

Dissemination of a Child Passenger Safety Program Through Trauma Center–Community Partnerships

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ABSTRACT

Improper child passenger restraint use contributes to higher pediatric motor vehicle collision morbidity and mortality among cultural minority populations. Child passenger safety education improves caregiver knowledge of restraint use, but effective interventions require culturally specific programming. The purpose of this study was to evaluate the effectiveness of a child passenger safety education program culturally adapted through a pediatric trauma center's community partnerships. A nonexperimental observational cohort study using program evaluation data for the child passenger safety education programs during a 24-month period. Paired pretest/posttest self-reported survey responses measured changes in caregiver knowledge and self-efficacy of restraint use. Data were analyzed by class location and by caregiver language using a paired *t* test and Wilcoxon's signed ranks test. A total of 1,795 paired survey

responses were collected in English, Spanish, or Russian. An increase in mean knowledge scores occurred overall, with a difference in mean of 0.565 (SE = 0.022, 95% CI [0.521, 0.607]). Stratification by class site and by language reflected significant increases in median scores, but findings were variable by study group. Pretest median scores for self-efficacy of restraint use were high for all groups, but the increases in posttest medians were also significant across groups ($p \leq .001$). Caregiver knowledge and self-efficacy for child passenger restraint use increased after participation in the community classes. The pediatric trauma center's community partnerships facilitated uptake and adaption of the child passenger safety education programs and increased the injury prevention outreach to minority communities.

Key Words

Child passenger safety, Community partnerships, Pediatric injury prevention

Child passenger safety restraints reduce fatalities and severity of injury for children in motor vehicle collisions (MVCs; Ma, Layde, & Zhu, 2012). Nevertheless, improper restraint use continues to be a contributing factor in pediatric MVC morbidity and mortality (Centers for Disease Control and Prevention, 2006; Lee, Shults, Greenspan, Haileyesus, & Dellinger, 2008), particularly among ethnic and racial minorities (Lee, Yaghoubian, Stark, Munoz, & Kaji, 2012; Macy & Freed, 2012). Individual and classroom-based injury prevention education improves caregiver knowledge of child passenger safety (Muller et al., 2014; Snowdon, Hussein, Purc-Stevenson, Follo, & Ahmed, 2009; Turner, McClure, Nixon, & Spinks, 2005), but effective education for minority groups requires

culturally specific programming adapted to the needs of individual communities (Falcone, Brentley, Ricketts, Allen, & Garcia, 2006; Johnston et al., 2009; Martin, Holden, Chen, & Quinlan, 2006). Child passenger safety education is the primary injury prevention initiative for the majority of pediatric trauma centers (Biddinger, Hanson, & Seaver Hill, 2011). Implementing culturally specific programs with a broad reach into the community often requires more resources than are available to hospital injury prevention staff. The trauma prevention and outreach program at a Level I pediatric trauma center partnered with local Family Resource Centers (FRCs) to improve access to child passenger safety education in underserved communities.

PURPOSE

The purpose of this study was to evaluate the effectiveness of culturally specific child passenger safety programs, adapted through the trauma center–community partnerships, in increasing caregiver knowledge and self-efficacy for child passenger restraint use. We hypothesized that knowledge and self-efficacy would increase among caregivers attending child passenger safety programs culturally adapted by community partners.

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METHODS

This is a nonexperimental observational cohort study analyzing evaluation data for child passenger safety education programs at six FRCs and one Level I pediatric trauma center during a 24-month period from January 1, 2013, to December 31, 2014. Paired pretest/posttest responses measured changes in caregiver child passenger safety knowledge and self-efficacy of child passenger restraint use. Data were analyzed first by class site and then by class language across all sites. The study was exempt from review by the academic medical center's institutional review board.

Participants

Study participants consisted of English-, Spanish-, Russian-, and Hmong-speaking caregivers attending a child passenger safety class offered by one of six FRCs participating in the study or the trauma center's injury prevention program. The FRCs recruited participants through multilingual flyers posted at the FRC sites and staff invitations during routine home visits. The six FRCs participating in the study are nonprofit organizations that offer health and wellness services to low-income, ethnically diverse families residing in their service area. Study inclusion criteria for FRC partners were: (1) a partnership established with the trauma center's injury prevention program for a minimum of 3 years; (2) a minimum of one FRC staff completing the 32-hr National Highway Traffic Safety Administration (NHTSA) Child Passenger Safety Technician training provided at no cost by hospital staff; (3) utilization and adaptation of the prevention program's child passenger safety education curriculum; and (4) adherence to guidelines for curriculum fidelity and program process reporting and evaluation.

Program Administration

Prior to program implementation, all participating FRC educators attended a 32-hr NHTSA Child Passenger Safety Technician training taught by the trauma center's injury prevention staff. The intensive nature of the weeklong training was a critical factor in establishing the partnerships and developing a strong mentor-mentee relationship between injury prevention and FRC staff. Educators received additional instruction on the trauma center's child passenger safety curriculum for caregivers. The standardized curriculum, available in English, Spanish, Hmong, and Russian, includes a 20-min video, a 30-min lesson plan, instructions for hands-on demonstration, and a six-item pretest and posttest questionnaire. The FRC educators were given autonomy to adapt program delivery for cultural relevance to caregivers in their service community. Injury prevention staff observed initial classes to ensure FRC educators maintained fidelity to the curriculum. Each FRC offered monthly classes of 90- to 120-min duration at its site in English, with an additional class or classes in Spanish, Russian, or Hmong as needed. The degree of program ad-

aptation varied by agency, but consistent themes emerged across sites: longer class times for Spanish speakers to accommodate caregiver questions on practical applications of car seat use; shifting focus of Hmong class instructions from printed materials to interactive discussion and visual demonstration; evaluation of Hmong caregiver learning through dialogue rather than written survey; and inclusion of extended family members for Russian- and Hmong-speaking caregivers to increase uptake of safe car seat use.

Program Evaluation

All FRC sites participated in program evaluation and submitted monthly reports to the injury prevention program with the following information: (1) number and primary language of caregivers educated; (2) number and type of free car seats distributed to caregivers; and (3) pretest and posttest surveys completed by caregivers attending the classes. Prior to the start of each class, FRC educators administered the standardized six-item written pretest survey in the language in which the class was being taught. The corresponding posttest survey was administered at the end of each class after participants had an opportunity to engage in a question-and-answer session. Class participants were informed that completion of the pretest and posttest surveys was not required to receive a free car seat; FRC educators from all sites reported that no English-, Spanish-, or Russian-speaking participants refused the survey. Hmong educators reported that a majority of Hmong-speaking caregivers were unable to complete the written survey due to low native language literacy.

Data Sources

Each month, FRC sites were required to submit to the trauma center the pretest and posttest surveys completed by caregivers at the time of each class. The pretest and the correlating posttest surveys included six questions; four with multiple-choice responses measuring caregiver child passenger safety knowledge, and two with Likert scale responses measuring self-efficacy of restraint use and installation (Table 1). The survey instrument used in this study was an original survey developed by the children's hospital Trauma Prevention Program in 2007. Study questions were derived from the NHTSA Child Passenger Safety Technician curriculum and revised with each update of the survey to improve reliability and validity of results.

Statistical Analysis

Paired pretest and posttest responses were stratified into seven study groups by class location and then re-stratified into three groups by language for a secondary analysis. Single missing responses were coded as incorrect; 176 missing knowledge question pairs and 126 missing self-efficacy question pairs were excluded from the analysis. The mean number of correct responses for each

TABLE 1 Pretest and Posttest Survey Questions

Question	Response Choices
1. The safest way for a newborn baby to ride is:	A. Buckled in a car seat that is facing the front of the car B. Buckled in a car seat that is facing the back of the car C. Held snugly in the arms of a parent who is wearing their seat belt
2. The chest buckle on the car seat straps should always be buckled and placed over what part of the child?	A. Stomach at the bellybutton B. It does not need to be buckled if the straps stay on by themselves C. Upper chest, level with the underarms
3. California law now requires children to stay in a car seat or booster seat until they are:	A. 6 years old or 60 lb B. 8 years old or 4 ft 9 in. tall C. I don't know
4. When children have outgrown their regular car seat, a booster seat will keep them safer during a crash by:	A. Strapping them securely to the car B. Lifting them up so the car seat belt fits them better C. I don't know
5. "I am sure that I can buckle up my baby correctly in the car seat every time I use it"	Likert scale—Strongly agree, agree, disagree, strongly disagree
6. "I am sure that I can buckle my car seat in the car tightly and the right way without any help"	Likert scale—Strongly agree, agree, disagree, strongly disagree

knowledge question pretest/posttest pair was compared using a paired *t* test. Statistical significance was considered for *p* values less than .05. Responses for each of the two self-efficacy questions were measured with a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree); pretest/posttest changes in cohort self-efficacy medians were analyzed using a Wilcoxon signed ranks test. Data analysis was performed with IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp, Armonk, NY).

RESULTS

A total of 1,795 English, Spanish, and Russian language paired surveys were collected from the Injury Prevention Program and six FRC class locations during the 24-month

study period (Table 2). The Hmong language cohort of class participants ($n \approx 20$) was excluded from this study because of lack of available data. There was a high pretest mean score for Question 1 across study groups, with no significant increase in the mean score for the posttest responses. With the exception of FRC 6, all study groups had a significant increase in mean scores for Questions 2, 3, and 4 (Table 3). Secondary analysis comparing correct responses to knowledge questions between language groups reflected similar findings to the data stratified by study group. All language groups had a high pretest mean score for Question 1, with no significant increase in posttest mean scores and significant increases in difference in mean scores for Questions 2–4. The English-speaking

TABLE 2 Language of Paired Surveys by Site

Class Location	English, % (<i>n</i>)	Spanish, % (<i>n</i>)	Russian, % (<i>n</i>)	Total (<i>N</i>)
Hospital	75% (117)	25% (40)	n/a	157
FRC 1	48% (107)	52% (115)	n/a	222
FRC 2	48% (67)	52% (73)	n/a	140
FRC 3	61% (209)	39% (132)	n/a	341
FRC 4	60% (230)	28% (107)	12% (44)	381
FRC 5	56% (114)	39% (80)	5% (10)	204
FRC 6	54% (190)	46% (160)	n/a	350
Total	1,034	707	54	1,795

Note. FRC = Family Resource Center; n/a = not available.

group not only had the lowest posttest mean scores but also showed the largest increase in mean scores (Table 4). All study groups stratified by site and language reported high baseline levels of self-efficacy for both harness use and seat installation (Table 5). There was no pretest/posttest change in the median for Question 5 among four of the groups and for Question 6 in one group; however, the Wilcoxon signed ranks test showed significant change ($p < .001$) across all groups for both questions.

DISCUSSION

Study participants from each of the six FRC study groups demonstrated an overall increase in child passenger safety knowledge. The high scores for correct pretest responses

for the knowledge question regarding proper rear-facing positioning of infants indicate substantial baseline knowledge of this important issue. Pretest responses to additional important safety information, however, suggest notably lower baseline knowledge for harness retainer clip positioning, state law, and proper booster seat use. The increases in self-efficacy for all groups suggest that parents and caregivers were more confident about their ability to correctly secure a restraint harness and install a car seat after they had attended the class. The secondary analysis comparing pretest responses by primary language rather than class location indicated a significant difference in baseline child passenger safety knowledge between language groups. Our findings of

TABLE 3 Mean Pretest and Posttest Scores Stratified by Site

Study Group	Survey Question	Pretest Mean	Posttest Mean	Differences in Means	
				Mean	SEM [95% CI]
Hospital	1	0.97	0.99	0.013	0.013 [-0.013, 0.390]
	2	0.88	0.97	0.092	0.027 [0.039, 0.145] ^a
	3	0.53	0.96	0.434	0.041 [0.352, 0.516] ^a
	4	0.59	0.88	0.296	0.043 [0.212, 0.380] ^a
FRC 1	1	0.98	0.97	-0.005	0.015 [-0.034, 0.025]
	2	0.85	0.98	0.131	0.024 [0.083, 0.179] ^a
	3	0.64	0.92	0.275	0.034 [0.207, 0.343] ^a
	4	0.47	0.76	0.293	0.036 [0.222, 0.364] ^a
FRC 2	1	0.96	0.98	0.023	0.017 [-0.011, 0.057]
	2	0.82	0.92	0.092	0.032 [0.030, 0.155] ^a
	3	0.57	0.87	0.300	0.046 [0.209, 0.391] ^a
	4	0.55	0.75	0.208	0.053 [0.103, 0.313] ^a
FRC 3	1	0.97	0.98	0.018	0.011 [-0.004, 0.041]
	2	0.91	0.98	0.064	0.016 [0.032, 0.095] ^a
	3	0.63	0.96	0.331	0.027 [0.278, 0.384] ^a
	4	0.54	0.78	0.240	0.029 [0.183, 0.297] ^a
FRC 4	1	0.97	0.97	0.003	0.011 [-0.018, 0.024]
	2	0.92	0.96	0.038	0.016 [0.007, 0.069] ^a
	3	0.79	0.96	0.163	0.021 [0.122, 0.205] ^a
	4	0.71	0.88	0.172	0.024 [0.125, 0.219] ^a
FRC 5	1	0.97	0.98	0.005	0.012 [-0.018, 0.029]
	2	0.89	0.96	0.064	0.025 [0.015, 0.112] ^a
	3	0.70	0.96	0.261	0.035 [0.191, 0.331] ^a
	4	0.63	0.84	0.207	0.033 [0.142, 0.273] ^a
FRC 6	1	0.96	0.98	0.021	0.011 [0.000, 0.043]
	2	0.87	0.89	0.024	0.021 [-0.016, 0.065]
	3	0.71	0.90	0.188	0.025 [0.140, 0.237] ^a
	4	0.56	0.78	0.216	0.028 [0.160, 0.271] ^a

Note. FRC = Family Resource Center.
^aSignificant at the 95% confidence level.

TABLE 4 Mean Pretest and Posttest Scores Stratified by Language

Study Group	Survey Question	Pretest Mean	Posttest Mean	Differences in Means	
				Mean	SEM [95% CI]
English	1	0.97	0.98	0.011	0.006 [-0.001, 0.023]
	2	0.89	0.95	0.061	0.010 [0.042, 0.081] ^a
	3	0.64	0.95	0.310	0.016 [0.280, 0.341] ^a
	4	0.55	0.78	0.232	0.016 [0.201, 0.263] ^a
Russian	1	0.90	0.90	0.000	0.048 [-0.097, 0.097]
	2	0.86	1.00	0.143	0.055 [0.032, 0.253] ^a
	3	0.83	0.95	0.119	0.051 [0.017, 0.221] ^a
	4	0.69	0.98	0.286	0.078 [0.127, 0.444] ^a
Spanish	1	0.97	0.98	0.012	0.008 [-0.003, 0.027]
	2	0.88	0.95	0.064	0.014 [0.037, 0.091] ^a
	3	0.72	0.92	0.196	0.018 [0.161, 0.231] ^a
	4	0.63	0.84	0.011	0.020 [0.177, 0.257] ^a

^aSignificant at the 95% confidence level.

lower scores among English-speaking caregivers are at odds with the cited evidence of racial disparities in child passenger safety (Bilston, Du, & Brown, 2011; Muller et al., 2014; Vaca, Anderson, Agran, Winn, & Cheng, 2002). Given the research, we would expect lower baseline knowledge among non-English-speaking caregivers. The lack of data from Hmong language participants requires further consideration for future evaluation of this cohort. Although the FRC educators distributed surveys to the Hmong-speaking participants, low native language literacy levels were a barrier to survey completion. While one Hmong educator reported unsuccessful attempts to administer the survey verbally, another was able to successfully evaluate participants' understanding of the class information through rephrased questions and discussion.

LIMITATIONS

This study was limited by the retrospective data analysis design that restricted collection of additional information on caregiver demographics. In addition, the pair-wise exclusion of 176 knowledge and 126 self-efficacy questions that were missing data may have skewed results. There is potential bias in reporting of knowledge by language level, which shows the mean pretest scores of English speakers as lower than those of the non-English speakers. It is possible that the bias occurred during survey administration for non-English-speaking caregivers where monitoring of fidelity was a challenge for the children's hospital staff who spoke only English. FRC study groups shared similar demographics but were not comparable with the hospital group, which had the highest percentage

TABLE 5 Median Response for Self-Efficacy

Study Group	Q5 Pre	Q5 Post	Q6 Pre	Q6 Post
Hospital	4	4	3	4
FRC 1	3	4	3	4
FRC 2	3	4	3	4
FRC 3	4	4	3	4
FRC 4	3	4	3	4
FRC 5	3	4	3	4
FRC 6	4	4	3	4
English	4	4	3	4
Russian	3	4	3	3
Spanish	3	4	3	4

Note. FRC = Family Resource Center; Post = posttest survey; Pre = pretest survey; Q# = Question no.

of non-Hispanic White participants. Although the trauma center staff observed the FRC classes to ensure fidelity, to date no formal fidelity measurement tool has been developed for these programs. The study measured short-term changes in knowledge, but no follow-up evaluations were conducted to determine long-term knowledge retention. This study was limited to the changes in caregiver knowledge and self-efficacy, which may not be reflective of behavioral change leading to increased restraint use. Testing validity must also be considered a potential limitation, as cohort literacy was not consistently assessed with each written test administration. In addition, the original survey instrument was not tested for reliability and validity. Further evaluation is needed to determine how programs affect caregivers' use of child restraint systems.

CONCLUSIONS

Trauma center injury prevention programs are expected to reduce population injury in their communities with effective outreach and prevention programming. Partnerships with community agencies can aid trauma centers in disseminating child passenger safety education to diverse populations. The results of this study demonstrate that a Level I pediatric trauma center's child passenger safety program can be effectively adapted by community partners to provide culturally specific education for ethnic and racial minority groups. The injury prevention program leveraged the partnerships to expand outreach beyond hospital-based classes to include an additional six locations in underserved communities. The model presented is promising for pediatric trauma centers that are building outreach capacity for programs focused on reducing MVC injury disparities among minority populations.

KEY POINTS

- Child passenger restraints reduce injuries, but improper use continues to be a contributing factor to pediatric MVC morbidity and mortality, particularly among ethnic and racial minorities. Child passenger safety education can increase proper use by improving caregiver knowledge, but effective education for minority groups requires culturally specific programming adapted to the needs of individual communities.
- A majority of pediatric trauma centers offer child passenger safety education through injury prevention programs, but inadequate resources may prevent effective dissemination to culturally diverse communities.
- Trauma center–community partnerships can be developed to facilitate cultural adaptation and dissemination of child passenger safety education to diverse communities.

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