

CAR RESTRAINT SYSTEMS: A Teaching Intervention Proposal for Nurses

Peggy Chou and Michelle Phan

Dominican University of California

## Table of Contents

Abstract.....	4
Problem Statement.....	5
Purpose Statement.....	6
Literature Review.....	7
Parents' knowledge and education on car seats.....	7
Nursing education and interventions.....	11
Theoretical Framework.....	12
Teaching/Intervention Plan.....	12
Design and Trajectory.....	12
Learner Population.....	13
Funding.....	14
Learning Objectives.....	14
Content.....	15
Learning Environment.....	18
Barriers.....	18
Ethical Considerations .....	19
Evaluation .....	20
Pre-test/Post-test.....	21
Presentation Evaluation.....	22
Discussion.....	23
References .....	27
Appendices .....	30

Appendix A: Letter to Children's Hospital.....	30
Appendix B: Pre-test / Post-test.....	32
Appendix C: Teacher Evaluation Tool.....	34

**Abstract**

According to the Centers for Disease Control and Prevention, motor vehicle accidents involving children are among the leading non-intentional causes of death in the United States. The purpose of this project is to educate nurses on the types of car safety seats (CSSs), the transitioning stage to the next CSS, and proper CSS installation. This educational intervention, which includes pre-tests, post-tests, and participant surveys, is directed toward registered nurses who work directly with children and their families. The more nurses reached by this training, the better and more consistent their collective advice to parents will be — and the safer children will be when riding in CSSs. This seminar will also be marketed to the California Highway Patrol, department stores carrying child safety equipment, and other related organizations.

### Car Restraint Systems: A Teaching Intervention Proposal for Nurses

In the beginning of the automobile industry, child occupant safety was not a popular issue; instead, comfort and convenience were the initial priorities for automobile manufacturers. The first car seat created was geared towards accessibility, not safety (Marcon-Fuller, 2010). Eventually, more consumers have gained awareness that motor vehicle accidents pose a significant safety risk. Advocate groups such as Physicians for Automobile Safety began to pressure car manufacturers to improve children safety in their vehicles.

#### **Problem Statement**

Many states implemented legislation focused on child passenger safety (CPS) . By 1985, all states had complied with federal requirements for child safety seat laws (Marcon-Fuller, 2010). As the practice of using child safety seats (CSS) increased, industry groups were able to gather data regarding its efficacy. In the mid 1990s, crash data from Sweden, recognized as one of the safest countries for children in automobiles, indicated that rear-facing child safety seats significantly increases child safety of children in crashes. Sweden's safe CSS practice of safe use of car seat is what makes it a leader in preventing and reducing childhood injuries and deaths in motor vehicle accidents (Marcon-Fuller, 2010). The American Academy of Pediatrics (AAP) adopted Sweden's guideline to practice safety measures. Despite the recommendations from AAP, majority of parents and caregivers today are still not complying.

Children are at great risk of vehicular accidents and injuries due to (1) improper use of CSS, (2) failure of transitioning to the next stage in car seat restraints, or (3) negligence of using car seats. Common child safety seat installation mistakes include not placing the child safety seat in the correct direction, incorrect installation of the CSS in relation to the vehicle's air bags,

incorrect installation and tightness of the CSS to the vehicle seat, not securing or tightening the CSS's harness and crotch straps, or improper use of locking clips for certain vehicle safety belts.

Parents who think they have all the information, often misunderstand the use of booster seats appropriate to the child's size and age (Muir & Bennett, 2010; Rosales & Allen, 2012). One misconception is when parents think their children are fit for booster chairs or car seats when they do not fit the criteria. Although there are parents with knowledge deficits, there are parents that do have the information, and fail to apply it. Failure to use CSS is due to accessibility and affordability (Birken, 2004; Marcon-Fuller, 2010). These factors hinder parents from using car safety measures for their children. A common mistake is using a second-hand, defective or broken child safety seat.

According to Brixey and Guse (2009), parents anticipate their primary health providers to educate them about CSS. A key role of nurses is to provide education, training, and practical resources to those with young children ages 0-8 (Caudius & Nager, 2004; Kedikoglou et al, 2004; Philbrook et al, 2009). If nurses do not have the current CSS information, how could they provide it to parents of young children?

### **Purpose Statement**

The purpose of this teaching project is to educate nurses on the types of car safety seats, the transitioning stage to the next car safety seat, and the proper way of installation. Nurses that work with families and children ages 0-8 years will be evaluated to determine the reason for this knowledge gap. We will examine nurses' educational backgrounds, specialties, and years of experience that contribute to the knowledge gap. A cohort analysis will answer hypotheses. For example, the analysis will determine whether nursing schools emphasize CSS education or have little or no knowledge of CSS, possibly due to changes in legislation. By exploring these

hypotheses, we will be able to narrow the cause of the educational gap in CSS in today's nurses. Nurses need to be knowledgeable of CSS because they are the first and last health providers to see the patients. With the correct information and comprehension of CSS, nurses can actually teach their patients on the proper use of CSS. Positive results from our literature review show an increase use of child car safety seats by educating nurses and parents.

### **Literature Review**

Motor vehicle accidents in children are among the leading non-intentional causes of death in the United States. According to the Centers for Disease Control and Prevention (CDC), "In the United States during 2009, 1,314 children ages 14 years and younger died as occupants in motor vehicle crashes, and approximately 179,000 were injured" and "618,000 children, ages 0-12, rode in vehicles without the use of a child safety seat or booster seat or a seat belt at least some of the time" (2012). These statistics of child injury and death exemplify the importance of increasing safety restraints. By providing education, training, and practical resources to parents and educators, this literature review examines the role of primary care providers, such as nurses, in providing proper CSSs information to fill this knowledge gap.

#### **Parents' knowledge and education on car seats**

Parent's lack of knowledge on CSS affects injury and death rates in children. For example, in *Ride Safe: A Child Passenger Safety Program for American Indian/Alaska Native Children*, researchers conducted a Ride Safe Program in fourteen different locations to increase child safety seat use, to educate families about car restraints, and to train parents on how to use child car seats. The study was conducted at the beginning and end of three program years (Fall 2003 to Spring 2006). The study observed the CSS usage in Fall 2003, provided educational training, and reassessed the program again in Spring 2006. Before they implemented the Ride

Safe Program, Head Start Center staff identified several reasons for lack of CSS usage: driving safely, guarding their child as a safer method, or driving short distances. Perceptions like these may result in negative outcomes because they interfere with using proper restraints for their children. While this program appeared to be effective, the program intervention can be improved by providing more specialized training to those observing the participants.

In the study, data collectors were not trained to observe how many parents used CSSs. Without proper training, the data collector may have collected incorrect or unreliable data to depict how many parents use CSSs. This may have weakened the result and be a waste of resources. Knowledge deficit in CSS may influence parents to not use CSSs and result in negative outcomes.

Undesired outcomes may result into MVA injury and death due to poor decision-making in CSS selection. For example, parents may prematurely transition their children to the next stage of CSS without knowing the criteria. When transitioning to shoulder seat belts too early, children may experience seat belt syndrome from car accidents. Seat belt syndrome occurs when the shoulder seatbelt overlaps with the abdomen when it should be overlapping the lap (Brixey & Guse, 2009). As a result, the external force affects the abdomen and its surrounding organs.

In addition, Brixey and Guse assessed physicians and caregivers understandings on CSS and the transition to seat belts. The survey was given to 492 caregivers, inquiring about statistical data on vehicle crashes, the criteria for CSS, barriers to CSS usage, and more (Brixey & Guse, 2009). Results of this study showed that about 45% of caregivers did not know that booster chairs are needed for children eight years old and under; they believed that seat belts alone were the best protection (Brixey & Guse, 2009, p. 548). About half of the participants did not know a child's sitting height determines the transition from booster chair to seat belts (Brixey & Guse,



2009). This research confronts the issue of parent's knowledge gap in advancing children to the next stage of CSS.

Although the research by Brixey and Guse shows many significant factors about parents' knowledge in CSSs, restrictions in this research should be explored further. Surveys were distributed in multiple areas to represent the central city population; however, the sampling did not capture the true representation of caregivers' behavior in car seats in Milwaukee (Brixey & Guse, 2009). In the research, participants did not respond to the survey, so the research relied on self-reporting to influence the desired outcome. There are several limitations in this research, but clearly, parents' lack of knowledge remains an obvious issue. There needs to be available resources and trained health care providers, particularly nurses, to educate parents in using child car seats to improve parent's knowledge. Fortunately, educational intervention may assist by closing knowledge gaps.

Providing CSS education to parents may minimize the high child death and injury rates in MVAs. Philbrook and his colleagues conducted a research to educate parents and children in the use of CSSs and compare the usage of CSSs before and after the program. The intervention was divided into three groups: Group one consists of 24 Caucasian and highly educated parents. Group two includes 58 parents, primarily Spanish speakers, who attend a one-hour course. Group three has 50 parents with little education and low socioeconomic status and/or was immigrants (Philbrook et al., 2009). Before the intervention was conducted, 42% caregivers in Group one, about 16% caregivers in Group two, and approximately 38% in Group three reported using car seats (Philbrook et al., 2009, p. 218). After the intervention, the total use of booster seats among parents by 87% (Philbrook et al., 2009, p. 218). With increased knowledge and training, parents are showing that they are practicing safety measures for their children.

Although parents from each group were taught the same content, they were taught in different ways. For example, Group one was more educated, so they were provided with take-home brochures, while predominantly Spanish speakers in Group two were required to attend an interactive course. Group three was given six visualizations on the proper and improper ways of restraining their children. Different teaching methods can affect the results among the groups. However, the educational intervention showed an increased in learning curve among these groups.

Similarly to the research conducted by Philbrook and his colleagues, the Ride Safe program also educated parents on proper information and application of CSS. The research was conducted over a four-year span from 2002-2006, and it included four components: “(1) a car safety passenger (CSP) curriculum tailored for use by Tribal Head Start teachers, health coordinators, and other staff; (2) funding for CSP technician certification training; (3) child safety seats (CSS); and (4) guidelines for evaluation activities including progress reporting, follow-up home visits, and observations of CSS use” (Letourneau et al., 2008). At the end of the program, the data showed an increase in child car safety by 47.5% (Letourneau et al., 2008, p. 60). The outcome showed moderate progress towards proper use of CSSs. The limitations in this study include the time the observation was conducted. The study was conducted at a specific time during the day. Limiting the time and location can affect the result because it decreases the likelihood of car accidents to happen. Taking time and location into consideration when conducting the study may improve the overall effectiveness of assistance programs. The Safe Ride program shows effectiveness of its education to the parents.

In addition to the Safe Ride Program, other programs have assisted parents to learn and use car seats appropriately. The loan scheme in a research conducted by Kedikoglou and her

colleagues was distributed to 188 participants to analyze its effectiveness in teaching parents about CSSs and their proper application (2004). Trained personnel analyzed participants on their level of understanding of car seat installation and knowledge of the appropriate usage of car seats. As a result, parents were able to accurately demonstrate how to install CSSs, “[The] proper uses of infant car restraints to according to Scheme’s instructions were recorded in 91.5% of the participants” (Kedikoglou et al., 2004, p. 45). Not only were they knowledgeable about how to use the car seats, but also they prepared themselves for the next stage of car seats by purchasing forward facing-car seats. One hundred fifty-four families out of one hundred eighty-eight bought a second-stage car restraint (Kedikoglou, et al., 2004).

The loan scheme was effective among 83.2% of mothers under 35. This group showed more car restraint applications than mothers’ age of 35 years and older (16.8%). The loan scheme succeeded in teaching parents to use child car restraints; however, a certain population was more responsive than others. Parents demonstrated knowledge deficit in CSS, however with education and intervention, they gained proper knowledge for child restraint. Similar to parents, majority of nurses convey the same problem.

### **Nursing education and interventions**

Primary care providers (PCPs), nurses in particular, affect their CSS teaching to parents when they lack knowledge in it. Nurses play a large role in providing education and interventions because they are the first people to assess patients and the last to make sure patients go home with proper information. Childhood injury and mortality rate in motor vehicle rate can be reduced with the help of nursing education and interventions. Before nurses can provide anticipatory guidance, they must be knowledgeable within this field.

According to Brixey and Guse, about 97 physicians or health care providers completed a twenty one-question survey on booster seats, transitioning to next-stage car seats, and knowledge of community resources for referral (2009). As a result, “48% were very comfortable with when to recommend a booster to a safety seat, 46% with when to transition from a booster to a safety belt. Only 24% were very comfortable with when to recommend a high-backed booster, 18% with when to recommend a low-backed booster” (Brixey & Guse, 2009, p. 549). These low rates show that the health care providers are not confident in providing information on car seats.

Parents can be affected when nurses are not educated on CSSs because parents do not receive the right information and resources. Many studies suggest that CSS intervention helps parent’s knowledge and skills in CSSs, however limited studies show how these interventions can help nurses. Our proposal will fill in nursing knowledge gaps in CSS education and application.

### **Theoretical Framework**

In the Novice to Expert theory, Dr. Patricia Benner explained, “Proficient nurses develop skills and understanding of patient care through years of experience” (Benner, 2013). Novice to Expert theory applies to this nursing education intervention project because we have to evaluate the learning and competency level in nursing in order to determine if the seminar is effective. For example, we will teach novice to expert nurses on how to effectively install child safety seats with detailed lecture and demonstration. The goal of the teaching intervention is for each nurse to reach the level of proficient by the end of the seminar. Using the Benner scale, we can evaluate the competency of nursing skills and the effectiveness of our seminar.

### **Teaching / Intervention Project Plan**

#### **Design and Trajectory**

Our proposed pilot study is an educational intervention that directs teaching towards registered nurses, educated at the associate, bachelor, or graduate education levels. The intervention focuses on the proper use of CSS, according to the American Pediatric Society standards. Subjects include types of CSS, the transitioning stages of CSS, and proper installation. A cohort analysis will be conducted to identify the knowledge gaps in nurses. With success of the pilot, the goal is to make this study widely available to provide publicly accessible content, including the production of education videos. This content could be marketed via nursing school websites under faculty sponsorship, and publicly broadcasted via traditional newsletters and social media sites, such as Facebook and Twitter, with endorsements from Dominican University and hospital clients.

### **Learner Population**

The target population for this study includes registered nurses, working in Pediatrics units, Labor & Delivery, Post Partum, and NICUs. A population of registered nurses will be recruited to participate in the educational seminar. A letter will be sent to the Nursing Director (see Appendix A). With permission from the Director, managers at Children's Oakland Hospital will be contacted about holding this voluntary seminar during the month of May. Participants will be selected and notified by the hospital personnel. The invitation will include information about the seminar, regarding content and times.

Any full time registered nurse employed at Children's Oakland Hospital in Pediatrics, Labor & Delivery, Post Partum, and/or NICU can participate in the seminar. Nurses from other hospital units, licensed vocational nurses, certified nursing assistants, nursing students, and recent graduate nurses are welcomed to the seminar, however, nurses in this specialty are more encouraged to attend.

**Funding**

Initially, we would require external funding to pay for staff training at client hospitals. This will prevent logistical or fiscal push-back from hospitals that may voice concern regarding nurse productivity or budget constraints. Funding is necessary to pay for lecturer time, demo car seat units, and refreshments for the participants, and more. The funds may come from external resources such as American Nurse Foundation (ANF), National Institute of Nursing Research (NINR), Sigma Theta Tau International Honor Society of Nursing (STTI), or from internal resources such as Dominican University grants. A grant proposal letter may be necessary to fund-raise monies for this project plan.

**Learning Objectives**

The following objectives will help guide evaluation of learners and teachers during the seminar. After completing the seminar, participants will be able to:

1. Understand the impact of improper CSS usage based on vehicle crash statistics.
2. Understand the significance of primary prevention in reducing injuries and deaths, caused by improper CSS usage.
3. Recognize parent's lack of knowledge, improper application of CSS and identify strategies to influence parents.
4. Accurately identify CSS appropriate for a child based on age and size. They will also be able to identify missing, incomplete, or incorrect pre-existing knowledge in relation to current CSS recommendations.
5. Demonstrate proper car seat installation in a simulated setting.
6. Identify specific corrections and modifications for advising parents on proper CSS usage.

7. Retain course knowledge six months after participating in the seminar and have the ability to teach the course content to another nurse.

### **Content**

Information of the stages of car seat transitions will be discussed in lecture format and include the following topics along with corresponding visuals:

- Rear facing seats for infants up to one year of age and weigh less than 20 pounds.
- Forward facing seats for children at least one year of age and over 20 pounds.
- Booster seats for children under 8 years of age or under 4'9" in height.
- Seat belts for children 8 years of age or taller than 4'9".

After the lecture, a live demonstration will be performed in the classroom, using a prop vehicle seat and samples of the different car safety seats discussed in lecture. Along with the classroom demonstration, a video of a proper installation in a real vehicle will be shown. This video will be produced by an alliance of car seat manufacturers and have been independently reviewed by accredited associations, such as the American Pediatric Society. Nurses are recommended to learn about CSS and different stages of car seat that transitions based on the child's age and weight.

The lecture gears toward factual presentation for memorization, while the demonstration will help the nurses connect knowledge to application. This will optimize the nurses' learning in using CSS. As shown in the study by Agran (2004), the effectiveness of an instructor at improving the use of CSS had a highly positive change in behaviors of learners. Physically showing participants the correct way to use a child car seat is more effective than verbal instructions. In our teaching plan, we will present information regarding the many types of car seats, car seat brands, and recommended carrier vehicles.

Children/infants are divided into several stages: Birth to age two, age two-four/up to 40 lbs., age four-eight/up to 4'9", and over eight years of age/ over 4'9" (CDC, 2012). Infants from birth to age two are recommended to be in rear-facing car seats. Rear-facing car seats provide the maximum support for infants under two years or 20lbs. In a crash, the head, back, and neck are most protected from external stress because the position reduces stress from those areas. There are several types of rear-facing car seats, such as infant car seat, convertible, and All-in-One or three-in-one. Infant car seats are generally for infants and weigh more than most CSS.

Convertible car seats offer both rear-facing and forward-facing car seats for infants to grow into. After infants outgrow the rear-facing car seat, parents can convert the unit into forward facing car seat. All-in-one car seats include all three types of car seats. According to Jessica Hartshorn, Sr. Lifestyle Editor of *American Baby Magazine*, suggests the Graco Snuggly 32 CSS for infants because it provides protection, convenient features, and ease to use (Petrin, 2011). However, there are many options to consider when evaluating affordability, accessibility, and security.

In addition to children under age two, children in the age two-four/up to 40 lbs. group may use the forward-facing position seat belts. When children outgrow the infant car seats, forward-facing seats are made available for this particular age and size. Forward-facing car seats include a harness and top tether to limit children's movement during a crash. The types of forward-facing car seats are the convertibles and all-in-ones mentioned above. There are several brands to consider for forward facing car seats, including the Diono RadianRXT Convertible Car Seat or the Britax Marathon 70-G3 Convertible Car Seat. One may prefer a particular brand to the other based on its features, appearance, and performance.



Children four to eight/up to 4'9" are promoted to booster seats. A booster seat allows children to use stock seat belts because it elevates them to an appropriate height and fit. A seat belt syndrome may occur when children transition to conventional seat belts early too early. To avoid this, "Child can sit with back against vehicle seat back, knees bend naturally over the edge of vehicle seat, lap belt fits low and snug across top of thighs, and shoulder belt crosses the collar-bone and center of chest" (CDC, 2012). However, the best protection from seat belt syndrome is to place children in booster seats to provide the best fit and protection. The Insurance Institute for Highway Safety (IIHS) provided a list of recommended 17 booster car seats, including, Britax Frontier 85, BubbleBum, and Chicco. KeyFit Strada was ranked IIHS's top "Best Bet" for 2013 (Almeida, 2012).

According to the Insurance Institute for Highway Safety (IIHS), it is important for car manufacturers to incorporate an easily functioning LATCH system (Lower Anchors and Tethers for Children) into their vehicles. The IIHS evaluates each vehicle and evaluates whether the car is suitable for a child car seat. The criteria include depth of the lower anchors, clearance around the anchors, and the force required to use the restraints. The higher the rating in each of these determinants, the easier it is for a parent to correctly install a child restraint.

The IIHS scored large sports-utility vehicles (SUV) as the best rated cars to accommodate a child car seat. SUV allow for easy installation because they include wider rear doors for the car seats to fit through. In addition to size advantages, SUV are becoming widely available with adjustable rear seating. This feature allows the parent recline the back row of the car in order to create a secure area for the child restraint. Vehicles such as the Chevrolet Suburban and Cadillac Escalade were shown to have the simplest accessibility for a child car seat. According to the IIHS, SUVs also have a lower fatality rate (17% based on a survey taken

in 2009). Although there are debates concerning the SUV's high rollover rate causing fatalities, manufacturers are incorporating rollover airbags to reduce fatal impacts. Along with the progress of new technology making SUV family-friendly car, there is no doubt that they are more suitable for child restraints and passenger safety.

### **Learning Environment**

The voluntary one-hour seminar will be available every other day during the month of May. Late spring presents an opportunity for long daylight hours, which is more accommodating for early morning and early evening sessions. There will be a seminar held twice a day at 6am and 6pm, in order to reach the greatest number of nurses working at Children's Oakland Hospital. A certificate of completion will be awarded at the end of the seminar. In six months, we will return to administer a re-test.

A conference room that can accommodate a group of five to ten participants will be located in the hospital venue. The conference room will be converted into a hands-on training. Participants will be broken up into groups of four to practice proper CSS usage. The demonstrator will stand by ready to answer any questions and correct mistakes. Groups will rotate once all key demonstration objectives have been met.

### **Barriers**

In a 60-minute session, facilitators are aware that obstacles may arise. For instance, it will be difficult to quantify whether participants actually apply the knowledge, gained from the seminar. The participants aren't keeping track of how many times they are using the CSS information, which doesn't help the facilitators measure the success of the seminar. It is immeasurable to count how many lives were saved by the information given at the seminar. Thus, there is uncertainty whether the seminar is a success or a failure.

Administrative barriers can also block this seminar from being held in the hospital. Due to hospital budget cuts and lay-offs, staff may not have the disposable time to attend the seminar. Administration can deem this seminar as an unnecessary educational tool for their staff. For example, demographics of the parents may not need the seminar because they are up-to-date with the current CSS requirements. Thus, this seminar may not be useful to certain hospitals. If this seminar fails in multiple hospitals, administrators will be hesitant to allow this seminar to take part in their hospital.

Additional challenges may include participants deciding that this seminar is not constructive enough for them and a waste of their time. Experienced nurses may feel they are overqualified to attend this seminar. Prior knowledge of CSS training may render some nurses' hesitant to attend current CSS training. These are some of the barriers we have identified so far. As we conduct this seminar, we will learn additional barriers and we will address and adjust for future seminars.

### **Ethical Considerations**

With respect to providing accurate information, respecting intellectual property rights and avoiding plagiarism, several sources are used in the development of the project lesson plan. Information from the Academy of Pediatrics, the California Highway Patrol website, Centers for Disease website, and our current textbooks, Hockenberry & Wilson: Wong's Essentials of Pediatric Nursing have all been employed. These sources will ensure accuracy in information and application that are given to nurses. This is how we will establish our academic integrity and credibility. Besides giving acknowledgement to the rightful owner of the products, the seminar will use these credible guidelines to demonstrate current practice in child safety seat care.

In addition to avoiding plagiarism and any unethical acts, Children's Oakland Hospital as well as the participants will fully be informed about the objectives, procedures, and potential benefits of the teaching intervention. Potential participants are provided with information about their rights and responsibilities to understand the nature of the intervention and the implications of participation. They have to be fully informed about litigations from our teaching intervention. A problem may arise when nurses give incorrect information to parents or parents misinterpret the information given. Nurses are liable for the anticipatory guidance given to parents because inaccurate information may result to motor vehicle accident related injury or death. It is important that nurses give proper anticipatory guidance on how to properly install the car seat. Our teaching intervention will provide accurate, up to date information from reliable sources such as the following:

- Parents central - from car seats to car keys: keeping kids safe,  
<http://www.safercar.gov/parents/carseats.htm>
- Child Car Seat Installation Videos,  
(<http://www.safercar.gov/parents/instructionalvideos.htm>)
- Hockenberry & Wilson: Wong's Essentials of Pediatric Nursing
- Car Safety Seats: A Guide for Families 2013 Safety Information (Academy of Pediatrics, 2013)

### **Evaluation**

The evaluation of this teaching project will consist of three tests. The three tests include pre-test, post-test, and teacher evaluation survey (see Appendix B and C). The pre-test results will represent the baseline of the learners' knowledge prior to the teaching intervention and the post-test will reflect the knowledge learners gained after the implementation of the teaching

intervention. Pre-test/post-test comparisons are determined by the differences in learning outcomes that will occur between two intervals – before and after the teaching intervention. The assessments will compare the changes in knowledge and skills as the direct result of the training. An advanced statistical analysis is not required, since the evaluative tool in training and education is simply comparing the knowledge before and after the intervention. The third test is a simple evaluation tool that will be given to the participants to assess the quality of the teaching.

### **Pre-test/Post-test**

The purposes of the pre-tests and post-tests are to improve our intervention and to judge the effectiveness, efficiency, or cost of our intervention. Measuring the before and after of the implementation of the teaching intervention will allow the educator to see if change has occurred. By assessing participants' knowledge, we must check the consistency and accuracy of the pre-test and post-test.

Prior to giving the tests, we must evaluate the test's reliability in able to prevent biased or confused questions. The pre-test and post-test will be designed by the project creators and made up of five true or false questions and five multiple-choice questions. Each question will be well written and free of grammatical and spelling errors. Copies of the tests will be submitted to resident experts in the pediatric department at Dominican University of California, the California Highway Patrol officers and local Child Passenger Safety technicians. Input will be sought from these professionals on the validity of the test. The input will be evaluated and any necessary changes will be made.

The reliability of the pre/post test will be achieved by piloting the test on a small group of peers. The overall goal of assessing the pre-test and post-test is to show that participants will be presented with tools that are reliable, valid, and free of biased questions. The test may be given

to the same population at a different time to obtain the same results. We want the results to truly reflect knowledge of the learners.

At the beginning of the seminar, learners will be given a pre-test to examine their current understanding of CSS. We will produce the pre-test that contains five true or false questions and five multiple-choice questions. The educator will collect, score, and record the exams. Following the pre-test, the teaching intervention will occur. The educator will lecture on car safety seats, requirements, and recommendations. Learners will be given the opportunity to teach back the proper CSS application methods done via hands-on activity. The educator will immediately correct mistakes and errors made by Learners. Following the demonstration, post-tests will be given that should last no more than five minutes to complete.

The pre-tests and post-tests will be evaluated to provide data in measuring how much the seminar improves the knowledge. We evaluate the pre-test candidates both immediately after the seminar and at the follow-up evaluation scheduled six months after the seminar to measure knowledge retention.

### **Presentation Evaluation**

In addition to quantitative results from the pre-test versus post-test, we will also collect feedback from learners regarding the quality of the presentation. In order to improve the teaching intervention, we must evaluate our teaching project and the educator. Learner satisfaction will be given a form Teachers Evaluation Tool (CSS Teachers' Evaluation), to express their opinions. The survey will determine how effective the instructors were in knowledge of content, speaking and reasoning, learning activities, and more. With the results from CSS Teachers' Evaluation, we will examine the areas that need to be improved and strengthened. One possible way to improve the teaching intervention is produce an audio recording of the seminar.

With the hospital's permission, we will record the seminar in the conference room. There are many advantages from having an audiovisual presentation. The video is accessible to participants who cannot attend the seminar. The participants can access the teaching intervention at their convenience and watch it as many times as needed. In addition, the recorded seminar can be beneficial for participants who require different learning style. This video can also be provided to our instructors for additional feedback to make improvements on the seminar.

### **Discussion**

The literature identifies a knowledge gap in current nursing practice in CSS due to lack of requirements at learning institutions. We will provide a teaching intervention, including hands on learning, to close this knowledge gap. Using surveys and interviews, we will seek demographic data on our participants, including education, specialty, and years of experience. The seminar is appropriate for nurses with a wide range of experiences. We hypothesize nurses who are not trained in CSS may have attended universities with little or no emphasis of CSS education. It is recommended that untrained nurses be enrolled in our seminar to learn about the current requirements of CSS.

During our seminar, we will instill the importance of car seats in reducing child mortality and injury rates. From the presentation, learners will further understand that many factors can impede the proper use of child safety seats. Upon completing the seminar, learners will be able to immediately incorporate the new knowledge into their current practice.

We plan to make gradual adjustments to the presentation after early iterations of the seminar. Adjustments will be proposed based on data collected from the pre-test, post-test, and CSS Teachers' Evaluation. These forms of feedback are critical for informing how to improve the overall intervention – with each round of feedback, we will understand our audience better,

and as a result will improve on the clarity of the message over time. Anticipated adjustments include adding questions or topics that need to be addressed to improve post-test results.

In future studies, we would like to find additional factors that may affect the CSS training the nurses received. If we are able to identify the factors based on evidence we collect through participant surveys, we can use these findings as constructive feedback for institutions. Possible factors may include a lack of funding or lack of faculty interest to teach this topic, some or all of which can be determined as cause for the knowledge gap.

With early success from the pilot seminars, as measured by post-test vs. pre-test deltas and positive feedback from learners, we would be encouraged to expand this program to reach more of our target learners. Provided with additional funds, the seminar could hold larger groups of participants and be made available throughout the year. To obtain additional funding at our pilot institutions, we can present the positive pilot results to the hospitals' leadership and propose the expansion of the program to multiple facilities in their network. Eventually, the seminar materials and format can be licensed to schools and hospitals to be used as a permanent learning tool.

Besides marketing the seminar to healthcare academia and industry, there are other entities that can also benefit – including the California Highway Patrol and retail stores selling child safety equipment. To facilitate these other outreach initiatives, we will require additional instructors and general support staff. To expand this program, we must expand the pool of qualified instructors. To scale this program in reach, we will need to provide a certification program to qualify instructors to teach at a wider network of facilities.

There are existing groups (e.g. SeatCheck.org) that are already active in promoting CSS safety, we will also work with these groups, community organizations, newspapers, parent



bloggers and local TV stations to disseminate public service announcements regarding proper CSS usage. To reach online audiences, we will also spread our campaign via search engines and social media sites by taking out ads on related keywords such as car seats, child car seats, or child car restraints. This will help drive traffic to our advocacy websites, where parents can learn more about our training and available resources.

The best outcome for this seminar is to reach every nurse so they can in turn provide parents with the proper advice regarding car seat usage. However, we acknowledge that while professionals may have the best training and intentions, it is ultimately up to parents themselves to adhere to the provided advice and consistently implement the procedures in daily use. We concede that actual adherence is hard to quantify and measure in significant scale, and we can only rely on future injury and death statistics to infer the effectiveness of our program. Furthermore, we may not be able to quantify the contribution of our seminar to future observed improvements, because we also expect continual improvements in car seat technology and general vehicle safety that will also improve safety for children riding in cars.

Nonetheless, through the accumulated results from our seminars, we will identify actions that the healthcare industry can take now to directly contribute to improving vehicle safety for the pediatric patient population. Getting child car seat safety training right is a low-hanging fruit in healthcare that can reap measurable benefits in a span of a few short years. We believe it's the nursing profession's responsibility and obligation to provide the most up to date and evidence-based information to parents, many of whom are currently misinformed. The collective preparedness of practicing nurses in promoting proper CSS usage can make a quick contribution to pediatric wellness.

Several years into implementing the seminar, the data collected from seminar participants will likely reveal the scope of knowledge deficiency for practicing nurses. If deemed necessary by our peers in health care, it may be reasonable to require nursing programs to incorporate CSS knowledge as a required element. One method to accomplish this could be proposing legislation for consideration in California to address the lack of CSS education, but if enough institutions take the lead to address the issue now, we will not have to seek legislation as a solution.

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APPENDIX A

LETTER TO CHILDREN'S HOSPITAL

March 26, 2013

Nursing Director  
Oakland Children's Hospital  
747 52<sup>nd</sup> St, Oakland, CA 94609

Dear Director of Nursing,

Our names are Michelle Phan and Peggy Chou and we are nursing students from Dominican University of California. We are writing to you regarding an open invitation to a pilot study. The topic for the pilot study is: *Nurses, Take a Front Row seat for Safety!*

With statistics from Center for Disease Control and Prevention, it has been reported that approximately 179,000 were injured motor vehicle crashes. The purpose of our pilot study is to teach nurses about the importance of the correct use of child car seats. The pilot study examines the competency level of nursing skills and knowledge in implicating child car seats, thus we can provide appropriate learning tools for them. We encourage all nursing staff, including RNs, LVNs, and technicians to join our pilot study. Also, we would like to request a small conference room for an hour seminar.

Ideally 5-10 nurses from the day and night shift will be needed to participate in this study. It is very much appreciated if you can inform your nursing staff know about our pilot study and RSVP for participation. Please contact us back about meeting up for further discussion. Thank you.

Sincerely,

Peggy Chou & Michelle Phan  
Dominican University of California  
50 Acacia Ave, San Rafael, CA 94901  
Dung.Phan@students.dominican.edu  
Peggy.Chou@students.domincian.edu

APPENDIX B  
PRE-TEST AND POST-TEST



**Pre-test / Post-test**

1. Are motor vehicle accidents and injuries the leading cause of death among children in the United States?

Yes      or      No

2. Do car seats expire?

Yes      or      No

3. Are children younger than 13 years recommended to ride in the back seat?

Yes      or      No

4. Are the parents' laps the best protection for child safety seats?

Yes      or      No

5. Can a rear-facing car seat be in the front seat of a vehicle?

Yes      or      No

6. At what age do children need to be in forward facing position?

- a. Birth through age 2
- b. Ages 2-4
- c. Ages 4-8
- d. After age 8

7. What car safety seat is recommended for children ages 2-4 or up to 40 lbs?

- a. Rear facing safety seat
- b. Forward facing safety seat
- c. Booster seat
- d. Seat belts

8. What car safety seat is recommended for children ages 4-8 years or up to 4'9" tall?

- a. Booster seat
- b. Rear facing safety seat
- c. Seat belts
- d. Forward facing safety seat

9. What syndrome can occur if a child transition to seat belt too early?

- a. Abdomen scarring syndrome
- b. Seat belt syndrome
- c. Lap belt contusion
- d. Seat belt contusion

10. What age is recommended for children to be in rear-facing position?

- a. Birth to 2 years old
- b. 2-4 years old
- c. 4-8 years old
- d. Over 8 years old

APPENDIX C  
TEACHER'S EVALUATION SHEET