

## Safe Transportation of Premature Infants

Increasing survival rates and earlier hospital discharge of premature infants have resulted in babies weighing less than 2500 g being transported frequently in the family car. Provision for safe motor vehicle transportation of this vulnerable population of infants is a major concern of parents and health professionals. The American Academy of Pediatrics Committee on Injury and Poison Prevention and the Committee on Fetus and Newborn believe that specific guidelines should be followed to ensure proper selection and use of car seats and other occupant restraint devices for low-weight infants.

Currently, Federal Motor Vehicle Safety Standard 213, which established design and dynamic performance requirements for child restraint systems, applies to children weighing up to 50 lb, but no minimum weight limit is established in the standard. Most safety restrains on the market are designed for infants weighing more than 7 lb (3.1 kg), and only recently have studies been done which allow some prediction of the protective capabilities of restraint devices for infants weighing less than 7 lb.<sup>1,2</sup> Initial research has indicated that some infants, particularly premature, low-weight infants, may be subject to oxygen desaturation when placed in an upright position in car safety seats.<sup>3,4</sup> Both rate of growth and neurologic maturation may influence potential risk of respiratory compromise in these and other seating devices. Further investigations will be necessary to precisely define the population at risk and the variety of situations in which risk occurs.

Proper positioning of small infants in car seats is important to minimize the risk of respiratory compromise while providing protection for the in-

fant in the event of a crash or sudden stop. Specific guidelines for positioning premature infants into car seats include the following:

1. Place the infant in the car seat in a location that allows for observation by an adult during travel. All infants weighing less than 17 to 20 lb must ride facing rear when secured in standard car seats.

2. Car seats with a distance of 5½ inches or less from the crotch strap to seat back should be selected to reduce the potential of a low-weight infant's slumping forward (Fig 1). A small rolled diaper or blanket between the crotch strap and the infant may be added to reduce slouching.

3. Seats with a distance of 10 inches or less from the lower harness strap to the seat bottom should be selected to reduce the potential of harness straps' crossing the infant's ears (Fig 1).

4. If the child safety seat is so upright on the vehicle seat that the baby's head drops forward, tilt the seat back. Wedge a cloth roll under the child safety seat base at the baby's feet, so that the baby reclines at a 45-degree angle.

5. The car seat's retainer clip should be positioned on the infant's chest, not on the abdomen or in the neck area (Fig 2).

6. Position the infant properly with towels or blankets. Blanket rolls may be placed on both sides of the infant's trunk to provide lateral support for the head and neck (Fig 2).

7. Small infants should not be placed into convertible car seats with a shield, abdominal pad, or arm rest if the infant's face and neck could directly contact these objects during an impact. Similarly, toddler-only car seats designed for children 20 to 40 lbs should not be used for newborn infants.

8. Never leave an infant unattended in a car seat.

Several specific recommendations can be made regarding travel for infants at possible risk of respiratory problems:

1. Families should be counseled to minimize travel for infants at risk for respiratory compromise.

2. Current information suggests that all preterm infants of less than 37 weeks' gestation should have

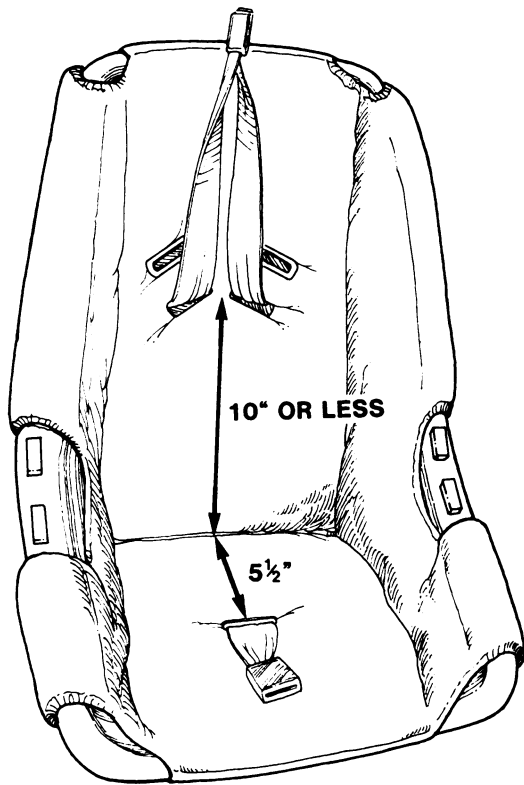
---

The recommendations in this statement do not indicate an exclusive course of treatment to be followed. Variations, taking into account individual circumstances, may be appropriate.

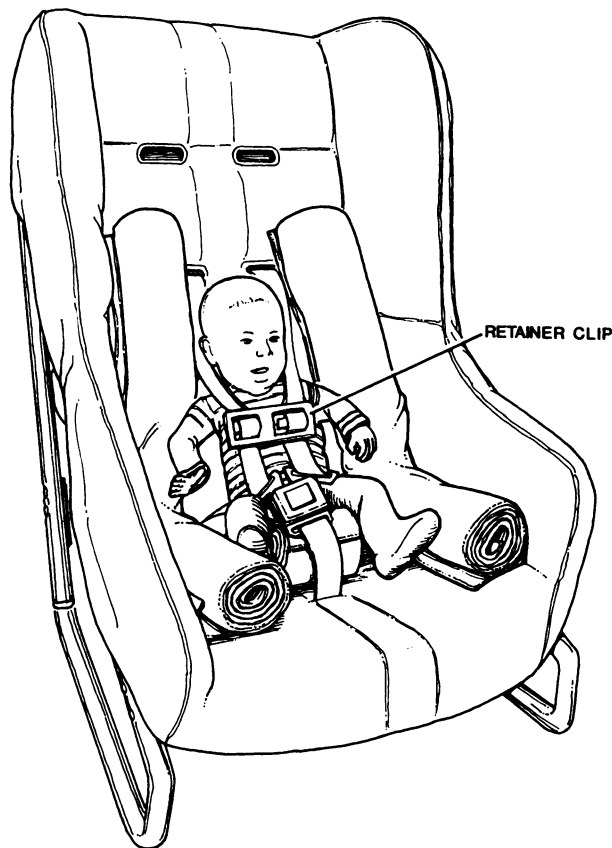
This statement has been approved by the Council on Child and Adolescent Health.

Use of brand names does not imply endorsement of specific products by the American Academy of Pediatrics.

PEDIATRICS (ISSN 0031 4005). Copyright © 1991 by the American Academy of Pediatrics.



**Fig 1.** Car seat with a distance of 5½ inches or less from the crotch strap to the seat back and 10 inches or less from the lower harness strap to the seat bottom.



**Fig 2.** Car seat with retainer clip positioned on the infant's chest.

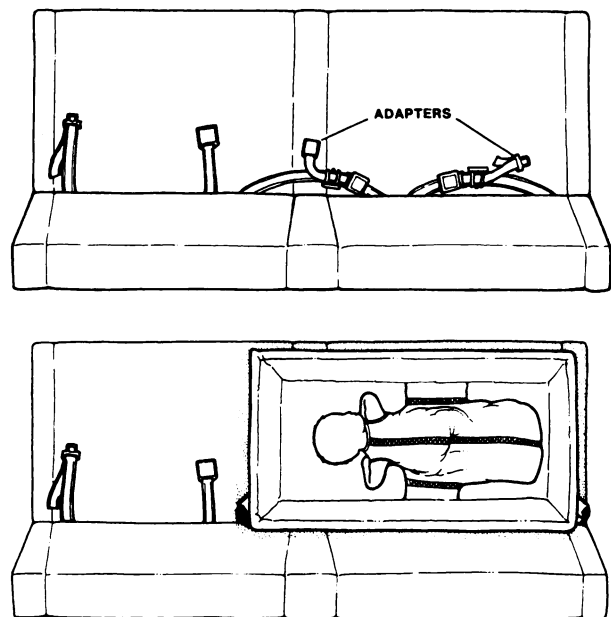
a period of observation in a car seat before discharge to monitor for possible apnea, bradycardia, or oxygen desaturation. An appropriate hospital staff person should conduct the observation.

3. Infants with documented desaturation, apnea, or bradycardia in an upright position should travel prone in an alternative seating device. If the clinical situation warrants, a supine position may be considered but this position may be associated with an increased risk of aspiration. Parents of these infants should also be counseled to avoid use of other upright equipment including infant swings, infant seats, and infant carriers.

4. Infants for whom home cardiac and apnea monitors are prescribed should use this monitoring equipment during travel. Have portable, self-contained power for twice the expected transport duration.

5. Until new technology is available for equipment restraints, all portable medical equipment such as monitors and oxygen tanks should be restrained with adjacent seat belts or wedged on the floor or under the seat to prevent the equipment from becoming a dangerous projectile in the event of a crash or sudden stop.

Alternative child restraint devices should be available for infants who must travel prone, supine, or in a less upright position. One alternative device that provides restraint for infants who must ride prone or supine is the Swinger car bed (Fig 3). The infant is secured in a bunting, which is attached with zippers on both sides of the car bed. The car bed's outer plastic shell is secured against the vehicle seat by clamps that attach to seat belts at both ends of the Swinger. The Swinger car bed should be considered only for use by those infants



**Fig 3.** Swinger car bed.

whose medical condition requires that they be transported prone or supine. Conventional car seats that allow for proper positioning of the low-weight infant should otherwise be selected if a semireclined position can be maintained safely by the infant, inasmuch as observation of the infant is easier if the child is in a conventional rear-facing car seat adjacent to the parent. The cost of standard car seats is also much less than that of the Swinger.

These guidelines are general by necessity to allow use of a wide variety of commercially available restraints. The anticipated development of new products should improve the available occupant-protection resources for low-weight infants. Specific information regarding currently available restraint systems can be obtained from the American Academy of Pediatrics.

The recommendations provided in this statement are proposed for premature babies but may, with further research, also apply to other small infants. The safe transportation of children with respiratory compromise due to neuromuscular and orthopedic problems will be addressed in a separate policy statement.

**COMMITTEE ON INJURY AND POISON PREVENTION, 1990 to 1991**

Mark D. Widome, MD, MPH, Chairman

William E. Boyle, Jr, MD

Katherine K. Christoffel, MD, MPH

Murray L. Katcher, MD, PhD

Sylvia H. Micik, MD

George C. Rodgers Jr, MD, PhD

**Liaison Representatives**

Gerard M. Breitzer, DO, American College of Osteopathic Pediatricians

John S. O'Shea, MD, Ambulatory Pediatric Association

Juan Rodriguez, MD, MPH, Centers for Disease Control

Peter Scheidt, MD, MPH, National Institute of Child Health and Human Development

Richard Stanwick, MD, Canadian Paediatric Society

**Section Liaison**

Joseph J. Tepas III, MD, Section on Surgery

Susan B. Tully, MD, Section on Pediatric Emergency Medicine

**Consultant**

Joel L. Bass, MD

Marilyn J. Bull, MD

**COMMITTEE ON FETUS AND NEWBORN, 1990 to 1991**

Gerald B. Merenstein, MD

George Cassady, MD

Allen Erenberg, MD

Bernard H. Feldman, MD, MPH

Stephen A. Fernbach, MD

Leonard I. Kleinman, MD

William Oh, MD

Irwin J. Light, MD

Marilyn Escobedo, MD

**Liaison Representatives**

Alexander Allen, MD, Canadian Paediatric Society

John C. Hauth, MD, American College of Obstetricians & Gynecologists

Carole Kenner, BSN, MSN, DNS, National Association for Neonatal Nurses, American Nurses' Association, Nurses' Association of the American College of Obstetricians and Gynecologists

Linda Wright, MD, National Institute of Child Health and Human Development

**REFERENCES**

1. Bull MJ, Stroup KB. Premature infants in car seats. *Pediatrics*. 1985;75:336-339
2. Bull MJ, Weber K, Stroup KB. Automotive restraint systems for premature infants. *J Pediatr*. 1988;112:385-388
3. Willet LD, Leuschen MP, Nelson LS, Nelson RM. Risk of hypoventilation in premature infants in car seats. *J Pediatr*. 1986;109:245-248
4. Willet LD, Leuschen MP, Nelson LS, Nelson RM. Ventilatory changes in convalescent infants positioned in car seats. *J Pediatr*. 1989;115:451-455

**Safe Transportation of Premature Infants**  
*Pediatrics* 1991;87;120

**Updated Information & Services**

including high resolution figures, can be found at:  
<http://pediatrics.aappublications.org/content/87/1/120>

**Permissions & Licensing**

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:  
<http://www.aappublications.org/site/misc/Permissions.xhtml>

**Reprints**

Information about ordering reprints can be found online:  
<http://www.aappublications.org/site/misc/reprints.xhtml>

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



# PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

## Safe Transportation of Premature Infants

*Pediatrics* 1991;87;120

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://pediatrics.aappublications.org/content/87/1/120>

Pediatrics is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. Pediatrics is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 1991 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 1073-0397.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

