What should I say to parents of children four to eight years of age regarding booster seats in cars?

Part A: Evidence-based answer and summary

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There is clear evidence that booster seats reduce motor vehicle-related injuries among children four to eight years of age (1,2). Despite this fact, booster seats are currently underused in this population. Evidence from controlled studies shows that a variety of interventions will increase parental use of booster seats. Interventions that include more than one tactic (ie, a combination of education and incentives, or a combination of education and distribution of a free booster seat) may be the most effective.

The Canadian Paediatric Society recommends that children weighing between 18 kg and 36 kg (between 40 lbs and 80 lbs), and having a height of less than 145 cm (57 inches), or are eight years of age or younger, should use a booster seat and be placed in the back seat of a vehicle (3). Booster seats improve seat belt fit among children by elevating them off the seat and allowing the seat belt to lie across the pelvis, and ribcage and shoulder, rather than the stomach and neck. Abdominal viscus injury, abdominal bruising and fractured vertebrae, that occur among children not using a booster seat, are collectively known as 'lap-belt syndrome', and refer to any injury in which the improperly fitting seat belt has actually injured the child in lieu of protecting him or her (4).

Among children, nonuse and misuse of age-appropriate child restraints are common factors associated with motor vehicle-related morbidity and mortality (5). Booster seats can reduce the risk of injury in a motor vehicle collision by up to 59% (6). Compared with children who are appropriately restrained in booster seats, those restrained by a seat belt alone are at 3.5 times the risk of injury and 4.2 times the risk of head trauma (7,8). A study (9) between 1998 and 2002, examining motor vehicle collisions involving children four to seven years of age from Wisconsin, USA, showed that 16 of the 28 observed deaths, and 84 of the 144 hospitalizations would have been prevented if the children were using booster seats at the time of the collisions (9). While similar statistics are not available for Canada, self-reported booster seat use among Canadians was found to be 28% (10); approximately 400 Canadian children are killed or hospitalized with a serious injury each year due to a motor vehicle collision (unpublished data). Between 1994 and 2000, hospital admissions have decreased by 40% to 50% among children zero to four years of age, and 10 to 14 years of age, but only declined by 18% in children five to nine years of age (unpublished data).

Current research demonstrates that the prevalence of booster seat use is low. Often, children are incorrectly

placed in a seat belt when they are too young. In 1997, Decina and Knoebel (11) found that 75% of preschool-aged children were restrained only by a seat belt. Winston et al (12) examined four years of restraint patterns among children younger than nine years of age who were in a collision in one of 15 American states. Between 1998 and 2002, the use of booster seats increased from 3.8% to 8.9% among children four to eight years of age. Among children four to eight years of age from Michigan, USA, only 194 of 3420 children were restrained in a booster seat and 1255 children were unrestrained (5). The age of the driver and his or her own seat belt were the strongest predictors of booster seat use.

When asked about booster seat use among their four- to eight-year-old children, parents in Michigan stated that their primary motivation to use booster seats was safety (13). Reasons for nonuse included lack of enforcement, perceived inconvenience, refusal by the child, parents believed that their child was too big and lack of knowledge regarding the safety benefits derived from using a booster seat. Parents reported that mandatory booster seat legislation would increase the likelihood of booster seat use. Simpson et al (14) conducted focus groups in an effort to determine strategies to increase booster seat use. Parents identified media campaigns, legislation, education and the requirement of older children to use restraints as potential methods to increase booster seat use (14).

BARRIERS TO BOOSTER SEAT USE

A Cochrane review (15) was conducted to examine methods to increase booster seat acquisition and use among parents of children four to eight years of age. The authors completed a methodologically rigorous, systematic review, which aimed at identifying all randomized controlled trials and controlled prepost studies that compared the effectiveness of programs that promoted booster seat use, regardless of language or publication status. Interventions included distribution of booster seats, education programs with and without incentives, legislation requiring booster seat use and its enforcement, and campaigns aimed at the promotion of booster seat use. Outcomes of interest included crash-related deaths and injuries among children four to eight years of age, who were and were not using a booster seat; children observed using a booster seat; and booster seat use reported by the driver.

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Five studies (16-20) were included in the present review. Two were randomized controlled trials and the remaining three studies were not randomized. The length of follow-up varied from two weeks to 15 months. Three studies reported observed booster seat use, one assessed self-reported booster seat use, while the remaining study examined self-reported booster seat use in combination with the redemption of a booster seat coupon.

The presence of any booster seat intervention resulted in a significant increase in booster seat use when compared with no intervention (RR 2.18 [range 1.12 to 4.23]). In particular, education programs resulted in a significant increase in reported or observed booster seat use compared with no educational intervention (RR 1.32 [range 1.16 to 1.49]). The combination of education and distribution of free booster seats, as well as the combination of education and incentives, significantly increased booster seat use compared with no intervention (RR 2.34 [range 1.50 to 3.63]; RR 2.75 [range 2.41 to 3.13], respectively). The presence of law enforcement resulted in no significant change in booster seat use compared with no intervention (RR 1.04 [range 0.91 to 1.20]). The authors concluded that education combined with an incentive or the distribution of free booster seats were the most effective interventions to increase booster seat use among children four to eight years of age.

There are three main limitations to the present systematic review. First, self-reported booster seat use is not as reliable a measure as observed booster seat use and, consequently, parents may overestimate the true prevalence of booster seat use. Second, the follow-up period in three of the five studies was less than six months, and it is unclear

whether the effects of the intervention are sustainable. Third, the studies were conducted in two countries – the United States and Australia; the results may not be generalizable outside these two countries, nor generalizable to the various sociodemographic strata within the two countries.

Since the publication of the above mentioned systematic review, one study (21) has subsequently been published. The study randomly assigned children four to seven years of age who presented to the emergency department, and were not restrained in a booster seat during a motor vehicle collision, into one of three groups – standard discharge orders; 5 min education session consisting of brochures, a video and purchasing instructions; or a 5 min education session and a free booster seat with installation. At one-month follow-up, parents were telephoned to determine booster seat use. The education and free booster seat group reported the greatest booster seat use (98.2%), followed by the education group (5.3%) and the control group (1.3%). Only 65% of the families were available at follow-up.

SUMMARY

Despite the fact that booster seats prevent injuries among children, they are underused. Evidence from controlled studies shows that a variety of interventions will increase booster seat use. Interventions that include more than one tactic (ie, education and incentives, or education and distribution of a free booster seat) may be the most effective. Although it did not significantly increase booster seat use, parents have stated that booster seat legislation would result in increased booster seat use.

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Part B: Clinical commentary

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As primary care physicians, we have a unique platform to be able to have our advice heard and heeded by our patients. This is extremely important in the field of injury prevention, in which our advice to our patients can potentially save their lives or the lives of their loved ones.

Injury is the leading cause of death in children four to eight years of age (1). Furthermore, a leading cause of injury in this age group is due to motor vehicle collisions. This makes it extremely important for primary care providers, who may be a family's only contact with the medical profession, to know and be able to communicate ways in which deaths and injuries due to motor vehicle collisions can be prevented. An important intervention, which has been shown to save lives in children four to eight years of age, is a properly used booster seat. Despite this knowledge, however, it is often underused in this age group.

A Cochrane review (2) on the topic of booster seat use showed that the most effective way to increase booster seat use in this vulnerable population was a combination of an educational program with an incentive or distribution program. Primary care providers and paediatricians can be an excellent source of education for the public. In addition, they can support public health departments by advocating the development of programs for distribution of booster seats to parents who may not otherwise have easy access to them. A succinct discussion regarding booster seat use should be undertaken at each appropriate office or emergency department visit.

Any discussion with a parent regarding booster seat use should focus on three areas to maximize the likelihood of their use. First, primary care providers should aim to convince parents of the need for their children to use booster seats. Second, explaining how the ergonomics of a booster seat work – lap and shoulder belt combination allows the restraint to fit properly over the child's hips and shoulder, rather than his or her stomach and neck – provides an important visual picture of why a booster seat is used. Third, citing an approximate 60% reduction in the

risk of injury to their child should also help convince them of the importance of using a booster seat.

Once the parent has a better understanding of why to use a booster seat, which includes an understanding of the safety benefits, the clinician should make sure that the age, height and weight stipulations regarding who should be in a booster seat are clear. Readily available brochures would greatly aid in this effort. All children younger than eight years of age, weighing between 40 lbs and 80 lbs (18 kg and 36 kg) and having a height of less than 145 cm (4 feet 8 inches) require a booster seat (3). These measurements can be easily obtained during the same patient encounter to aid in identifying those children in need of a booster seat.

Finally, the parent should be directly asked why they are not currently using a booster seat, and an attempt should be made to resolve barriers to its use. Hopefully, through these simple interventions, parents will have a better understanding of why they should be using a booster seat for their child. Ideally, to increase the probability for booster seat use, a free booster seat should be available through local community programming. At the very least, parents should be advised, before they leave the physician's office, where they can find the nearest and most economical place to purchase a booster seat.

Injuries account for a large burden of disease in our society, and this is just one of the many areas that primary care providers and paediatricians can have a direct effect in reducing injuries in this high-risk population.

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