

Evaluation of knowledge of parents about safety in transportation of children in vehicles and motorcycles

Avaliação do conhecimento dos pais sobre segurança no transporte de crianças em veículos automotores e motocicletas

Evaluación del conocimiento de los padres sobre seguridad en el transporte de niños en vehículos automotores y motocicletas

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ABSTRACT

Objective: To evaluate parents' knowledge on safe transport of children in motor vehicles and motorcycles.

Methods: Cross-sectional study that applied a questionnaire to parents and guardians who were accompanying children in the waiting room for outpatient public and private services. To evaluate knowledge on safe transport of children, the recommendations of the Brazilian Association on Traffic Medicine were used. Data analysis was performed using the chi-square and Mann-Whitney tests for categorical and numerical variables respectively, being significant $p < 0.05$.

Results: The sample consisted of 248 parents, 119 from private and 129 public medical services. Among the issues related to motorcycles, 76% of those who usually carry children in this vehicle answered correctly the minimum age allowed for that, however more than 30% of them did not know the safest position to carry children on motorcycles. Considering the automobile transport, the question with the highest percentage of correct answers was about the minimum age to use the front seat, with 64% of correct answers. In other issues, the percentage of correct answers ranged from 24 to 46%.

Conclusions: Knowledge of the studied population about safe transport of children in motor vehicles is poor, especially regarding the use of the restraint system, the prerequisites for front seat use, as well the age and the correct form of transporting children on motorcycles.

Key-words: motor vehicles; child; safety.

RESUMO

Objetivo: Avaliar o nível de conhecimento dos pais sobre segurança no transporte de crianças em veículos automotores e motocicletas.

Métodos: Estudo transversal, realizado por meio de questionário autoaplicável em pais e responsáveis que acompanhavam crianças na sala de espera de ambulatórios público e privado. Para avaliar os conhecimentos sobre segurança no transporte de crianças, foram utilizadas as recomendações da Associação Brasileira de Medicina do Tráfego. A análise dos dados foi realizada por meio do teste do qui-quadrado e as variáveis quantitativas testadas por Mann-Whitney, sendo significante $p < 0,05$.

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Resultados: A amostra foi composta por 248 pais, sendo 119 da rede privada e 129 da rede pública. Dentre as questões relacionadas com motocicletas, 76% daqueles que costumam transportar crianças nesse veículo acertaram a idade mínima permitida, todavia mais de 30% não acertaram a posição segura para tal. Quanto ao transporte em automóveis, a questão com maior percentual de respostas corretas foi referente à idade mínima para utilizar o banco da frente, com 64% de acertos. Nas demais questões, estes variaram de 24 a 46%.

Conclusões: O conhecimento da população estudada sobre a segurança no transporte de crianças em veículos automotores é deficiente, tanto no emprego de dispositivos de retenção, pré-requisitos para o uso do banco da frente, bem como idade e forma de transporte de crianças em motocicletas.

Palavras-chave: veículos automotores; criança; segurança.

RESUMEN

Objetivo: Evaluar el nivel de conocimiento de los padres sobre seguridad en el transporte de niños en vehículos automotores y motocicletas.

Métodos: Estudio con delineación transversal, realizado mediante cuestionario autoaplicable en padres y responsables que acompañaban a niños en la sala de espera de ambulatorio público y privado. Para evaluar los conocimientos sobre seguridad en el transporte de niños, se utilizaron las recomendaciones de la Asociación Brasileña de Medicina del Tráfico. El análisis de los datos fue realizado mediante la prueba de chi cuadrado y las variables cuantitativas probadas por el test Mann-Whitney, siendo significativa $p < 0,05$.

Resultados: La muestra fue compuesta por 248 padres, siendo 119 de la red privada y 129 de la red pública. Entre las cuestiones relacionadas con motocicletas, el 76% de aquellos que suelen transportar niños en este vehículo acertaron la edad mínima permitida; sin embargo, más del 30% no acertaron la posición más segura para el transporte. Respecto al transporte en coches, la cuestión con mayor porcentual de respuestas correctas se refería a la edad mínima para utilizar el banco delantero, con el 64% de aciertos. En las cuestiones restantes, variaron de 24 a 46%.

Conclusiones: El conocimiento de la población estudiada sobre la seguridad en el transporte de niños en vehículos automotores es deficiente, tanto en el empleo de dispositivos de retención, prerrequisitos para el uso del banco delantero, así como edad y forma de transporte de niños en motocicletas.

Palabras clave: vehículos automotores; niño; seguridad.

Introduction

One million children up to 14 years old die every year due to traffic injuries all over the world, and over 90% of these deaths occur in developing countries⁽¹⁾. In Brazil, in 2007, external causes accounted for 12% of the total number of deaths in the general population and for about 20,000 deaths of 0-19 year old individuals (24%), and were the main cause of death for children 1-14 years old⁽²⁾. In the 5-14 years group, injuries in traffic accidents are the first cause of death due to a defined cause in most countries of the American continent⁽³⁾.

Traffic accidents do not happen by chance, but, are rather, results of road or vehicle deficiencies and, mainly, of human failure. The progressive increase in the number of circulating motor vehicles, the growth of the population, the lack of a popular safety culture, impunity and the lack of effective legislation are additional associated factors⁽⁴⁾. In developed countries, the reduction of traffic deaths has been substantial in the last 30 years, probably due to changes in automotive designs, road improvements, awareness about the use of safety belts, reduction of driving under the influence of substances, educational campaigns and enforcement of the laws that require the use of safety devices in vehicles^(5,6).

Child seats (child restraints) are very effective and, when used correctly, provide adequate protection. They are one of the most important preventive measures to reduce deaths and injuries due to traffic lesions among children⁽⁷⁾. Although legislation requires the use of these seats in Brazil, they are not used all the time, or are used incorrectly. Only 6 to 9% of children 4 to 8 years old use a booster seat when transported in motor vehicles, and for all the others, only the vehicle's seat belt is used⁽⁸⁾.






Chart 1 shows the types of child seats recommended for each age and weight, as well as the recommendations of the Brazilian Association of Traffic Medicine (Abramet) for the correct use of these restraints⁽⁷⁾. Abramet recommendations are in agreement with those established by the American Academy of Pediatrics⁽⁹⁾.

The purpose of this study was to evaluate parental knowledge about safety in the transportation of children in motor vehicles and the differences between those that use private and public child healthcare services, as well as the effect of schooling, income and age of parents or guardians.

Method

This cross-sectional study enrolled a convenience sample of parents and guardians of children in public and private

Chart 1 - Restraints for children according to age and weight and recommendation made by Abramet (adapted from Abramet guidelines)⁽⁷⁾

Type of restraint	Weight (kg)	Age (years)	Recommendations and characteristics	
Infant safety seat	9	<1	Rear facing, in the center position of the rear seat whenever possible	
Convertible seat	13	<1	Infants that weigh more than 9 kg but are younger than 1 year Infant should be transported rear-facing until reaching the maximum weight for this seat	
Child safety seat	9-18	1-4	Front facing, vertically positioned in the central rear seat	
Booster seat	18-36	4-10	The seat is too small, but the child is not tall enough for the car seat belt. Adjusted to the rear seat, the safety belt can be used in the correct position. A lap and shoulder belt should be used.	
Vehicle's safety belt	>36	10 (1,45m)	The shoulder strap should be over the child's shoulder and down across the child's chest, and the lap strap should be placed over the hip bones or upper thighs.	

outpatient pediatric clinics in Tubarão, a city in southern Santa Catarina state, Brazil. All individuals able to read and write were included if they accepted to participate in the study voluntarily, signed an informed consent term, and answered at least 75% of the questions about how to transport children in motor vehicles. The sample comprised 119 parents and guardians enrolled in the private clinic and 129 in the public clinic.

Data were collected in the waiting room of a medical school outpatient clinic and a private pediatric office that provides healthcare to private and insured patients. Respondents had brought their children for medical visits. The volunteers filled out a self-administered questionnaire with multiple choice questions about demographic data and knowledge about restraints used in motor vehicles for children of different ages and questions about motorcycle safety. The questionnaire was prepared according to the recommendations made by the Brazilian Association of Traffic Medicine (Abramet)⁽⁷⁾.

Data were collected and analyzed using the Statistical Package for Social Science (SPSS) 16.0. Bivariate analysis used the Pearson chi-square test or the Fisher exact test (when appropriate) to compare qualitative variables, and the Kolmogorov-Smirnov test was used to test the normal distribution of quantitative variables. The Mann-Whitney test was used for non-Gaussian distributions, and the level of significance was set at 95%. When more than one independent variable was significant, variables were dichotomized and multivariate logistic regression was used for analysis.

This study was conducted with adults that accepted to participate voluntarily, signed an informed consent term, and were not submitted to any physical contact or procedure that exposed them to any substantial risk. This study was approved by the Ethics in Research Committee of the institution where it was conducted. The authors did not receive any financial support from companies associated with the production or sales of restraints for children in motor vehicles.

Results

This study enrolled 248 parents and guardians that brought their children to medical visits; most of the respondents were mothers. The comparison between users of the private and the public clinic revealed that the first had higher incomes and more years of schooling ($p < 0.05$). Table 1 shows other demographic data.

The question about whether they had a motor vehicle was answered affirmatively by 221 (89.1%) respondents: 85.5% ($n = 212$) had only a motor vehicle, 6% ($n = 15$), only a motorcycle, and 24.2% ($n = 60$), both. Respondents in the public medical service used motorcycles more frequently ($p = 0.01$).

Of the questions about transportation in cars, the highest percentage (64%, $n = 159$) of correct answers was for minimum age for a child to sit in the front passenger seat. Most incorrect answers were given to the question about transportation of children 4 to 10 years old: most respondents said that there was no need of any restraint besides the vehicle's own seat belt in the outboard position behind the front passenger seat. The analysis of agreement between knowledge and daily practice revealed that 47% ($n = 117$) always transported children according to the answer given, but only 2.5% ($n = 3$) gave correct answers to the 4 questions about restraints for children in cars, which is evidence of incorrect transportation.

The number of respondents that had up to three correct answers was greater in the private office group than in the public outpatient clinic group (Table 2). Mean number of correct answers was not associated with schooling, but was significantly higher in the private office group ($p = 0.04$). Table 3 shows the answers to

Table 1 - Demographic characteristics of the sample

	Private healthcare service (n=119)	Public healthcare service (n=129)	p
Respondent			
Father	15.1% (18)	20.9% (27)	
Mother	77.3% (92)	65.1% (84)	
Other	7.6% (9)	14.0% (18)	0.62
Mean age (years)	35	32	0.69
Mean number of children	2	2	0.91
Mean income (reals)	2.714	1.475	0.03
Schooling years			
0 to 4 years	1.7% (3)	7.9% (11)	
5 to 8 years	5.1% (2)	19.8% (26)	
9 to 11 years	29.9% (37)	47.6% (61)	
Incomplete college	19.7% (24)	7.1% (9)	
College degree	32.5% (39)	12.7% (16)	
Graduate degree	11.1% (14)	4.8% (6)	0.02

Table 2 - Percentage of correct answers according to type of healthcare service used

	Public healthcare service	Private healthcare service
No correct answers (n=21)	81.8	18.2
One correct answer (n=77)	53.8	46.2
Two correct answers (n=77)	43.8	56.2
Three correct answers (n=53)	49.1	50.9
Four correct answers (n=9)	77.8	22.2
Five correct answers (n=6)	16.7	83.3

Table 3 - Answers to questions about transportation of children in motor vehicles according to type of healthcare service used

		Private healthcare service	Public healthcare service	p
What is the minimum age to sit in front passenger seat?	Since birth	0	2.3% (3)	0.01
	3 years	0	3.1% (4)	
	7 years	5.9% (7)	17.2% (25)	
	10 years	74.6% (89)	55.5% (71)	
	14 years	19.5% (23)	21.9% (28)	
Transportation <1 year, up to 9kg	Right	54.6% (65)	38% (49)	0.01
	Wrong	45.4% (54)	62% (80)	
Transportation <1 year, 9 to 13kg	Right	25.2% (30)	29.5% (39)	0.45
	Wrong	74.8% (89)	70.5% (90)	
Transportation 1 to 4 years	Right	26.1% (31)	24% (31)	0.71
	Wrong	73.9% (88)	76% (98)	
Transportation 4 to 10 years	Right	21.8% (26)	26.4% (34)	0.41
	Wrong	78.2% (93)	73.6% (95)	

* Fisher exact test

Table 4 - Answers to questions about transportation of children in motor vehicles according to type of healthcare service used

		Public healthcare service	Private healthcare service	p
Wears helmet?	No	0	1.6% (2)	0.18
	Yes	100% (119)	98.4% (117)	
What is the safest position to transport a child in a motorcycle?	In front of driver	1.7% (2)	1.6% (2)	0.85
	Between 2 adults	25.9% (31)	28.9% (37)	
	Behind the driver	66.4% (79)	65.6% (85)	
	No position	6.0% (7)	3.9% (7)	
Minimum age to transport child in motorcycle	Don't know	6.7% (8)	0.8% (1)	0.01
	Younger than 7 years	7.6% (9)	13.2% (17)	
	7 years or older	69.7% (83)	78.3% (101)	
	Never	16% (19)	7.8% (10)	

the questions about transportation of children in motor vehicles. Users of the private service had more correct answers about transporting children in the front passenger seat and transporting children that weigh less than 9kg. Higher income and schooling were also associated with more correct answers about the transportation of infants (younger than 1 year).

The variables “income”, “years of schooling” and “type of healthcare”, for which there was more than one significant independent variable, were dichotomized and analyzed using multivariate logistic regression. Significance was confirmed for the association between higher schooling and greater number of correct answers about the transportation of infants weighing up to 9kg ($p=0.02$) and between private healthcare service and more correct answers about the minimum age for children to sit in the front passenger seat ($p=0.028$).

Parents in the private office had more correct answers about the minimum age for the transportation of children in motorcycles than parents in the public outpatient clinic (Table 4).

Discussion

According to Chapter IV, paragraph 64 of the Brazilian Traffic Code, children younger than 10 years should be transported in the rear seat of vehicles, except when different provision are made in the same Code. They should also use a seat belt or equivalent restraint, according to Resolution 15, paragraph 1 of the Brazilian National Traffic Council. The transportation of children in motor vehicles without compliance with the special safety norms established in the Brazilian Traffic Code is a very serious traffic violation punished with a fine and administrative measures, such as

vehicle detention until the child is removed from the front seat, as provided for in Section 168 of Chapter XV. Moreover, Section 244 of Chapter XV of the same Code defines that the transportation of children younger than 7 years in motorcycles is also a serious traffic violation, and the penalty is a fine and driving license suspension, as well as license arrest as an administrative measure⁽¹⁰⁾. Parents and guardians, in addition to control officers, have to know what seat in the vehicle should be used to transport children and the safest and most adequate way to fit vehicles with child seats and safety belts to meet legal requirements and achieve their objective, the protection of the child's health and well-being.

Children transported in the rear seat have a lower risk of death or serious injury. Such measure reduces absolute injury and death risk among children 1 and 4 years old in 42 and 12%⁽¹¹⁾. Safety is even greater when the child is transported in the center position of the rear seat, with a 24% lower risk of death in case of accidents when compared with transportation on the outboard seats⁽¹²⁾. Children younger than 2 years have a 75% lower risk of death or serious injury when transported facing the rear of the vehicle⁽¹³⁾.

This study found an important lack of knowledge among parents about transportation of children in motor vehicles. External causes are the main reason of death among children 1 to 14 years⁽¹⁾. Among these causes, traffic accidents are the main determinant of death in the 5 to 14 age group⁽³⁾. Therefore, lack of knowledge is even more alarming because of the possible preventive measures that should be taken, but are not. Studies about it in the Brazilian literature are scarce considering the relevance of this topic⁽¹⁴⁾.

Several studies that included vehicles involved in crashes found that the correct use of restraints, as well as

the transportation of children in the rear seat, significantly reduces the risk of death and injuries due to accidents^(5,15,25). As a result of inadequate transportation, children may have major trauma in crashes. There are potentially greater chances of multiple organ injury and a greater incidence of closed trauma, as well as greater potential risk of ejection from the vehicle, which makes head trauma the main cause of death in these cases^(14,26). There is also evidence that, to reduce morbidity and mortality in traffic accidents, all passengers should be using restraints correctly⁽²⁵⁾.

The transportation of children in motorcycles is a source of great concern, because over 30% of those that usually transport them in this type of vehicle do it incorrectly. No studies were found in the literature about information provided to the general population about the transportation of children in motorcycles, except quotes from the Brazilian Traffic Code that define the minimum age for transportation in motorcycles, which is 7 years.

The prevalence of correct answers about transportation of infants younger than 1 year shows that only 27% of the respondents knew the correct way to transport them. This lack of knowledge is greater among the population with fewer schooling years, and the variables income and type of healthcare service seem to be confounding factors after multivariate analysis. The increase of risks due to inadequate transportation in this age group is confirmed in international studies⁽¹⁵⁾, which also confirm the significant increase of use of adequate safety restraints after educational campaigns aimed at the general population⁽¹¹⁾. This might explain why higher levels of schooling and knowledge were associated with more correct answers in this question, and suggests that, as parents and guardians are educated, numerous deaths and serious injuries due to external causes may be prevented.

The question with the highest percentage of correct answers was about the minimum age to transport children in the front passenger seat, and the users of private healthcare services had more correct answers in this item. There might be greater influence of traffic laws on the answers to this item,

and the general population might control it more closely⁽⁶⁾. Schooling was not associated with correct answers in this question, but studies in the literature show that educational campaigns reduce the transportation of younger children in the front passenger seat⁽²⁷⁾.

The analysis of the association of other variables with transportation of children in motor vehicles revealed a low percentage of correct answers, which indicates that, regardless of type of healthcare service, schooling or income, there is an important lack of knowledge and, consequently, inadequate practices in the transportation of children 1 to 10 years. An American study found that the main barriers to booster seat use were: lack of knowledge about its protective role, lack of laws that require its use, low availability, extra passenger in the vehicle, difficulty to install and to use the seat, which suggests that educational campaigns, improvements in legislation, parental education and extension of the use of the booster seats to more advanced ages increase the frequency of its use⁽²⁸⁾.

Another important finding was that only 47% of the respondents always transport children in accordance to the answer given, and only 2.5% had correct answers for the four questions about restraints used for children in motor vehicles. In developed countries, studies confirmed the importance of educational strategies to minimize risks^(6,8,11,27). Therefore, traffic education should begin in infancy, in the family, so that, based on the example of people with whom the child lives, the percentage of individuals that transport children in vehicles adequately increases^(5,11). Despite these conclusions, our findings are not easily generalized because our study did not calculate sample size, the sample of motorcyclists was small, and there are few Brazilian studies about the same topic for comparison of results.

The knowledge of the study population about safety in the transportation of children in motor vehicles is deficient, both about the use of restraints and the requisites to sit in the front passenger seat, as well as about the age and form of transportation of children in motorcycles.

References

1. Denatran [homepage on the Internet]. Criança Segura Brasil - Dados sobre acidentes [cited 2009 Aug 15]. Available from: http://www.denatran.gov.br/eventos/seminarios/cinto_cadeirinha/arquivos/Apresentacao%20CRIAN%C3%87A%20SEGURAnoCarroSemin%C3%A1rioDenatran.pdf
2. Datasus [homepage on the Internet]. Informações de Saúde. Mortalidade – Brasil [cited 2009 Aug 15]. Available from: <http://www2.datasus.gov.br/DATASUS/index.php?area=02>
3. [No authors listed]. Deaths from motor vehicle traffic accidents in selected countries of the Americas, 1985-2001. *Epidemiol Bull* 2004;25:2-5.
4. Barros AJ, Amaral RL, Oliveira MS, Lima SC, Gonçalves EV. Traffic accidents resulting in injuries: underreporting, characteristics, and case fatality rate. *Cad Saude Publica* 2003;19:979-86.
5. Waksman RD, Piritto RM. The pediatrician and traffic safety. *J Pediatr (Rio J)* 2005;81 (Suppl 5):S181-8.

6. Segui-Gomez M, Glass R, Graham J. Where children sit in motor vehicles: a comparison of selected European and American cities. *Inj Prev* 1998;4:98-102.
7. Abramet [homepage on the Internet]. Diretrizes. Segurança no Transporte Veicular de Crianças [cited 2009 Aug 15]. Available from: http://www.abramet.org.br/Site/Pagina.aspx?ID=373&MenuID=50&lang=pt_BR
8. Ebel BE, Koepsell TD, Bennett EE, Rivara FP. Use of child booster seats in motor vehicles following a community campaign: a controlled trial. *JAMA* 2003;289:879-84.
9. Committee on Injury and Poison Prevention; American Academy of Pediatrics. Selecting and using the most appropriate car safety seats for growing children: guidelines for counseling parents. *Pediatrics* 2002;109:550-3.
10. Brasil - Departamento Nacional de Trânsito. Código de Trânsito Brasileiro: instituído pela Lei nº 9.503, de 23-9-97. Brasília, DF: Denatran; 2002.
11. Winston FK, Chen IG, Elliot MR, Arbogast KB, Durbin DR. Recent trends in child restraint practices in the United States. *Pediatrics* 2004;113:e458-64.
12. Evans L, Frick MC. Seating position in cars and fatality risk. *Am J Public Health* 1988;78:1456-8.
13. Bull MJ, Durbin DR. Rear-facing car safety seats: getting the message right. *Pediatrics* 2008;121:619-20.
14. Blank D, Liberal EF. Pediatricians and the external causes of morbidity and mortality. *J Pediatr (Rio J)* 2005;81 (Suppl 5):S119-22.
15. Rice TM, Anderson CL. The effectiveness of child restraint systems for children aged 3 years or younger during motor vehicle collisions: 1996 to 2005. *Am J Public Health* 2009;99:252-7.
16. Braver ER, Whitfield R, Ferguson SA. Seating positions and children's risk of dying in motor vehicle crashes. *Inj Prev* 1998;4:181-7.
17. Durbin DR, Elliott MR, Winston FK. Belt-positioning booster seats and reduction in risk of injury among children in vehicle crashes. *JAMA* 2003;289:2835-40.
18. Cummins JS, Koval KJ, Cantu RV, Spratt KF. Risk of injury associated with the use of seat belts and air bags in motor vehicle crashes. *Bull NYU Hosp Jt Dis* 2008;66:290-6.
19. Petridou E, Skalkidou A, Lescohier I, Trichopoulos D. Car restraints and seating position for prevention of motor vehicle injuries in Greece. *Arch Dis Child* 1998;78:335-9.
20. Johnston C, Rivara FP, Soderberg R. Children in car crashes: analysis of data for injury and use of restraints. *Pediatrics* 1994;93:960-5.
21. Winston FK, Durbin DR, Kallan MJ, Moll EK. The danger of premature graduation to seat belts for young children. *Pediatrics* 2000;105:1179-83.
22. Caviness AC, Jones JL, Deguzman MA, Shook JE. Pediatric restraint use is associated with reduced transports by emergency medical services providers after motor vehicle crashes. *Prehosp Emerg Care* 2003;7:448-52.
23. Arbogast KB, Durbin DR, Cornejo RA, Kallan MJ, Winston FK. An evaluation of the effectiveness of forward facing child restraint systems. *Accid Anal Prev* 2004;36:585-9.
24. Sherwood CP, Ferguson SA, Crandall JR. Factors leading to crash fatalities to children in child restraints. *Annu Proc Assoc Adv Automot Med* 2003;47:343-59.
25. Cummings P, Rivara FP. Car occupant death according to the restraint use of other occupants: a matched cohort study. *JAMA* 2004;291:343-9.
26. Scheidler MG, Shultz BL, Schall LM, Ford HR. Risk factors and predictors of mortality in children after ejection from motor vehicle crashes. *J Trauma* 2000;49:864-8.
27. Greenberg-Seth J, Hemenway D, Gallagher SS, Ross JB, Lissy KS. Evaluation of a community-based intervention to promote rear seating for children. *Am J Public Health* 2004;94:1009-13.
28. Simpson EM, Moll EK, Kassam-Adams N, Miller GJ, Winston FK. Barriers to booster seat use and strategies to increase their use. *Pediatrics* 2002;110:729-36.