

## Revised assessment protocols for assessing ease-of-use in the Australian Child Restraint Evaluation Program (CREP): A countermeasure for child restraint misuse

Suratno, B. R.<sup>1</sup>, Leavy, D.<sup>1</sup>, Haley, J.<sup>2</sup>, Case, M.<sup>3</sup>, Kelly, P.<sup>4</sup>, Paine, M.<sup>5</sup>, Griffiths, M.<sup>4</sup>, Brown, J.<sup>6</sup>

<sup>1</sup>NSW Centre for Road Safety, Roads and Traffic Authority, <sup>2</sup>NRMA Motoring & Services, <sup>3</sup>Royal Automobile Club Victoria (RACV), <sup>4</sup>Road Safety Solutions, <sup>5</sup>Vehicle Design & Research, <sup>6</sup>Prince of Wales Medical Research Institute, UNSW  
email: Basuki\_Suratno@rta.nsw.gov.au

### Introduction

In 1992, the Roads and Traffic Authority of NSW (RTA), the National Roads and Motorists Association (NRMA) and the Australian Consumers' Association (ACA) combined their resources to design and implement a Child Restraint Evaluation Program (CREP). The purpose of this program was to provide consumers with valuable information, and to pressure manufacturers to deliver child restraint systems (CRS) that performed well beyond the requirements of the Australian Standard.

Since its inception, the CREP has included an assessment of both the dynamic performance of child restraints and the ease of use of these restraints. The latter is important as incorrect use of a child restraint degrades the level of protection provided in a crash. In some cases, incorrect use can lead to injury where injury would otherwise have been avoided [1]. Ease of use assessments attempt to measure the inherent propensity for incorrect use.

The original ease of installation and use trials were modelled on a draft ISO CRS fitting trial standard that required recruitment of child and adult subjects. This method proved to be a relatively expensive and time consuming exercise. Following publication of the results from the first CREP series, the protocols were simplified and combined with the NRMA's vehicle compatibility trial. This combination was then used for CREP Stages 2 (1996) and 3 (1999-2000).

More recently, the Insurance Corporation British Columbia, the National Highways Traffic Safety Administration, (NHTSA) and the Consumer Union, developed more advanced ease-of-use assessment models for CRS assessment. This development led to a review of the CREP assessment procedures in 2005. The outcome of this review was more comprehensive ease-of-use assessment protocols and hitherto unused scoring protocols to be used in the revised assessment protocols [2]. This newly revised protocol forms the basis of assessment for the current CREP 4 series and has been presented elsewhere [3].

This paper provides exemplar results obtained from the significantly expanded ease of use component of CREP. In addition to demonstrating the benefits of the revised protocol, the highest priority areas for making significant gains in reducing the propensity for misuse among current Australian child restraints are presented. The role this form of assessment and programs, such as CREP, can have as an effective countermeasure to child restraint misuse are also discussed.

### Methods

The full details ease of use criteria can be found at <http://tinyurl.com/29me5k>. The protocol is similar to that used by NHTSA [4] with additional assessments of some features and a modified feature assessment ranking.

This method requires each feature listed within five categories to be assessed individually. These categories are: Packaging, Instructions, Labels, Securing/Releasing the Child, and Securing/Releasing the Restraint Within the Vehicle (the last was not used for booster seat ratings). The scoring system was divided into four groups: Good, Acceptable, Marginal and Poor. Each feature was then assessed and rated according to the criteria set out for that feature, and where necessary additional comments were made.

Initially, it was intended to use the same scoring protocol as NHTSA [4]. However, trials using this method revealed that the NHTSA method did not usefully discriminate between products. This was contrary to a number of obvious variations seen during assessment. A modification to the NHTSA method that basically takes the NHTSA tripartite scale to a quartile ranking system, and allows for the inclusion of a bonus weighting factor for design features that were particularly innovative and effective in reducing the propensity for misuse overcame the initial lack of discriminatory power.

The resulting scoring and ranking method therefore is unique to CREP but heavily based on the NHTSA's method. In summary, the method scores various features according to a predetermined set of criteria and weights these score depending on the likely severity of the misuse that is being addressed by that feature.

An overall rating for each restraint is obtained by averaging the result obtained for each category. An equal weighting is given to each category since safety related weightings have already been applied when each feature is assessed. The range of results is divided into four, corresponding to A, B, C and D breakpoints, where 83% of maximum and above received an A, 67% and above a B, 50% and above a C. Anything less than 50% results in a D. Each restraint is therefore awarded a rating of A – D depending on its overall score.

### Results and discussion

Exemplar overall ease of use results are shown in Figure 1 to 3. As shown in these results all restraints assessed in this series scored an overall B or C rating. While the protocols allowed for discrimination across the spread of results, the spread was still relatively small. Rather than a reflection of the protocols, this is likely due to the fact that less than half of the currently available restraints have been tested and most of these were from a single manufacturer, meaning most of the instruction booklets, packaging and labels have the same format.

Misuse of a restraint system can have serious consequences in the real world. Field studies have repeatedly reported misuse as the number one factor in serious injury seen in

restrained children in crashes. While educating parents and carers to always ensure their children use the most appropriate restraint correctly is one countermeasure to this problem, encouraging restraints to be designed and sold in such a way that there is little opportunity for misuse is potentially a more effective measure. This no-mistake design approach is currently being adopted in a number of other jurisdictions overseas, and experience gained in ease of use assessments in other countries was used as a basis for the protocols used in the current ease-of-use assessments

An important part of the consumer evaluation process is to provide guidance to manufacturers regarding where the highest priority areas for significant gains in performance lie.

The results of this assessment illustrate that there is significant scope for improving the design and informative material supplied with child restraints to assist in reducing the propensity for misuse. In particular, packaging and securing the child were areas where many restraints need major improvement.

There are some examples of good performance in instructions and vehicle installation; however, there are still several ways that the risk of incorrect installation and use can be minimised. So far no restraint has been eligible for the “bonus” points for performance well beyond the minimum required of the standard. These are available for innovations such as instructional DVDs, quick set-up guides and sensors to alert carers if the CRS is not correctly installed or the child is not correctly using the harness or seat belt. Availability of instructions in other languages is also an area needing attention.

An important part of CREP is the communication of results to consumers and to manufacturers. Knowing whether or not the restraint they are choosing to purchase has been designated as “easy to use” or not could, in itself, counter some forms of misuse. Parent/carers with restraints that are not easy to use might be more likely to seek expert help thereby reducing some potential for misuse. Encouraging consumers to include ease of use in their purchasing decision will increase pressure on manufacturers to improve the design of their restraints, and the informative material supplied with them. This is the ultimate objective of CREP and potentially an important tool in reducing the current levels of misuse among Australian child occupants.

**Conclusions**

The CREP ease-of-use assessment is successful in showing up differences between child restraints to allow for comparison between the best and worst performers within a category and can be used to influence consumers to buy restraints which rate well, and avoid the restraints which do not. Widespread dissemination of CREP ease of use results will assist CREP achieve its objective as a tool to reduce the rate of misuse among Australian child occupants.

**References**

1. Brown J, Bilston L, *Journal of ACRS* 18 (3):34-42 2007.
2. Brown J, et al. Report prepared for the NSW RTA, the RACV, and NRMA, April 2005.
3. Brown J, et al. *20th ESV Conf*, 2007.
4. NHTSA, Federal Register Part II. Vol. 67 No 214:67448-67465 November, 2001.

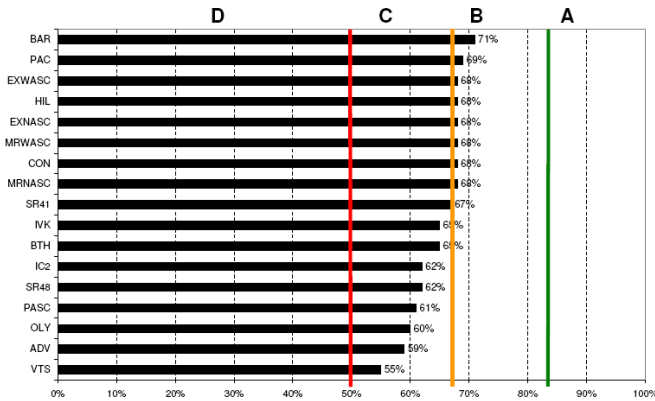


Figure 1: Ease of use results for boosters.

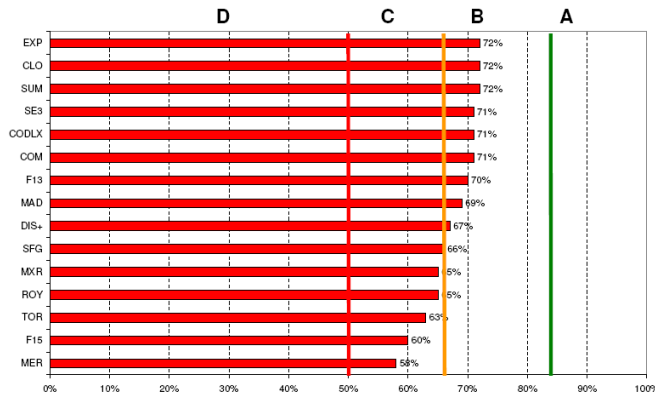


Figure 2: Results for forward facing restraints.

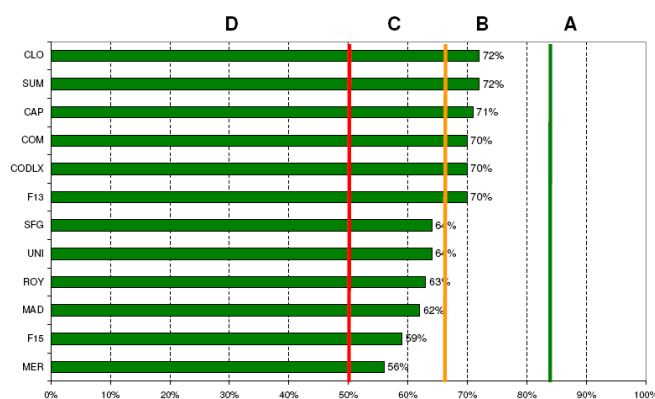


Figure 3: Results for rearward facing restraints.