Good, Better, Best: Car Seat Instructions, Laws, Best Practices

Julie Mansfield, MS
Research Engineer, Injury Biomechanics Research Center
The Ohio State University College of Medicine

Richard W. Kent, PhD
Professor, Mechanical and Aerospace Engineering, Biomedical Engineering, and Emergency Medicine, University of Virginia,
Deputy Director, Center for Applied Biomechanics, University of Virginia

Marilyn J. Bull, MD, FAAP
Morris Green Professor of Pediatrics, Indiana University School of Medicine,
Neurodevelopmental Pediatrician, Riley Hospital for Children at IU Health

Lifesavers 2018 ~ San Antonio, TX
Tuesday, April 24, 2018
Goals and Objectives

Attendees will understand:

• How science helps shape policy and best practice
• How laws affect public perception
• How to impart best practice counseling
Extended Rear-Facing

Swedish Experience


Swedish Observations on Rear-Facing Protection

- Severe neck injuries occur when forward-facing even without head contact.
- Head accelerations and neck forces are low for a rearward facing child restraint system even at high velocities.
- Children up to at least 3 years are better protected in rear-facing car restraints than forward-facing car restraints.
• Convened informal meeting of researchers, advocates, and government officials to discuss status in US of rear-facing child seats

• Discussion was that research, mostly on basis of Swedish publications, did suggest safer when rear-facing, but policy makers wanted US data
Extended Rear-Facing

American Academy of Pediatrics - 1996

- Infants should ride rear-facing in car seats until one year of age

Committee on Injury and Poison Prevention
Pediatrics May 1996, 97 (5) 761-762
Extended Rear-Facing

United States Experience

Extended Rear-Facing

United States Experience

• Children under age 2 are 75% safer rear-facing than forward-facing

• Children in the second year of life are over 5 times less likely to be seriously injured or die in a crash rear-facing than forward-facing

Car Safety Seats for Children: Rear Facing for Best Protection
Extended Rear-Facing

American Academy of Pediatrics - 2011

“All infants and toddlers should ride in a rear-facing seat until they are at least two years of age or, preferably, until they reach the highest weight or height allowed by their car seat manufacturer.”

- AAP Policy reviewed in September 2017. No changes made to policy at that time.

Jeya Padmanaban released unpublished research that stated children age 1 year were safer in FFCSS than RFCSS.
Extended Rear-Facing

Expression of Concern

- Authors of Henary paper unable to reproduce analysis of 2011 research

- Problem may be that survey weights were incorrect in initial analysis and caused apparent sample size to be smaller than actual sample size and caused inflated statistical significance

Online at: http://injuryprevention.bmj.com/content/injuryprev/23/4/e1.full.pdf
1. NASS-CDS data indicate low injury rate up to 2 years of age in both RFCRS and FFCRS

2. Estimates suggest both 0yo and 1yo have fewer rate injury in RFCRS than FFCRS but data insufficient to reach statistical significance

3. Biomechanical studies and field experience in Sweden where children ride rear-facing to age 4 are key justification to keep rear facing as long as possible, up to weight or height limit of the CRS
Extended Rear-Facing
Dorel Juvenile Products Research

• Reversed previous recommendation and do not require a minimum of age 2 in our instructions for convertible seats

• Published on web site background for change in recommendation
  – Jeya Padmanaban research, which stated unable to reproduce findings of Henary paper, was commissioned by Dorel in response to law suit

• Dorel reports they commissioned crash tests suggesting that there may be some increased risk to children when forward-facing

*Dorel Position: Minimum Age Criterion for Facing Forward.*
*Consumer Care. September 14, 2017 11:57.*
National Highway Traffic Safety Administration Position on Rear-Facing

NHTSA’s 2011 best practice child car seat recommendations state that:

- Children under age 1 should always ride in rear-facing car seats
- Children 1 to 3 years of age ride in rear-facing car seats as long as possible and until they reach the upper height or weight limit according to the manufacturers’ instructions

The information and analyses available thus far supports NHTSA’s position on car seats

Our best practice recommendations remain the same in 2017

NHTSA, September 18, 2017
How Laws Intersect with Best Practice

• Laws of physics guide child restraint development
  – State laws frequently are a minimum of best practice
  – Families frequently equate state laws with best practice

• Safe Kids Worldwide overview of current state laws:
  – Rear-facing
  – Booster seats
Child Passenger Safety Legislation 2018

A Goal: Match State Laws with AAP Guidelines

- Rear-facing up to age 2 (or height and weight based on the manufacturer’s guidelines)
- Booster seat until belt fits correctly and safely, typically when have reached 4’9” in height and are between 8 and 12 years of age
- Rear seat up to age 13
Child Passenger Safety Legislation 2018

Why Laws on Child Safety, CPS?

- Laws Influence, Reinforce Social Norms
- Some Parents Base Their Conduct on What the Law Is
- Passage of Laws Help Provide Awareness Opportunity


Safe Kids Worldwide
Kansas – CPST immunity
Florida – booster seat to age 6
Massachusetts – rear seat
Missouri – primary enforcement of safety belt law
Nebraska – primary enforcement of CPS laws
New Jersey – increases penalties violation of CPS laws
Oklahoma – to weaken rear-facing law VETOED
Tennessee – CPS law applied to child care centers

Child Passenger Safety Legislation 2018

Other CPS Legislation Pending
Child Passenger Safety Legislation 2018

9 States Have Adopted Rear-facing Law

- New Jersey
- California
- Oklahoma
- South Carolina
- Oregon
- Pennsylvania
- Connecticut
- Rhode Island
- New York (eff Nov 1, 2019)
• In the second year of life children are 5 times less likely to die or have serious injury in a crash when riding rear-facing than forward-facing.

• Children should use car seats to highest weight and height allowed by manufacturer.

• Children should ride in back seat until they are teenagers.
Messaging

- Laws of physics always trump laws of the land
- Belts are made for adults; not children
- All cars and all seat belts are made differently
- Booster seats should be used until the seat belt fits correctly and safely
Challenges to Technician

- Essential to stay current with research, federal regulations, and state laws
- Incorporate “adult learning” in your family interactions
- Last person to touch seat and make final decision is caregiver
- Following manufacturer instructions is essential for every seat
Conclusions

• Infants and young children are well protected when properly restrained in car seats

• Child passenger safety is in constant evolution and continued research is essential to guide product development and inform policy

• Improved understanding of biomechanics of young child occupants is important in design of protective child restraint systems

• Improved and increased data collection and crash scene reporting is needed to provide numbers adequate for reasonable statistical power
Please use the Lifesavers Conference Mobile App to evaluate this presentation