

Child Safety Seat Knowledge Among Parents Utilizing Emergency Services in a Level I Trauma Center in Southern California

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ABSTRACT. *Objective.* To determine the level of child safety seat (CSS) and airbag safety knowledge in parents who utilize emergency care services for their children and to determine factors that influence knowledge of safe transportation of children.

Methods. A prospective survey study was conducted in a 42 000-visit-per-year Level I trauma center and emergency department (ED) in Southern California from May through October 2000. Subjects were parents of ED-registered children (≤ 6 years). Research assistants administered the survey in the subject's native language. Parent knowledge of age-appropriate restraint use and airbag safety was collected.

Results. Six hundred fifty-five subjects were enrolled. Most parents (97%) reported a regular source of pediatric medical care, and 57% had a previous ED visit. Eighty-six percent reported owning a CSS or booster seat. Eighty-one percent were aware that infants in rear-facing CSSs should never be placed in front of an airbag. Only 46% knew that a child weighing 40 to 60 lb should travel in a booster seat, and 59% knew that the State law required CSS use for children up to 4 years and weighing up to 40 lb. When knowledge scores were examined by ethnicity, fluency in English, income, and years of education, fluency was found to have the greatest influence on both CSS and airbag knowledge.

Conclusions. Although nearly all of our subjects admitted that their children had a regular source of care, many parents showed evidence of lack of knowledge of CSS and airbag safety. Furthermore, many parents were not familiar with the state law regarding child restraints. Our findings suggest that parents of small children who utilize emergency care services could benefit from child passenger safety education during their ED visit and that non-English media and materials may be important to reaching this population. *Pediatrics* 2002;110(5). URL: <http://www.pediatrics.org/cgi/content/full/110/5/e61>; *child safety seat, airbag, knowledge, occupant safety, Hispanic.*

ABBREVIATIONS. ED, emergency department; CSS, child safety seat; NHTSA, National Highway Traffic Administration.

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Motor vehicle crashes continue to claim the lives of US children too frequently. In 2000, there were 8145 passenger vehicle occupants under the age of 15 involved in fatal motor vehicle crashes. Of these, 2343 children were killed in crashes. In addition, 529 of the fatally injured children were under the age of 5 years, and 251 were found to be completely unrestrained.¹

Emergency physicians and pediatric emergency medicine specialists are confronted daily with caring for these injured children and in many cases trying to educate parents about "best" child occupant safety practices. The task of injury prevention education in the emergency department (ED) setting can be challenging. Yet most acute health care providers and traffic safety advocates affirm that this education is needed for parents, particularly in light of the growing socioeconomic and cultural diversity found in EDs today. Furthermore, researchers have found that ED populations are "high injury risk" groups, and those individuals that utilize emergency care services are at greater risk for injury and repeat ED visits for trauma.^{2,3} Moreover, epidemiologic studies show that children of certain minority groups are at higher risk of dying in motor vehicle crashes.⁴

Despite the large number of resources allocated to media campaigns, infants and young children continue to travel unrestrained, in unsafe seating positions, and in front passenger seats of airbag-equipped vehicles.⁵⁻⁷ We anticipate that this may become more of a problem as vehicles are resold to second owners. As the fleet of airbag-equipped motor vehicles age, increasing numbers of low-income families who may have lower levels of education, inability to read and speak English, larger families, and fewer resources will be using these vehicles. Therefore, there is a need to determine the level of knowledge related to airbags and safe transport of children in a population at greater risk for crash and airbag-related injury.

The objective of our study was to determine the level of child safety seat (CSS) and airbag safety knowledge in parents who utilize emergency care services for their children and determine factors that may influence knowledge associated with safe transportation of children.

MATERIALS AND METHODS

Methods

A prospective, cross-sectional survey study was conducted in a 42 000 annual visit Level I trauma center and ED located in Orange

County, California, between May and October of 2000. Enrolled subjects were parents of children 6 years old or younger seeking emergency care services for their child. Informed consent was obtained, and parents were enrolled only if their child was evaluated in the ED. Parents of a child found to be medically unstable or suspected to be a victim of child abuse were excluded from enrollment. The knowledge assessment tool used in the study was developed by the research team, translated by certified Spanish and Vietnamese interpreters, back translated to assure clarity and understanding, piloted, and revised for final study administration.

Trained research assistants administered the survey in English, and trained certified interpreters administered the survey when the subject's native language was Spanish or Vietnamese. In part, the information that was obtained included subject and referent child demographics, emergency care service utilization and crash injury history, the presence of a routine source of medical care, and self-report of child and parent restraint use. Finally, parent knowledge of airbag safety, age-appropriate restraint use, and knowledge of safety equipment (presence of airbag, number of airbags and seat belts) present in the vehicle the child routinely traveled in was also obtained. Although we did not record the exact number of prospective subjects that refused to be enrolled, the refusal rate was very low. The poverty level used in our analysis was that level determined by the US Census Bureau for the year 2000.

To further investigate the influence of ethnicity, language, income, and education on child occupant safety knowledge, we constructed scales of child restraint and airbag safety based on the number of correct answers to 7 and 13 questions, respectively (Table 1). The 7 child restraint questions were based on best practice of age- and weight-appropriate CSS selection, position, and placement within the vehicle.⁸ Descriptive analysis of data and analysis of variance were undertaken with SPSS 10.0 for Windows (SPSS, Chicago, IL). Before subject enrollment, the study protocol was reviewed and approved by our Human Subjects Research Institutional Review Board. Enrolled subjects were compensated for their participation in the study.

RESULTS

Six hundred fifty-five parents were enrolled, of which 60% were Hispanic, 25% were non-Hispanic white, 6% were Asian, 3% were black or African American, 1% were Native Hawaiian or other Pacific Islander, 1% were American Indian or Alaskan Native, and 4% classified themselves as other. The majority of parents (97%) reported a regular source of pediatric medical care, and a substantial number (57%) reported that their child had previously visited an ED. Ninety-seven percent of parents of children 0 to 3 years old, but only 42% of the parents of children 4 to 6 years old, reported that they owned a CSS or booster seat for their child ($P < .001$). The majority (84%) of the surveys were conducted in English, and most (42%) household incomes were in the 1- to 2-times poverty level category. Table 2 further describes selected characteristics of our study population.

The majority of parents (90%) correctly identified that an appropriately restrained child weighing <20 lb and <1 year of age should ride rear-facing. They also noted that the proper restraint for a child 20 to 40 lb is an infant/child car seat (78%) and that the rear middle seat is the safest place for a child 0 to 12 years to travel in a car (47%). Fifty-nine percent of parents knew that the state law (California) required CSS use for children up to 4 years and weighing up to 40 lb, yet less than half (46%) knew that a child weighing 40 to 60 lb should travel in a booster seat.

TABLE 1. Knowledge Scale Questions ($n = 655$)

	Percent Correct
CSS-related questions (multiple choice)—7 items	
For a child weighing <20 lb and <1 year of age, how should the child ride in the car?	96
For a child weighing <20 lb and <1 year of age, the infant car seat should face which direction when placed in a car?	90
For a child weighing between 20 to 40 lb and older than 1 year of age, how should the child ride in the car?	78
For a child weighing between 40 to 60 lb, how should the child ride in the car?	46
The safest place for a child between the ages of 0 and 12 years old to ride in a car is:	47
Infants properly restrained in an infant car seat should not be turned from a rear-facing position to a forward facing position until the infant . . .	60
California law states that children should be restrained in a child car seat until . . .	58
Airbag safety-related questions (multiple choice)—13 items	
If the car has "SRS" imprinted on the dashboard, what does this mean?	44
How can you tell if a car is equipped with an airbag on the front driver's side?	
The steering wheel has the word "SRS" or "Air Bag" printed on it.	72
The owner's manual includes a section on airbags.	74
An "Air Bag" sticker or decal is present on the driver side sun visor.	71
How can you tell if a car is equipped with an airbag on the front passenger side?	
The dashboard has the word "SRS" or "Air Bag" printed on it.	74
The owner's manual includes a section on airbags.	74
An "Air Bag" sticker or decal is present on the passenger side sun visor.	70
Please tell me whether you agree or disagree with the following statement:	
"If my car has a driver side airbag, I don't need to wear my seat belt when driving."	96
Please tell me whether you agree or disagree with the following statement:	
"If my car has a passenger side airbag, I don't need to wear my seat belt when riding in the front seat."	96
Which one group of children should NEVER be placed in front of an airbag in a car?	81
If you owned a new model (2000) pick-up truck with no rear seats and wanted to carry an infant in the front passenger side of the truck, what should you do to protect the child from an airbag related injury once the child is properly restrained?	24
On a trip to the store, a 5-year-old child must ride in the front seat of a 5-passenger car with a passenger side airbag. After properly restraining the child, what precautions could you take to reduce the possibility of the child being injured by an airbag?	43
Would you say that airbags in new model cars and trucks (1999 and 2000 Models) are: less powerful than 5 years ago, the same as 5 years ago, more powerful than 5 years ago, don't know.	14

TABLE 2. Study Population Characteristics (*n* = 655)

	Percent
Race/ethnicity	
Hispanic	60
Non-Hispanic white	25
Asian	6
Black or African American	3
Native Hawaiian or other Pacific Islander	1
American Indian or Alaskan Native	1
Other	4
Language survey conducted in	
English	84
Spanish	16
Vietnamese	0.3
Household income	
<Poverty level	27
1–2 × poverty level	42
>2 × poverty level	28
Missing	3
Years of school completed	
0–11 y	37
12 y	25
13–15 y	23
16 y and greater	11
Not reported	4
Routine source of medical care for child	
Yes	97
No	3
Child with previous ED visit since birth	
Yes	57
No	43

Eighty-one percent identified that infants in rear-facing CSSs should never be placed in front of an airbag (Table 1).

The mean knowledge scale scores were 4.7 of 7 for the CSS questions and 8.3 of 13 for the airbag questions. In an attempt to further elucidate the contribution of ethnicity, language, income, and education on child restraint knowledge, analysis of variance was conducted (Table 3). Parents were noted to have progressively lower knowledge on both the CSS and airbag knowledge scales if they were less fluent in

English, had lower income, or had fewer years of education. Those most fluent in English answered twice as many airbag knowledge questions correctly as those least fluent. Hispanic parents were found to have lower scores on both scales. When these characteristics were included in an analysis of variance, fluency in English had the strongest association with both scores. In addition, ethnicity was associated with both scores, and low income was associated with low airbag knowledge when controlling for other variables. The number of years of education was not associated with either knowledge scale when the other variables were included.

DISCUSSION

In 1999, visits to EDs were estimated at nearly 103 million (37.8 per 100 people) with injury-related visits totaling nearly 38 million (13.8 per 100 people).⁹ Motor vehicle crash-related injuries in children continue to account for a substantial proportion of these visits and raising awareness of child occupant safety issues is vital to reducing injury risk. To date, little has been written about the need for parent education for child occupant safety in the ED. Our study results point to the need to utilize the ED visit as an opportunity to inform and reinforce child passenger safety messages.

Our study population was found to be predominantly Hispanic with a low annual household income and few years of formal education. The results of our study reveal a gap in child occupant protection knowledge of parents who utilize emergency care services. Only 81% of our subjects agreed that infants in rear-facing CSSs should never be placed in front of an airbag. A 1998 national survey report by the National Highway Traffic Safety Administration (NHTSA) found that 92% of individuals surveyed believed it was unsafe to position a rear-facing CSS in the front seat of an air bag-equipped car.¹⁰ The

TABLE 3. Knowledge and Demographic Variables

Variable	Value	<i>n</i>	Child Restraint Knowledge (7 Items)			Airbag Knowledge (13 Items)		
			Mean Score	<i>P</i> (1-Way ANOVA)	<i>P</i> (4-Way ANOVA)	Mean Score	<i>P</i> (1-Way ANOVA)	<i>P</i> (4-Way ANOVA)
Overall mean			(4.7)			(8.3)		
How well do you speak English?	Very well	437	5.1	<.001	<.001	9.3	<.001	<.001
	Well	101	4.4			7.6		
	Not so well	41	4.3			6.7		
	Poorly	76	3.7			4.6		
Income	<Poverty level	180	4.4	<.001	.08	6.9	<.001	<.001
	1–2 × poverty level	272	4.6			8.4		
	>2 × poverty level	184	5.3			9.6		
	Missing	19						
Ethnicity	Hispanic	390	4.4	<.001	.01	7.5	<.001	.03
	Non-Hispanic White	166	5.4			9.7		
	Other or missing	99						
Years of school	1–11	240	4.4	<.001	.53	7.0	<.001	0.39
	12	165	4.7			8.8		
	13–15	148	5.1			9.2		
	≥16	72	5.3			9.5		
	Missing	30						

ANOVA indicates analysis of variance. Cases with any other or missing values excluded from ANOVA. Multiple ANOVA used 515 cases (140 were excluded).

NHTSA has been warning consumers of injury risk to small children with regard to airbags since December 1991.¹¹

Appropriate restraint selection for a 40- to 60-lb child was another area of concern. Only 46% of parents were able to identify the booster seat as the appropriate restraint to be used. A commonly cited reason for a child of this weight range not to ride in a booster is the parent's perception that the child is large enough to travel safely restrained by the vehicle seat belt alone.¹² Several studies point to the dangers and risks of severe crash-related injury to small children as a result of inappropriate child restraint selection and premature use of vehicle seat belts.¹³⁻¹⁶

Almost all children weighing 40 to 60 lb would be included in booster seat guidelines that have been published since we designed our questionnaire.^{17,18} Current NHTSA guidelines recommend boosters for children weighing 40 to 80 lb and up to 57 in in height.¹⁷ More than 97% of children have a body mass index >13, the value for a child who weighs 60 lb and is 57 in in height.¹⁹

Finally, 59% of our subjects did not know California State law requirements for CSSs. At the time that our survey was administered, the child passenger safety law required that all children under 40 lb and <4 years of age use a CSS. The lack of familiarity with the California State law found in our study further points to the need for continued child occupant safety education.

Because our study population was found to be predominately Hispanic, we chose to further assess the degree to which key variables (ethnicity, fluency of English, income, and years of education) might influence CSS and airbag knowledge scale scores. When these variables were independently analyzed, they were found to have significant association with both CSS and airbag knowledge scale scores. Analysis of the variables in combination with each other revealed that fluency of English had the greatest association on both knowledge scores, with Hispanic ethnicity also having a significant yet lesser degree of association.

In addition, when other key variables were controlled for, lower income was found to be significantly associated with lower airbag knowledge. We believe that this finding represents a lack of familiarity with airbags by parents who might not have the money required to purchase and drive airbag-equipped vehicles. This finding should prompt heightened concern for lower income families who may buy and drive older airbag-equipped vehicles in the future.

Limitations

Our study was developed to assess the level of child passenger safety knowledge of parents. Although the results show that a gap in knowledge exists in our subjects, it does not speak to actual observed practice that may be less than the self-report survey findings. In addition, the self-report nature of the study makes it difficult to relate the level of knowledge to the extent of "best" practice used by

parents. Because our study population is heterogeneous and in some respects unique as a result of our geographic location, generalizability of our findings are a challenge.

CONCLUSION

The results of our study point to the need for additional education for child occupant protection in parents who utilize emergency care services for their children. Although 97% of our subjects had a routine source of care for their child, over half had previously visited an ED. Given the frequency of visits to EDs, this setting is another viable opportunity to reach a high-risk population, reinforce safety messages, and inform parents of "best" child occupant protection practice. ED populations are a diverse group with special communication needs, and Spanish media and materials that are culturally appropriate for Hispanics are essential to reaching this population. Finally, the noted association between low household income and low airbag safety knowledge should yield concern for those families with fewer resources buying older airbag-equipped vehicles. Strategies for routinely disseminating airbag safety information to buyers of older airbag-equipped vehicles should be explored.

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