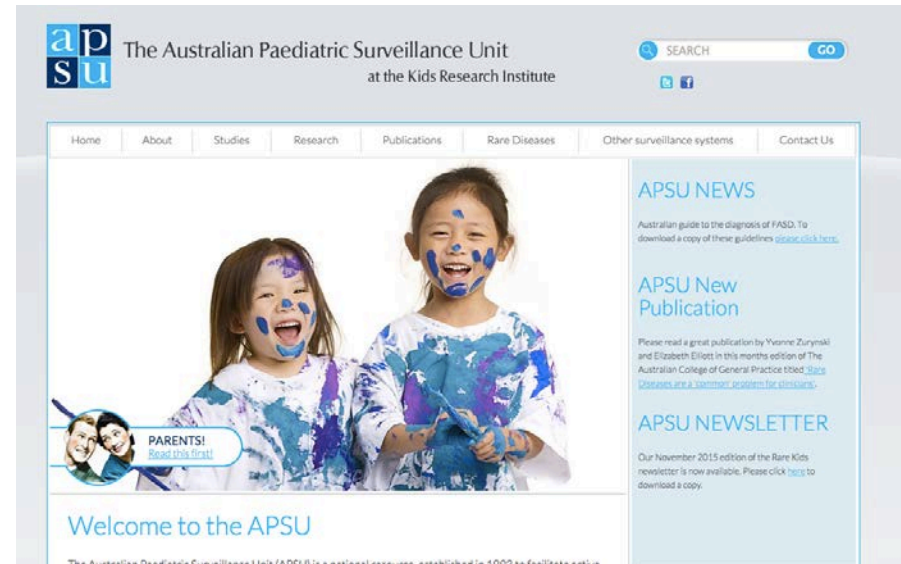
- Lap belts are not the only problem
- Using a restraint inappropriate for age and size of child
- Inappropriate fitment/tethering of restraint to vehicles
- Misuse of restraints



Photographs courtesy of Prof Bilston NEURA, UNSW

APSU Study 2006-07

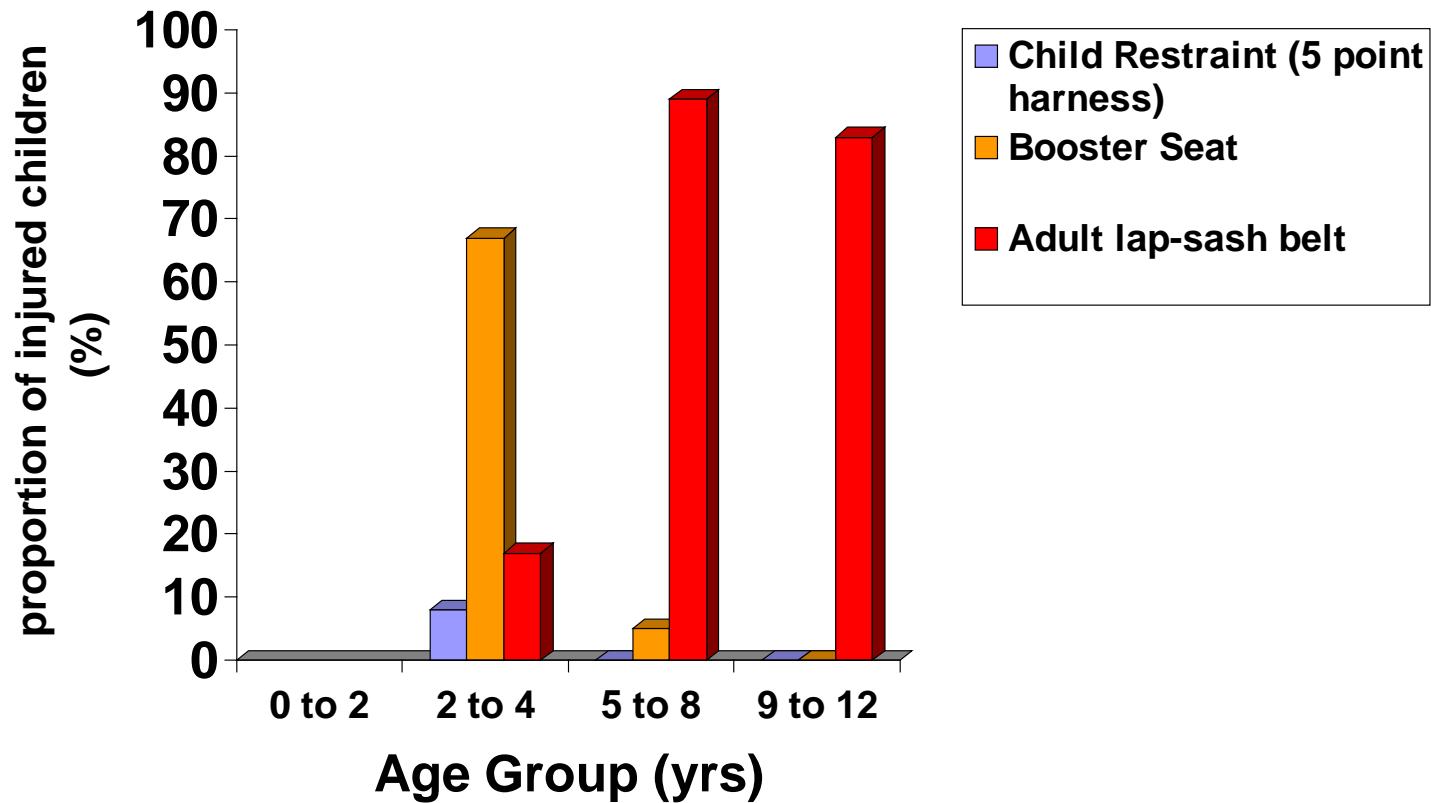
- Document and describe serious seatbelt related injuries in Australian children
- Presenting with serious injuries
 - Abdominal
 - Spinal: lumbar, cervical
 - Head
 - Thorax
- Report all children aged <13 who were injured while restrained in a motor vehicle in a crash



- ~1500 child health specialists report each month
- ~90% of report cards returned each month

N=52

Use of restraints by age group



N=52

Restraint used:

Adult seatbelt only: 63%

Adult seatbelt + booster: 19%

Lap-belt: 8%

Booster + Lap belt 2%

Approved child restraint 2%



10% Lap Belt



**30% Confirmed or likely misuse of seatbelt / restraint
(belt behind back or under arm, loose straps)**

~ 49% information on misuse unknown

Injury Type	(%)
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Abdominal	77
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Intestinal	27
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Hepatic	25
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Splenic	19
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Duodenal	17
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Renal	10
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Spinal	33
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Spinal Cord	8
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Thoracic	40
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Facial	35
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Head and Neck	35
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Extremities	23
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Outcome

Surgery	44%
ICU	44%
ICU stay (days):	Range: 1-47 Median: 5
Hospital stay (days):	Range 2-103; Median: 6
Paraplegia	2
Death:	4

Most severe injuries were associated with front or centre rear seating position and use of adult seatbelts without boosters and age < 9 years

- Media attention
- Lobbying by parents and safety experts
- New research results from NEURA UNSW (Crash lab)
- APSU study results
- Submissions to the Australian Transport Safety Bureau

Isabelle's legacy - nation on brink of car reform

Not in vain ... Isabelle Broadhead, 3, was killed in a car accident last year. She was in a booster seat but was crushed by the seatbelt.

Jordan Baker, Transport Reporter Sydney Morning Herald May 17, 2007



7th Amendment to the Australian Road Rules; January 2008

Enacted by states: Victoria - Nov 2009; NSW, Qld and WA - March 2010; SA July 2010; Tasmania -Nov 2010; ACT - March 2011; NT - February 2013

RTA: Choose Right Buckle Right

The new Safer Child Restraint Rules

Effective from 1 March 2010, children under 7 years of age must be restrained in a suitable and approved child restraint or booster seat when travelling in a car.

- Children under 6 months must be restrained in an approved rearward-facing restraint that is properly fitted to the vehicle and adjusted to fit the child's body correctly.
- Children aged between 6 months and 4 years must be restrained in an approved rearward or forward-facing restraint that is properly fitted to the vehicle and adjusted to fit the child's body correctly.
- Children aged between 4 and 7 years must be restrained in an approved forward-facing restraint or booster seat that is properly fitted to the vehicle and adjusted to fit the child's body correctly.
- Children under 4 years old must not travel in the front seat of a vehicle that has two or more rows.
- Children aged between 4 and 7 years must not travel in the front seat of a vehicle that has two or more rows unless all the other back seats are occupied by children who are also under 7 years travelling in an approved child restraint.



Children under 6 months

Children under 6 months must be restrained in an approved rearward-facing restraint. The restraint is held in place by the seatbelt and the top tether strap. These restraints have an inbuilt harness system.

There are some convertible forward-facing restraints that combine the features of rearward-facing and forward-facing restraints in one child restraint. These restraints accommodate babies from birth in rearward-facing mode and can then be converted to forward-facing when the child is around 6 to 12 months of age. All have an inbuilt six-point harness system.

An infant restraint must be correctly installed and properly adjusted in your vehicle, and the inbuilt harness must snugly fit your baby. If it is not fitted correctly, the restraint may not offer full protection in the event of a crash.

Make sure you have a restraint installed in your car before your baby is born, ready for their first car trip which will probably be on the way home from the hospital.



Children aged between 6 months and 4 years

Children aged between 6 months and 4 years must be restrained in an approved rearward or forward-facing restraint. Once your child has outgrown their rearward-facing restraint (this usually happens from around 6 to 12 months of age) they can be moved into a forward-facing restraint. The forward-facing restraint is held in place by the seatbelt and the top tether strap. The seat faces forward and incorporates a six-point harness.

There are some restraints that combine the features of forward-facing restraints for young children and booster seats for older children. These restraints come with an inbuilt harness and a top tether strap. The harness is used until the child outgrows the harness. This is when the harness straps are too tight and do not fit over the shoulders correctly. Once the child has outgrown the inbuilt harness, it MUST be removed (as per the manufacturer's instruction) and the restraint is used as a booster seat with an adult lap-sash seatbelt.

You will know that your child has outgrown their child seat when their shoulders no longer fit comfortably within the child seat, when their eye-level is higher than the back of the child seat or when the top insertion slots for the shoulder straps are below the level of the child's shoulders.

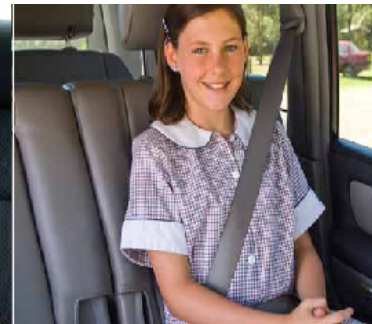


Children aged between 4 years and 7 years

Children aged between 4 years and 7 years must be restrained in an approved forward-facing restraint or booster seat. Booster seats are used with an adult lap-sash seatbelt and feature high backs and sides which provide protection for children in side impact crashes as well as providing support when a child is sleeping.

Children should travel in a booster seat that is secured by an adult lap-sash seatbelt, never in a lap-only belt.

A booster seat should be used until your child's shoulders no longer comfortably fit within the booster seat or when their eye-level is higher than the back of the booster seat.



Older children 145 cm or taller

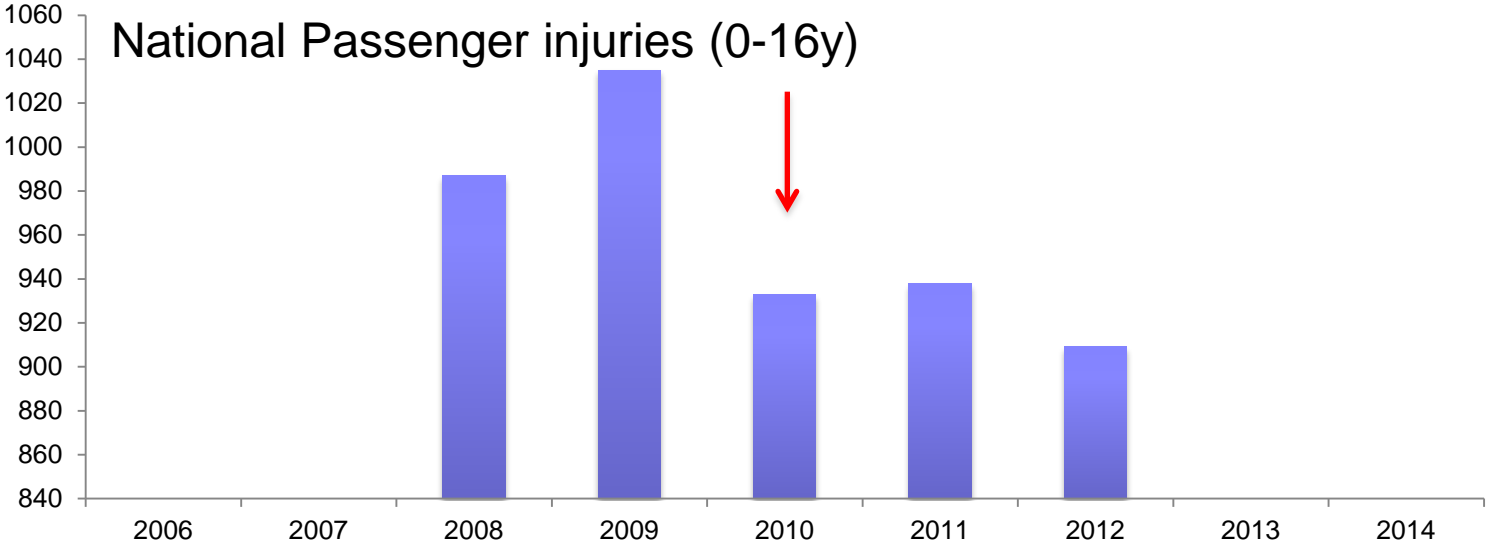
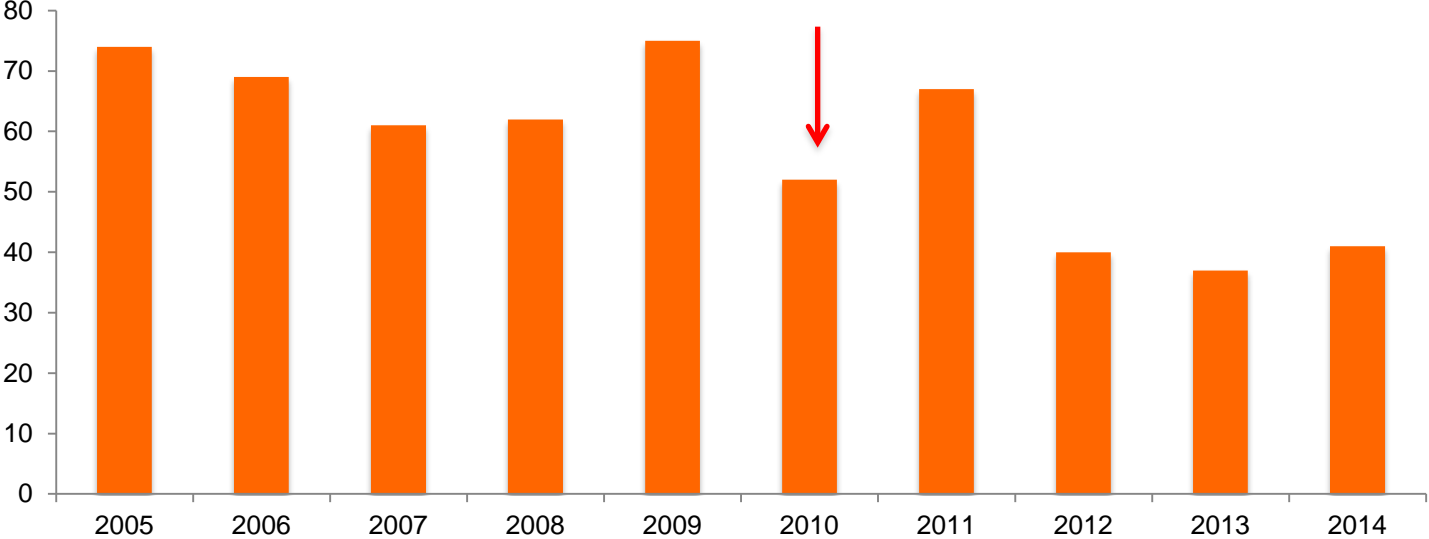
It is strongly recommended that children aged 7 years and over stay in their booster seats until they are too big for them. Adult lap-sash seatbelts are designed for people with a minimum height of 145 cm. Lap-sash seatbelts offer greater protection to passengers than lap-only seatbelts, but they must fit correctly. This means that the lap belt is positioned low over the hip and the sash belt sits in the middle of the shoulder and does not touch the neck.





Have fatalities and injuries among child passengers declined?

National Passenger deaths (0-16y)

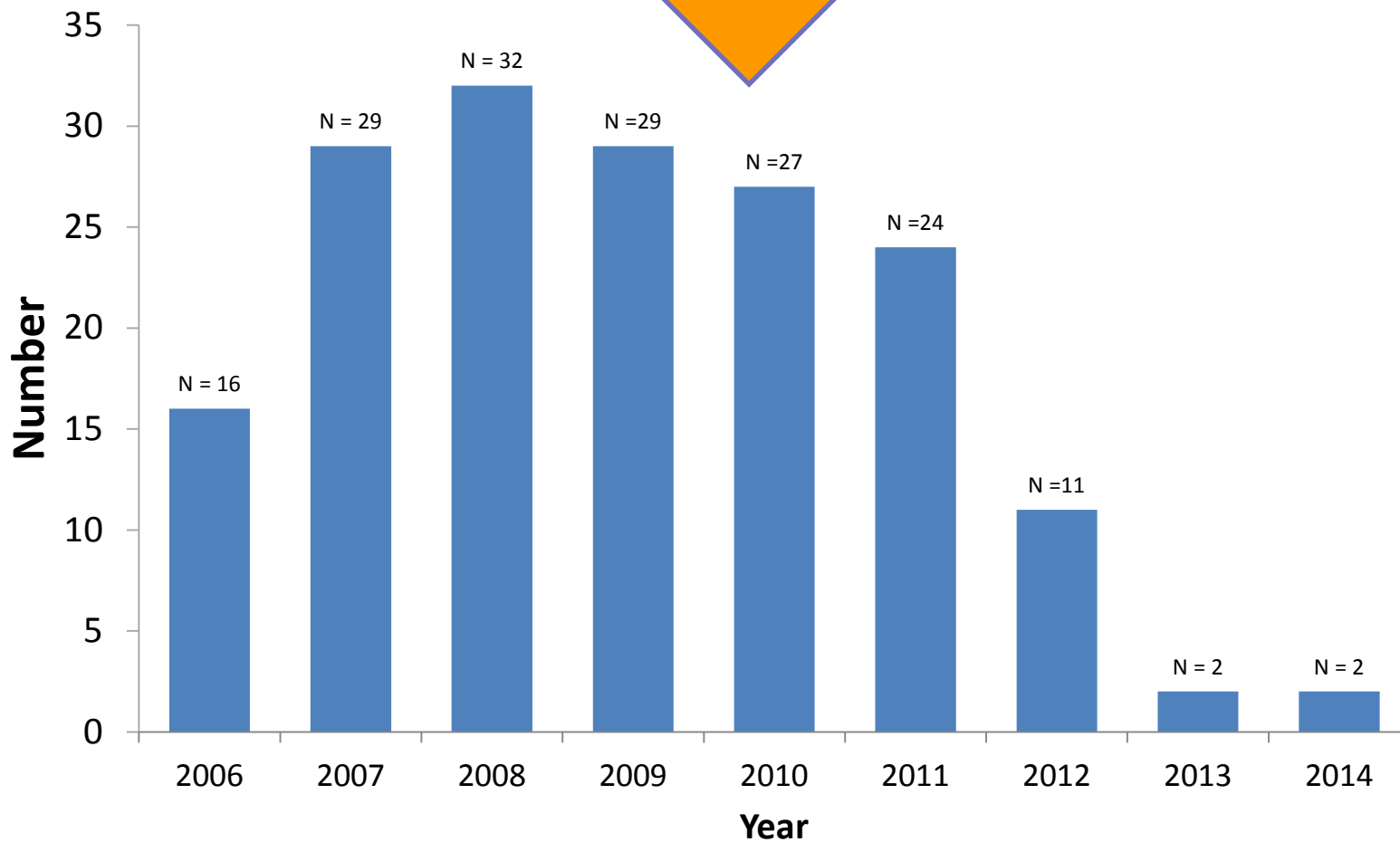
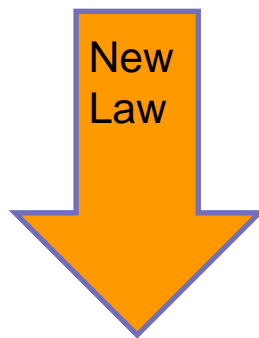


- National Coronial Information System 2006 – 2014
- Ethics application to access data (closed cases only)
- Police reports, autopsy reports and coronial finding
- Death of vehicle occupant aged 0-13
- Motor vehicle crashes
- Restrained or unrestrained
- Which restraint used

The screenshot shows the homepage of the National Coronial Information System (NCIS). The header features the NCIS logo on the left and the text "National Coronial Information System" in the center. On the right side of the header, there is a section for "NCIS Access for Authorised Users" with a green "Sign in" button and a lock icon, and a link for "Apply for access". Below the header is a navigation menu with links for Home, News, About NCIS, Data collection, Data quality, How to access data, Mortality data, FAQ, Links, and Contact Us. The main content area includes a introductory paragraph: "The National Coronial Information System (NCIS) is an internet based data storage and retrieval system for Australian and New Zealand coronial cases" with a right-pointing arrow button. To the right of this text is a search bar with a "Go" button. Below the search bar are sections for "Categories" (listing NCIS Mortality Publications, News, and Uncategorized) and "Archives" (with a "Select Month" dropdown menu). A large image of smooth, dark stones in a row on water is positioned on the left side of the main content area. At the bottom, there is a statement: "Our vision is to provide comprehensive coronial data for those who need it." and a section titled "UPDATES".

Number of child deaths reported to the NCIS (closed cases) 2006 - 2014

TOTAL 172 fatalities 2006-2014 (0-13yrs)



National Coronial Information System (NCIS)

172 fatalities child passengers 2006-2014

38 – not known whether restrained or not

N = 134

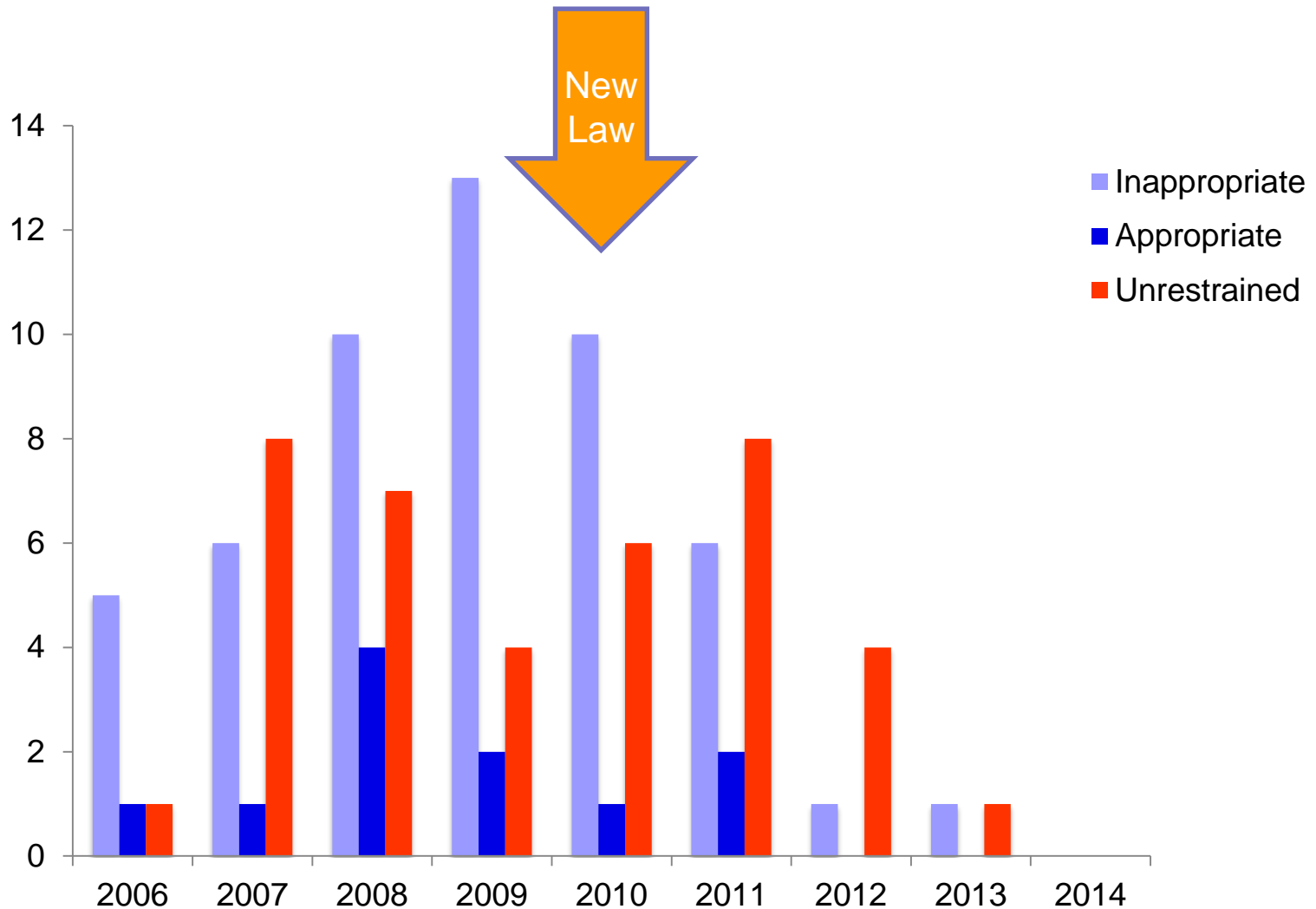
Restrained	95 (71%)
Unrestrained	39 (29%)

Restrained:

Age appropriate and properly used	14 (15%)	
Age/size inappropriate	48 (50%)	
Age appropriate but misused	15 (16%)	
Age appropriate and misuse likely	16 (17%)	(misuse not confirmed)
No information about restraint type	13 (14%)	

NCIS Limitations: Data quality and completeness

Number of passenger deaths by restraint type by year



NB Inappropriate = wrong for age, misused by child or not properly tethered to vehicle

NCIS Examples of inappropriate use or misuse:

Seatbelt around more than one person – e.g. two children in one belt; mother and baby in one belt

Straps not tightened inside the restraint

Asleep on the back seat while wearing adult seatbelt

Baby wrapped in blankets and then strapped into rear facing capsule

Child restraint not tethered to vehicle but child strapped into child restraint

2yo travelling in a booster seat

3yo restrained by an adult belt only

Sash behind back

Sash under the arm and others



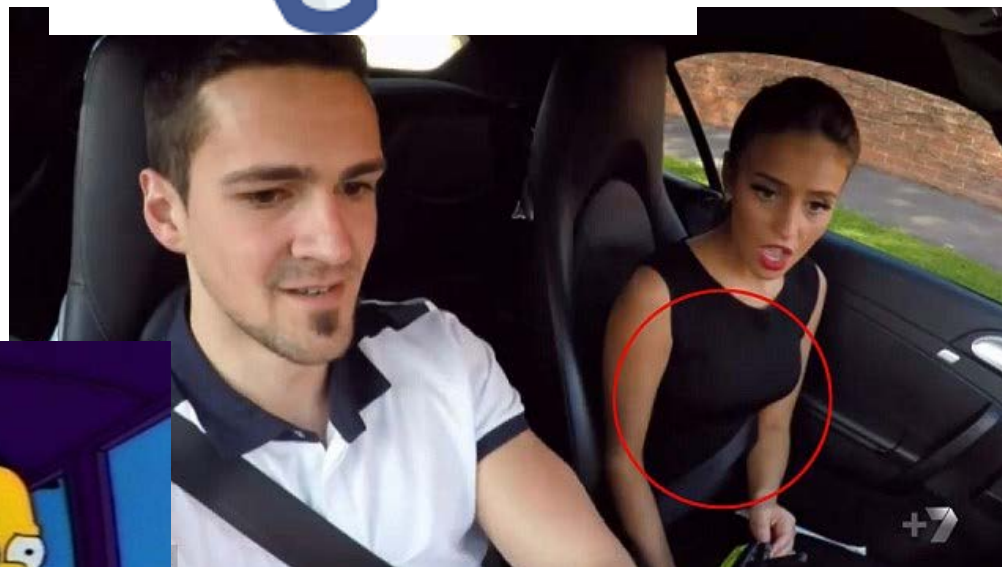
Western Sydney March 2012



Some bad messages – internet and media



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Children of different sizes and ages need different types of restraints:



Rearward Facing Child Restraint

For children from birth, with a built-in 5 or 6 point harness, where the child faces the rear of the car. **Type A** in the Australian Standard.

NB. Rearward facing restraints come in three types: Type A1 for children up to 70cm tall (approx 6-9 months), Type A2 for children up to 80cm tall (approx 12 months), and a new category Type A4, for children up to 2-3 years of age.



Forward Facing Child Restraint

For children who have outgrown their rear facing restraint up until at least 4 years of age, with a built-in 5 or 6 point harness where the child faces the front of the car. **Type B** in the Australian Standard.

NB. Forward Facing restraints, Type B, fit most children up to at least 4 years of age. A new forward-facing restraint with an inbuilt harness, Type G, is now available which can be used up to approximately 8 years of age.



Booster Seat

For children who have outgrown their forward facing restraint up to at least 8-10 years of age, to position the lap and sash belts safely. Use of an add-on harness is not recommended. **Type E, F** in the Australian Standard.

NB. Booster Cushions are boosters without the back and side wings that protect the child's head. They are being phased out, except for those built into cars.



Lap sash seatbelt

A seatbelt that has one part that goes across the lap and another that goes over the shoulder. Use when a child is big enough to meet all parts of the ['5 step test'](#). Only use a 'lap only belt' when there is no lap sash belt available.

Current recommendations



- Number of fatalities down
- Number of injuries down
- Fewer fatalities where inappropriate restraints used
- Resources for parents
- No timely source of national data of sufficient detail
 - **We're getting there!!!**



Thank you!

Study Group: Elizabeth Elliott, Lynne Bilston, Mary McCaskill, Anthony Dilley,
Fred Leditschke, Hua Chang, Amy Phu

NHMRC Enabling Grant 402784

All paediatricians and other child health professionals
who reported cases to this study

Questions?