

Construction of Injury and Road closure time Prediction Algorithm in Highway Accidents

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Highways are designed for the movement of large numbers of vehicles at high speeds (compared to ordinary roads), and as a result, accidents that may occur on highways are more likely to be of a higher severity. Additionally, there are more issues with emergency activity on highways following an accident than on general roads, and highway closures cause significant traffic congestion and economic loss. The purpose of this study was to enable rapid occupant rescue using Advanced Automatic Collision Notification (AACN), and provide drivers with traffic information to make informed traffic route choices. Binomial and ordinal logistic regression analyses were performed using highway accident data from Institute for Traffic Accident Research and Data Analysis (ITARDA) database to predict driver injury and road closure times specifically for highways.

Fig.1 shows an example of predicted accident injuries and road closure times with the conditions: passenger car, over 65 years old driver, single vehicle accident, and pseudo $\Delta V = 80$ km/h. The fatal and serious injury (FSI) rate was 60%. The highest probability of road closure time was 1 hour, with a probability of 26%.

Fig.2 shows the relationship between pseudo ΔV and FSI rates by vehicle type for under 65 years old drivers, in a single vehicle accident. All vehicles had an increase in FSI rates with an increasing pseudo ΔV . The vehicle class with the highest risk of FSI was kei trucks, the second highest FSI was medium trucks, and the third highest FSI was kei passenger cars.

Fig.3 shows the relationship between pseudo ΔV and road closure times for passenger cars, in a single vehicle accident for under 65 years old drivers. The probability decreased with increasing pseudo delta V up to 1 hour of closure, but increased from 2 hours of closure. Therefore, for passenger cars, it can be said that the greater the ΔV and the more significant the accident, the more likely it is that there will be a road closure of 2 hours or more.

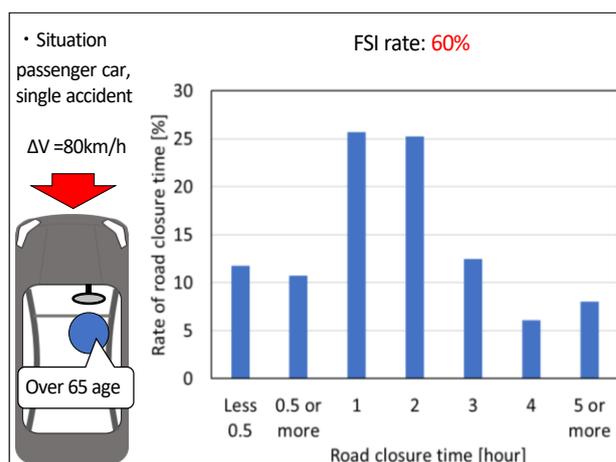


Fig.1 Examples of injury and road closure times prediction

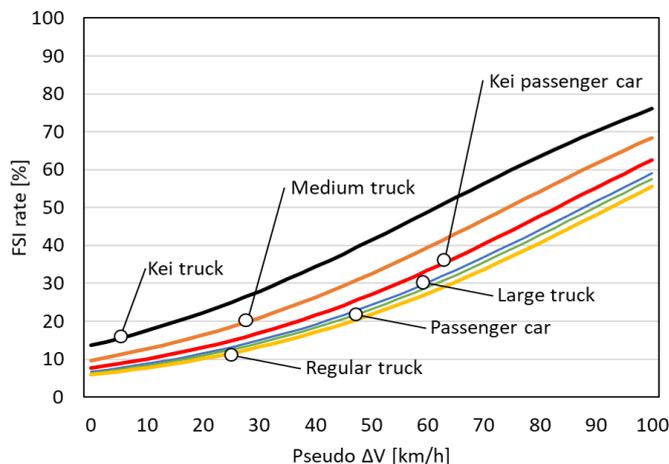


Fig.2 Risk curves based for different vehicle classes
 Situation: under 65 years old, single vehicle accident

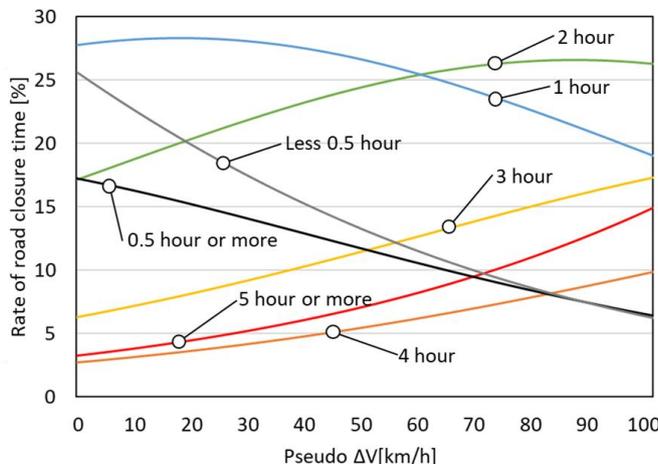


Fig.3 Risk curves based with road closure time
 Situation: passenger car, single vehicle accident, under 65 years old