BRIEF REPORT

Providing car seat checks with well-child visits at an urban health center: a pilot study

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Objective: To evaluate a pilot program of providing child restraint system (CRS) checks by certified technicians with well-child care in an urban health center serving a low-income community.
Methods: During well-child care, nationally certified child passenger safety technicians assessed CRS use, educated care givers, corrected misuse, and provided a new CRS if necessary. The program's effect was assessed at a subsequent medical visit.
Results: A total of 3650 CRS checks were performed. CRS non-use was found for 307 (17%) infants, 604 (50%) toddlers, and 593 (88%) booster seat-sized children. Exposure to the program was associated with a significant positive effect on CRS use ($p<0.001$) and significant improvements in the major components of misuse ($p<0.05$) months later.
Conclusions: This urban health center has high rates of CRS non-use and near-universal misuse. Providing CRS checks by certified technicians during well-child care is a promising means of promoting sustained and improved CRS use.

Motor-vehicle-related trauma remains a leading cause of death for children around the world,[1 2] and approximately half of the children who die in crashes in the United States are unrestrained.[3] Children in low-income areas are at particular risk of being unrestrained and improperly restrained in vehicles.[4 5] Finding innovative means to improve child occupant restraint in these areas holds particular promise to reduce child crash deaths and injuries.

The goals of this study were to: (1) assess child restraint system (CRS) non-use and misuse among children receiving care at a US Federally Qualified Health Center (FQHC) serving an urban low-income population; (2) gain a preliminary assessment of the effectiveness of performing CRS checks with well-child care in this setting.

METHODS

Assessment of CRS non-use and misuse

From September 2001 to September 2003, CRS checks were offered to families of children aged under 9 years at well-child visits at an FQHC serving a low-income urban population on the south side of Chicago. For families leaving by car, nurses offered the CRS service at check-in. After the medical visit, a certified child passenger safety (CPS) technician accompanied the family to their vehicle, evaluated the child's restraint situation, and addressed any needs. CPS technicians recorded whether a CRS or belt-positioning booster (BPB) was used. If present, CPS technicians assessed multiple components of proper CRS use and collected data using a standard form[6] modified for this pilot study.

If a CRS was needed, one was provided, installed, and the family was trained on its proper use in the family vehicle before leaving. For the first year, CRSs were provided free. During the second year, to discourage occasional episodes of abuse of our program, CRSs were provided for a charge of US$10.

Preliminary evaluation of the effectiveness of the CRS program in the clinical setting

A convenience sample of families was approached for enrollment in the evaluation if a child weighed under 40 pounds, was receiving services through this CRS program for the first time, and was expected to be in the same seat at their next scheduled well-child visit. Oral informed consent was obtained from all parents who participated in the study. Enrolled families identified at a follow-up medical visit underwent a follow-up CRS check.

The effect of the program on CRS use (versus non-use) and properness of use was assessed using McNemar's test. This evaluated discrepant pairs while taking into account the correlation of 2 points of data from the same child. The Cochran–Armitage test was used to assess trends in binomial proportions. To assess demographic differences between those with and without follow-up data, we used Pearson's χ^2 test and, in the case of small cell sizes, Fisher's exact test. A p value of <0.05 was considered significant. All tests were two-tailed.

The cost of the program per child served was calculated on the basis of the salaries (plus fringe) of the two CPS technicians (2 @ US$37 000/year) and CRS costs (~$30 000/year).

The protocol for the evaluation was approved by the Institutional Review Board of the University of Chicago.

Table 1 Characteristics of subjects in evaluation of program

Characteristic	Complete follow-up (n = 102)	Without complete follow-up (n = 262)	p Value
Age group			
<12 months	99 (97.1)	220 (84.0)	<0.01
12–48 months	3 (2.9)	42 (16.0)	
Sex			
Male	52 (51.0)	132 (50.4)	0.92
Female	50 (49.0)	130 (49.6)	
Race/ethnicity			0.23
African American	87 (85.3)	238 (90.8)	
White	8 (7.8)	10 (3.8)	
Other	7 (6.9)	14 (5.3)	
Insurance			<0.01*
Public	75 (73.5)	216 (82.4)	
Private	25 (24.5)	23 (8.8)	
Self/none	1 (1.0)	4 (1.5)	
Unknown	1 (1.0)	19 (7.3)	

Values are number (%). Percentages within some categories do not add up to 100 because of rounding. Except where indicated, the p value was from Pearson's χ^2 test.
*Fisher's exact test.

Abbreviations: BPB, belt-positioning booster; CPS, child passenger safety; CRS, child restraint system; FQHC, Federally Qualified Health Center

RESULTS

Assessment of CRS use and misuse at the FQHC

During the 2-year study period, a total of 8103 children aged under 9 years coming for well-child care were screened. Of these, 2578 were not leaving the health center by car. Of the 5525 leaving by car, 1190 (21.5%) parents refused the service and 685 (12.4%) agreed to the service, but left before it could be provided. CPS technician services were performed for the remaining 3650 (66.1%) children. This included 1755 infants who should have been in a rear-facing CRS, 1219 toddlers who should have been in a forward-facing CRS, and 676 children who should have been in a BPB.

Non-use of CRSs increased with increasing age from 17% (307/1755) among infants, to 50% (604/1219) among toddlers, to 88% (593/676) among children who should have been using a BPB ($p<0.01$, test for trend). Among those using CRSs, misuse was detected in 95% (1417/1448) of infants, 98% (604/615) of toddlers, and 84% (70/83) of children using BPBs.

Preliminary assessment of the effectiveness of the CRS program

A convenience sample of 364 children was enrolled in the evaluation. For 102 children, follow-up data were collected at a median of 105.5 days (range 14–443 days) from the baseline assessment. Of these, 88 used a CRS at baseline, and 14 did not. No follow-up data were collected for 262 children (194 baseline CRS users and 68 baseline CRS non-users). These patients were lost to follow-up for multiple reasons, but, for 145, no subsequent medical visit was made during the study period. Compared with those without data from a follow-up check, those with follow-up data were more likely to be aged less than 12 months and to have private insurance ($p<0.01$, table 1).

The program was associated with a significant positive effect on the use (versus non-use) of CRSs at follow-up ($p<0.001$). Of the 14 children who were not using a CRS at baseline, all but one were using a CRS at follow-up a median of 86.5 days (range 14–251) later. All of the 88 children who were using a CRS at baseline were found to be continuing to use a CRS at follow-up.

We were unable to detect any effect of exposure to the CRS check at baseline on an improvement in the CRS being in the proper direction specifically ($p = 1.00$). Of the 88 children who were using a CRS at baseline, 20 were improperly facing forward at baseline (9), follow-up (9), or both (2). Because several components of proper CRS use are defined assuming proper CRS direction (eg, correct recline angle for rear-facing CRSs), the data for these 20 infants were not included in the analysis below of the effect of the program on proper CRS use.

For the remaining 68 children whose CRSs were facing the correct direction at both baseline and follow-up, significant improvement in multiple components of CRS use were observed at follow-up (table 2). There was significant improvement in the installation of the CRS in the car and proper restraint of the child in the CRS.

To assess bias from the higher rate of loss to follow-up among those with public insurance, we reanalyzed our evaluation data for just those families with public insurance ($n = 75$). Results were largely similar, although the effect of the program on three components (harness in correct slots ($p = 0.07$), harness on correctly ($p = 0.06$), and seatbelt locked ($p = 0.13$)) was no longer statistically significant.

DISCUSSION

This study documents significant rates of non-use and near-universal misuse of CRSs among children receiving well-child care at an FQHC serving a low-income urban US population. This work also provides encouraging preliminary data on the effectiveness of a CRS program involving CPS technicians performing CRS checks with well-child visits in this setting.

Providing CPS technician services and CRSs as needed cost about US$60 per child. A recent study found that this type of CRS disbursement and education program funded by public insurance would be as cost-effective as other prevention programs (eg, immunizations) currently funded by the federal government.[7]

Integrating CRS checks into well-child care has advantages beyond those of traditional CRS checks at ''events''[8] and ''fitting stations''[9] as typically performed. Families who choose to attend these CRS check ''events'' or schedule appointments at ''fitting stations'' are often already using a CRS and are safety conscious enough to take the time to have it checked. Providing CRS checks with well-child visits in a low-income

Table 2 Effect of child restraint system (CRS) check on proper CRS use at follow-up

Component of proper CRS use	Change from baseline to follow-up		No change from baseline to follow-up		p Value*
	Baseline incorrect/ follow-up correct	Baseline correct/ follow-up incorrect	Baseline correct/ follow-up correct	Baseline incorrect/ follow-up incorrect	
Proper installation of the CRS in the vehicle					
Correct seat recline angle	18	5	38	6	<0.01
Seatbelt holding CRS tight	19	2	4	34	<0.01
Seatbelt locked	19	8	25	8	0.03
Carrier handle in correct position	21	2	18	1	<0.01
Proper restraint of the child in the CRS					
Harness used	0	2	65	1	0.16
Harness in correct slot	21	9	32	3	0.03
Harness on correctly	7	1	55	2	0.03
Harness snug	27	1	3	34	<0.01
Harness retainer clip threaded correctly	10	4	45	2	0.11
Retainer clip at armpit level	22	5	16	18	<0.01
Correct seat for child weight and age	2	1	64	1	0.56
Aftermarket products not used†	15	1	51	1	<0.01

*p Value for McNemar's test. This evaluates the impact of the intervention on these outcomes considering that the baseline and follow-up measurements were on the same child and are therefore associated. This test compares the number of baseline/follow-up measures in which CRS use went from incorrect/correct to correct/incorrect. Of the 102 subjects with complete follow-up information, 14 were not using a CRS at baseline, and 20 faced the incorrect direction at either baseline or follow-up. These data represent an evaluation of the effect of the program on the components of proper CRS use for the remaining 68 subjects. Data were missing for the following components: correct seat recline angle (1), seatbelt holding CRS tight (9), seatbelt locked (8), carrier handle in correct position (18), harness used (0), harness in correct slot (3), harness on correctly (3), harness snug (3), retainer clip threaded correctly (7), retainer clip at armpit level (7), correct seat for child weight and age (0), aftermarket products not used (0).
†''Aftermarket products'' refer to cushions or blankets inappropriately used under the child.

Key points

- At this large community health center serving low-income families, 17% of infants and 50% of toddlers who came by car for their well-child visit were not using a child restraint system (CRS).
- For those not using a CRS at baseline, exposure to a CRS check at the time of a well visit was associated with sustained use at follow-up checks an average of 3 months later.
- Among CRS users at baseline, misuse was nearly universal. Exposure to the CRS check at the well-child visit was associated with significant improvements in the components of proper use months later.
- Providing CRS checks by certified child passenger safety technicians at the time of well-child care is a promising new means of promoting child passenger safety in this high-risk population.

population brings these services to many families who may not be using CRSs and are at high risk of misuse.

To our knowledge, this is the first evaluation of a CRS program using certified CPS technicians in the clinical setting. Previous research evaluated programs primarily in the 1970s and 1980s,[10–16] before the current system of nationally standardized training and certification of CPS technicians established by the National Highway Traffic Safety Administration in 1997.[17]

This study has several limitations. First, a significant number of children were lost to follow-up in this pilot study, which probably introduced some bias. However, the bulk of our findings remained after limitation of the analysis to just those families with public insurance. Future work should include improved efforts at follow-up, perhaps identifying an elder relative who could serve as a ''permanent contact''. Second, our evaluation involved a before–after comparison of outcomes without a control group. Third, most of our follow-up data involved infants under 12 months. Further work will need to evaluate the effectiveness of this program specifically in children over 12 months.

Implications for prevention

From the results of this study, providing CRS checks during well-child visits for children served at an FQHC appears to be a promising means of promoting the use of and increasing the proper use of CRSs in a population with significant need for these services. The feasibility of this type of program at other FQHCs should be explored further.

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REFERENCES

1 **CDC**. Web-based Injury Statistics Query and Reporting System (WISQARS). http://www.cdc.gov/ncipc/wisqars/default.htm (accessed 30 Jul 2007).
2 **World Health Organization**. *World report on road traffic injury prevention*. Geneva: WHO, 2004.
3 **National Highway Traffic Safety Administration, National Center for Statistics and Analysis**. *Traffic safety facts 2003: children fact sheet*. Washington, DC: National Highway Traffic Safety Administration, 2004.
4 **Winston FK**, Chen IG, Smith R, *et al*. Parent-driver characteristics associated with sub-optimal restraint of child passengers. *Traffic Inj Prev* 2006;**7**:373–80.
5 **Simpson JC**, Turnbull BL, Stephenson SCR, *et al*. Correct and incorrect use of child restraints: results from an urban survey in New Zealand. *Int J Inj Contr Saf Promot* 2006;**13**:260–3.
6 **SAFE KIDS, USA**. Generic car seat checklist. http://www.safekids.org/certification/docs/Generic%20Checklist.doc (accessed 30 Jul 2007).
7 **Goldstein J**, Branas C, Kallan M, *et al*. Cost-effectiveness of a Medicaid-based child restraint system disbursement and education program [abstract]. Presented at the American Academy of Pediatrics National Conference and Exhibition, 10 Oct 2005, Washington, DC..
8 **Taft CH**, Mickalide AD, Taft AR. Child passengers at risk in America: a national study of CRS misuse. Washington, DC: National SAFE KIDS Campaign, 1999.
9 **National Highway Traffic Safety Administration**. A guide to implementing child passenger safety inspection stations. http://www.nhtsa.dot.gov/people/injury/childps/CPSInspectionStation/index.html (accessed 30 Jul 2007).
10 **DiGuseppi C**, Roberts IG. Individual-level injury prevention strategies in the clinical setting. In: Behrman RE, eds. *The future of children: unintentional injuries in childhood*. Los Altos, CA: David and Lucille Packard Foundation, spring/summer, 2000;**10(1)**.
11 **Scherz RG**. Restraint systems for the prevention of injury to children in automobile accidents. *Am J Public Health* 1976;**66**:451–6.
12 **Miller JR**, Pless IB. Child automobile restraints: evaluation of health education. *Pediatrics* 1977;**59**:907–11.
13 **Greenberg LW**, Coleman AB. A prenatal and postpartum safety education program: influence on parental use of infant car restraints. *J Dev Behav Pediatr* 1982;**3**:32–4.
14 **Christophersen ER**, Sosland-Edelman D, LeClaire S. Evaluation of two comprehensive infant CRS loaner programs with 1-year follow-up. *Pediatrics* 1985;**76**:36–42.
15 **Christophersen ER**, Sullivan MA. Increasing the protection of newborn infants in cars. *Pediatrics* 1982;**70**:21–5.
16 **Liberato CP**, Eriacho B, Schmiesing J, *et al*. SafeSmart safety seat intervention project: a successful program for the medically indigent. *Patient Educ Couns* 1989;**13**:161–70.
17 **SAFE KIDS, USA**. CPS certification. http://www.usa.safekids.org/tier2_rl.cfm?folder_id=3600 (accessed 30 Jul 2007).