

# Child Passenger Safety: Investigation into American Academy of Pediatrics Recommendations, Laws, Regulations, and Safety Testing and How They Compare to California Regulations

Candace LeFlame, D.O., Anh Rebhan, D.O., M.S.

In the United States, motor vehicle accidents are the leading cause of death among children ages four years and older(1). Fortunately, parents, caregivers, and physicians can make a lifesaving difference by advocating for the correct use of child safety seats (CSS). The proper use of child safety seats can reduce the risk of injury by 71-82% in children involved in a motor vehicle collision(1). Unfortunately, an estimated 46% of car seats and booster seats are misused, decreasing their effectiveness and protection of child passengers (2). A look at San Bernardino and Riverside Counties in California shows the age-adjusted rate of death by car accident per 100,000 people has been consistently higher than the national average(3). Therefore, it is imperative to learn the local CSS laws and discuss child passenger safety with our patients and their families to ensure proper placement and utilization.

## Newborn Period:

The American Academy of Pediatrics (AAP) released a policy statement that guides child passenger safety with five best practice recommendations for child restraint systems for children from birth through adolescence (Table 2). For the newborn period, the AAP recommends "All Infants and Toddlers Should Ride in a Rear-Facing CSS Until They Are 2 Years of Age or Until They Reach the Highest Weight or Height Allowed by the Manufacturer of Their CSS" (4). California law follows this AAP Best Practice Recommendation with Vehicle Code Section 27360, stating, "Children under two years of age shall ride in a rear-facing car seat unless the child weighs 40 or more pounds OR is 40 or more inches tall. The child shall be secured in a manner that complies with the height and weight limits specified by the manufacturer of the car seat" (3). Rear-facing car seats are important in this age group because their spines are developing, and their heads are disproportionately large for their bodies. Therefore, in a forward-facing car seat, a newborn's head is likely to be propelled forward, and their spinal cords stretched, possibly resulting in serious injury. Whereas, in a rear-facing car seat, a baby's head, neck, spine, and upper body are cradled by the back of the child safety seat



Figure 1. Forward-facing carseats may propel a newborn's head forward resulting in serious injury as opposed to rear-facing carseats where the head and neck are cradled during a motor vehicle accident. <https://rearfacingtoddlers.com/pages/why-rear-facing-is-safer>

(figure 1) (5-7).

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## Steps to Install Rear-Facing Car Seat

1. Make sure the seat has the correct angle by using the car seat angle indicator. Many rear-facing car seats also have an adjustable base to help set the angle.
2. Next, strap the seat into the car. There are two different methods to fix the car seat in place - the Lower Anchors and Tethers for Children (LATCH) and the seat belt system. Both methods are safe.
  - a. The LATCH system was developed to make it easier to install child safety seats without using seat belts correctly. They are in most vehicles made after September 1, 2002. Caregivers can check their vehicle's owner manual to see if the LATCH system is available in their car. Most vehicles have fabric tags or small plastic buttons on the automobile's seat to indicate where to find the lower anchors. When installing a car seat with the LATCH system, attach each hook onto its own rigid lower anchor.
  - b. Seat belt system: When installing with a seat belt, pull the seat belt and thread it through the belt path of the car seat. Make sure the seat belt does not have any twists and buckle the seat belt.
3. Tighten and adjust the car seat's straps so that the seat does not move more than one inch in any direction. Press down on the car seat and pull the LATCH or seat belt to tighten further. This will secure the car seat and establish a tight fit.

Placing a child correctly into a car seat is just as important as correctly installing a car seat. Follow the steps below to ensure the infant or toddler is properly secured (figure 2) (1,5-9).



Figure 2: Appropriate placement of infant in rear-facing car seat placement

1. The harness straps should be threaded through the slots at or directly below the baby's shoulders.
2. The harness should be a 5-point restraint system and buckled at the armpit level.
3. The straps should be tightened so that the harness lies in a straight line with no slack. Advise parents that they should not be able to pinch a fold at the shoulders.
4. The child's head should be positioned at least 1 inch below the top of the car seat.

***“Children should stay in a rear-facing car seat as long as possible because every transition to a new type of car seat decreases the level of protection provided to the child (4). Parents should not move their children to forward-facing car seats until at least two years of age or until they reach the maximum height and weight limit of their rear-facing car seat (4,7-9).”***

Children should stay in a rear-facing car seat as long as possible because every transition to a new type of car seat decreases the level of protection provided to the child (4). Parents should not move their children to forward-facing car seats until at least two years of age or until they reach the maximum height and weight limit of their rear-facing car seat (4,7-9). The AAP best practice

recommendation may differ from local state or government requirements, so please check what the local law allows.



Figure 3. Illustration of incorrect booster seatbelt positioning vs. correct booster seatbelt positioning. [https://www.cdc.gov/transportationsafety/child\\_passenger\\_safety/resources.html](https://www.cdc.gov/transportationsafety/child_passenger_safety/resources.html)

#### Infant Car Seat Challenge

An infant car seat challenge is a period of observation before discharge to monitor for bradycardia, apnea, and desaturations while the infant sits in a car safety seat (10). Most recent AAP guidelines from 2009 recommend a period of observation for 90-120 minutes or the duration of the car ride home, whichever is longer for all infants born <37 weeks GA (10). The AAP has provided no specific recommendations for testing infants with complex medical issues. Therefore, it is left up to each health institution to decide which neonates should undergo a car seat challenge (10). Besides premature infants, one of the most tested groups is the low birth weight (LBW <2.5kg) neonates. Almost half of the NICUs surveyed by the AAP had LBW as an inclusion criterion, regardless of birth GA (10). Loma Linda University Children's Hospital car seat challenge criteria include Gestational age <37weeks, birth weight less than 2g, or a compromised airway.

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#### Toddler Period:

For the toddler period, AAP's additional best practice recommendation states that “All children 2 Years or older, or those young-



Figure 4: Different types of forward-facing car seats.

er than two years who have outgrown the rear-facing weight or height limit for their CSS, should use a forward-facing CSS with a harness for as long as possible, up to the highest weight or height allowed by the manufacturer of their CSS” (4.) California law also follows this AAP recommendation. “Children over two years of age or children under two years of age and weighs 40 pounds or more or is 40 inches or more may ride forward-facing. The child shall be secured in a manner that complies with the height and weight limits specified by the manufacturer of the car seat” (3). Installing rear and forward-facing CSS are remarkably similar, with only a few minor differences. Advise parents to adjust the angle so that the child sits more upright in the vehicle (7-9). If using the seat belt method, make sure the belt runs through the forward-facing belt path. If using the lower anchors, the child must not exceed 65 pounds (7-9). Parents and caregivers will also need to optimize the safety of forward-facing car seats by attaching the seat’s top tether strap to the correct anchor point in the vehicle (7-9).

There are many different types of forward-facing car seats (figure 4). The combination child seat/belt-positioning booster seat is a booster seat with an internal harness that can be used until the child weighs about 40-65lbs (1,7-8). The parent can then remove the harness and convert the seat into a belt-positioning booster seat that utilizes the vehicle’s lap and shoulder belt. Travel vests are another type of forward-facing car seat. They can be worn by children between 20-168 lbs (7-8). They are especially useful when a car has lap-only seat belts or for children whose weight exceeds what is allowed by most child safety seats. Some vehicles even have forward-facing child safety seats integrated into their rear seats (7-8). Advise parents to check their vehicle’s owner manual to see what their vehicle has installed.

#### What to Buy

Parents are often overloaded with car seat choices and ask their pediatrician for recommendations for car restraint systems. The best child safety seat is the one that suits their family needs, one that is easy to use, fits in their vehicle(s), and is compatible with their vehicle’s seat belt or LATCH system. Advise parents to make sure their car seat meets national standards. This information is

often found on a sticker on the side of their car seat. The label should say, “This child restraint system conforms to all applicable U.S. federal motor vehicle safety standards” (7-9). Furthermore, caregivers should be informed that most car seats will need to be replaced if they have been in a motor vehicle accident. For parents buying a used car seat, providers should recommend caregivers inquire about the following: history of the car seat (any MVA), car seat recalls, and the car seats expiration date. Inform parents they can visit the National Highway Traffic Safety Administration for recall information (1,7-9).

#### Young Children Ages 4-8

The AAP recommends “All children whose weight or height is above the forward-facing limit for their CSS should use a belt-positioning booster seat until the vehicle lap and shoulder seat belt fits properly, typically when they have reached 4ft 9 inches in height and are between 8 and 12y of age” (4). No California law addresses when to transition to a booster seat. However, California law does address that, at a minimum, any child younger than eight years old must use a seat belt (3). A booster seat is used in this age group to raise the child, so the vehicle’s lap and shoulder belt is appropriately positioned across the child’s hips and chest away from their neck and abdomen (fig 4) (1,7-8). When a child reaches the highest weight and height limit allowed for their forward-facing car seat with a harness, they should then use a belt-positioning booster seat until the vehicle lap and shoulder belt fits them properly (1,7-8). This is typically around a height of 4 feet 9 inches and 8-12 years of age. A belt-positioning booster seat should go in the back seat of a caregiver’s vehicle and always with the vehicle’s lap and shoulder belt. For proper seat belt positioning, the lap belt should lay across the child’s upper thighs, below the hip bones (1,7-8). The shoulder belt should cross the center of the child’s chest and shoulder and not cut across the neck or face. Many boosters come with belt guides or plastic clips to help the belt stay on the shoulder to make the shoulder belt fit better (1,7-8). If this is not available, parents can use the shoulder belt height adjusters built into their vehicles. Furthermore, it is important to remind caregivers never to put the shoulder belt behind a child’s back or under their arms. Healthcare providers can utilize



Figure 5: Once children are old enough parents can try this Five-step seat belt test to assess their child's readiness for a seat belt without a booster seat

the rhyme: "Under the arm, seat belts cause harm. Behind the back, safety will lack" (8).

#### Older Children

When a child reaches the appropriate age and height to use the vehicle seat belt alone, the AAP recommends, "They should always use lap and shoulder seat belts for optimal protection" (4). They also advise, "All children <13 years of age should be restrained in the rear seats of vehicles for optimal protection" (4). In contrast, California law states that children who are eight years of age OR who have reached 4'9" in height may be secured by a booster seat, but at a minimum, must be secured by a safety belt (3). Therefore, parents can test their child's readiness for a seat belt when they reach 4 feet 9 inches and are between 8-12 years of age. Parents and caregivers can accomplish this by doing a 5-step seat belt test as seen below (Fig 5) (1,7-8).

#### 5-Step Belt Test for Older Children

1. The lower back is against the vehicle seat. If the child needs to sit forward to allow their legs to go over the edge of the seat, it can cause the seat belt to be on their abdomen instead of their upper thighs. It can also create slack which can allow a child to be thrust forward during an accident.
2. Children need to be tall enough so that their knees bend comfortably at the edge of the seat.
3. The lap belt stays on the upper thighs across the hip bones. This step is critical because improper seat belt use poses a higher risk of intra-abdominal injury in MVC. A seat belt position on the upper thighs allows the belt to be placed on rigid body parts, protecting abdominal and internal organs.
4. The shoulder belt crosses between the neck and shoulder. This positioning is important because a shoulder belt that sits off the shoulder can fall off during an accident, reducing its protection.
5. A child can follow all the rules for the length of the car ride.

Children who move excessively or cannot tolerate proper seat belt placement are not ready for the seat belt only without a booster seat. In this case, they will be safer in a 5-point harness car seat or travel vest.

If a child can follow all the steps mentioned above, s/he may be ready to transition to seat belt-only from the booster seat. The AAP recommends that any child under age 13 remain seated in the rear seat (4). If there is only a front row in the car, then many vehicle owner's manuals instruct caregivers how to deactivate the safety airbag in the passenger seat. Research has shown that airbags can cause more serious injury and even death to a rear-facing infant passenger vs. injury to an adult (11).

#### Special Considerations

A population of children with special health needs also must be protected with a CSS when riding in a vehicle. Special health needs can include airway obstruction, muscle tone abnormalities, gastrointestinal issues, casts, challenging behavior, or wheelchair transportation. Although most children may safely ride in a traditional car seat, there are special considerations and circumstances where that may not be the safest option. The AAP has written a supplemental policy statement that further details how to transport this special population (6).

#### Parents/Caregivers Still Need Help?

If caregivers have children with special requirements or are still confused about child passenger safety, there are many community resources available. Advise caregivers to find a Child Passenger Safety Technician in their area through the National Child Passenger Safety Certification Program. They will provide in-person step-by-step instructions on how to safely and correctly install any child passenger restraint system (12). Many local fire stations also provide this service.

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#### Summary

Proper child passenger safety is imperative because child safety seats can reduce the risk of death by as much as 71% (1). Unfortunately, motor vehicle collision is still the leading cause of death in children four years and older (1). Even more unsettling, a recent

| Best practice recommendation for child safety restraint system | Recommendation  | Typical age/weight/height criteria         |
|--|---|--|
| Infant-only or convertible CSS used rear-facing                | All infants and toddlers should ride in a rear-facing CSS as long as possible until they reach the highest weight or height allowed by their CSS manufacturer.  | Newborn - 2 years of age                   |
| Convertible or combination CSS used forward-facing             | All children who have outgrown the rear-facing weight or height limit for their CSS should use a forward-facing CSS with a harness for as long as possible, up to the highest weight or height allowed by their CSS manufacturer.                                   | 2 - 8 years of age                         |
| Belt-positioning booster seat                                  | All children whose weight or height is above the forward-facing limit for their CSS should use a belt-positioning booster seat until the vehicle lap and shoulder seat belt fits properly.  | Height: 4 ft 9 inches<br>Age: 8 - 12 years |
| Lap and shoulder vehicle seat belt                             | When children are old enough and large enough to use the vehicle seat belt alone, they should always use lap and shoulder seat belts for optimal protection<br><br>All children <13 years should be restrained in the rear seats of vehicles for optimal protection | Age: > 13 years                            |

Table 1: Summary of Best Practice Recommendations by the American Academy of Pediatrics

study showed more than half of car seats are not used or installed correctly, and 1 in 3 occupants ages 0-12 who were killed in MVC was unrestrained at the time of the accident (1). Therefore, continued education and guidance surrounding child passenger safety are essential. The American Academy of Pediatrics has provided their best practice recommendations to assist healthcare and caregivers on correct child passenger safety (1,4,7-10). AAP best practice recommendations are as follows: rear-facing car safety seats as long as possible, forward-facing car safety seats from the time they outgrow rear-facing seats for most children through at least four years of age, belt-positioning booster seats from the time they outgrow forward-facing seats for most children through at least eight years of age, lap and shoulder seat belts for all who have outgrown booster seats, and all children younger than 13 years to ride in the rear seats of vehicles ( Table 1) (4). A common mistake made among parents is transitioning their children to the next phase of the child passenger restraint system too early (1,4,7-10). However, caregivers should be encouraged to delay these transitions as each transition is associated with decreased

protection. The American Academy of Pediatrics urges all pediatricians to know and promote these recommendations as part of child passenger safety anticipatory guidance at every health supervision visit.

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Anh Rebhan, D.O., M.S.  
Department of Pediatrics, PGY-3  
Loma Linda Children's Hospital, Loma Linda, CA  
Riverside University Health Systems, Moreno Valley, CA  
11234 Anderson St.  
Loma Linda, CA 92354  
Email: [AREbhan@llu.edu](mailto:AREbhan@llu.edu)

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**NT**

**Corresponding Author**



Candace LeFlame, D.O.  
Department of Pediatrics, PGY-2  
Loma Linda Children's Hospital  
11234 Anderson St.  
Loma Linda, CA 92354  
Email: [CLeFlame@llu.edu](mailto:CLeFlame@llu.edu)