THE EVALUATION OF MOBILE ROAD SAFETY CAMERAS IN NORTH YORKSHIRE: SUMMARY OF METHOD AND KEY FINDINGS

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1. Introduction

Road casualty reduction is a key aim of transport policy and relies heavily on the implementation of effective road safety measures at known collision hotspots. This usually requires significant financial investment from finite available budgets. Road safety practitioners are therefore very keen to understand the impact that these measures are having, particularly for guiding future investment decisions. This is usually performed through before-and-after comparisons of casualty rates although these analyses are often prone to errors, usually from selection bias, resulting in well-documented regression-to-mean effects. Researchers at Newcastle University have developed new methods for evaluating the impact of road safety measures which are able to take common sources of error into account to provide more realistic estimates of the effectiveness of site-based road safety interventions[1]. Newcastle University were approached by North Yorkshire County Council and North Yorkshire Police in 2015 to apply these new methods in the county to evaluate the effectiveness of mobile road safety cameras in terms of casualty reduction.

2. The Approach

Usually there will have been some change (ideally a reduction) in the number of casualties observed at a collision hotspot before and after treatment. Not all of this reduction is necessarily due to the treatment – some may be due to general trends in casualty numbers and some may be due to selection bias (i.e. regression-to-mean effects). The remainder, we assume, is due to the actual treatment itself and it is this number that should be used for evaluation purposes. Ignoring these non-treatment effects may over-estimate the effectiveness of the treatment. The method essentially builds a statistical model to combine what we have actually observed in the before and after period in terms of casualty numbers at the treated sites, with what we would expect to observe based on a set of 'control' sites (i.e. sites that are as near a mirror image of our treatment sites as possible, but without the high casualty counts that have led our treatment sites to be identified as hotspots). Using appropriate statistical techniques and a general estimate of casualty trends based on historical data, this enables us to estimate how many casualties would not have happened anyway, and therefore how much of the reduction is actually attributable to the treatment (in this example mobile road safety cameras). These techniques are now available through the RAPTOR software developed by the team at Newcastle University[2].

3. The Collision Data

The research team were provided with casualty data for 22 sites in North Yorkshire for 2011-2014 to cover the periods immediately before and after the introduction of mobile safety cameras. No casualty data were available for a set of control sites from the same area. Therefore data from a set of pre-existing control sites in the Northumbria police force area were used in the analysis. Statistical tests confirmed that these Northumbria control sites were an acceptable set of control sites for the treatment sites in North Yorkshire. In total there were 46 casualties at the 22 sites in North Yorkshire in the before period and 33 casualties in the after period, and these formed the basis of the evaluation of the mobile safety cameras.

4. Key Results and Findings

Casualties			Estimated breakdown of raw reduction in casualties		
Before	After	Raw reduction	RTM effect	Trend effect	Safety camera effect
46	33	13	4.5	0.5	8

Table 1: Raw casualty figures with raw reduction between the before and after period (left-hand-side); estimated breakdown of raw reduction into components of RTM, trend and treatment effect (right-hand-side). Results here have been aggregated across the 22 treated sites.

Table 1 shows key findings as identified by the research team at Newcastle University. The results show that an observed reduction of 13 casualties between the before and after periods. However, our analysis suggests that we would have expected a reduction to approximately 41 casualties anyway, even without any mobile safety camera scheme. Of this reduction of five casualties from 46 to 41, we estimate RTM and trend contributions to be around 4.5 and 0.5 casualties respectively. Thus, the remaining reduction from 41 casualties to 33 casualties we attribute to the mobile safety cameras themselves, giving an estimated treatment effect of 8 casualties. In terms of percentage reductions, we estimate a 20% reduction in casualties owing to the mobile safety cameras.

Contact details: For more information regarding the analysis and the RAPTOR software used in this study please contact either of the authors at [redacted]

References:

[1] Fawcett, L. and Thorpe, N. (2013) Mobile safety cameras: estimating casualty reductions and the demand for secondary healthcare. *Journal of Applied Statistics*, DOI: 10.1080/02664763.2013.817547 http://www.tandfonline.com/doi/abs/10.1080/02664763.2013.817547

[2] Fawcett, L., Thorpe, N., Matthews, J. and Kremer, K. (2017). A novel Bayesian hierarchical model for road safety hotspot prediction. *Accident Analysis & Prevention*, **99**, pp.262-271. http://www.sciencedirect.com/science/article/pii/S0001457516304341