IMPROVING CAR SEAT SAFETY ANTICIPATORY GUIDANCE IN THE PEDIATRIC PRIMARY CARE SETTING

Doctor of Nursing Practice Project
Presented to the Faculty of MU Graduate Studies
University of Missouri

In Partial Fulfillment of the Requirements for the Degree
Doctor of Nursing Practice
by
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APRIL 2024
Improving Car Seat Safety Anticipatory Guidance in the Pediatric Primary Care Setting

Motor vehicle crashes (MVC) are the second leading cause of death in children (Centers for Disease Control and Prevention [CDC], 2021). In 2020, on average, three children died, and 380 children were injured daily in an MVC in the United States (National Highway Traffic Safety Administration [NHTSA], 2022). Almost half (46%) of car seats and booster seats are installed incorrectly, according to the CDC (2022) and the NHTSA (n.d.-a). This improper use of restraints leads to higher rates of injury for children. Compared with seat belt use, car seats reduce the risk of injury in a crash by 71-82% for children (CDC, 2022). Booster seats reduce the risk of injury for children ages 4-8 years old by 45% (CDC, 2022). Car and booster seats can reduce injury and death for children, but parents must be appropriately educated on how to use them.

Research demonstrates that conversations between primary care providers and parents regarding car seat safety practices are strongly linked with increased parental safety behaviors (OR = 6.15, 95% CI [1.25, 30.32], \( p = 0.03 \)) (Fuzzell et al., 2018). By increasing car seat safety conversations, primary care providers can improve parental use of car seats and booster seats, reducing pediatric injury and fatality from MVCs. This paper will examine a quality improvement (QI) project to increase car seat safety education during well-child exams for children from newborn to 13 years old in a pediatric primary care clinic.

Statement of Purpose

The purpose of this QI project was to improve car seat safety anticipatory guidance by a pediatric primary care provider during well-child visits from newborn to age 13 years and, subsequently, increase parental knowledge and adherence to car seat safety guidelines. The purpose and aims of the project relate to the following PICOT question: In a pediatric primary care clinic (P), how does the implementation of an evidence-based car seat safety handout at well-child visits for newborns to age 13 years (I), compared to current practice (C), affect parental knowledge of car seat safety (O) at two months post-implementation (T)? The specific aims of this QI project were:

1. A 20% increase in parental knowledge of car seat safety following the intervention was measured by a pre-and post-test.
2. Ten percent of parents will report plans to have a car seat safety check with a child passenger safety technician (CPST), measured by a survey on the post-test.
3. The evidence-based car seat safety handout will be used for 50% of well-child visits for newborns to age 13 years old.

Review of Literature

A literature search was conducted to identify common reasons for the lack of car seat safety restraint use and effective interventions to increase knowledge on car seat safety for parents and caregivers. The following themes were found: failure to utilize car seat safety restraints to reduce injury, barriers to car seat use, and car seat safety education interventions in primary care.

Failure to Utilize Car Seat Safety Restraints to Reduce Injury

McMurry et al. (2018) found that children under two years who remain in a rear-facing car seat are less likely to be injured than those in a forward-facing car seat. Park et al. (2018) reported that children riding in a car seat were significantly less likely to sustain an intracranial injury than those not riding in car seats, at a rate of 0.8% vs 2.2% (OR = 0.31). Lastly, Caskey et al. (2018) found that children riding in a seat belt alone or riding unrestrained were injured at higher rates.
Sauber-Schatz et al. (2015) revealed that 17.8% of children aged 1-3 years in an MVC used a seat belt alone. For children ages 4-7 years old, 61% were using only a seat belt (Sauber-Schatz, 2015). Lee et al. (2019) found that only 40% of 1-year-olds killed in an MVC were in a rear-facing car seat. Additionally, when compared to 3-year-olds, children under one year were 1.72 (95% CI [1.21, 2.45]) times more likely to be in the appropriate car seat, 1-year-olds were 1.90 (95% CI [1.36, 2.66]) times more likely, and 2-year-olds were 1.54 (95% CI [1.07, 2.23]) times more likely (Lee et al., 2019).

**Barriers Affecting Adherence to Car Seat Safety Guidelines**

Cooper-Sood et al. (2019) found that parents do not use proper car seats because of a lack of knowledge of car seat safety. Parents believe they have installed their car seats correctly, preventing them from seeking help (Levi et al., 2020). Piotrowski et al. (2020a) cited a theme of negative feelings from children using a booster seat due to a lack of independence because they cannot buckle themselves. Another study by Piotrowski et al. (2020b) pointed out that fear of teasing or bullying can be a significant barrier to keeping children in a booster seat or the car’s back seat.

**Car Seat Safety Education Interventions in Primary Care**

In 2017, Jones et al. found that parents who discussed car seats with their primary care provider were more likely to keep children rear-facing until at least 2 years old, in accordance with AAP guidelines. Furthermore, parents who received care in a pediatric clinic instead of family practice or were aware of the American Academy of Pediatrics (AAP) car seat recommendations were more likely to keep their child rear-facing past 18 months (Jones et al., 2017). Car seat safety education tailored to parents improves the use of the proper car seat for their child (Gielen et al., 2018).

Kuroiwa et al. (2018) used pre- and post-tests to evaluate their car seat safety educational intervention and found that scores rose from 5% of participants to 77% who could answer 10 of 15 questions correctly. Cooper-Sood et al. (2019) used an educational handout to improve test scores by 18%. Similarly, Budziszewski et al. (2021) used a pre-test and a post-test to measure the improvement in parental knowledge of car seat safety in a cross-sectional study. The parents answered 46% (M = 3.25, SD = 1.46) correct on the pre-test, while they answered 73% (M = 5.12, SD = 1.71) correct on the post-test. The Cohen $d$ was calculated to be 1.17 ($p < .001$), making the improvement statistically significant (Budziszewski et al., 2021).

**Methodology**

This QI project was designed to evaluate the effectiveness of an educational intervention of a pediatric primary care provider using an evidence-based handout to educate parents and caregivers on car seat safety guidelines at well-child visits. The project was evaluated using a pre-test, implementation of the educational intervention, and a post-test. The intervention occurred in a pediatric primary care clinic in Cedar Rapids, IA. The target population of this study was parents or caregivers of pediatric patients from newborns to 13 years who were presenting to the clinic for their well-child visits.

**Intervention**

Training was provided to the primary care provider and nursing staff on the pre-and post-test surveys and the evidence-based car seat safety handout (Appendix C). After the education, the provider implemented the evidence-based handout for routine newborn through 13-year-old well-child visits. Parents or caregivers were given a pre-test at check-in regarding their car seat safety knowledge, the provider used the handout for teaching during the visit, and then parents or
caregivers were given a post-test to measure their progress at the end of the visit. The nursing staff collected the pre- and post-tests, stapled them, and placed them in a folder. The principal investigator collected and reviewed the data. Scores from the pre- and post-tests were compared to evaluate the effectiveness of the intervention and measure the knowledge gained by parents or caregivers.

**Tools/Measures**

Using a confidence interval of 95%, a margin of error of 5%, and a population size of 120, a minimum of 92 participants were required (Raosoft, 2004). Convenience sampling was utilized to ensure an adequate sample size. The primary outcome variable was an improvement of scores between pre- and post-tests. Secondary outcomes included the utilization of the evidence-based car seat safety handout during well-child visits for children from newborn to 13 years and the number of parents or caregivers who reported plans to have a free car seat safety check. Descriptive statistics were used to provide an overview of the sample group. Nominal level data was analyzed using the McNemar’s test. IBM SPSS Statistic version 24 (Chicago, IL) was used for statistical analysis. Statistical significance was defined as $p \leq .05$.

**Evaluation**

**Overall Demographics**

The evidence-based car seat safety handout was used for anticipatory guidance teaching in 100% of 143 well-child visits for newborns to 13 years. However, 20 parents or caregivers did not complete the pre- and post-tests, resulting in a sample size of $n = 123$. All 123 who completed the pre- and post-tests at well-child visits were included in the demographic data analysis. The most predominant age group for the children seen was newborn to 2 years ($n = 48, 39\%$), followed by 3-5 years ($n = 26, 21\%$), 6-8 years ($n = 26, 21\%$), 9-11 years ($n = 15, 12\%$), and 12-13 years ($n = 8, 7\%$). The sample was predominantly female ($n = 76, 62\%$) and Caucasian ($n = 110, 89\%$), with eleven African American (9%), and two Hispanic (2%).

**Pre- and Post-Test Scores**

Of the 123 parents or caretakers who filled out the pre- and post-test, 76% ($n = 93$) increased their mean score by at least 20% following the intervention. The mean pre-test score was 65.53% ($SD = 24.47$), and the mean post-test score was 91.38% ($SD = 13.33$). A paired-sample $t$-test was performed to compare the pre- and post-test results. A very large, statistically significant increase of 39.5% ($p < .001, d = 1.3$) was seen in the mean test score between the pre- and post-test.

A McNemar’s test was performed to compare pre- and post-test scores for each question. For question one, when asked how old a child should be to sit in a forward-facing car seat, there was a statistically significant decrease in incorrect answers from 30 to seven ($p < .001$). Question two asked how old a child should be to sit in a booster seat, and there was a statistically significant decrease in incorrect answers from 25 to one ($p < .001$). Question three asked how old a child should be to ride in the front seat of your vehicle and showed a statistically significant decrease in incorrect answers from 74 to 13 ($p < .001$). Question four asked when children should stop rear-facing and had a statistically significant decrease in incorrect scores from 41 to 14 ($p < .001$). Lastly, question five asked when children should stop using a booster seat and again showed a statistically significant decrease in incorrect answers from 40 to 17 ($p < .001$).
For Q2, there was a statistically significant difference in post-test scores for gender \( (p = .03) \). No other statistically significant differences were seen based on gender.

**Report of Car Seat Safety Check**

Of the 123 parents or caregivers who participated in the pre- and post-test, the majority \( (n = 79, 64\%) \) reported plans to visit a local CPST to check that their car seat is installed correctly. There was no significant difference for race \( (p = .24) \) or sex \( (p = .11) \) in those who decided to have a safety check.

**Conclusion**

This QI project aimed to increase parental knowledge of car seat safety practices at well-child visits for children from newborn to 13 years old by implementing an evidence-based car seat safety handout. The first objective of a 20% increase in parent or caregiver scores from the pre-test to the post-test was met with a mean increase of 39.5% in scores. The second objective of achieving a ten percent rate of parents or caregivers who intend to have their car seat installation checked by a CPST was also accomplished, with a significant majority \( (n = 79, 64\%) \) indicating they plan to do so. Lastly, the objective to use the evidence-based car seat safety handout in at least 50% of well-child visits for children newborn to 13 years old was met, with the handout being used at 100% \( (n = 143) \) of the well-child visits.

**Stakeholder Recommendations**

Including an evidence-based car seat safety handout with individualized education can increase parent and caregiver knowledge of car seat safety. Based on the statistically significant improvement seen during this project, continuing car seat safety education using the evidence-based handout is recommended. Expansion of the handout to the other providers in the clinic would help disperse information to more parents and caregivers.

**Strengths and Limitations**

This QI project's strengths include demonstrating strong statistical and clinical significance. The intervention is cost-effective, with the only cost being printing the evidence-based car seat safety handout. Limitations include the use of convenience sampling and a short intervention period. Future interventions with longer periods to gather a larger sample with the potential for random sampling are recommended.

In summary, this QI project demonstrated statistical and clinical significance for all outlined objectives. Implementing an evidence-based car seat safety handout in a pediatric primary care setting led to a statistically significant improvement in parent and caregiver knowledge of car seat safety practices. Primary care providers can increase the protection of children and reduce the risk of harm in an MVC by educating parents and caregivers about car seat safety practices.
References


https://www.cdc.gov/transportationsafety/child_passenger_safety/cps-factsheet.html#:~:text=In%202019%2C%20608%20child%20passengers,more%20than%202091%20were%20injured.&text=Of%20the%20children%2012%20and%2C%2038%25%20were%20not%20buckled%20up.


https://doi.org/10.1016/j.injury.2018.04.001


Appendix A

D1 Committee Form

DNP Residential Project Committee Appointment Request

Student’s Name: Molly Wells
Student’s Number: 14347728
Date Submitted: 07/05/2021

I request that the faculty members listed below be appointed to serve as my Residential Project committee.

Dr. Tammy Rood  
Name of Chair*

Dr. Ellen Chiocca  
Member*

Sara Goslin-Neff, ARNP  
Member*

Member*  
Molly Wells

Signature of Chair of Committee

Signature, Member

Signature, Member

Signature, Member

Signature of Student

Signature of Director of DNP Program, School of Nursing

*Please type or print

To be completed during the semester enrolled in:

N9080 Section 1 DNP Residency Project

SON Approved 7/2012
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Appendix B

D3 Project Proposal Form

Approval of DNP Residency Project Proposal and the Institutional Review Board Protocol

Candidate's name: Wells, Molly
Mizzou ID number: 14347728
Project Title: Improving Car Seat Safety Anticipatory Guidance in the Pediatric Primary Care Setting

Signatures of review members
(Please sign full names legibly)

Chair: Tammy Rood
Dr. Tammy Rood
Digitally signed by Dr. Tammy Rood
Date: 2023.10.09 12:52:31 -05'00'

Member: Ellen Chiocca

Member: Sara Goslin-Neff

Member:

The clinical project is:

The Program Committee has explained the decision regarding the acceptability of my project proposal.

Student Signature

Miriam D. Butler,
DNP, NP-C, FNP-BC

Date

SON Approved 7/2010
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Appendix C
Evidence-Based Car Seat Safety Handout

FREE Car Seat Checks
Iowa City – Contact UI Stead Family Children’s Hospital Safety Store
  • Call: 1-319-356-3543 or E-mail: keepingkids safe@uiowa.edu
Safe Kids Linn County
  • Call: (319) 286-5434 or E-mail: s.sampsone@cedar-rapids.org

Resources
HealthyChildren.org - www.healthychildren.org
CDC.gov - https://www.cdc.gov/transportationsafety/child_passenger_safety/resources.html

References

A PARENT’S GUIDE TO SAFETY
Choosing the Right Car Seat

Using the correct car seat or booster seat can be a lifesaver. Make sure your child is always buckled in an age- and size-appropriate car seat or booster seat.

**Tips for Success:**
- ALWAYS follow the height AND weight recommendations set by your car seat - this is usually found in the manual or on a sticker on the side of the seat.
- Children should remain in the seat until they have exceeded the height OR the weight limit.
- Forward facing car seats should ALWAYS use the top tether for installation.
- Children should NEVER wear a winter coat in the car seat – use a blanket or lay their coat over top of them instead!
- Children cannot ride in the front seat until they are 13 years old.

Checking for a Proper Fit:
1. Chest clip: buckled at armpit level
2. Shoulder straps: always refer to your manual, but in general:
   a. Rear-facing: should be at or below the shoulders
   b. Forward-facing: should be at or above the shoulders
3. Pinch test: straps are snug, the slack is removed, and you can't pinch any excess strap between two fingers.

Steps to Graduate to a Seat Belt Alone*
1. The child’s butt is all the back in the seat.
2. Knees bend over the edge of the seat with feet flat on the floor.
3. Lap belt is across the hips, not laying on the stomach.
4. Shoulder belt lays across the shoulder, not on the neck and not hanging in front of the child.
5. The child can stay seated like this for the whole ride.

*This usually happens when children are around 4’ 9”