

An Evaluation of the Effectiveness of the State Black Spot Program in Western Australia, 2000-2014

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Abstract

The Western Australian (WA) State Black Spot Program defined a Black Spot as an intersection or non-intersection road section with a high incidence of crashes. All road classifications were eligible for funding. The program targeted existing Black Spots, and potentially hazardous locations selected on the basis of formal road safety audits.

This study aims to evaluate the effectiveness of the WA program in reducing crash frequency and severity at existing Black Spots treated between 2000 and 2014. The results will provide Main Roads WA and other road safety organisations with reliable and objective information for enhancing strategies for future investment.

Methods

A quasi-experimental before and after study design was used to compare the frequencies of: (1) all reported crashes; (2) casualty crashes (fatal, hospitalisation, and/or medical treatment crashes); and (3) killed or serious injury (KSI) crashes (Office of Road Safety, 2014), at existing Black Spot sites which were treated between 2000 and 2014.

Crash data was obtained up to 31st December, 2015, from the Integrated Road Information System (IRIS) which is maintained by Main Roads WA. This data included the crash date, crash severity, specific crash location, and local government area of the crash. On the basis of Nicholson (1986), this study utilised five years of pre-treatment crashes, and up to five years (if available) of post-treatment crashes which excluded the treatment construction period. The regression to the mean effect was considered. And in the absence of a comparison group, the general trend of crashes in WA was also considered.

Main Roads WA also provided information on the treated Black Spots. This included information about the treatment description and treatment start and finish dates. A generalised estimating equation (GEE) Poisson model (Dupont, 2002; Twisk, 2003) was used to take into account the correlated nature of the repeated measures of the study design, as well as the different length of post-treatment exposure available for each site.

Results

The final sample of 903 treated Black Spots included for analysis all had at least one reported crash in the previous five year period prior to treatment. They consisted of 676 metropolitan and 227 rural sites. The average length of follow-up exposure crash data post treatment for the 903 sites was 55.1 months. Overall, they reported a significant reduction of 17.5% in all reported crashes, a significant 30.3% reduction in casualty crashes, and a significant 22.0% reduction in KSI crashes ($p < 0.001$ for all three).

In the metropolitan area ($n = 676$), the treatments analysed were heavily weighted towards intersection treatments ($n = 634$). The effectiveness of the WA Program in the metropolitan area was mainly due to the high crash reductions at these 634 metropolitan intersections, with significant

reductions in all reported crashes by 17.5%, casualty crashes by 29.8%, and KSI crashes by 18.3% ($p < 0.001$ for all three) at these 634 intersections.

The evaluation found 119 rural intersections that received treatments showed significant reductions in all reported crashes by 23.1%, casualty crashes by 46.3%, and KSI crashes by 44.7% ($p < 0.001$ for all three). Rural road sections that received treatments ($n = 108$) also showed significant reductions in the same three crash types, by 39.0%, 44.8% and 46.0% respectively ($p < 0.001$ for all three).

Conclusions

The fatalities and serious trauma that result from crashes at Black Spots place a great burden on society. This study found the WA State Black Spot Program to be effective producing positive outcomes for the community in terms of road safety, and recommends the WA program to be continued and extended to hazardous locations not yet treated by the appropriate countermeasures.

References

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