

# **Child Passengers at Risk**

## **North Dakota**

### **2011 Car Seat Checkup Summary**

### **2009-2011 Comparison**



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# Definitions

**Aftermarket products** - Accessories that are often designed to improve the comfort, fit or installation of car seats, but are not regulated by the government. Examples include head-positioning pads, car seat inserts, toys attached to infant seat handles, mirrors and seat protections. Most car seat manufacturers warn consumers against using accessories that did not come with the car seat because they were not crash-tested with their seats.

**“Best practice”** – Guidelines that provide the occupant with the most protection. “Best practice” guidelines often go above what is required by state law and are generally strong recommendations from health and safety organizations, such as the American Academy of Pediatrics.

**Car seat, child restraint, car safety seat** – A crash-tested device or system that is specifically designed to provide infant/child protection and that meets federal motor vehicle safety standards. Systems include infant, convertible and forward-facing seats, as well as boosters and seat belts.

**Car seat checkup** – An event attended by parents to receive assistance with use and installation of their car seats. Checkups are staffed by nationally certified child passenger safety technicians. The primary focus is to educate participants so they will have the knowledge and will be comfortable safely buckling up their children after they leave the checkup.

**Harness slots** – The holes in the shell of the child restraint where the harnesses pass through from the front to the back of the restraint. Most seats come with multiple sets of slots, with the correct ones depending on the height of the child using the restraint.

**Harness straps** – A system of straps that keep a child within the shell of the child restraint. They are designed to distribute crash forces and help a child “ride down” the force of a crash.

**Lower Anchors and Tethers for Children (LATCH)** – An occupant protection system that is used to attach a child restraint to a vehicle. The LATCH system is used in place of the vehicle seat belt. The LATCH system was phased in gradually, but was required to be in place by all MY 2003 passenger vehicles.

**Retainer clip** – A plastic clip that holds the harness straps together over the child’s chest. It should generally be positioned at armpit level on the child. It may be referred to as a chest clip by some car seat manufacturers.

**Tether strap** – A piece of belt webbing that anchors the top of the child restraint to the vehicle. Tethers keep the restraint from tipping forward and limit head excursion in a crash.

# Executive Summary

Nationally, and in North Dakota, motor vehicle crashes are the leading cause of death and injury for children ages 3 to 14. Many of these deaths and injuries could have been prevented with the correct use of child restraints, such as car safety seats and seat belts.

This report summarizes data from forms completed at car safety seat checkups sponsored by the North Dakota Department of Health throughout the state in 2011 and compares the 2011 results to checkups done in 2009 and 2010.

Child restraints were assessed in four general categories, including:

- Was the restraint **appropriate** for the age, weight and height of the child riding in it?
- Was the **child secured** correctly in the restraint?
- Was the **car seat installed** correctly in the vehicle?
- Was the car seat in good **condition**, not recalled, had not been in a crash and was not expired?

Within each category, several items were assessed or questions asked to determine correct use. Technicians used a standardized checklist for each assessment.

## Highlights of 2011 Checkups

- Data was entered on 922 restraints.
- 83.9 percent of the restraints were misused.
- 14.2 percent of the restraints were not appropriate for the age, weight or height of the child riding in them.
- 71.4 percent of the children were not secured correctly in the harness system of the car seat or were improperly buckled in the seat belt.
- 68.7 percent of the car seats were installed incorrectly.
- 62.7 percent of the car seats were installed with the vehicle's seat belt; 32.9 percent were installed with the LATCH system; and 4.5 percent were incorrectly installed with both systems.
- 3.2 percent of the car seats were recalled.
- 4.6 percent of the car seats had been involved in a crash.
- 15.4 percent of the restraints had aftermarket accessories added to them or in the vehicle. With the permission of the parent, technicians removed 71.1 percent.

# Introduction

Nationally, and in North Dakota, motor vehicle crashes are the leading cause of death and injury for children ages 3 to 14. (Source: National Highway Traffic Safety Administration and North Dakota Department of Health). Many of these deaths and injuries could have been prevented with the correct use of child restraints, such as car safety seats and seat belts. The use of child restraints has increased over the years as a result of educational campaigns, the state's child passenger safety law, the national training and certification program and car safety seat checkups. Unfortunately, many child restraints are used incorrectly, often placing children at risk for serious injury or death in a crash. Factors that contribute to misuse include:

- Incompatibility between child restraints and vehicle designs.
- Failure to read child restraint manufacturer instructions and vehicle owner's manuals.
- Confusing or contradictory information between child restraint instructions and vehicle owner's manuals.
- The wide variety of child restraints available to consumers, each with specific age, weight and height requirements.
- The large fleet of motor vehicles – each with specific occupant protection systems.
- Changes in occupant protection technology, such as the LATCH (Lower Anchors and Tethers for Children) system, side impact air bags, inflatable seat belts and larger size dummies used in crash testing.
- Inconsistent or incorrect information from health and safety professionals caused by changes in best practice guidelines, personal beliefs or gaps in the state's child passenger safety law.

To assist parents and caregivers in correct use of their child restraints, the North Dakota Department of Health and other safety organizations conduct car seat checkups throughout the state. Parents and caregivers voluntarily participate in these events – generally for assistance in installing their car seats. The restraints are checked by nationally certified child passenger safety technicians who work with the parents/caregivers to assure they are comfortable and capable of safely buckling up their children after they leave the checkup.

Technicians use manufacturer's instructions, vehicle owner's manuals and "best practice" guidelines from the American Academy of Pediatrics and the National Highway Traffic Safety Administration to determine appropriate child restraint selection, installation and use.



Recommendations include:

### **Rear-Facing**

Children should ride rear-facing until at least 2 years of age. Two types of car seats are available for rear-facing:

*Infant Seats* – Most of these seats can be used until 22-35 pounds. Use them until the highest weight limit or until the child’s head is within one inch of the top of the seat.

*Convertible Seats* – These seats can be used rear-facing and forward-facing. Most can be used rear-facing up to 30-40 pounds. Use them rear-facing until the highest weight or height limit allowed by the manufacturer.

### **Forward-Facing**

When children are at least 2 years of age or have outgrown the highest rear-facing limits of their car seat, they may ride forward-facing in a car seat with a harness. Use the seat until the child reaches the harness’s highest weight limit allowed by the manufacturer. Car seats with harnesses can be used up to 40-100 pounds.

### **Boosters**

When children have outgrown the harness in their forward-facing car seat, they may be moved to a booster. The child should be at least 40 pounds and at least 4 years of age. Keep the child in the booster until about 4’9” tall or the seat belt fits correctly over the child’s body, generally between 8 and 12 years of age. Most boosters can be used up to 80-120 pounds.

### **Seat Belts**

Children should use a seat belt when it fits over their body correctly. For a seat belt to fit properly, the lap belt must lie snugly across the upper thighs and be snug across the shoulder and chest. It should not lie on the stomach or across the neck.

For your child's safety:

- **Select** a car seat based on your child's age, size, developmental and maturity level. Weight and height information will be on labels attached to the car seat and in the instruction manual.
- **Register** your car seat, check for recalls and monitor the expiration date of the seat. Replace your car seat if it's involved in a crash.
- **Secure** your child in the seat snugly, following the car seat instructions.
- **Install** the seat tightly in your vehicle using the seat belt OR Lower Anchors and Tether (LATCH) system. Follow the car seat instructions and vehicle owner's manual.

# Methodology

This report summarizes data from forms completed at car safety seat checkups sponsored by the North Dakota Department of Health throughout the state in 2011 and compares the 2011 results to checkups done in 2009 and 2010.

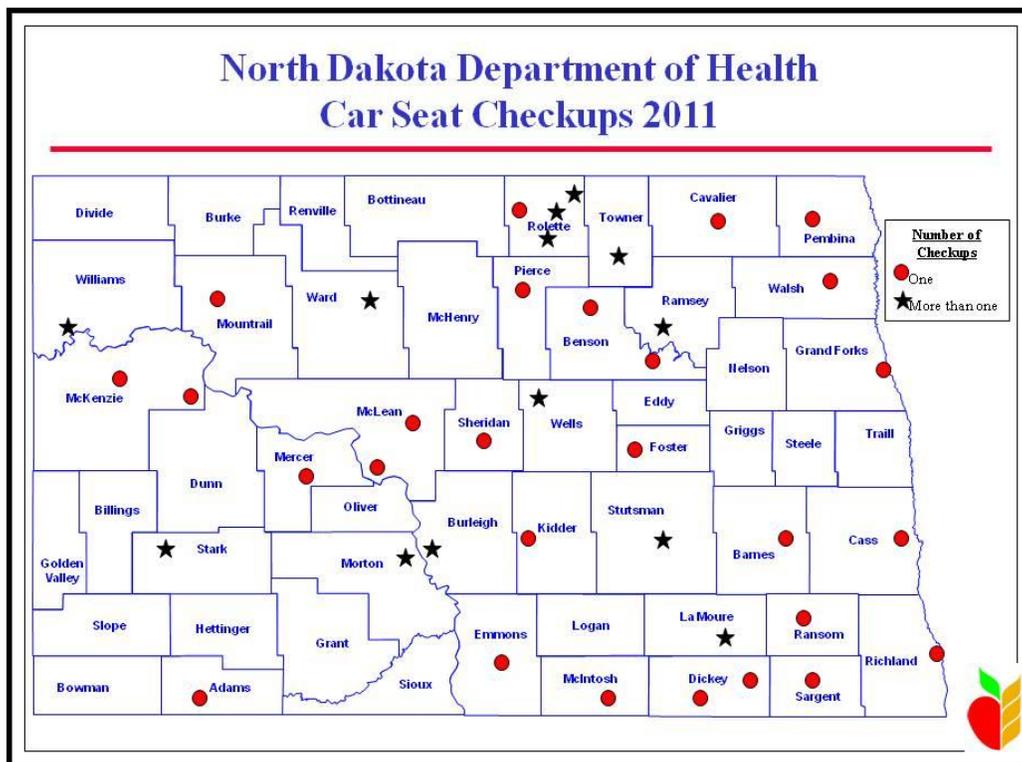
Child restraints were assessed in four general categories, including:

- Was the restraint **appropriate** for the age, weight and height of the child riding in it?
- Was the **child secured** correctly in the restraint?
- Was the **car seat installed** correctly in the vehicle?
- Was the car seat in good **condition**, not recalled, had not been in a crash and was not expired?

Within each category, several items were assessed or questions asked to determine correct use. Technicians used a standardized checklist for the assessment.

Data was entered by two certified child passenger safety instructors who had used the form extensively and had overseen the majority of the car seat assessments. For quality assurance, the forms had been reviewed for accuracy by an instructor or a lead checker at the time of the restraint check.

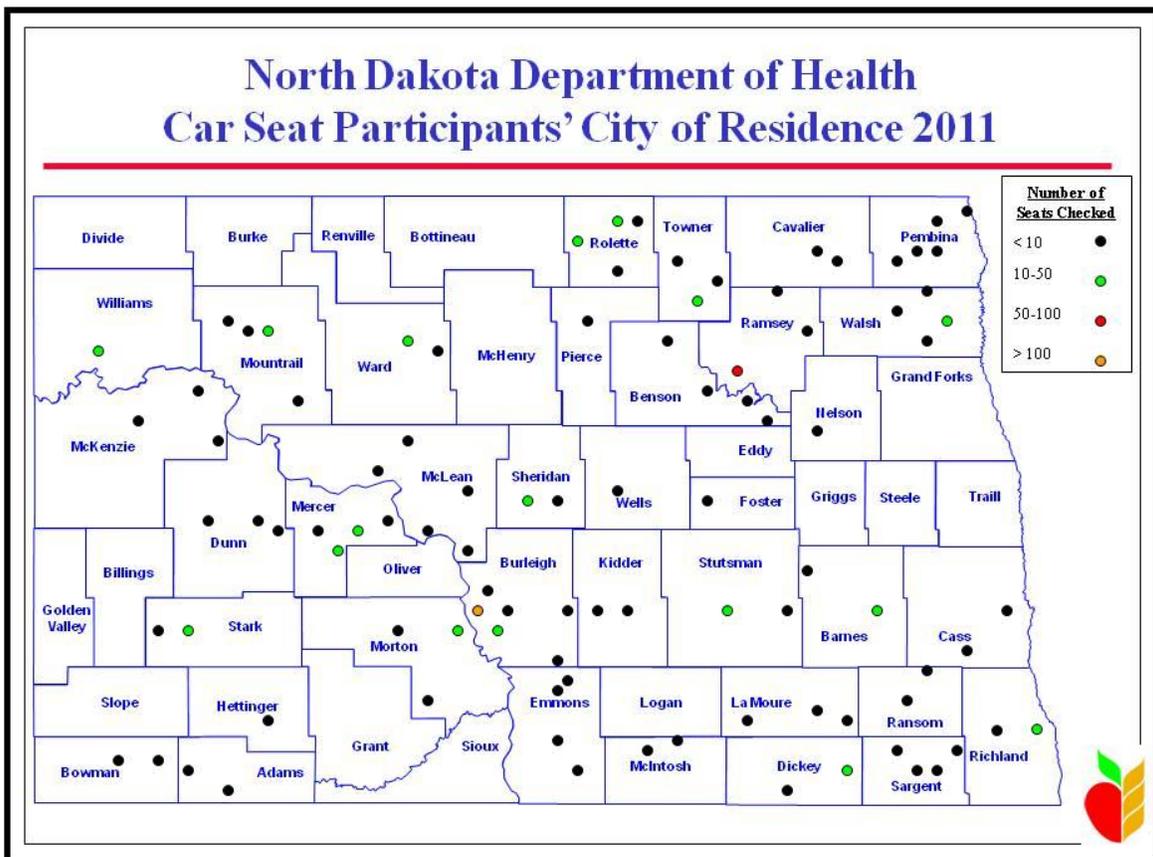
Following is a map showing locations of 2011 car seat checkups sponsored by the North Dakota Department of Health:



# 2011 Results

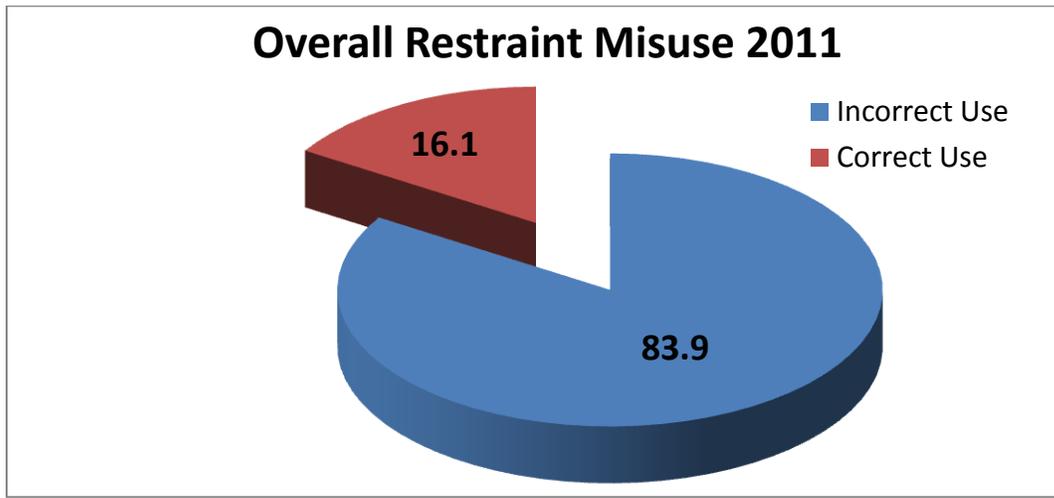
Data from 922 checkup forms for restraints assessed in 2011 were entered into the database. It should be noted that the sample size (N, or number of cases) varied for different questions based on the number of responses to a particular question. Factors which affected the number of responses included whether or not the child restraint was installed in the vehicle or whether or not a child was secured in the restraint. These fields were listed as Not Applicable on the assessment form and in data entry.

The map below provides information on the residence of families who participated in car seat checkups sponsored by the North Dakota Department of Health. It should be noted that Safe Kids Fargo-Moorhead and Safe Kids Grand Forks conducted checkups on a regular basis, providing this service for families in surrounding counties. Data from those checkups are not included in this report.



## General Information

- Data was entered on 922 restraints.
- 38.7 percent of the restraints were infant seats, 11.7 percent were rear-facing convertibles, 29.5 percent were forward-facing seats with a harness, 14.2 percent were booster seats and 5.9 percent were seat belts.
- 83.9 percent of the restraints were misused.



### Incorrect Use by Type of Seat

- Infant Seats – 94.4 percent were misused
- Rear-facing convertibles – 82.6 percent were misused
- Forward-facing – 86.4 percent were misused
- Boosters – 58.3 percent were misused
- Seat belts – 79.6 percent were misused

Infant seats had the highest rate of misuse. This may be because many checkup participants are new parents who have never used a child restraint and are unfamiliar with their vehicle occupant protection systems and general features of car safety seats. Boosters had the lowest rate of overall misuse – most likely because boosters are relatively easy to use.

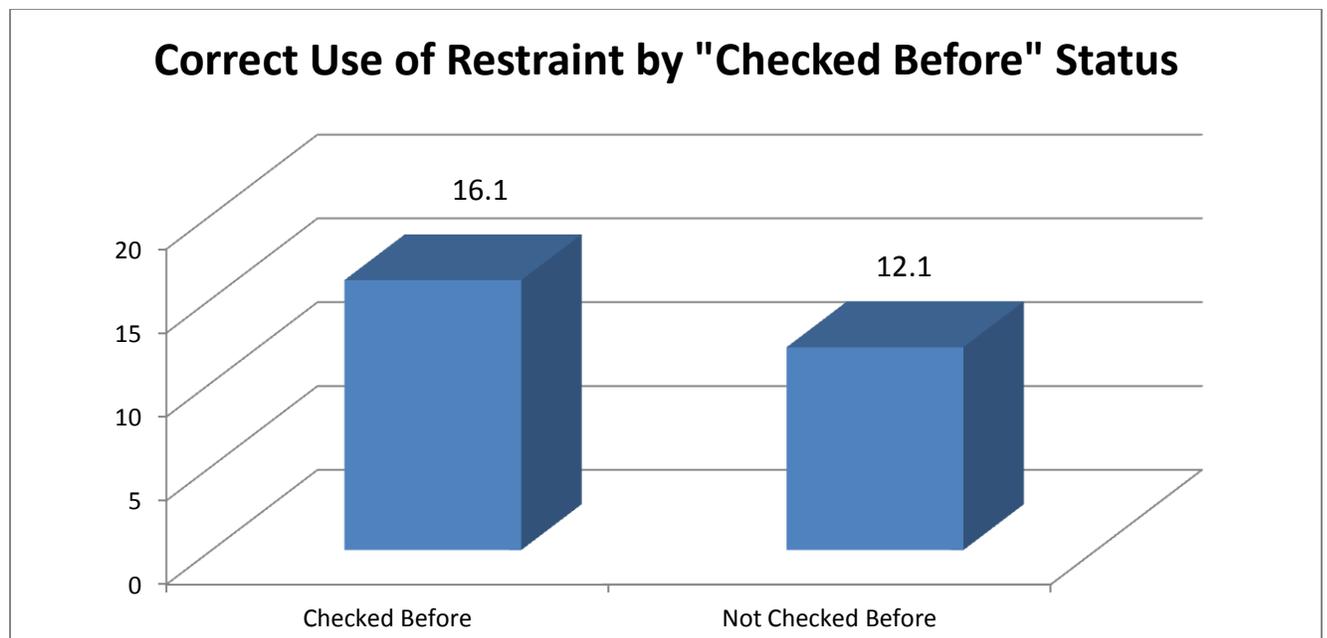
### **Correct Use by "Checked Before" Status**

Participants at checkups were asked if the restraint had been checked prior to this visit. This question was asked as an indicator of whether participants learned from a previous experience at a checkup event.

- 16.8 percent of the restraints had been checked at a prior event; 77.9 percent had never been checked before; the "checked before" status was listed as unknown in 5.3 percent of the records.

Of the restraints that had been checked before, 16.1 percent were used correctly, compared to 12.1 percent correct use if the restraint had not been checked before.

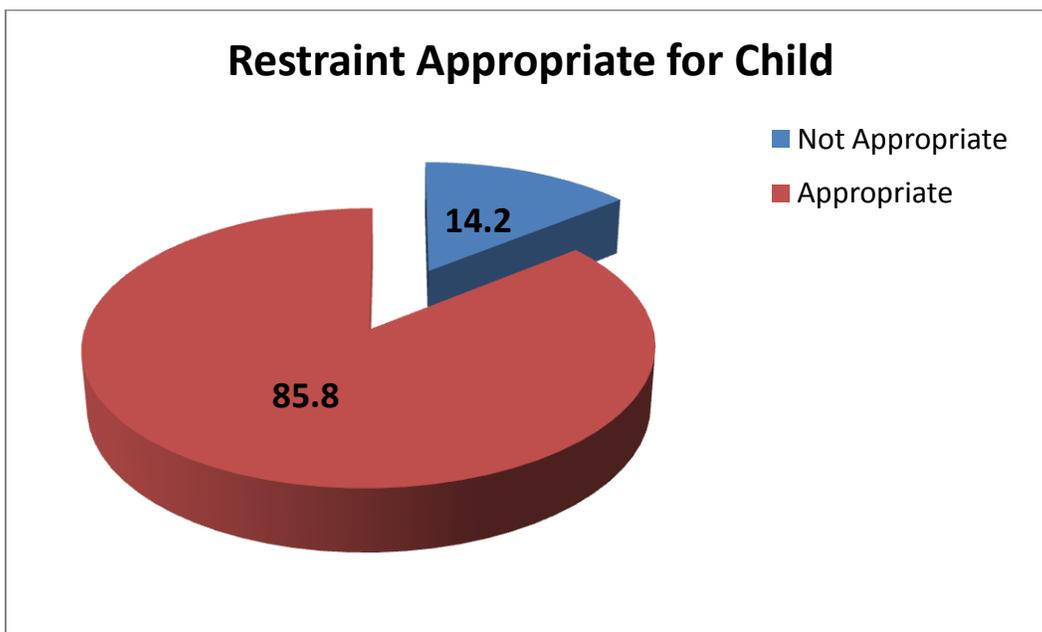
Correct use is slightly higher for participants who had attended a prior event, but not as high as one might expect. Reasons for this may be that the parents were taught how to use the restraint in a different vehicle with different seat belts or the car seat may have been used for a different age/weight child and in a different direction (rear-facing vs forward-facing). The car seat may have been recalled or expired between seat checks.



## Was Restraint Appropriate for Child?

The first step in assessing correct use of a child restraint was to determine if it was appropriate for the weight, height or special needs of the child riding in it. This was based on the manufacturer's instructions, labels on the car seat and "best practice" guidelines from health and safety organizations.

- 85.8 percent of the restraints checked were appropriate for the child in them upon arrival at the checkup. In the 14.2 percent of cases where the restraint was not appropriate, 30.9 percent were because the child was too large for the restraint; 51.8 percent were because the child was too small; and 55.5 percent because the child was too young.

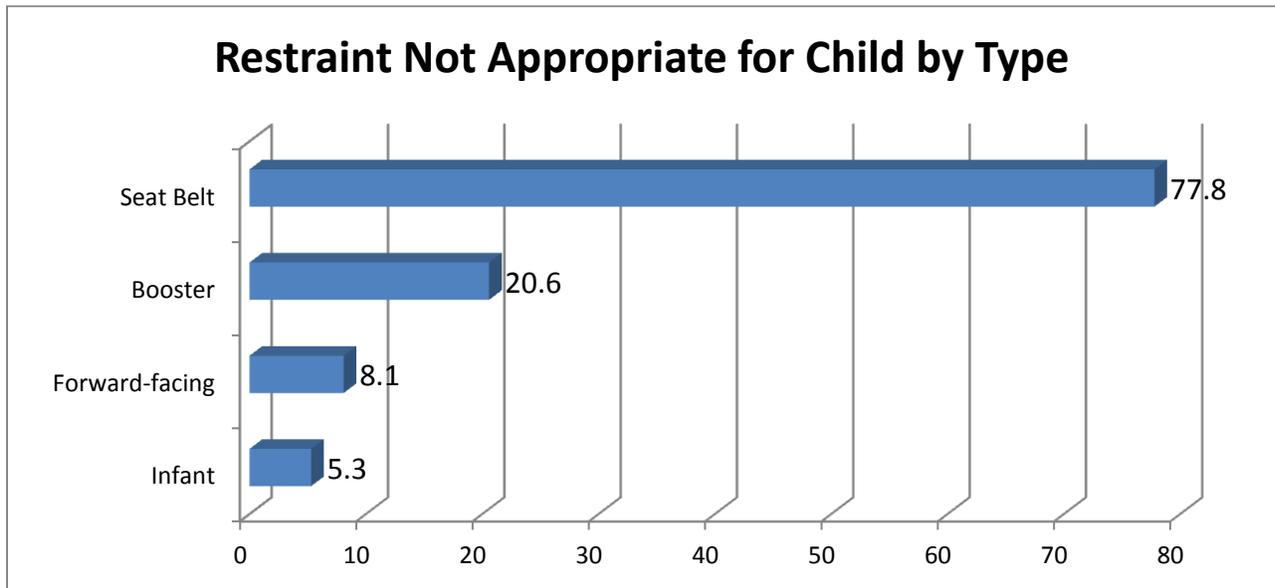


### **Not Appropriate by Type of Seat**

- 5.3 percent of infant seats were not appropriate for the child riding in them.
- 8.1 percent of forward-facing seats were not appropriate for the child riding in them.
- 20.6 percent of booster seats were not appropriate for the child riding in them.
- 77.8 percent of seat belts were not appropriate for the child riding in them.

In cases where the booster was not appropriate, 10.7 percent of the children were too small (under 40 pounds) and 18.3 percent were too young (younger than 4). Children are safer in car seats with harnesses and parents should be encouraged to keep children in harnessed seats as long as possible. In the past few years, car seat manufacturers have increased the capacity of their harnesses to hold older, heavier children. Many seats have harnesses that can accommodate children up to 50, 65, 70 or even 100 pounds.

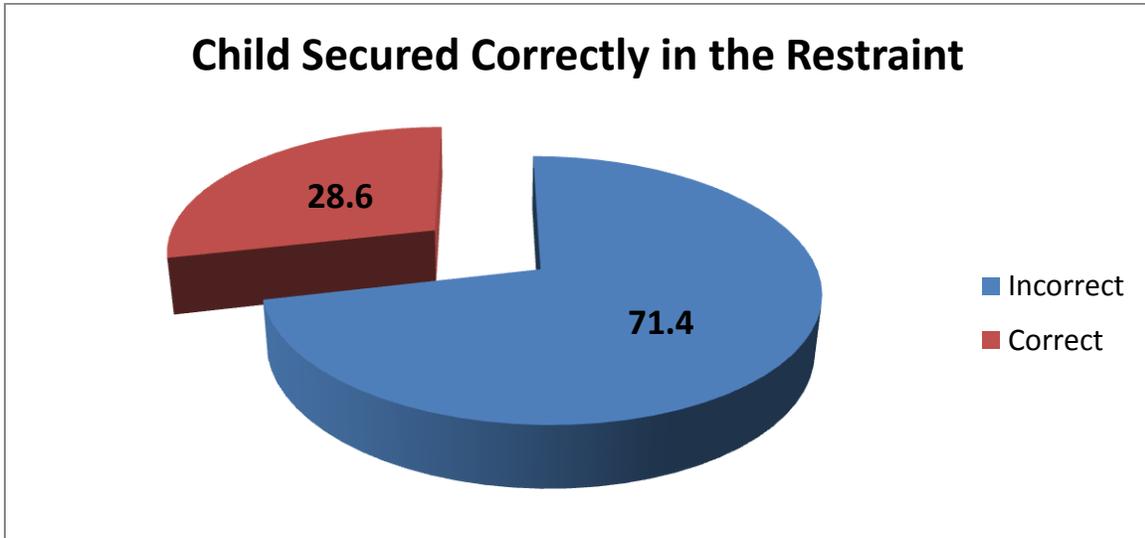
Of particular concern was the high rate of seat belts (77.8 percent) that were not appropriate for the child. In these cases, 72.2 percent of the children were too small and 64.8 percent were too young. Appropriate age, weight and height for seat belt use appear to be an area of considerable confusion for parents and caregivers. State law allows children to use a seat belt at age 7, but best practice guidelines suggest that many 8 to 12 year olds should still be in a booster. The best indicator of appropriate seat belt use is when the seat belt fits the child correctly.



## Was Child Secured Correctly in Restraint?

Correct use requires children to be secured properly in the restraint. Technicians checked for harness tightness, retainer clip position, harness slots and harness threading. For children in boosters and seat belts, proper position of the lap and shoulder belt was assessed. Of the restraints checked, 513 had a child secured in them or the tech was able to assess harness errors.

- Of the 513 restraints, 71.4 percent had errors related to how the child was secured in the harness.



### Type of Securing Errors – Infant, Rear-facing Convertible and Forward-facing Seats

- 52.6 percent of the harness straps were not tight enough.
- 33.7 percent had the retainer/chest clip positioned incorrectly.
- 28.8 percent of the harness straps were in the wrong slots for the child riding in the seat.
- 16.7 percent of the harness straps were threaded wrong.

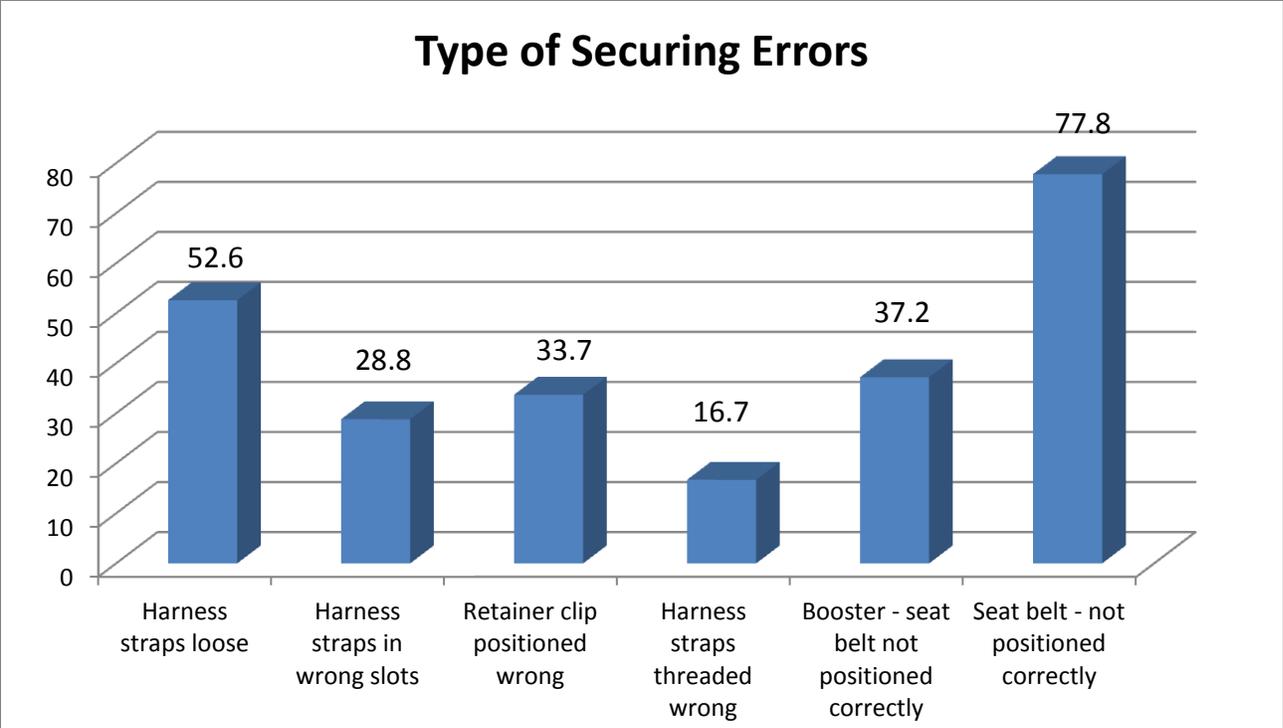
### Types of Securing Errors – Booster Seats

- 37.2 percent of the booster seats had errors related to how the seat belt was positioned over the child riding in the booster.

### Types of Securing Errors – Seat Belt

- 77.8 percent of the children riding in seat belts had errors related to how the lap or shoulder belt was positioned over the child. For proper fit, the lap belt must lie snugly across the upper thighs and be snug across the shoulder and chest. The shoulder belt should never be placed behind the back or under the arm.





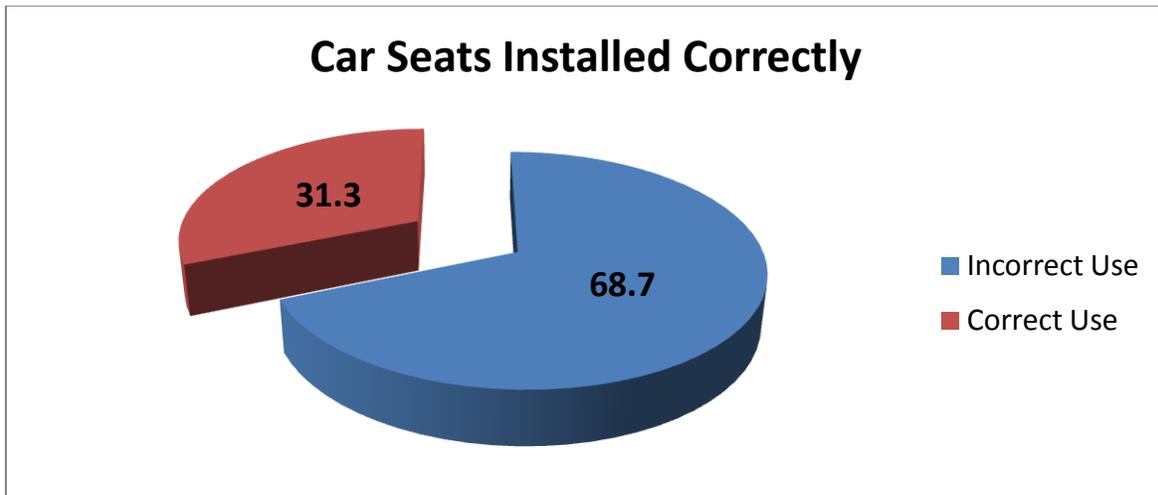
The above chart shows that the most common securing error for car seats with internal harnesses involved straps being too loose. Harness straps should lay flat on the chest and over the hips. Straps should be tested for tightness by pinching them at the shoulder, with no slack or excess webbing. Parents should be reminded to adjust harnesses on each ride, since what the child is wearing may affect secureness of the harness.

The chart also shows the high rate of errors related to securing children in seat belts. Seat belt securing errors involved shoulder belts behind the shoulder or under the arm and lap belts over the soft tummy instead of low on the hip bones. Misuse of seat belts is usually indicative that it is the wrong restraint selection for the child. In all probability, these children need a booster seat to raise them up and help position the seat belt correctly.

## Was Car Seat Installed Correctly in Vehicle?

Before removing the car seat from the vehicle, technicians checked for correct installation, including how tight the seat was installed in the vehicle, correct belt path, correct recline position, how it was installed (seat belt, lower anchors, tether) and correct handle position on infant seats. Of the restraints checked, 534 installation assessments were completed.

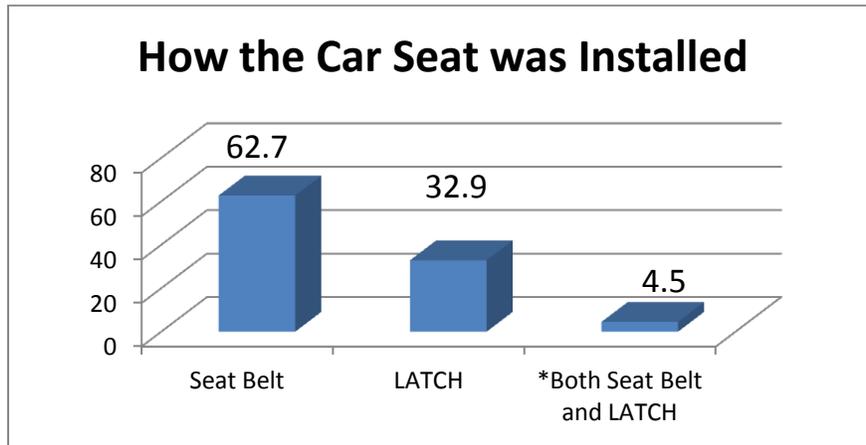
- Of the 534 installed car seats, 68.7 percent were incorrect, having at least one error in how they were installed.



## How Car Seat Was Installed in Vehicle

Parents often have a choice of installing their car seat with the vehicle seat belt or the LATCH system. Most vehicles and child restraints manufactured after 2003 have LATCH hardware that was designed to make installation easier. Child restraint and vehicle manufacturers advise against using both LATCH and the seat belt. Of the restraints that were installed:

- 62.7 percent were installed with the vehicle seat belt.
- 32.9 percent were installed with the LATCH system.
- \*4.5 percent were installed with both the seat belt and LATCH.



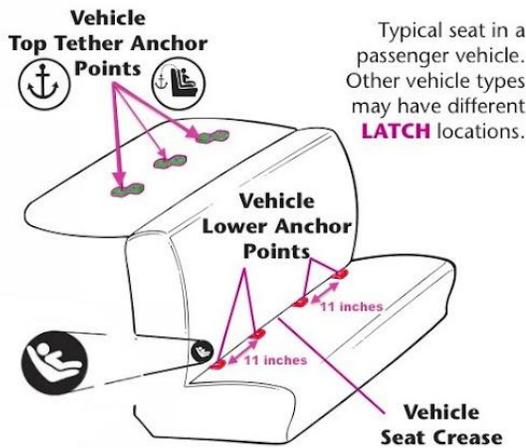
\*Both seat belt and LATCH system should not be used together.

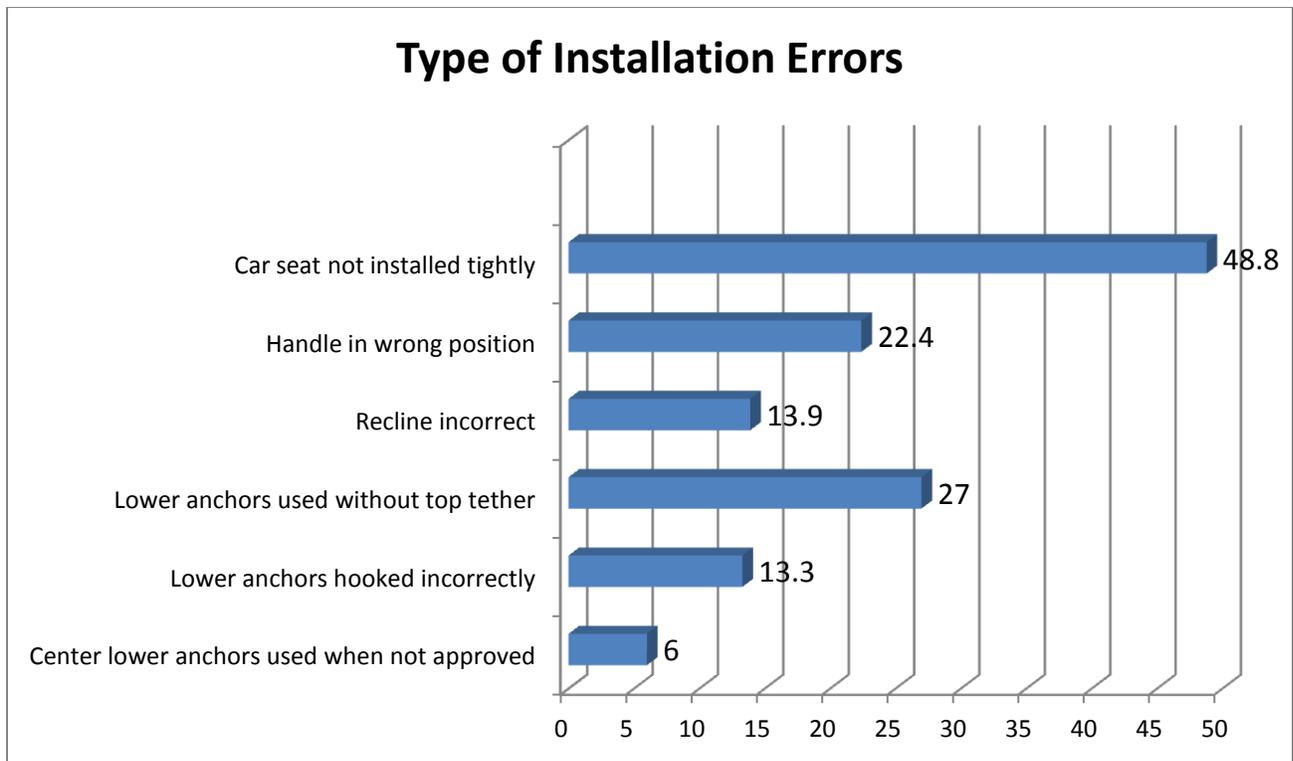
## Types of Installation Errors

- 48.8 percent of the car seats were not installed tightly.
- 22.4 percent of the infant seats had the handle in an incorrect position for vehicle travel.
- 13.9 percent of the seats were not reclined correctly for their direction or the age/weight of the child riding in them.
- 7 percent of the children riding in backless boosters had no head protection in the seating position in which they were riding. *Head restraints prevent the child from receiving whiplash injuries in a crash.*
- 4.5 percent of the car seats were installed with both the LATCH system and the vehicle seat belt. *Car seats should be installed with either system, but not both.*

Of the car seats installed with LATCH:

- 27 percent of forward-facing car seats were using the lower anchors but not the top tether. *Since LATCH is a system, both components (lower and upper) must be used on forward-facing car seats.*
- 13.3 percent of the lower anchors were hooked incorrectly, with the hook facing upwards. *Lower anchor straps on the child restraint should be attached to the lower anchors in the vehicle with the hooks facing downward.*
- 6 percent of the car seats were installed in the center using lower anchors that were not approved by the vehicle manufacturer. *Lower anchors are often located in the outboard seating positions, but not the center. Because parents want to place their child in the center position, they often attach the car seat to the inside hooks of the outboard position. Unless approved by the vehicle and child restraint manufacturer, it is not okay to do this.*





The above chart shows that the most common installation error involved car seats not being installed tight enough. Many parents who attend car seat checkups do so because they have difficulty getting the restraint tight. Oftentimes, parents are unsure of how their seat belts lock, are confused about the LATCH system and are unsure if/how they should use a locking clip.

### Use of Top Tether Straps

- 196 forward-facing restraints had tether straps on them and the vehicles in which they were installed had tether hardware available. 53.1 percent of the tethers were attached to the vehicle. *Tethers limit head excursion and provide extra protection in a crash. They should be used whenever possible.*
- For the restraints using the top tether strap, 26 percent were used incorrectly – generally because they were attached to the wrong tether anchor for the seating position or to a non-approved anchor in the vehicle.

Use of tethers can be confusing for parents – both in terms of when tethers should be attached and the correct location in the vehicle to attach them. Tethers are the top part of the LATCH system and must be used with lower anchors on forward-facing car seats. Tethers should also be used when car seats are installed with seat belts.

## Condition of Restraint

Technicians inspected car seats for condition, missing parts, torn or frayed harnesses and missing labels. Using the model number and date of manufacture, car seats were checked for manufacture recall. Parents or caregivers were questioned about the history of the car seat, i.e., was it purchased new or received from another source (friend, relative, rummage sale). They were asked if the car seat had been in a crash. Seats were checked to see if they were outdated, based on manufacturer's expiration dates or six years from date of manufacture.

- 3.2 percent of the car seats were recalled or were missing labels, so the technician was not able to check recall status.
- 4.6 percent of the car seats had been in a crash or the parents/caregiver was unsure of the car seat's history. *Most car seat manufacturers advise consumers to replace car seats that have been in a crash.*
- 6.6 percent of the car seats were outdated. *Car seats have expiration dates because of normal wear-and-tear and because technology, regulations and "best practice" recommendations change over time. A car seat may become obsolete or be less effective than a new product.*



- 15.4 percent of the car seats had aftermarket products added to them or in the vehicle. With the permission of the parent, technicians removed the products in 71.1 percent of the cases. *Aftermarket products are often designed to improve the comfort, fit or installation of car seats, but they are not regulated by the government. Examples include head-positioning pads, toys attached to car seat handles, mirrors, seat protectors and window shades. Most manufacturers warn consumers against using accessories that did not come with the car seat because they were not crash-tested with their seats.*



# Car Seat Misuse

## 2009-2011 Comparison

Car seat checkups were done in 2009, 2010 and 2011, using the same guidelines and checkup form for assessing the restraints. Data for all three years was entered and compiled by two certified child passenger safety instructors who had assisted with the majority of the checkups. Following are comparisons of data results between the three years.

### Number of Restraints Checked

- In 2009, data was entered on 1,579 restraints, compared to 1,379 in 2010 and 922 in 2011, for a three-year total of 3,880 restraints checked.

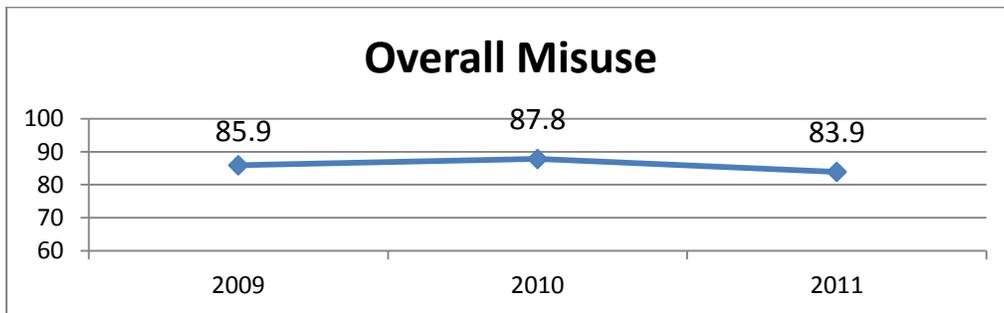
### Type of Restraints Checked

	2009	2010	2011
Infant Seat	36.7	37.7	38.7
Rear-facing Convertible	12.4	12	11.7
Forward-facing	29.7	30	29.5
Booster	18.6	16.8	14.2
Seat Belt	2.6	3.5	5.9

### Overall Misuse

Misuse means there was at least one error in how the restraint was being used, with many restraints having multiple errors. Errors fell into four general categories, including Restraint Not Appropriate for Child; Child Not Secured Correctly in Restraint; Car Seat Not Installed Correctly in Vehicle; and Condition of Restraint.

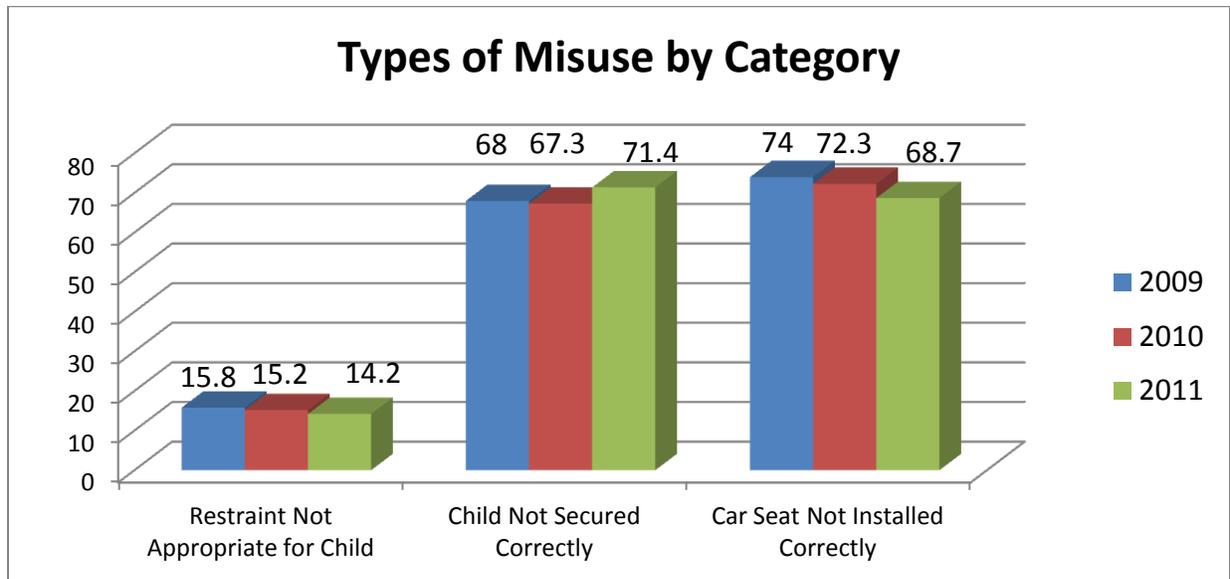
- In 2009, 85.9 percent of the restraints were misused.
- In 2010, 87.8 percent of the restraints were misused.
- In 2011, 83.9 percent were misused.



Misuse of child restraints has remained fairly consistent during the three-year period. The slight decrease in overall misuse between 2010 and 2011 is encouraging, but at this point, it is too soon to know if this is a trend that will continue.

## Types of Misuse

	<b>2009</b>	<b>2010</b>	<b>2011</b>
Restraint not appropriate for child	15.8	15.2	14.2
Child not secured correctly in restraint	68	67.3	71.4
Car seat not installed correctly in vehicle	74	72.3	68.7



Parents seem to be doing a better job in selecting the car seat that is most appropriate for their child’s age, weight, height and developmental level, as evidenced by a slight, but continued decrease in the number of restraints that were not appropriate for the child – from 15.8 percent in 2009 to 14.2 percent in 2011.

During the three-year period, there was a slight increase in the number of children who were not secured correctly in their restraint, from 68 to 71.4 percent. However, upon further analysis, there is good news that shows a reduction, from 59.5 percent to 52.6 percent, in loose harnesses, a critical component of correct use. The following chart shows types of securing errors during the three-year period.

	<b>2009</b>	<b>2010</b>	<b>2011</b>
Securing Error: Harness too loose	59.5	58.2	52.6
Securing Error: Retainer clip positioned wrong	32	26.2	33.7
Securing Error: Harness straps wrong slots	21.8	24.1	28.8
Securing Error: Harness straps threaded wrong	10.8	20.4	16.7

It is encouraging to see a gradual decline in installation errors from 74 percent in 2009 to 68.7 percent in 2011. Worth noting is that during each of the three years, half of the car seats were installed tightly. Tight installation is another critical component of correct use. The decline in installation errors may be due to educational campaigns, technician training and general increase in knowledge about the importance of correct installation and the importance of reading vehicle owner's manuals.

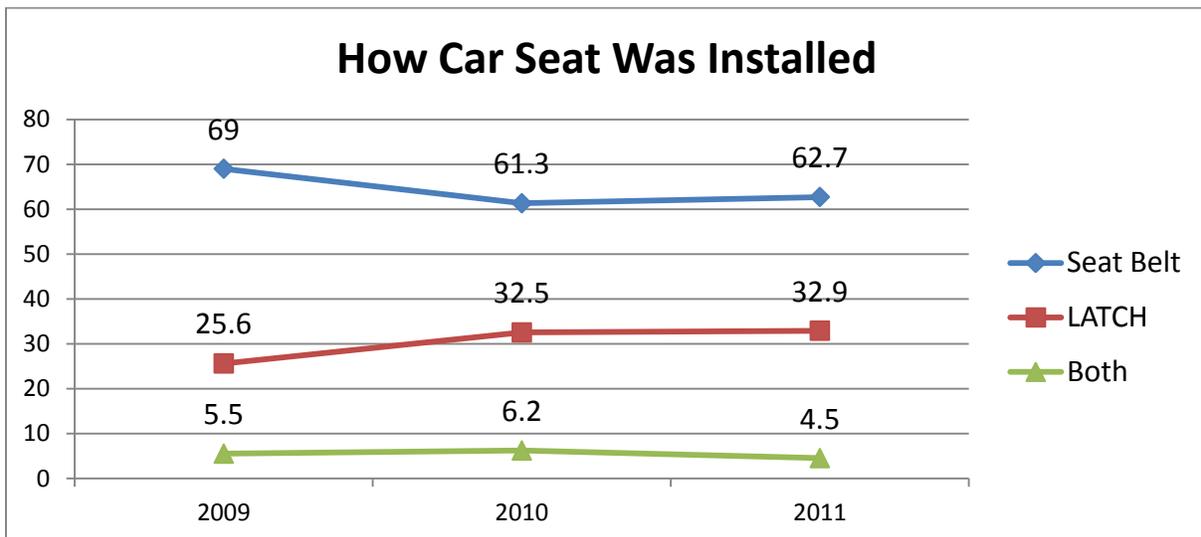
The following chart describes types of installation errors during the three-year period. Worth noting is the increase in incorrect handle position on infant car seats. This may be caused by changes in appropriate handle positions by some manufacturers and subsequent confusion for parents.

	2009	2010	2011
Installation Error: Car seat not tight	49.3	50.7	48.8
Installation Error: Handle in wrong position	14.8	23.7	22.4
Installation Error: Incorrect recline	11	13.3	13.9
Installation Error: Incorrect belt path	2.8	2.2	2.0
Installation Error: Wrong direction	1.9	4	3.5

### How Car Seat Was Installed in Vehicle

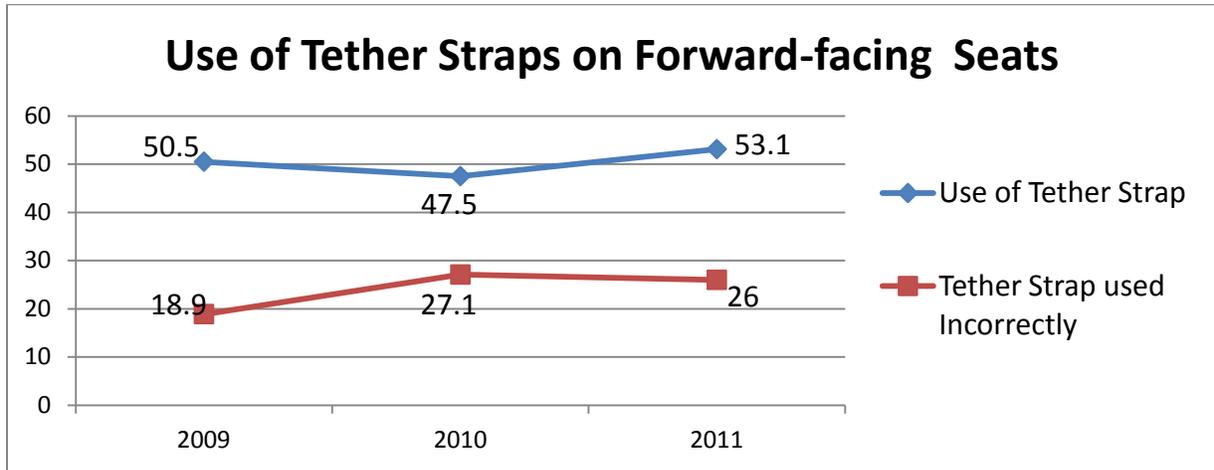
Parents often have an option of choosing to install their car seat with the vehicle's seat belt or the LATCH system. Use of LATCH increased from 2009 to 2011. This may be a result of vehicle turnover with more vehicles having the LATCH system in them (required by MY 2003) or a result of enhanced education from dealerships and others about the LATCH system.

	2009	2010	2011
Car seat installed with seat belt	69	61.3	62.7
Car seat installed with LATCH	25.6	32.5	32.9
Installed with both seat belt & LATCH	5.5	6.2	4.5



**Use of Tether Straps on Forward-facing Seats**

	<b>2009</b>	<b>2010</b>	<b>2011</b>
Use of tether strap when available	50.5	47.5	53.1
Tether strap used incorrectly	18.9	27.1	26



The use of tether straps on forward-facing car seats has increased during the three-year period. This could be attributable to the increase in use of the LATCH system (which requires use of the top tether) or to an increase in education about the importance of using top tethers whenever possible. Unfortunately, as the use of tethers has increased, so has the incorrect use. Parents should be encouraged to read their vehicle owner’s manual for correct locations of tether anchors in the vehicle.

**Condition of Restraint**

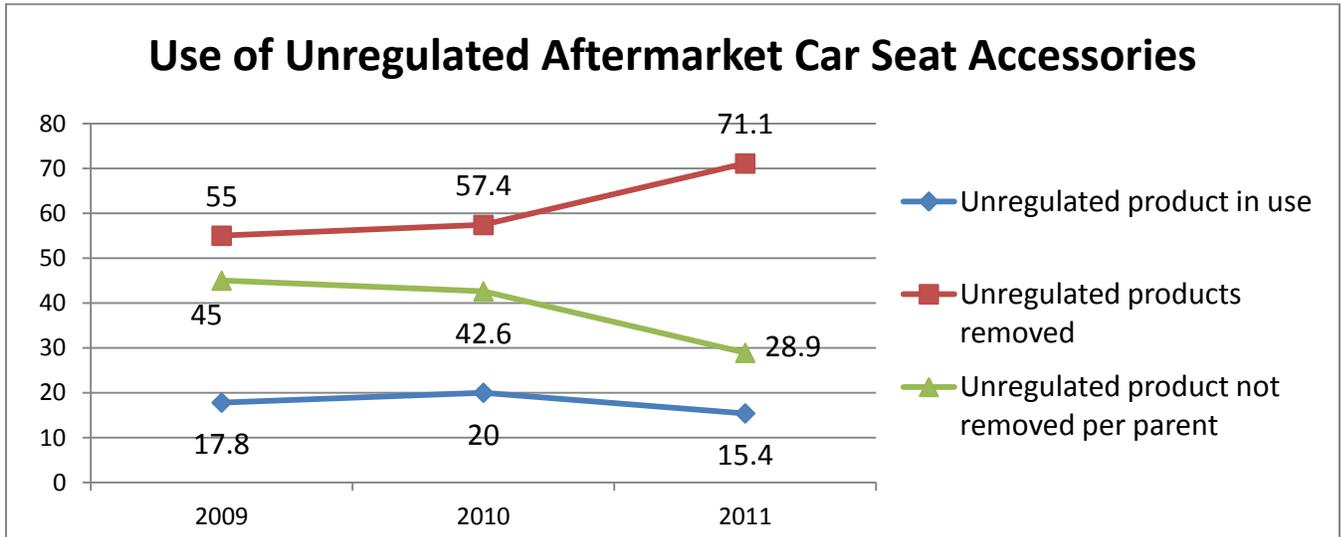
	<b>2009</b>	<b>2010</b>	<b>2011</b>
Car seat recalled or missing labels	5	4	3.23
Not original owner of car seat or unsure	9.9	5.3	4.4
Car seat in a crash or unsure of history	9.5	5.7	4.6
Car seat outdated or unsure	7.4	5.2	6.6

Throughout the three-year period, parents seemed to be aware of the importance of not using old or second-hand car seats or those that had been in a crash, with relatively low numbers in all “condition of restraint” categories. Even with the low beginning numbers, improvements were made in all categories, but particularly in use of second-hand seats and seats involved in crashes. Much media attention has been given to these topics, along with car seat roundups that collect and destroy old car seats.



**Use of Unregulated (Aftermarket) Car Seat Accessories**

	<b>2009</b>	<b>2010</b>	<b>2011</b>
Unregulated (aftermarket) product in use	17.8	20	15.4
Unregulated products removed	55	57.4	71.1
Unregulated product not removed per parent	45	42.6	28.9



During the three-year period, approximately 15 to 20 percent of the restraints checked included use of unregulated aftermarket accessories. On a positive note, parents/caregivers removed accessories on 71 percent of the restraints at the 2011 checkups, compared to 55 percent in 2009. Over the past two years, certified technicians have been more assertive in warning parents against use of aftermarket products and in assisting them with removal of the accessories.

**Misuse by Type of Restraint**

The following charts identify the different types of restraints checked and highlight misuse for each type of restraint in the general categories: Overall Misuse, Securing Child in Restraint, Installing Restraint in Vehicle and Restraint Appropriateness for Child.

**Infant Seats**

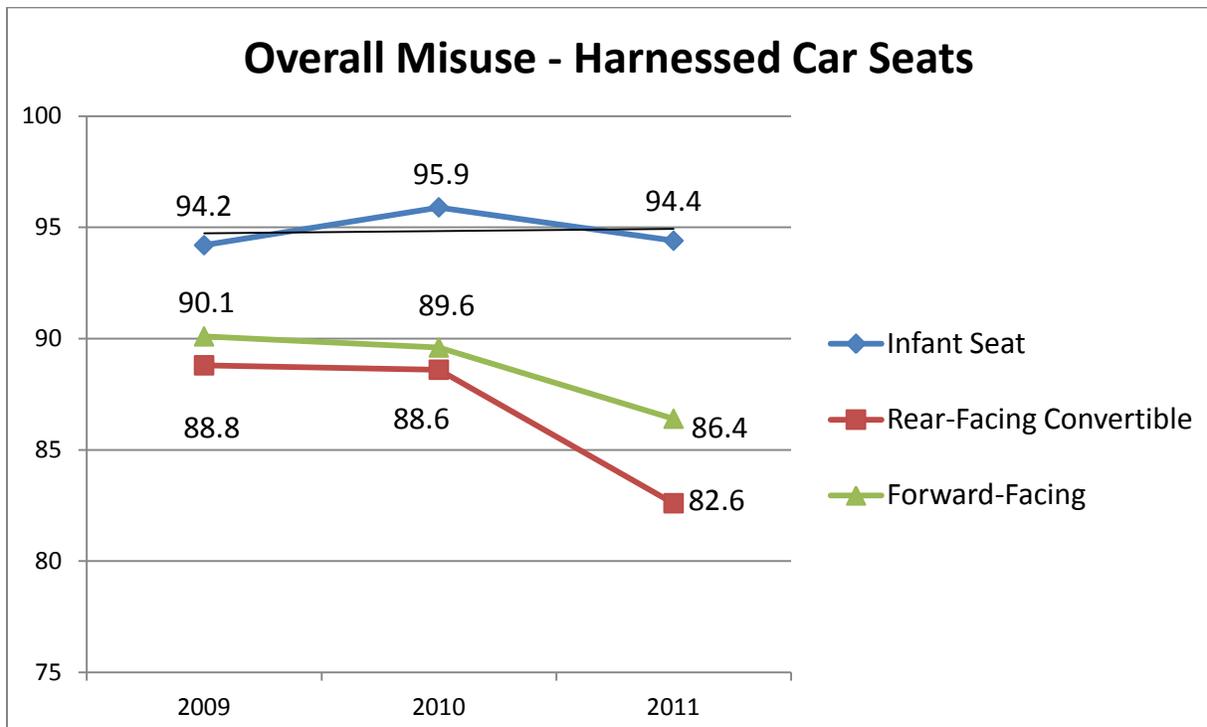
	<b>2009</b>	<b>2010</b>	<b>2011</b>
Overall Misuse by Restraint Type: Infant Seat	94.2	95.9	94.4
Child not secured correctly in Infant Seat	78.5	72	81.6
Infant seat not installed correctly	82.2	84.8	74.8
Inappropriate by Type: Infant Seat	9.3	5.4	5.3

**Rear-facing Convertibles**

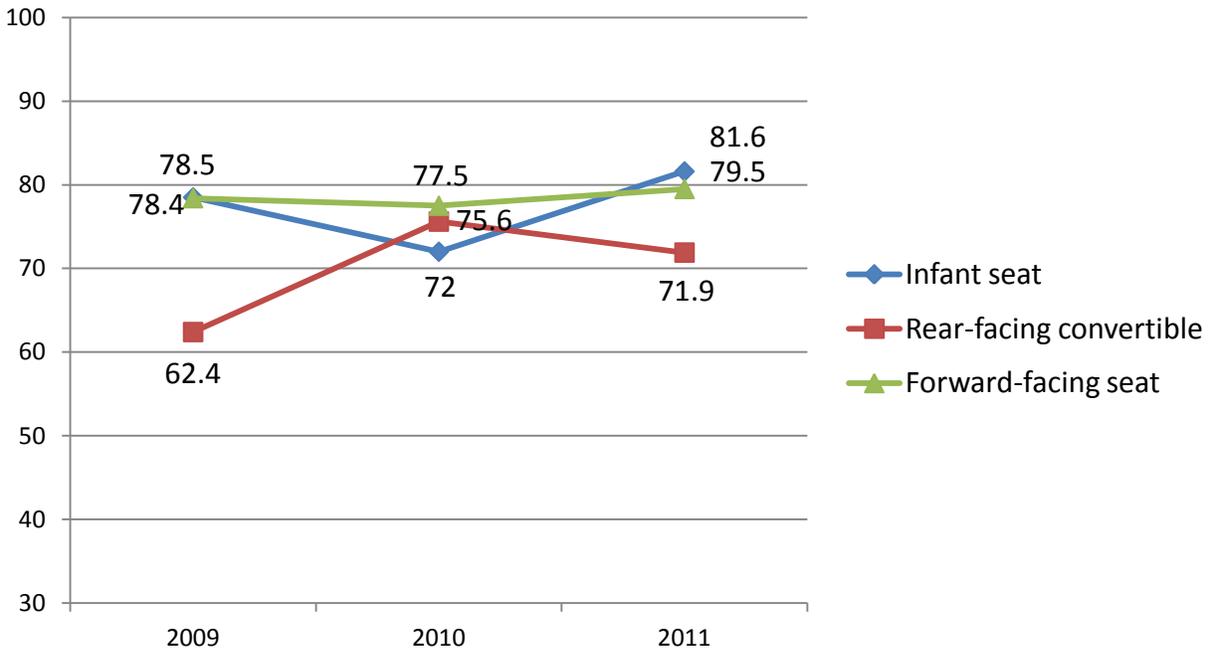
	2009	2010	2011
Overall Misuse by Restraint Type: RF Convertible	88.8	88.6	82.6
Child not secured correctly in RF Convertible	62.4	75.6	71.9
Rear-facing convertible not installed correctly	66.7	57.4	64.8
Inappropriate by Type: Rear-facing Convertible	0	1.2	0

**Forward-facing Seats with Harness**

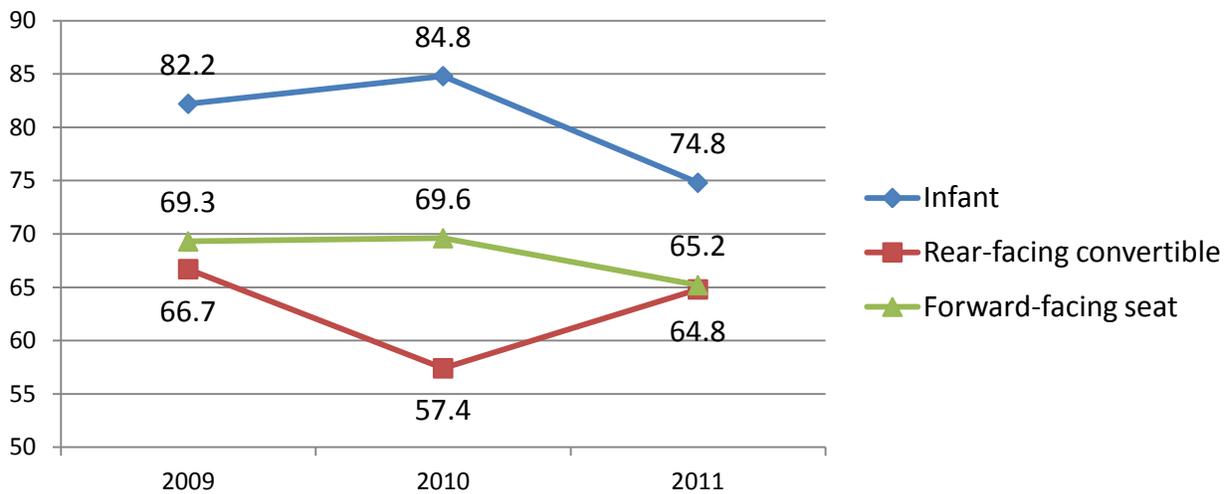
	2009	2010	2011
Overall Misuse by Restraint Type: Forward-Facing	90.1	89.6	86.4
Child not secured correctly in Forward-facing Seat	78.4	77.5	79.5
Forward-facing car seat not installed correctly	69.3	69.6	65.2
Inappropriate by Type: Forward-facing	12.4	12.8	8.1



### Secured Incorrectly - Harnessed Car Seats



### Installed Incorrectly - Harnessed Car Seats

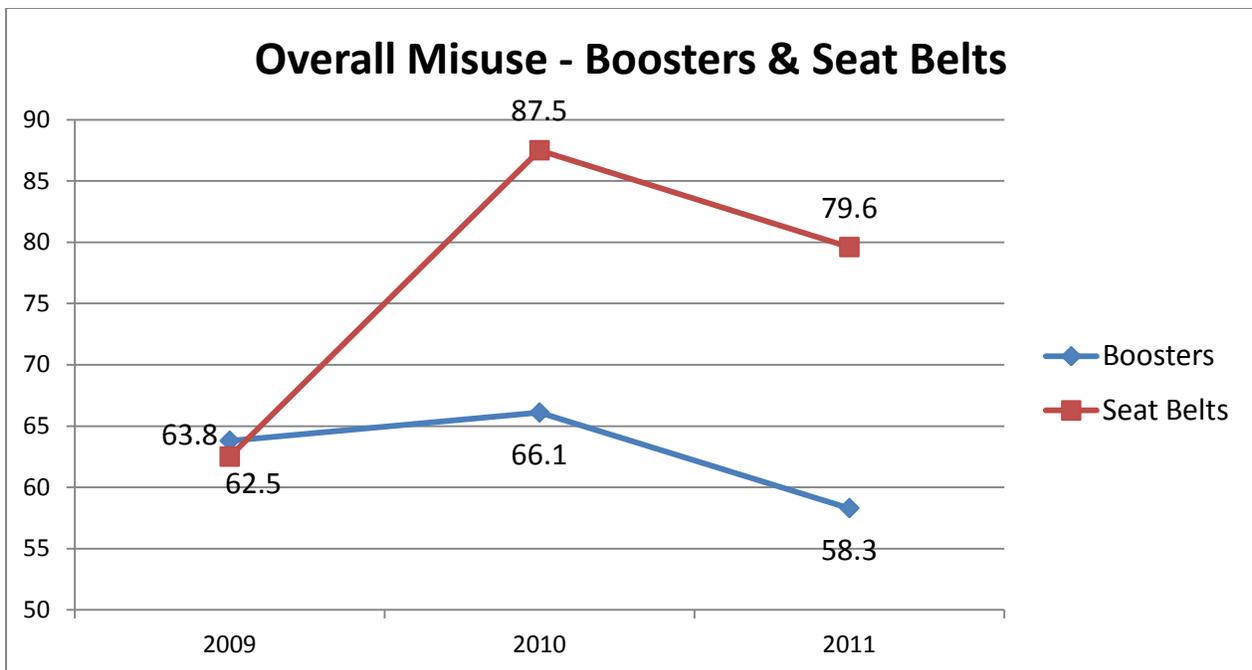


**Booster Seats**

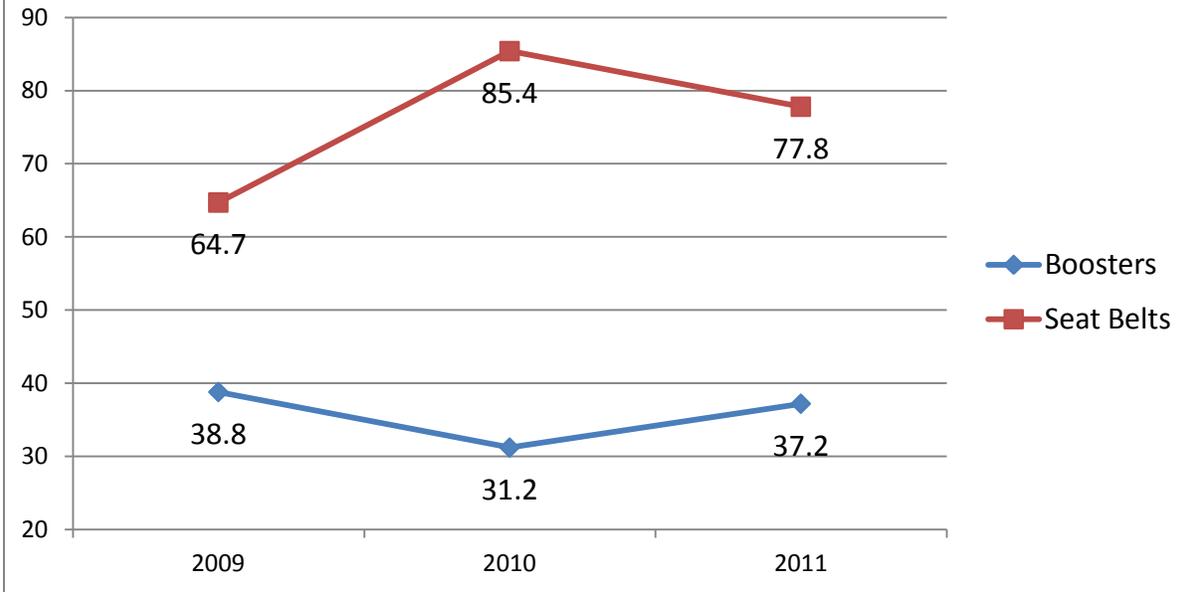
	<b>2009</b>	<b>2010</b>	<b>2011</b>
Overall Misuse by Restraint Type: Booster	63.8	66.1	58.3
Child not secured correctly in Booster Seat	38.8	31.2	37.2
Installation Error: Backless boosters w/o head protection	13.8	12.1	7
Inappropriate by Type: Booster	8.9	22.1	20.6

**Seat Belts**

	<b>2009</b>	<b>2010</b>	<b>2011</b>
Overall Misuse by Restraint Type: Seat Belt	62.5	87.5	79.6
Child not secured correctly in Seat Belt	64.7	85.4	77.8
Inappropriate by Type: Seat Belt	62.5	79.2	77.8



## Secured Incorrectly - Boosters & Seat Belts



# Conclusions

Misuse of child restraints has remained fairly consistent during the three-year period. The slight decrease in overall misuse between 2010 and 2011 is encouraging, but at this point, it is too soon to know if this is a trend that will continue. Also, it may be unrealistic to expect significant reductions in overall misuse because of the large number of items that are assessed during each checkup, with each item having possible errors that will affect the overall misuse rate. As new technological advances become available in vehicles and child restraints there is a potential for new types of misuse. When checking car seats, technicians must review vehicle owner's manuals about numerous issues that affect correct installation of car seats. A trend for car seat manufacturers has been development of products that go from birth to booster which require adjustments as the child grows – again opening the door for additional types of misuse.

While overall misuse rates should not be overlooked, it may be more beneficial and have more significance to monitor data within the major categories of misuse, particularly those critical components which would have the most effect in protecting a child in a crash.

During the three-year period, there was an improvement in overall installation of child restraints with 26 percent installed correctly upon arrival in 2009, compared to 31.3 percent correct in 2011. When it comes to tight installation, however, only about half of the car seats were installed tightly enough in the vehicle to be considered correct.

Another critical component of correct use is for the child to be secured snugly in the harness system. It is encouraging to see improvement in this area, with 40.5 percent of the children arriving in a snug harness in 2009, compared to 47.4 percent in 2011.

The use of tether straps on forward-facing car seats increased during the three-year period from 50.5 percent to 53.1 percent, but unfortunately, almost half of the child restraints which could be tethered, are not. Even when tethers were used, about one-fourth of them were used wrong. Because of the extra safety provided by tether straps, this is an issue that deserves additional attention and education.

Of particular concern was the high rate of seat belts (77.8 percent) that were not appropriate for the child and in which the child was not secured correctly. In many cases, the child arrived with the shoulder belt under the arm or behind the back and the lap belt positioned on the stomach instead of the lower thighs. This is an issue which seems to be very confusing for parents and caregivers. On one hand, state law allows the child to use a seat belt at age seven, whereas, health and safety officials often recommend a specific weight or height. This is one area which should be addressed – both through education and enhancement of the state's child restraint law – that could have a significant impact on the safety of older children.

Throughout the three-year period, parents seemed to be aware of the importance of not using old or second-hand car seats or those that had been in a crash, with relatively low numbers in all "condition of restraint" categories. Even with the low beginning numbers, improvements were made in all categories, but particularly in use of second-hand seats and seats involved in crashes.

And finally, parents do appear to be learning from experiences at car seat checkups. For the three-year period, 18.2 percent of the restraints were used correctly when the parent/caregiver had attended a prior checkup. This compared to 9.2 percent correct use if the restraint had not been checked before. Families should be encouraged to participate in checkups when they are available in their communities or should seek assistance from certified technicians in their area.