

Child passenger safety awareness training for healthcare professionals in Singapore

Dear Editor,

Road traffic injuries are a preventable cause of childhood morbidity and mortality.^{1,2} Use of age-appropriate child car seats (CCS) lowers the risk of injury and death by about 82% and 28%, respectively.³⁻⁵ In Singapore, although the Road Traffic Act states that CCS use is mandatory,⁶ many children presenting to paediatric emergency departments are unrestrained at the time of the road traffic accident.^{7,8}

In a retrospective cohort of over 2,000 Singapore children with road traffic injuries, more than half were unrestrained, with non-compliance to CCS greatest at infancy.⁷ In a subsequent qualitative study,⁹ parents of young children cited lack of knowledge on the importance of CCS, and inadequate installation skills as barriers to CCS use; parental suggestions to improve CCS compliance from birth included the hospital as a “crucial touch point” for opportunistic education and assistance with installation.⁹ In a local cross-sectional study of parents in a tertiary hospital neonatal unit, a significant proportion thought cradling the baby or using a baby carrier was a safe alternative to a CCS, while only 41% of those planning to return home via a motor vehicle intended to use a CCS.¹⁰ This apparent gap in parental knowledge and skills may be addressed by providing information and guidance during the postnatal discharge of newborn infants from the hospital and at the hospital emergency department. Healthcare professionals also need “train the trainer” education to teach parents the requisite knowledge and skills for the safe use of child car restraints.

Therefore, the injury prevention group in KK Women’s and Children’s Hospital (KKH) implemented training for healthcare staff to provide effective patient and family education on CCSs, with the long-term aim of shifting the emphasis upstream—from managing road traffic injuries in children, to preventing road traffic injuries through the correct use of CCSs for children in passenger cars. In this pilot study, we aim to examine the awareness and skill sets of healthcare staff before and after receiving online child passenger safety training.

KKH is an 830-bed tertiary hospital in Singapore. Approximately 12,000 well babies are born each year in the hospital, and it had an annual emergency department volume of approximately 150,000 patients

prior to the COVID-19 outbreak. From 21 to 25 June 2021, we conducted Child Passenger Safety training for healthcare staff including nurses and doctors from the Emergency Department, Neonatology, and Obstetrics. This consisted of 3 standalone 2-hour online sessions, training a total of 727 persons. The didactic component was taught by a US-certified Child Passenger Safety instructor and the interactive component facilitated by paediatric emergency physicians and a hospital physiotherapist. The course content included the following aspects of child passenger safety relevant to patient and family education: (1) how a CCS protects a child, (2) choosing a CCS for various aged children, (3) answering parents’ frequently asked questions and where to find resources, (4) modelling and advocating for best-practice child passenger safety in one’s family and community, and (5) identifying obvious CCS mistakes.

We administered a pre- and post-intervention anonymous survey as an online form prior to training (“pre-course”), and following each training session (“post-course”). The survey included competency-based questions with self-reported familiarity scores, and “true/false” knowledge-based questions. Participants were encouraged to complete the survey immediately after training, with 2 months (until 25 August 2021) after training to complete the post-course survey. Data were analysed with SPSS Statistics software version 26.0 (IBM Corp, Armonk, US), using the Wilcoxon rank sum test for continuous variables and the Pearson’s chi-square test for categorical variables. The institutional review board granted exemption from ethics review (reference number 2020/2473).

The survey response rate was 93.6% (755/807) for the pre-course survey and 81.3% (591/727) for the post-course survey. Most of the post-course survey respondents (84.4%, 499/591) completed the post-course survey immediately after training, while 15.5% (92/591) completed the post-course survey up to 2 months later. The 755 pre-course survey respondents had a median age of 35 years (range 18–74); 95.6% (722/755) were female and 4.4% (33/755) were male. The 591 post-course survey respondents had a median age of 35 years (range 19–74 years); 96.2% (569/591) were female, and 3.7% (22/591) were male. With respect to their area of work, for pre-course

Table 1. Results of pre- and post-intervention surveys. (A) Median familiarity score for each competency dimension with interquartile range in parentheses (1 = “not familiar”, 5 = “very familiar”). (B) Percentage scoring correct answer on “true/false statement” knowledge questions.

A. Competency dimensions	Pre-course median score	Post-course median score	P value
1. Where to find reliable information on child car seats	2 (1–3)	4 (4–5)	<0.001
2. How to select an age-appropriate child car seat	2 (1–3)	4 (4–5)	<0.001
3. When to transition the child to the next stage of child car seat	2 (1–3)	4 (4–5)	<0.001
4. Where to obtain a child car seat	3 (1–4)	4 (4–5)	<0.001
5. How to install the child car seat in the car	2 (1–3)	4 (4–5)	<0.001
6. How to buckle a child in the car seat	3 (1–4)	4 (4–5)	<0.001
7. Whether the car seat should face forwards or backwards	3 (1–4)	4 (4–5)	<0.001
8. How to find a taxi/private hire vehicle with child car seats	2 (1–3)	4 (4–5)	<0.001
9. How to encourage a crying infant to stay in the car seat	2 (1–3)	4 (4–5)	<0.001
10. Your overall familiarity with child car seats	2 (1–3)	4 (4–5)	<0.001
B. Knowledge questions (Correct answer in parentheses)	Pre-course correct answers	Post-course correct answers	P value
1. Singapore has a legal requirement to use a child car seat in cars and private hire vehicles. (True)	95.8%	94.1%	0.159
2. Child car seats are effective in protecting children in the event of an accident. (True)	99.6%	99.8%	0.445
3. Since I grew up without a child car seat, my child need not have one. (False)	90.6%	91.5%	0.548
4. Even if I drive safely, other drivers may not. (True)	94.7%	95.4%	0.541
5. Even a short trip carries the risk of a serious road traffic accident. (True)	99.2%	99.0%	0.669
6. Second-hand child car seats are only safe before the expiry date and if accident-free. (True)	49.3%	69.4%	<0.001
7. Babywear/baby carrier is NOT a substitute for a child car seat. (True)	93.2%	95.4%	0.088
8. Child car seats when used appropriately are safe for an infant’s breathing and infant’s spine. (True)	94.7%	97.6%	0.007
9. If practical, it is better not to use the car seat as a seat for the child when they’re not in the car. (True)	65.3%	79.0%	<0.001
10. Premature babies should not be placed in a child car seat. (False)	64.2%	81.2%	<0.001
11. An infant’s harness should be snug, at shoulder level or just below the shoulder, in a rear-facing car seat. (True)	82.3%	92.0%	<0.001
12. It is all right to place a swaddled baby in a car seat and/or place bolsters/pillows around them. (False)	72.7%	77.3%	0.053
13. It is all right for a newborn infant to look small compared to the car seat. (True)	55.6%	74.8%	<0.001
14. If the infant appears fragile, this is the reason why the child car seat should be used. (True)	56.6%	78.2%	<0.001
15. Children should ride in rear-facing car seats until age 2 or older. If their seat’s height/weight limit allow, they should remain rear-facing until age 4 or older. (True)	75.5%	92.0%	<0.001
16. You can place a rear-facing car seat in the front of a car with a passenger airbag. (False)	65.8%	77.7%	<0.001
17. Children should remain in a harnessed car seat (rather than a booster seat where the adult seat belt goes in front of the child’s body) until age 5 or older. If their seat’s height/weight limit allow, they should remain in that seat longer. (True)	78.7%	87.1%	<0.001
18. Children 5 years and above should travel in a booster seat until about 1.35–1.45 metres tall. (True)	79.5%	87.5%	<0.001
19. A 6-year-old can sit in the front passenger seat. (False)	69.9%	84.8%	<0.001
20. Children can use an adult seat belt only when the seat belt fits (lap belt across upper thighs and shoulder belt across the chest) without a booster seat. (True)	71.0%	68.4%	0.296

survey respondents, 73.0% (551/755) were from the Neonatal Intensive Care Unit, Nursery, and Delivery Suite; 22.8% (172/755) from Children's Emergency, and 4.2% (32/755) from the Paediatric Wards. For post-course survey respondents, 79.0% (467/591) were from the Neonatal Intensive Care Unit, Nursery, and Delivery Suite; 17.4% (103/591) from Children's Emergency, and 3.6% (21/591) from the Paediatric Wards. The survey respondents' professional roles were as follows. For pre-course survey respondents, 89.4% (675/755) were nurses, 9.4% (71/755) doctors, and 1.2% (9/755) allied health. For post-course survey respondents, 91.2% (539/591) were nurses, 7.6% (45/591) doctors, and 1.2% (7/591) allied health. Only 4.4% (33/755) of pre-course survey respondents had previously attended teaching on child car restraints.

The first part of the survey comprised 10 competency-based questions on child passenger safety, rating respondents' familiarity on a 5-point scale, 1 being "not familiar", and 5 being "very familiar". Table 1 shows a significant improvement in the median self-assessed familiarity score for all 10 competency dimensions pre- to post-course.

The second part of the survey comprised 20 "true/false statement" knowledge-based questions testing key aspects of course content, with 17/20 questions showing an increase in the percentage of correct answers following training (statistically significant increase in 12/20 questions). The greatest knowledge increments were shown in these true statements "If the infant appears fragile, this is the reason why the child car seat should be used" (+21.6%), and "Second-hand child car seats are only safe before the expiry date and if accident-free" (+20.1%). When results were stratified by respondents' areas of work, those working in the Children's Emergency scored a higher percentage of correct answers than colleagues from other parts of the hospital on 13/20 knowledge-based questions.

This is to our knowledge the first Singapore study to specifically evaluate the awareness and skill sets of healthcare professionals in a tertiary children's hospital, before and after receiving training in child passenger safety. Less than 5% of respondents reported having previously attended teaching on child car restraints, reflecting the need for greater knowledge in healthcare workers who have the opportunity to provide CCS education to parents and families. We found that across all 10 competency dimensions, the average self-assessed familiarity score increased following training. For knowledge-based "true/false" questions, most

(17/20) questions showed an increase in the percentage of correct answers following training, with 3/20 questions having a marginal decrease in the percentage of correct answers. For question 20, this may be due to difficulty interpreting the lengthy question. The higher scores for knowledge-based questions in respondents working in the Children's Emergency may possibly be related to encountering child injuries from road accidents, although this will need further study to ascertain. Taken together, these suggest that course respondents' sense of self-efficacy in knowledge and skill sets increased with training, broadly translating into increased knowledge in the immediate and short-to-medium term post-training period.

We recognise that this study was designed to assess knowledge and familiarity with child passenger safety skill sets, rather than to test actual skills in correct child car seat instruction and use. We only assessed immediate to short-medium term knowledge gains and were not able to assess knowledge attrition. To maximise the gains in healthcare professionals' knowledge and skill sets, hands-on CCS training of selected hospital staff and refresher training with car seat clinics to evaluate and maintain their skills, are part of an ongoing multipronged approach encompassing multiple aspects of injury prevention.

In conclusion, our pilot study supports the feasibility of online training for mass educational outreach to healthcare professionals in child passenger safety. These findings may provide better understanding for future interdisciplinary child road safety and injury prevention efforts in Singapore.

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