

The Effect of Correct Child Restraint Cross-Chest Clip Use on Injury Outcomes in Motor Vehicle Crashes

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Abstract

While correctly used age-appropriate child restraints offer excellent protection to young children in crashes, misuse of shoulder harness straps is common. Australian regulations discourage the use of cross-chest clips on harnesses that can assist in keeping shoulder straps in place, due to concerns about potential neck injury from the clips. This study used the US NASS-CDS database to examine the relationship between cross chest clip use and injury outcomes. For all children aged 0-4 years, correct chest clip use was associated with decreased AIS2+ injury, but it was not associated with neck injury. However, outcomes varied by age.

Background

Cross-chest clips join the two shoulder straps of a child restraint harness, and are meant to help keep the harness in position in a crash (Klinich, Manary, & Weber, 2012). They are designed to connect the two shoulder harness straps with a clip at the level of the axilla (Bulgur, Kaufman, & Mock, 2008), thereby preventing the shoulder straps from slipping off the shoulder. The latter is associated with child's ejection from the restraint or vehicle, and thus high injury risk. However, there has been historical concern about the potential for clip-induced neck injuries during a crash, including in Australia and has resulted in restrictions on their use in The Australian and New Zealand Standards for Child restraints (AS/NZS 1754:2013). No large-scale studies of chest clips' influence on injury or this potential neck injury mechanism have been undertaken. This study aimed to examine the relationship between injury and cross chest clips, using US data where they are common.

Methods

Child passengers aged between 0-4 years of age were identified in the US National Automotive Sampling System (NASS) Crashworthiness Data System datasets (2003-2014). Overall AIS 2+ injury, and the presence of any neck injury were the primary outcome variables. Logistic regression analysis was used to determine associations between chest clip correct use and injury outcomes while controlling for age, crash severity, crash direction and restraint type.

Results

In the whole sample of children aged 0-4 years, correct chest clip use was associated with decreased moderate to severe injury (OR 0.44, 95% CI 0.21-0.91) compared to incorrect/absent chest clip use, and was not associated with neck injury. However, in children <12 months old, chest clip use was associated with decreased AIS2+ injury (OR 0.09, 95% CI 0.02-0.44) and the seven minor neck injuries observed (all AIS1, mostly minor contusions or abrasions) all occurred with correct cross-chest clip use. Of these 7 neck injuries, 3 could have occurred due to contact with the chest clip. For 1-4 year old children, cross-chest clip use was not associated with AIS2+ injury, and correct use carried decreased odds of neck injury (OR = 0.49; 95% CI 0.27-0.87) compared to an incorrectly used or absent cross-chest clip. No serious injuries were directly caused by the chest clips.

Conclusions

Correct cross-chest clip use appeared to reduce injury in crashes, and there was no evidence of serious clip-induced injury.

References

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