NEONATAL GUIDELINE

Hospital Based Child Passenger Safety Program for Neonates/Infants

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Part One: Background, AAP Guidelines, Evidence

I. Purpose: To review the current AAP position statement for Safe Transportation of Newborns at Hospital Discharge, to discuss the background and evidence for this practice, and to provide the practitioner with information on the implementation and maintenance of a hospital-based child passenger safety program.

II. Introduction:

A. Morbidity/mortality

1. Crash/injury statistics (NHTSA Traffic Safety Facts, 2005).
   a. In 2005, there were a total of 43,443 traffic fatalities in the U.S.
   b. The 14 and younger age group accounted for 4% (1,946) of those traffic fatalities and 9% (234,000) of all people injured in motor vehicle crashes.
   c. In Arkansas in 2005, traffic fatalities included: 6 children under 1 year, 5 children 1-3 years, 10 children 4-7 years, and 20 children 8-14 years of age (total 41 children).
   d. Every day in the U.S., an average of 5 children age 14 and younger were killed and 640 were injured in motor vehicle crashes in 2005.
   e. Child safety seats reduce the risk of fatal injury by 71 percent for infants (< 1 year of age) and by 54 percent for toddlers (1-4 years of age) in passenger cars.
   f. In 2005, there were 450 passenger vehicle occupant fatalities among children under 5 years of age. Of those 450 fatalities, where restraint use was known (428), 151 (35%) were totally unrestrained.
   g. Among children under age 5, an estimated 420 lives were saved in 2005 by child restraint use. Of these 420 lives saved, 382 were associated with the use of child safety seats and 38 with the use of adult safety belts.
   h. At 100 percent child safety seat use for children under 5, an estimated 518 lives (that is, an additional 98) could have been saved in 2005.
   i. In 2005, Arkansas had the 9th highest death rate from crashes in the U.S.
2. Child restraint use/misuse statistics
   a. NHTSA Traffic Safety Facts, 2008.
      1) 19% of children under age 1 were not in rear-facing seats.
      2) 23% of children less than 20 pounds were not in rear-facing seats.
      3) 28% of children under age 1 or less than 20 pounds were not in rear-facing seats.
   b. NHTSA Misuse of Child Restraints, 2004.
      1) Child restraint use and critical misuse data were collected in 2002 for 5,527 children <80 lb in 4,126 vehicles in 6 states.

2) One or more critical misuses were found in 72.6% of the observed car seats. 83.9% of infant seats had critical misuse. The most common critical misuses were:
   a) Loose harness straps securing child to car seat.
   b) Loose vehicle seat belt attachment around the car seat.
   c) Visible damage to the car seat.

B. Goals for a hospital-based child passenger safety program.
   1. Child passenger safety training for medical and nursing staff.
   2. Basic child passenger safety education for expectant and new parents, as well as parents/caregivers of children with special needs.
   3. Individual consultations with parents on child safety seat selection, usage and installation.
   4. Provisions to make available an appropriate car safety seat by sale, short-term loan, or donation to parents before discharge if the parents are unable to provide their own.
   5. Angle Tolerance Testing for children meeting criteria.

III. Literature Review

A. One of the earliest publications on the subject (Bull and Stroup, 1985) recognized that child car seats had no specification for minimum weight, and that no seats on the market at that time were suitable for the LBW baby without modification.

B. In 1986, a study by Willett et al evaluated 30 newborn infants for respiratory compromise before, during and after placement in a child car restraint. Included were 12 premature infants with a history of apnea of prematurity, 8 premature infants without observed apnea, and 10 full term infants. Oxygen saturation, ECG and pneumocardiograms were done on each infant.
   1. The premature infants with known prior apnea of prematurity and the premature infants without previously observed apnea all showed significant decreases in oxygen saturation < 90% and had significantly greater time with oxygen saturation < 85% while in the child car restraint.
   2. These authors recommended developing car seats designed for LBW infants. They also recommended the monitoring of premature and LBW infants in their chosen car restraint prior to discharge from the hospital.

C. Willett et al (1989) further studied respiratory compromise of premature/LBW infants in car seats.
   1. Investigators enrolled gestational age < 37 weeks, convalescent status with anticipated discharge home within 72 hours and length of NICU admission more than 7 days. 62 infants, 31 with a gestational age < 32 weeks, 22 with gestational age 32-36 weeks, and 9 full term (> 36 weeks). ECG, chest wall and abdominal wall impedance, nasal airflow and oxygen saturation were measured.
   2. All of the premature infants in the study had significantly more time with oxygen saturation < 85% and more episodes of short apnea while in the car seat. Sixteen (26%) of the 62 infants had bradycardia, desaturation or apnea that required intervention during the car seat phase with the study being terminated for 3 infants due to these events. No full term infant was found to have abnormal results while in the car seat.

3. Investigators concluded that some premature infants will experience respiratory compromise in a child car restraint; and that respiratory difficulties in a child car restraint are most likely multifactorial and may be different for individual infants. The only predictive factor identified for respiratory compromise was prematurity, and the authors recommended screening premature infants in the car restraint prior to discharge. The authors also suggested that greater recline angle of the restraint may improve oxygen saturation.

D. Summary of 1990 AAP Policy Statement, Safe Transportation of Newborns Discharged From the Hospital. (http://aappolicy.aappublications.org/cgi/reprint/pediatrics;86/3/486.pdf) Recommended hospital discharge policies to include procedures for discharging each newborn in a car safety seat appropriate to maturity and medical condition, education of parents as well as staff on correct use of car seats, provisions to make available car seats on loan if family unable to afford, and designation of an individual responsible to carry out the policy.

E. Summary of 1991 AAP Policy Statement, Safe Transportation of Premature Infants. (http://aappolicy.aappublications.org/cgi/reprint/pediatrics;87/1/120.pdf)
   1. Statement gave specific recommendations on positioning of premature baby in car safety seat.
   2. Statement recommended that all preterm infants of < 37 weeks' gestation have 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. In addition, recommended that infants with documented desaturation, apnea, or bradycardia in an upright position should travel prone in an alternative seating devise; other upright seating devices should be avoided.
      a. Supine position also could be considered.
      b. Families should be counseled to minimize travel, and use home cardiac/apnea monitors if prescribed for home.

IV. Current AAP Statements

A. 2001: American Academy of Pediatrics, Committee on Injury and Poison Prevention, School Bus Transportation of Children With Special Needs. Pediatrics. 2001; 108(2):516-518. (http://aappolicy.aappublications.org/cgi/reprint/pediatrics;108/2/516.pdf)

B. 1999: American Academy of Pediatrics, Committee on Injury and Poison Prevention. Safe Transportation of Newborns at Hospital Discharge. Pediatrics, 1999;104:986-987. Reaffirmed 2006. (http://aappolicy.aappublications.org/cgi/reprint/pediatrics;104/4/986.pdf)

C. 1999: American Academy of Pediatrics, Committee on Injury and Poison Prevention. Transporting Children with Special Health Care Needs. Pediatrics. 1999;104:988-992. Reaffirmed 2006. (http://aappolicy.aappublications.org/cgi/reprint/pediatrics;104/4/988.pdf)

D. 1998: American Academy of Pediatrics, Committee on Fetus & Newborn, Hospital Discharge of the High-Risk Neonate – Proposed Guidelines. Pediatrics. 1998; 102:411-417. (http://aappolicy.aappublications.org/cgi/reprint/pediatrics;102/2/411.pdf)

E. 1996: American Academy of Pediatrics Committee on Injury and Poison Prevention and Committee on Fetus and Newborn, Safe Transportation of Premature and Low Birth Weight

Infants. Pediatrics. 1996;97(5):758-760.
(http://aappolicy.aappublications.org/cgi/reprint/pediatrics;97/5/758.pdf)

V. Summary of Recommendations, 1999 AAP Policy Statement: Safe Transportation of Newborns at Hospital Discharge:

A. All hospitals with services for newborns should develop policies for the discharge of newborns in car safety seats that are crash tested and meet the FMVSS212.
   1. These policies should be developed in consultation with a car seat expert who has successfully completed the National Highway Traffic Safety Administration (NHTSA) 4-day course.
   2. Although the resources of hospitals and patients vary greatly, at discharge every newborn should be properly restrained in a car safety seat.

B. Pediatricians should work with these hospitals in establishing hospital policies that clearly define staff roles for each required task.

C. Hospital policies related to newborns should include the following:
   1. Methods by which expectant parents will be informed, before delivery, of the importance of using car safety seats and potential problems with vehicle incompatibility.
   2. Designation of an individual responsible for implementing hospital policies and procedures related to discharge of newborns in car safety seats that are used properly.
   3. Designation of an individual or team specifically trained to assess the needs of infants with special health care needs with regard to the selection of the most appropriate child safety seat.
   4. A policy to ensure provision of a period of observation in a car safety seat before hospital discharge for each infant born at < 37 weeks' gestation to monitor for possible apnea, bradycardia, or oxygen desaturation.
   5. Provision for periodic in-service education of staff responsible for parent and guardian education on correct use of car safety seats. Those responsible for training other hospital staff and parents and guardians should have successfully completed the NHTSA 4-day course.
   6. Provision of regular periodic review by a designated person who has completed the NHTSA 4-day course of all materials distributed to parents and guardians of newborns about proper car safety seat use.
   7. Provisions to make available an appropriate car safety seat by sale, short-term loan, or donation to parents before discharge if the parents are unable to provide their own.

D. Admission orders for newborns should include an order written by a physician for parent instruction about use of child safety seats.

E. Discharge policies for newborns should include:
   1. Determination of the most appropriate car safety seat for each newborn according to maturity and medical condition by a designated hospital employee.
   2. Provision of information and training for parents/guardians should be presented before discharge on the generic issues related to correct use of car safety seats. Hands-on teaching including "return demonstration" should be a part of this instruction. The installation of a specific car seat in a specific car must be the parent's responsibility.

3. A period of observation in a car safety seat before hospital discharge should be provided to each infant born at < 37 weeks' gestation to monitor for possible apnea, bradycardia, or oxygen desaturation.

VI. What are some of the concerns expressed by clinicians and hospital administration about doing angle tolerance testing and implementing a hospital-based car safety seat program?

A. Assumption is that babies who experience oxygen desaturation events while in carseat are at increased risk for adverse neurodevelopmental outcomes.
B. Assumption is that the ATT will detect instability.
C. Assumption is that if we intervene with recommended ATT and delay discharge until baby passes ATT, we increase the chances of a good outcome (decreased mortality, decreased exposure to hypoxemia, etc.).
D. Recommendation for car bed is based on the assumption that events are less likely to occur in a car bed than in a car seat.
E. Cost
F. Liability

VII. Data supporting ATT of premature infants in hospital prior to discharge:

A. Apparently life threatening events in infant car safety seats (Tonkin, 2006).
   1. Prospectively examined all infants referred to the Auckland Cot Monitoring Service after an apparently life threatening event in early infancy.
   2. Over an 18 month period, 43 infants were referred to the service for evaluation after apparently life threatening events.
   3. All infants had been seen on one or more occasions to develop cyanosis or to turn pale, and the caregivers thought the infants were not breathing. Nine infants had been restrained in a car safety seat appropriate for their age. The median age at presentation of the nine infants was 5 weeks; mean birth weight was 3149 grams. One infant was preterm; the remainder of were term infants with normal growth.
   4. The scene was reconstructed, using the infant's own car seat, to establish the precise position of the infant when the event occurred. When the infants, quietly awake, were placed in the position of the original episode, the infants' heads flexed forward, typically with the jaw pressed down on the chest, and this was associated with intercostal recession on inspiration in all cases.
   5. All but one of the ALTE events occurred when the infants had been left in the car seats indoors, allowing them to fall asleep restrained in a relatively upright position.
   6. Authors suggested that modifying car safety seats so that head flexion is unlikely could avoid the risk of ALTE.

B. Car Seat or Car Bed for Very Low Birth Weight Infants at Discharge Home (Salhab et al, 2007).
   1. Authors assessed 151 VLBW babies in car seat and car bed for 120 minutes each.
   2. Incidence of apnea, bradycardia, or desaturation was compared. They found no evidence that an event is less likely in a car bed than in a car seat. However, they did find, as in previous studies, a significant proportion of VLBW infants with one or more episodes (15% in car seat and 19% in car bed). BPD was the only significant predictor for failing an ATT.

   a. Failing infants were of lower GA and birth weight and required longer mechanical ventilation than those with no events.
   b. Each 1-week decrease in the GA increased the chance of events by around 30%.
   c. They recommended that preterm VLBW infants should be closely observed and travel time limited, irrespective of the device used.

C. Sudden infant death in sitting devices (Cote et al, 2007). Retrospective population-based cohort study reviewing all cases of sudden unexpected death in infants between birth and 1 year of age that occurred in the province of Quebec between Jan. 1991 and Dec. 2000.
   1. Of the 508 deaths, 17 occurred in a sitting device, of which 10 were unexplained.
   2. There was an excess of infants of less than 1 month of age found to have died in a sitting position in the unexplained death group.
   3. Three infants who died in a sitting position had an increased risk of upper airway obstruction.
   4. Although very few deaths occurred in car seats, results suggested that caution should be used when placing younger infants in car seats and similar sitting devices, whether the infants were premature or not.

D. Stability of the Infant Car Seat Challenge and Risk Factors for Oxygen Desaturation Events (DeGrazia, 2007). This study examined the outcomes of 49 premature infants during two 90-minute Angle Tolerance Tests (ATT) at a tertiary center.
   1. 86% of the babies had the same result on both ATT's (Pass or Fail).
      a. 8% passed the first challenge, but failed the second.
      b. 6% failed the first challenge, but passed the second.
   2. Authors concluded that the ATT success rate for identifying infants at risk for oxygen desaturation events was equal to or better than that of other screening tests for newborn medical conditions.
   3. They also found that the odds for oxygen desaturation events increased for infants born at less than or equal to 34 weeks gestation and hospitalized longer than 7 days.

E. Respiratory Instability of Term and Near-term Healthy Newborn Infants in Car Safety Seats (Merchant, 2001). Objective was to evaluate the respiratory stability and safety requirements of healthy, minimally preterm infants (in normal newborn nursery) in car seats compared with term infants.
   1. Authors evaluated 50 term and 50 minimally preterm newborns in supine position and in car seat.
   2. Newborns were monitored for apnea, bradycardia, and oxygen saturation. Authors assessed car seat appropriateness of fit.
      a. 24% of preterm and 4% of term newborn infants did not fit securely into suitable car seats despite the use of blanket rolls.
      b. Seven infants (3 preterm and 4 term) had oxygen saturation values of < 90% for longer than 20 minutes in their car seats.
      c. 12% of preterm infants but no term infants had apneic or bradycardic events in their car seats.
   3. Because oxygen saturation is lower in both groups, car seats should be used only for travel, and travel should be minimized during the first months of life.

F. Premature infants and car seat safety (Hamelin, 1996). 161 infants monitored for apnea, bradycardia and desaturation for minimum one hour or length of time to travel home (max 2.5 hours).
   1. Premature and LBW infants are at risk of desaturation in a child car restraint.
      a. The highest rate of "failure" (16%) occurred in infants who were both < 36 weeks gestation and < 2,300 grams.
      b. The infants most vulnerable appeared to be those who were < 2,300 grams at discharge.
   2. Premature infants are vulnerable to respiratory compromise during travel. Parents should be advised to limit travel until infant is older/larger.

G. Monitoring Premature Infants in Car Seats: Implementing the American Academy of Pediatrics Policy in a Community Hospital (Bass et al, 1993).
   1. Sixteen of 87 (18.4%) infants 26-36 weeks gestation had abnormal results when monitored for 90 minutes in car safety seat.
   2. In addition, one 37-week gestational newborn who was monitored because of duskiness during feeds also became apneic and bradycardic in the car seat.
   3. Monitoring results are consistent with previous reports that premature infants are at risk of desaturation in a car seat.
   4. In addition, authors demonstrated that a full-term neonate may also be at risk if other evidence of desaturation (i.e. duskiness during feedings) is observed.

VIII. Data regarding use of car bed and effect of angle of CSS, effect of head positioning.

A. Car Seat or Car Bed for Very Low Birth Weight Infants at Discharge Home (Salhab et al, 2007). Authors assessed 151 VLBW babies in car seat and car bed for 120 minutes each.
   1. Incidence of apnea, bradycardia, or desaturation was compared.
   2. They found no evidence that an event is less likely in a car bed than in a car seat.

B. Can we reduce episodes of haemoglobin desaturation in full-term babies restrained in car seats? (Tonkin et al, 2007) Objective was to determine whether episodes of haemoglobin oxygen (SpO2) desaturation in full-term infants restrained in car seats could be reduced by the use of a simple foam plastic infant car seat insert (designed to push the body forward, with space for the protuberant occiput to lie behind the spine, and so reduce flexion of the infant's head on the trunk).
   1. Evaluated eighteen healthy full-term babies while restrained in car safety seat with, and without, foam insert.
   2. Insert that allows the newborn's head to lie in a neutral position during sleep may reduce the frequency of mild episodes of reduced SpO2 in some full-term newborn babies.

C. Comparison of Respiratory Physiologic Features When Infants are Placed in Car Safety Seats or Car Beds (Kinane, 2006). Objective was to compare the respiratory physiologic features of healthy term infants placed in either a car bed or a car safety seat.
   1. 67 healthy term infants were recruited and assigned randomly to be monitored in either a car bed or a car safety seat.
   2. The authors found that the respiratory physiologic features of infants in the 2 car safety devices were observed to be similar.

3. Of note, substantial periods of time with oxygen saturation of < 95% were surprisingly common in both groups.

D. Risk of cardio-respiratory abnormalities in preterm infants placed in car seats: a cross-sectional study (Ojadi et al, 2005). Studied 42 preterm neonates 24-48 hours prior to discharge: monitored for periodic breathing, oxygen saturation < 90%, bradycardia < 80.
   1. Weight at discharge < 2000 grams was associated with increased events.
   2. Repositioning from the car seat to the supine position showed normalization of cardio-respiratory function in the majority (83%) of the tested infants.

E. Effects of child seats on the cardiorespiratory function of newborns (Nagase et al, 2001). Examined 15 healthy term newborns for respiratory compromise due to restraint in two types of car seats (chair-shaped and bed-shaped), and compared to supine position on bed.
   1. Mean oxygen saturation with the chair-shaped car seat (95.8%) was significantly lower than that with the bed-shaped car seat (98.8%).
   2. More episodes of mild and moderate desaturation were present when child in chair-shaped car seat as opposed to bed-shaped car seat.

F. Predischarge car seat safety study for premature infants (Young, et al, 1996). Evaluated 141 premature (26-36 weeks) infants ready for discharge within 48-72 hours.
   1. 18 excluded for incomplete data.
   2. Infants were monitored for 90 minutes each in both a crib and the car seat for apnea, bradycardia, and desaturation events.
   3. 24% failed the ATT. For 62% of the 29 who failed the ATT, desaturation was corrected immediately by decreasing the angle of recline of the restraint to 30 degrees from horizontal.
   4. Found that there did not appear to be a relationship between “pass” or “fail” and the type of car restraint but that pass or failure appeared to relate more to the degree of recline of the restraint.

G. The physiologic effects of positioning premature infants in car seats (Smith and Turner, 1990). Authors examined 14 premature infants, born between 28 and 35 weeks.
   1. Babies were observed for 90 minutes once daily for three days.
   2. Used different angles of recline each day (95, 110, and 140 degrees, randomly assigned).
   3. 3 of 14 infants had apnea and bradycardia episodes while in the most upright position (95 degrees).
   4. Heart rate and blood pressure increased significantly in the 95 degree angle. Authors did not note desaturation events, but they did note slouching of the head which they felt could lead to airway obstruction and hypoventilation if not corrected.
   5. Concluded that premature infants may tolerate a 95 degree recline position less well than the 110 and 140 degree recline positions.
      a. Authors recommended that adults observe the infant during travel for lateral slouching of the head.
      b. They also recommended that foam inserts be used to provide better positioning of the head and body.

IX. Other considerations:

A. Pre-discharge "Car seat challenge" for preventing morbidity and mortality in preterm infants." The Cochrane Database 2005 (Pilley & McGuire). This study assessed the evidence to support the practice of angle tolerance testing to determine whether the use of the car seat challenge prevents morbidity and mortality in preterm infants.
   1. Authors did not find any randomized controlled trials that fulfilled the eligibility criteria.
   2. Recommended further studies to determine whether the car seat challenge accurately predicts the risk of clinically significant adverse events in preterm infants traveling in car seats.
   3. If this is shown to be the case then a large randomized controlled trial is needed to provide an unbiased assessment of its utility in pre-discharge assessment.

B. The car seat: a challenge too far for preterm infants? (Pilley & McGuire) The evidence base for the use of the car seat challenge in discharge assessment, the possible implications for infants, their families, and health services of adopting the practice, and the issues that may be resolved with further research are discussed.

C. Pre-Hospital Discharge Car Safety Seat Testing in Infants Following Congenital Heart Surgery (Simsic, 2007). Car safety seat testing was retrospectively reviewed for 66 postoperative infants (cardiac surgery).
   1. Four patients of 66 (6%) failed the angle tolerance testing.
   2. It may be beneficial to extend the AAP recommendations for car safety seat testing to include this high-risk patient population.

D. Car Seat Challenges: Where are we in implementation of these programs (Williams & Martin, 2003)?
   1. Many level II and level III units have begun to implement car seat safety programs despite the lack of literature and guidelines available on how to develop a program.
   2. Although most programs monitored the same criteria, there were variations in length of testing, which infants were tested, and recommendations for the infants who failed the testing.

E. Oxygen saturation in Term Infants in Car Safety Seats (Bass et al, 2002). In addition to infants born prematurely, near term and term healthy newborns may experience oxygen desaturation when properly positioned upright in CSS.
   1. Until additional research on the potential significance of oxygen desaturation in CSS is available, consideration should be given to limiting the time spent in CSS to that necessary for transportation and ensuring children are not left unattended while in a CSS.
   2. Positioning young infants in devices such as swings, infant carriers, backpacks, or slings, may have similar physiologic effects in susceptible infants to positioning semireclined in CSS, and consideration should also be given to limiting the use of these devices as well.

F. Oxygen desaturation of selected term infants in car seats (Bass et al, 1995). Term infants who in the judgment of their pediatrician were felt to be at risk of apnea or desaturation were monitored for a 90-minute period for apnea, bradycardia, and desaturation events.
   1. Eight of 28 monitored infants (28.6%) had a period of desaturation < 90%.
   2. In addition, five of 28 monitored infants (17.8%) had borderline results (oxygen saturation 90-93%). All four infants monitored because of genetic syndromes had abnormal results.

3. Oxygen desaturation was also observed in two term infants who had been observed to be apneic by a parent after discharge from the nursery.

Part Two: Components of a Hospital Based Child Passenger Safety (CPS) Program

I. Staff Training:

Staff training is an integral part of any hospital-based CPS program, because of the role that the staff plays in patient education. Staff who complete training, regardless of type, become part of a specialized team whose goal is to empower parents with the information they need to safely transport children. Having multiple staff trained and evenly distributed throughout all shifts will make it much easier to educate parents regardless of when a patient is being discharged.

A. Basic training: CPS Advocate course (hospital specific)
   1. Length: 4 hours
   2. Purpose – In this introductory course, staff learn basic CPS concepts, including what happens in a crash, morbidity/mortality statistics, and relevant Arkansas laws. They also learn how to determine whether a child safety seat is appropriate, if the seat has been recalled, and identify and correct common types of misuse. CPS Advocates can determine whether a non-conventional restraint system is needed. Resources for additional information or assistance are provided to CPS Advocates.
   3. Note: CPS Advocates CANNOT teach parents how to install a car seat in a vehicle, nor can they install a car seat in a vehicle.

B. Advanced training: National CPS Technician Training course
   1. Length: 5 days
   2. Purpose – This "train the trainer" course provides the basic technical skills and knowledge of the correct use and installation of child restraints and safety belts that are necessary to educate parents. Successful completion of the educational program results in certification; CPS Technicians become valuable resources in their communities.
   3. Certification period: 2 years
   4. Note: CPS Technicians CAN teach parents how to install a car seat.

C. Specialized training: Transporting Children with Special Health Care Needs training; 2 days additional training (Pre-requisite: National CPS Technician training)
   1. Length: 2 days
   2. Purpose: This course is designed to serve as continuing education for CPS Technicians and Instructors who want to learn more about special needs transportation. Participants are introduced to medical conditions that impact restraint selection, and also have the opportunity to install specialized restraint systems.
   3. Note: This course is especially helpful for CPS Technicians who work with children with special transportation needs due to orthopedic, respiratory, behavioral, or other conditions, as well as premature/low birth weight infants.

II. Parent Training (Anticipatory Guidance)

Hospitals and other healthcare providers routinely provide education on many patient-specific topics; child passenger safety should be included in the menu of topics. Hands-on instruction decreases the numbers of errors in car seat installation; however, few parents receive hands-on instruction from experts (Lane et al, 2000).

A. Antepartum
   1. Best time to teach parents because this is the first of many CPS "steps."
   2. The pregnant woman should know that it is important:
      a. To buckle up, and how to correctly wear a safety belt throughout her pregnancy.
      b. For the driver and all passengers to buckle up on every ride.
      c. To buy the car seat before the baby is born, if possible, and take it to the hospital prior to the infant's discharge.
      d. To read and follow the instructions that come with the car seat before the baby is born, if possible.

B. Post-partum/patient discharge
   1. Parents who did not receive antepartum CPS education period should be offered the opportunity to receive CPS education during this phase.
   2. Parents should know that it is important:
      a. For the driver and all passengers to buckle up on every ride.
      b. For the car seat to be appropriate for the age and weight of the baby.
      c. To bring the car seat to the hospital as soon as possible after the baby is born. If it's necessary for the baby to remain in the hospital after the mother is discharged, the car seat should not be brought to the hospital until the infant is within one week of discharge.
      d. To read the car seat instruction booklet. Parents should be encouraged to discuss any car seat questions with hospital staff who have completed CPS training.
      e. To use their car seat correctly. Parents should be taught how to place the baby in the car seat, tighten and loosen the harness straps, use rolled blankets and/or washcloths for positioning, appropriate angle of recline, etc.
      f. To get help with their car seat if they have problems or questions after the baby is discharged.

C. Parents should be given the opportunity to ask questions about their car seat right up to the time of discharge.

D. Developmental milestones
   1. What is an "appropriate" child safety seat or restraint system will change as the child grows. It is important to incorporate CPS into routine anticipatory guidance at all well-child visits.
   2. See AAP Guideline: Selecting and Using the Most Appropriate Car Safety Seats for Growing Children: Guidelines for Counseling Parents.

III. Child Safety Seats

A. Assessment
   1. The child safety seat or restraint system to be used at discharge should be assessed for appropriateness prior to discharge.
      a. The child's age, weight and height should be within the limits set by the manufacturer for the car seat.
      b. The car seat should be within the lifespan set by the manufacturer. Note: Current car seats have a "do not use after" date stamped in the plastic shell.
      c. The car seat should not be recalled for a safety related reason.

d. The car seat should be in good repair (no visible mold or mildew, strong smoke or other odor, bugs, or cobwebs). It should not have been modified in any way.
e. The car seat should not have been involved in a moderate to severe crash.

2. Parents should bring the entire car seat (including the infant car seat, base, instructions, extra parts or pieces) to the hospital for assessment.

B. Availability of Child Safety Seats

1. The AAP recommends that hospitals make child safety seats available by sale, short-term loan or donation to parents before discharge if the parents are unable to provide their own. Much variation exists within hospital programs.
2. If a hospital-based CPS program does not offer options for child safety seats, then the family should be referred to a community agency for assistance if possible.
3. A systematic review process identified strong evidence of effectiveness for child safety seat distribution plus education programs. Insufficient evidence was identified for education only programs aimed at parents, young children, healthcare professionals or law enforcement personnel (Zaza et al, 2001).

IV. Angle Tolerance Testing (newborn/infant population)

A. Criteria (any one of the following):

1. <37 weeks estimated gestational age at birth
2. Documented apnea/desaturation/bradycardia
3. < 2268g (<5 pounds) – although some hospitals use < 2500g at discharge
4. Discharge on oxygen
5. Home cardiac/apnea monitoring
6. Special Needs:
   a. Poor head/neck control
   b. Congenital heart disease
   c. Scoliosis
   d. Spina bifida
   e. Poor tone (infants with Trisomy 21, hydrocephalus)
   f. Airway impairments (Pierre Robin, tracheostomy, or Chronic Lung Disease)
   g. Orthopedic issues (spica casts)
   h. Child admitted to hospital for ALTE, any other medical condition or procedure which may be associated with apnea/bradycardia/desaturation events.

B. Procedure for ATT. Note: The goal of ATT is not to get a "pass" but to assess whether the infant can tolerate riding in a semi-reclined position without experiencing apnea, oxygen desaturation, or bradycardia for a specified period of time.

1. Determine whether the infant meets the criteria for ATT
2. Confirm that a physician's order has been written for the ATT and is in the chart.
3. Confirm that the parent has been instructed on the purpose of the ATT and will furnish the child safety seat at the appropriate time.
4. When the infant is within seven days of discharge, the ATT can be scheduled. Ideally, the ATT should be completed before the day of discharge and prior to room-in (couplet care).
5. Before the ATT is initiated, the infant should:
   a. Be able to maintain temperature in an open crib for 6-8 hours, and

b. Be on all P.O. feeds and without an NG tube.

6. It is strongly recommended that the ATT be completed before painful, invasive procedures (i.e. circumcision, eye exam, etc.). Otherwise, consider waiting until the infant has completely recovered from the procedure before initiating the ATT.
7. Assess whether the child safety seat to be used at hospital discharge is appropriate for the infant.
   a. If not appropriate, recommend the use of an appropriate child safety seat.
   b. If appropriate, proceed with ATT.
8. Ensure that all required equipment is available for the ATT. The equipment needed for the assessment:
   a. Pulse oximeter and cardiorespiratory monitor – allows to assess accuracy of monitor alarms – as well as the appropriate leads.
   b. Actual child safety seat to be used at discharge.
   c. Current recall list.
   d. Blankets (2-3) /washcloth.
   e. Vehicle seat simulator if possible.
   f. Documentation required for the ATT.
9. Connect the infant to the monitors. This can be done by any staff member who has completed the required CPS training.
10. Follow the policy/procedure for monitor settings, including heart rate low alarm, pulse oximeter low alarm limit, and apnea limit.
11. Record baseline vital signs per hospital procedure, and continue to monitor the infant for events throughout the entire ATT.
12. Determine the duration of the ATT based on policy/procedure.
13. Observe the infant throughout the ATT, and record vital signs at key points throughout the duration, per procedure.
14. During the ATT:
   a. Limit stimulation of the infant during the ATT.
   b. A pacifier can be used, if needed and if the parent has given permission.
   c. The infant should not be fed during the ATT.
   d. Ideally, an infant would not be discharged immediately after the ATT has been completed.
15. Record the results of the ATT, when the test is completed.
   a. Pass: No apnea, bradycardia or oxygen desaturation events.
   b. Fail: Follow hospital policy/procedure.
      1) Document the time, reason and any other information explaining why the infant did not pass.
      2) Notify the physician of the failure.
      3) Discuss when the ATT should be repeated and the type of child safety seat to be used.
   c. Notify the physician and family of the test results as soon as possible regardless of the results.
16. Remove the infant from the child safety seat and return the baby to the crib.

C. Procedure for repeating an ATT after a fail result.

1. Follow policy/procedure to determine how long to wait before retesting.
2. Ideally, re-testing will be completed at least 24 hours before discharge.
3. Determine whether the test will be conducted in the same child safety seat used for the initial ATT, an alternate infant child safety seat, or in a car bed.
4. Follow the procedure for ATT. Refer to the medical record to determine how many previous ATT have been conducted and record the current number. (Help!)
5. Car beds
   a. Determine whether the car bed can be installed correctly in the vehicle to be used at discharge and thereafter.
   b. The car bed can be securely installed using the safety belt.
   c. There are sufficient seating positions and safety belts for all individuals who routinely ride in the vehicle.
   d. Read and follow all instructions for the car bed.
   e. If the infant does not pass the ATT in the car bed, staff should follow policy to determine what car seat should be used and how long to wait until repeating the ATT.
   f. A post-discharge ATT should be scheduled for any infant discharged in a car bed.

D. Post-discharge ATT
1. Post-discharge ATT is recommended for infants discharged:
   a. In a car bed or
   b. On oxygen
2. The purpose of the post-discharge ATT is to determine whether the infant can tolerate the semi-reclined position of a typical infant car seat.
3. The post-discharge ATT should be conducted 4-6 weeks post-discharge (when the infant is at least 40 weeks estimated gestational age).

V. Discharge instructions/orders.

A. Physician discharge orders should reflect that the child should be transported in a child safety seat/restraint system that is appropriate for the age, weight, and physical tolerance of the infant/child.

B. Suggested wording for discharge instructions:
1. If discharged in typical infant car seat: The baby should ride in a car seat in the back seat, facing the back of the car at all times whenever in the car.
2. Discharge in car bed (wording varies based on type of car bed):
   a. Angel Ride car bed
      1) This car bed can only be used until the baby weighs 9 pounds or is 20 inches long.
      2) The baby will ride flat in this seat.
      3) Use this seat until your baby has passed a follow-up car seat test.
   b. Ultra Dream Ride car bed
      1) This car bed can be used until the baby weighs 20 pounds or is 26 inches long.
      2) The baby will ride flat in this seat.
      3) Use this seat until your baby has passed a follow-up car seat test.

VI. Documentation (Link to samples)

A. Patient Education
B. Angle Tolerance Test Flow Sheet (ATT)
   1. UAMS Safe from the Start Child Passenger Safety Program
   2. ACH Neonatal Car Seat Screening Data Form
C. Waiver/Release Form
   1. UAMS Car Seat Liability Waiver
   2. ACH Child Passenger Safety Information Release
D. Special Needs Loaner Program Agreement Form

VII. Risk Management/Liability

A. Risk management should be involved up-front in program development and implementation, and also involved in emergent situations as needed.
B. Following best practice recommendations is the best way to minimize risk of liability. This includes having staff who are currently certified as CPS Technicians and who are up-to-date on current best-practice recommendations.
   1. Best practice recommendations are set forth in the AAP guidelines and the NHTSA National Child Passenger Safety Technician Training. Use the most current iteration of the guideline or training curriculum.
   2. Designate one currently certified CPS Technician to review all patient education materials (print and video) for accuracy of content and consistency with current best practice recommendations.

VIII. Resources

A. Guide to Online Resources for Technicians
B. The USAA Educational Foundation: Installing Child Safety Seats: http://www.usaaedfoundation.org/pdf/544.pdf
C. 2008 Safe Ride News Catalog: Documents available for order at http://www.saferidenews.com
   1. Child Restraints for a Newborn Infant (A Healthcare Provider's Guide)
   2. Car Safety for Tiny Babies (English)
   3. Car Safety for Tiny Babies (Spanish)

IX. ACH and UAMS Hospital Car Safety Programs (Link to handout)

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