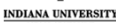




CPS on Non-Passenger Cars: Low Speed Vehicles, Ambulances, EMS Issues

Lifesavers 2011
Phoenix, Arizona
Monday, March 28, 2011

Marilyn J. Bull, MD, FAAP

Automotive Safety Program
Riley Hospital for Children at Indiana University Health
Indiana University School of Medicine
Section of Developmental Pediatrics
Indianapolis, IN



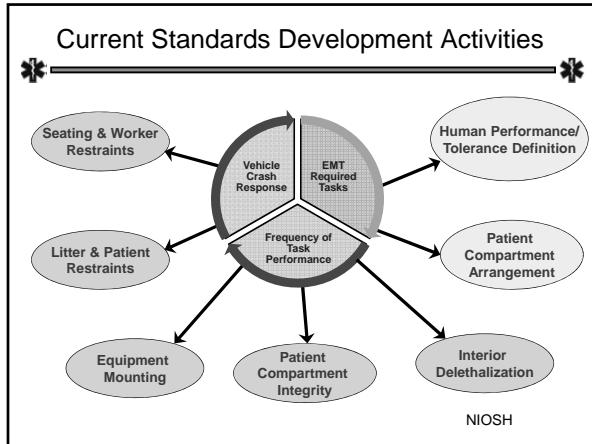
CPS on Non-Passenger Cars: Low Speed Vehicles, Ambulances, EMS Issues

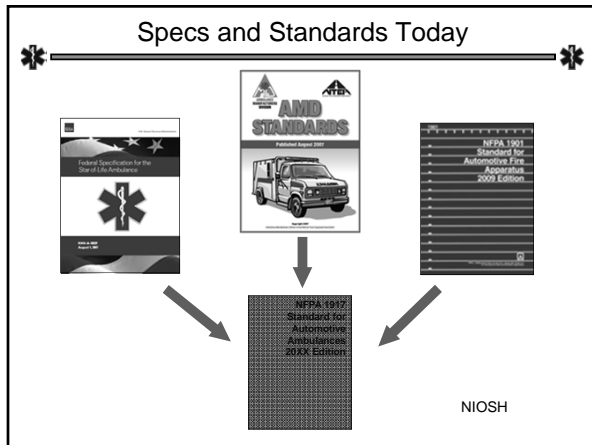
- AAP Section on Transport Medicine webinar: Ambulance Safety in the 21st Century - April 2010
- Recommendations for the Safe Transportation of Children in Emergency Ground Ambulances - August 2010
 - NHTSA.GOV (<http://www.nhtsa.gov/staticfiles/ntti/ems/pdf/EMScconference05aug2010.pdf>)
- EMS Solutions for Transporting Children in Emergency Vehicles Work Group - 2009
 - EMSC.NET
 - NHTSA.GOV

Federal Register
Monday, March 14, 2011

<http://www.federalregister.gov/articles/2011/03/14>

- Partnership to test patient compartment seating and restraints to proposed standard
- National Institute for Occupational Safety and Health (NIOSH), CDC HHS
- National Truck Equipment Association, Ambulance Manufacturers Division (NTEA-AMD)





- ### Proposed Standards To Be Evaluated
- AMD STANDARD 026—Seat, Seat Mount and Occupant Restraint Dynamic Test—Proposed (draft)
 - SAE J2917 Surface Vehicle Recommended Practice, Occupant Restraint and Equipment Mounting Integrity—Frontal Impact System-Level Ambulance Patient Compartment, published May 2010
 - SAE J2956 Surface Vehicle Recommended Practice, Occupant Restraint and Equipment Mounting Integrity—Side Impact System-Level Ambulance Patient Compartment (draft)

**Improving Occupant Protection for
Non-Critical Pediatric Patients in
Ambulances: A Training Curriculum for
EMS Personnel**

Primary Authors: Marilyn J. Bull, MD
Laura W. Novak, MS OTR
Judith L. Talty, Director, Automotive Safety Program

Funding Provided by: National Highway Traffic Safety Administration
Kohls Center for Safe Transportation

July 2010

Acknowledgements

- National Highway and Traffic Safety Administration (NHTSA)
- National Center for the Safe Transportation of Children with Special Healthcare Needs, Kohl's Center for Safe Transportation of Children, Automotive Safety Program at Riley Hospital for Children and Indiana University School of Medicine
- Thank you to all reviewers of this training curriculum

Training Purpose

- Address issues related to improving occupant protection for non-critical pediatric patients
- Scheduled and non-scheduled ambulance transport
- Approximately 4 ½ hours
- Designed for EMS personnel

Ambulance Curriculum

- For EMS personnel
- Transporting non-critical pediatric patients in ambulances
- 4- 4 ½ hours; lecture and hands-on
- Approved instructors receive disk containing all course materials for \$25; includes shipping and handling

Materials Required

- LCD Projector
- Laptop Computer
- PowerPoint Slides
- Two Ambulance Cots
 - Include one Ferno
- Car Bed
 - Dreamride
- Child Restriants
 - Infant only
 - Convertible
 - Forward Facing only
 - Combination
 - Booster
- Dolls

Equipment Used

- Stryker cot
- Ferno cot
- Convertible CSS
- Dreamride car bed w/extra set of loops
- Safe Guard Transport
- EP-96 Rescu-Air
- Pedi Pal
- Pedi Mate
- Guardian Integrated safety seat
- Dolls

Equipment

- Not all instructors will have complete selection of equipment
- Instructors may be able to borrow from other programs
- May add video clips from websites

Instructors

Training Curriculum for Non-Certified Pediatric Patients in Ambulances
A Training Curriculum for EMS Personnel
Instructor Certification Form

Applicant: _____
 Title: _____
 Address: _____
 City: _____ State: _____ Zip: _____
 Phone: _____
 E-Mail Address: _____
 Date: _____

1. I understand the requirements for this curriculum and agree to follow the curriculum as written.
 2. I understand the requirements for this curriculum and agree to follow the curriculum as written.
 3. I understand the requirements for this curriculum and agree to follow the curriculum as written.
 4. I understand the requirements for this curriculum and agree to follow the curriculum as written.
 5. I understand the requirements for this curriculum and agree to follow the curriculum as written.
 6. I understand the requirements for this curriculum and agree to follow the curriculum as written.
 7. I understand the requirements for this curriculum and agree to follow the curriculum as written.
 8. I understand the requirements for this curriculum and agree to follow the curriculum as written.
 9. I understand the requirements for this curriculum and agree to follow the curriculum as written.
 10. I understand the requirements for this curriculum and agree to follow the curriculum as written.

Signature: _____
 Date: _____

Approved by: _____
 Title: _____
 Date: _____

- Instructors required to be certified CPST with current experience in the field of emergency medical services
- Submit application to Bryanna Lawler, blawler@iuhealth.org, 1-800-KID-N-CAR

Instructors

- To date, 103 instructors
- Database by state on www.preventinjury.org in Special Needs section
- Requirements:
 - Submit class roster; indicate CPST
 - Agree not to adapt or use any photographs from presentation

NHTSA Work Group

- NHTSA
“EMS Solutions for Transporting Children in
Emergency Vehicles Work Group” - 2009
 - Evaluate EMS transport practices and formulate
recommendations
 - Address urgent transportation services provided by
ambulances
 - Ambulance services for inter- hospital transportation
NOT addressed but similar principles apply

Part One: Ambulance Transportation: Issues and Considerations

- Time allotted:15
minutes
- Ambulance crash
characteristics,
research, EMSC and
CDC
recommendations
- Consider self-study



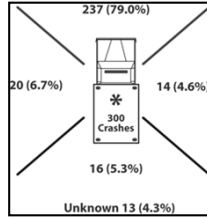
Ambulance Crash Characteristics

- 10,000 ambulance crashes
every year that cause death
or injury (American Ambulance
Association, 2002)
- 1 fatality for every 100
crashes (Clawson, 1998)
- 78% of fatalities occur in
other vehicles or involve
pedestrians (Kahn, 2001)



Ambulance Crash Characteristics

- NIOSH analysis of field crash data
- Of 300 fatal crashes, 79% considered frontal impacts



NHTSA Fatality Analysis Reporting System (FARS), 1991-2000; Green J. et al. "Reducing Vehicle Crash-Related EMS Worker Injuries Through Improvements in Restraint Systems", World Congress on Safety & Health at Work, 9/05.

Ambulance Crash Characteristics

- Most serious/fatal injuries occur:
 - in rear compartment
 - to unrestrained or improperly restrained occupants
 - at intersections
 - during emergency use (Kahn, 2001)



- 82% of fatally injured rear occupants were unrestrained (Becker, 2003)

Ambulance Crash Characteristics



- Estimated EMS fatality rate of 12.7 per 100,000 workers
 - Twice the national average of work related fatalities
 - Higher than police and firefighters
- Cause of death
 - 74% transportation related

Maguire, 2002

**Part Two:
Child Restraint Basics**

- Federal safety standards, CSS in a crash, parts of CSS, types of CSS etc.
- Allotted 30 minutes; took 34 minutes
- Consider self-study

FMVSS and Ambulance Specific Restraints

- No Federal Motor Vehicle Safety Standards to define performance criterion for child restraint use in ambulance patient compartment
- Many ambulance specific restraints may advertise meet or exceed injury criterion measures such as FMVSS 213
 - **Contact manufacturers to obtain crash test data and specific criteria used for testing**

Considerations for Ambulance Specific Restraint Use

- EMS personnel should consider the following when selecting restraints:
 - Demographics of pediatric population served for scheduled or non-scheduled transport
 - Ease of use during installation and harness procedures when securing a child in the restraint
 - Ease of cleaning and storage inside the ambulance

**Considerations for Ambulance
Specific Restraint Use**

- Instruction manuals for various ambulance specific child restraints may be unclear or confusing
- Contact the manufacturer(s) before use to clarify installation procedures and requirements for use on the cot or inside the ambulance

**Part Three:
Child Safety Seats: Considerations for
Ambulance Use**

- Issues related to using different type of car seats in ambulance
- Included front seat, attendant seats, and cot

**Part Four:
Research on Use of Convertible Child
Restraint and Car Bed on Ambulance Cot**

- Reviewed Crash Test research
- Includes slide and video footage of crash tests conducted in 1990 for comparison
- Time: 30 minutes
- Hands on exercise with convertible seat and Dreamride and check-off at end of Part 4
- Allowed participants to work in groups while instructor supervised



Dr. Joseph O'Neil (I) oversees members of class install convertible seat on cot.



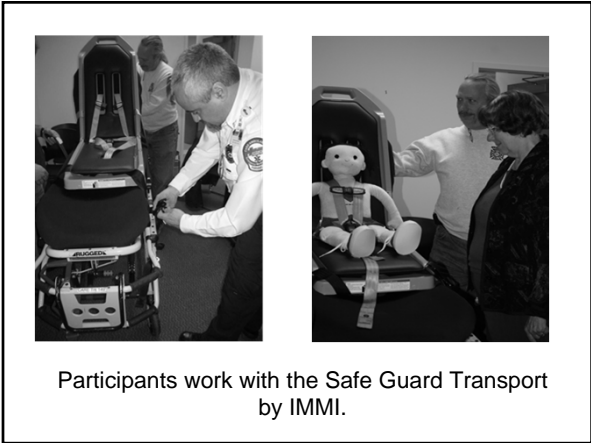
A participant waits to be checked off on his installation of a car bed on a cot.

**Part Five:
Restraints Specifically Designed for
Ambulance Use**

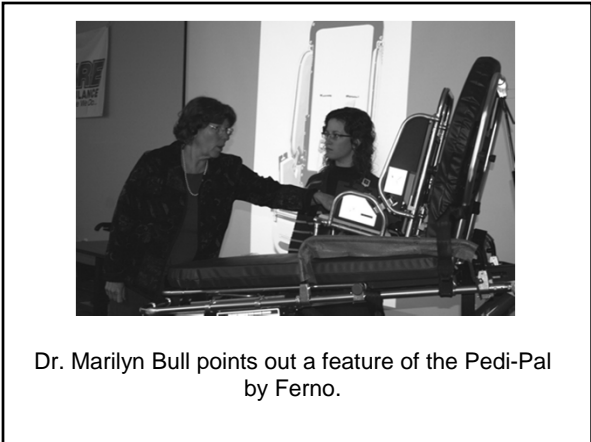
- Overview of restraints designed for cot use or integrated into attendant seat
- Sampling of products not intended to be all inclusive, imply endorsement, or indicate crashworthiness
- Hands on exercise with ambulance restraints and check-off at end of Part 5
- Allowed participants to work in groups while instructor supervised



Participant works with integrated system by Serenity Safety Products.



Participants work with the Safe Guard Transport by IMMI.



Dr. Marilyn Bull points out a feature of the Pedi-Pal by Ferno.



Participants check the instructions for use of the Pedi-Pal.

**Part Six:
Policy and Protocol
Development for Pediatric
Transportation in Ambulances**

**Components of Pediatric
Transport Policy**

- Define acceptable means of child transport
 - Will vary depending on seating options within the ambulance and child restraints available from the facility
- Identify types of child restraints approved and available for use at the facility with:
 - height and weight parameters
 - harness adjustment procedures
 - cot placement and configuration
 - installation requirements for cot or seating positions

Components of Pediatric Transport Policy

Exclude unacceptable practices such as:

- Child on a parent's lap
- CSS on side-facing jump seat
- CSS on ambulance bench seat
- CSS in airbag equipped seating position

Components of Pediatric Transport Policy

- Address equipment types
- Specify securement and storage methods
- Define cleaning and storage procedures for each type child restraint



Components of Pediatric Transport Policy

- Identify members of policy team
- Specify and train parties responsible for implementation
- Include signatures of approval

Other Considerations: Injured Child Transport

- A critically injured child that must travel supine or needs intubation and ventilator support should use the restraint that fits best while considering the medical needs of the patient
- Additional research may be required to accommodate children and transport them safely under various circumstances

Other Considerations: Use of CSS That Was in a Crash

- Develop procedures to determine how best to transport children in child restraints from the scene of an emergency
- Decision to use or not use a child restraint on ambulance cot after involved in crash left to the discrimination of the EMS provider

Other Considerations: Use of CSS That Was in a Crash

- The NHTSA has provided guidelines for use of a CSS that has been in a crash
- CSS manufacturers may also provide recommendations about the advisability of reuse of their seats after a crash
- Under triage circumstances the decisions are more challenging and may require tradeoff decisions by the emergency personnel at the scene

Other Considerations: Use of CSS That Was in a Crash

- Use of restraint designed and crash tested specifically for ambulance cot use would be the preferred choice for use by an uninjured or injured but stable child after involvement in a crash
- If ambulance specific crash tested child restraint for cot use is not available, use of a convertible child safety seat or appropriate car bed on the ambulance cot would be a possible alternative

Other Considerations: Use of CSS That Was in a Crash

- If properly installed on the cot, a convertible CSS that has not been damaged in a crash can be expected to restrain a child more securely than an ill-fitting ambulance cot belt restraint

What we learned

- Format of class may be adjusted to include self-study
- Most useful part of class was student interaction with restraints
- Instructors need to be familiar with ambulance restraint instructions and make them available to students
