An Evaluation of the Effectiveness and Cost-Effectiveness of a Rural Run-Off-Road Crash Program in Western Australia

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Abstract

Single vehicle run-off-road crashes accounted for almost 60% of all road deaths and serious injuries in regional and remote Western Australia (WA) from 2008 to 2012. A total of 984 kilometres of rural WA roads received road treatments under the rural "Run-off-road Crash Program" from 2012 to 2015. This study aims to evaluate the effectiveness of the WA program in reducing the frequency and severity of run-off-road crashes, as well as the program's cost-effectiveness in terms of savings to the community for each dollar invested.

Background

Drivers lose control of their vehicle and run off road for various reasons including distraction or fatigue (Szwed, 2011). In rural areas, drivers of vehicles that come into contact with unsealed road shoulders at high speed are likely to lose traction and control. This loss of control frequently results in rollover crashes or collisions with roadside objects often resulting in fatalities or serious trauma.

The counter measure audible edgelines is a surface treatment applied to the edge of the travel lane that can create noise and vibration to alert inattentive drivers, while s*houlder widening and/or sealing* provides an opportunity to recover safely.

Methods

A quasi-experimental before and after study design was used to compare: (1) run-off-road crashes (all severities); (2) run-off-road casualty crashes (fatal, hospitalisation, and/or medical treatment); and (3) run-off-road killed or serious injury (KSI) crashes (Office of Road Safety, 2014), at sites treated during 2012-2015. An economic analysis estimating the net present value (NPV) and benefit-cost ratio (BCR) was also performed on the treated sites to indicate the cost-effectiveness of the WA program.

Crash data was obtained up to 31st December, 2015, from the Integrated Road Information System maintained by Main Roads WA. The Road Use Movement code was used to identify run-off-road crashes at each site (before and after treatment). On the basis of Nicholson (1986), this study utilised five years of pre-treatment crashes, and up to five years post-treatment (if available). The regression to the mean effect was considered. And in the absence of a comparison group, the general trend of run-off-road crashes in rural WA was also considered.

Main Roads also provided information on treated sites and their costs.

A generalised estimating equation Poisson model (Dupont, 2002; Twisk, 2003) that accounted for exposure was used to compare crashes before and after each treatment. For evaluating the WA program's cost-effectiveness, the NPV and BCR of treatment over each site were calculated taking into account the: (i) initial capital outlay, (ii) ongoing costs, (iii) expected treatment life, (iv) crash reductions, and (v) cost of each crash based on severity, with (v) provided by Main Roads using average costs from rural WA crashes in 2011-2015 based on a Willingness to Pay approach.

Results

The final sample of 57 sites reported a significant 35.5% reduction in run-off-road crashes for all crash severities ($p<0.001$), a significant 18.4% reduction in run-off-road casualty crashes ($p=0.021$), and a significant 25.6% reduction in run-off-road KSI crashes ($p=0.031$).

The NPV and BCR across the 57 sites were estimated to be $100.2 million and 2.1 respectively, indicating there were cost savings to the community of $2.10 for each $1 invested.

Conclusions

Run-off-road crashes are especially problematic in rural WA, with their fatalities and serious trauma placing a great burden on society. Given the positive outcomes in both crash reductions and cost savings, it is recommended WA's "Run-off-road Crash Program" be continued and extended to roads not yet treated by the countermeasures.

Further investigation into crash migration and comparison with programs in other states are ongoing.

References

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