

# MOTOR VEHICLE CRASHES: INJURY COSTS TO THE COMMUNITY AND A METHODOLOGY FOR LOCAL GOVERNMENT TO REDUCE THIS BURDEN OF INJURY

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## Abstract

There is no shortage of data available to indicate the enormity of the cost to communities of road crashes. Every country suffers the ignominy of death and injury on its roads and this is rightly considered a situation that should not exist.

One problem faced by all governments in this regard is the appropriate addressing of the trauma cost with the most cost effective strategy to reduce the considerable burden on government spending.

Almost all reference to road trauma costs refers to death, serious injury and injury crashes. Just analysing the definition of these categories can produce significant problems with data as what one jurisdiction sees as being a 'serious' injury may differ considerably from another. Even the definition of death related to a road crash carries a multiplicity of definitions.

The issue of defining serious injury, and how this correlates to community costs, is investigated in this discussion. Can accurate identification of crash locations, where serious injury has been clearly identified, empower councils in reducing injury, crash occurrence, mitigate risk and address community expectations?

With local government owning the majority of the roads network, perhaps it is time to look at this as being a problem in need of addressing from the local level.

**Key Words: motor vehicle crashes, risk, accurate data, road safety**

## Introduction

Mention of road safety and local government in the same sentence usually evokes polarised views on responsibility and cost shifting. Over 80% of NSW roads are owned by local government and so funding to maintain, repair, rebuild and rectify problems with this network are always going to be a sticking point.

Often, data available to councils regarding crashes is up to 2 years old when received. If up to date data is required by councils for legal purposes, it becomes a difficult position to defend when knowledge of specific locations

where serious crashes have occurred is not easily identifiable.

Apart from merely having information sooner, councils can benefit from having more accurate data on the exact location of crashes and how much those crashes cost the community.

Is the data currently used accurate enough, if somewhat delayed, to provide such detail? Would more accurate information on crash location and severity benefit councils in any tangible way?

A methodology for providing councils with specific data to aid in minimising risk and reducing crash injuries is contained in the remaining report. It is believed that greater detail in the provision of data can link to more prescribed funding application at the least, and greatly improved safety at best.

### **What is a serious injury?**

Information on the severity of crashes is frequently provided in terms of minor, serious and fatal. It is therefore imperative that this information accurately portrays its intention and everyone involved understands what is being referred to.

Some have indicated that it doesn't really matter to councils if this is not so accurate- the overall costs of crashes 'amortise' out and a picture of the risks and treatment needs become clear ultimately. This assumes that the current data is close to providing what is needed to create the picture of the health of the road network.

Is a serious injury crash one where someone is hospitalised for several weeks and is then unable to work without rehabilitation? Or is it someone who was taken to hospital with no apparent injury, for 'clearance' by doctors, to ensure they were ok? Obviously the community costs for rehabilitation of both these people would be significantly different.

It is these examples which highlight the problem of defining what a serious injury is and how much that injury costs the community. Obviously, a serious injury will have a significantly higher community cost. The Bureau of Transport Economics (BTE) Report (*Road Crash Costs in Australia*, 2000) indicates that during the 1990s there were in excess of 20 000 serious injury crashes in Australia each year. The NSW RTA Accident Statistics (*Roads and Traffic Authority*, 2006) for 1997-2006 indicates there were between 24 454 and 25 439 injury crashes each year in NSW alone, with a peak of almost 30 000 in 2000. The RTA imputes the number of *serious* crashes from this yearly total to be over 8000.

The definition for serious injury, used by many statisticians in Australia, is from the IRTAD (International Road Traffic and Accident

Database). This database compiles definitions of serious injury from many countries. For Australia, a serious injury is defined as someone "*Admitted to hospital as a result of injuries from a road crash (IRTAD Special Report, 1998)*".

An Australian College of Road Safety (ACRS) report on Injury Statistics (*Australian College of Road Safety, 2009*) stated that "*there is no common definition across Australian jurisdictions of a 'serious injury crash.'*" This report also states that "*these problems become significant because they mask the true extent of road trauma.*"

The Australian Transport and Safety Bureau (ATSB) (*Australian Transport Safety Bureau. 2004*) also use the IRTAD system of identifying serious injury so this again may not be providing an accurate picture of serious injury throughout Australia.

For the last 5 years, the average total number of serious injury patients treated in trauma hospitals, in NSW, due to road trauma, was 970 (*NSW Institute of Trauma and Injury Management. 2009*). (Refer to Appendix A)

The disparity of this data shows the desperate need for accurate information which can accurately guide application of remedial measures.

### **A standardised measure**

The Abbreviated Injury Score (AIS) was developed in 1971 (*Songer T. PhD, 2000*) with the specific intention of assessing motor vehicle injuries and giving them some point of direct comparison and subsequent cost implications. The AIS is primarily an anatomical measure of injury severity. It classifies severity based on body region injured and the magnitude of the injury to that region.

These were determined by the subjective assessment of a group of medical experts. So while not perfect, they do reflect as accurately as possible, a method of simply stating the level of specific injury. This is crucial to determining accurate costs for injuries.

## What advantages does this provide councils?

The chart in *Appendix B* indicates the specific values attributed to road crashes based solely on the level of injury, and whether the injuries were single or multiple.

By knowing the nature of the injury it is now clearer to see that specific costs can accurately be apportioned to these injuries indicating how much an individual crash cost the community.

The squares highlighted in the *Appendix B* chart could be reference points indicating a prescribed 'level' of injury at which a significant amount of cost had been borne by the community which now requires more investigation. From an AIS of 3, with more than one injury, it can be seen that this will cost the community over \$100 000. To provide some physical reference to this, an AIS of 3 could be a badly broken leg and broken ribs or head injury with someone knocked unconscious.

## Inadequacies of current data

The data currently provided to councils comes predominantly from RTA and Police sources.

This data does not provide the information required to accurately note serious injury crashes or their locations. This is not the fault of the Police and is more a reflection on the way data is collected. The RTA is seeking data for different purposes (to indicate behavioural problems with road users for example) and is not designed to specifically gather serious injury data.

Police are not mandated to attend every crash and frequently are unable to do this due to limits of resource allocation. If the Police are unable to attend a reported crash, they 'sublet' the incident to the Ambulance Service. The Ambulance Service is mandated to attend urgently so the Police fulfil their 'duty of care' by ensuring the appropriate resources attend.

This occurs up to 4000 times a month in NSW, resulting in approximately 1000 transports to hospital. As only 3-4% of all reported motor vehicle crashes result in a serious injury, this equates to 30-40 serious injuries per month not reported completely accurately due to the

Police arriving either late to the scene or after the incident is over. This significantly affects the accuracy of data available to the RTA and Police.

The exact location of incidents is also not always captured in the current data making it difficult to use the data to accurately locate the cost of serious injuries. If a Police Officer enters the incident onto their database from the Police station and not the crash site, this is what is used as the crash location.

Apart from the occasional motorcycle crash where only a rider's pride is hurt, and the incident is not reported, the Ambulance Service *does* attend virtually every incident on the roads. It is unlikely that there will ever be the ability to capture every crash as some will be on private roads or property but there are very few that the Ambulance Service does not attend. Those not picked up through ambulance data are captured by the hospital system.

## What data could be used?

Through an association with the Ambulance Service of NSW, the IPWEA could access information necessary to provide an accurate picture of crash costs and locations. Trauma hospital data, combined with Ambulance data, could create a picture of each crash and provide:

- Accurate information on location (GPS coordinates and street address)
- Time and date of crash
- Type of vehicle and damage to that vehicle
- Injury Severity Score and Abbreviated Injury Score of all victims
- Driver, passenger, motorcyclists, pedestrian, etc.
- Outcome of crash (survived or died)
- Whether Police attended scene at the time or later

There are many other aspects which could be included but these key elements provide much information for councils.

If the injury level is provided, the costs can be extrapolated from the above chart.

Further to this, GIS maps can be produced indicating the nature of the incident and the severity, thus showing direct costs for the entire LGA road network (From January 2009, data on minor injury costs is also collected providing greater depth to this information).

Arrangements have already been put in place which will hopefully soon see the Road Safety Project Manager from the IPWEA (NSW Division) working closely with the Ambulance Service of NSW to establish the exact content and process of getting accurate data to councils. 2 councils have already indicated their interest in participating in a trial.

### **Case studies**

Below are 2 cases studies, one regional and one city based, to indicate how such a system could benefit councils directly.

#### Case one:

*A crash occurs on the Crookwell Road, 35km north of Goulburn. At the time, one patient is transported to a Sydney Trauma hospital via helicopter due to the severity of their injuries whilst another in the vehicle is taken to Goulburn.*

*Data is reviewed and sent to the Goulburn Council representative, who will be responsible for maintaining the database for crash costs, 2 months after the incident.*

*(The data volume will be manageable as there are less than 1000 serious injuries per year over the 152 councils)*

*The data will indicate specific locations of crashes, including GPS coordinates, costs calculated from the known data on injury levels, time of day, type and number of vehicles and whether the injured person was a driver, passenger, etc. This will appear on a GPS map which shows costs and number of incidents throughout the LGA.*

*Details of this crash may indicate the patient received injuries to an AIS of 5 meaning the costs to the community of this crash was \$860 000.*

*Other data will be included showing the other patient taken to Goulburn received injuries to an AIS of 1 meaning their injuries cost the community \$11 700.*

*Each 3 months, Councils will receive a report indicating the 'spread' of such crashes and their costs. This data will be available retrospectively for many years as the Ambulance database can provide this for serious injuries previous to 2009.*

*As a clearer picture develops, there will be an opportunity to use this data to examine crash sites with road safety audit reports. This is not crash investigation but looking only to investigate what part the road could have played in the incidents which have occurred. Creating guidelines for the initiation of these audit reports could standardise council's approach to examining risk levels on its road network and provide a method of prioritising treatments.*

#### Case two:

*3 people are injured in an intersection crash on the Princes Highway, Kirrawee. 2 of these people are taken to St George Hospital and one to Sutherland. The person at Sutherland is later transferred to Prince of Wales Hospital due to a suspected spinal injury.*

*When the data arrives at council 3 months later, it is possible to clearly identify the crash as data on each patient has been collected from Trauma Hospitals and matched to the Ambulance Service database. GIS mapping indicates the costs each injured person experienced indicating what this one crash has cost the community.*

*As in the first case, information gathered over time could indicate exactly what a specific location has cost the community and be used to initiate road safety audits of these areas.*

*(The Princes Highway was specifically used in this case as identifying exactly where a crash*

occurred on this long road is a piece of information often not available)

### **Legal implications**

It should be remembered that the primary reason to develop such a network will be to provide councils with information which can aid in the reduction of people being injured or dying on council roads.

Whilst road safety is still a state government priority, the data gathered this way can more accurately provide methods of treating the road network in a manner which specifically addresses known problems.

Another major benefit of this data is that the legal aspects of foresee ability and reasonableness could be fulfilled.

There can only be a certain amount of foresee ability in road design.

If a road appears to comply with standards and there have been few crashes on any section it *may* be considered to be reasonably safe.

If design is poor and there are obvious areas of risk to road users it could be foreseen that there is increased risk potential and thus it is foreseen to be a problem. But how does council determine this level of risk? It is not possible for a council to 'audit' its entire road network. It is also not considered to be the best response to merely 'fix up' a section of road when a fatal crash has occurred on it.

The above scenarios indicate how this data could meet council's needs in terms of clear identification of the problem with an ability to prioritise works based on accurate information.

The gravity and probability of any situation also indicates the need for applying a duty of care. The more evidence to suggest a risk exists, the greater the requirement to rectify the problems. Knowing specific details about the problems is often what is lacking from council data.

The issue of what is a reasonable action to take must be identifiable, from council's perspective, if a standardised form of analysis and action to take is to be applied to roads.

Measurement of change in injury rates will be simpler to apply with this data demonstrating effectiveness of treatments.

### **Willingness to pay**

For the general community, it is sometimes difficult to perceive value for money in much of what is done regarding roads. By providing councils with accurate information of crash costs and sites, the community can be made aware of the exact state of the road network and how funding can be allocated.

This method of estimating the cost of injury could be applied to the above data (*Centre for Disease Control. 2009*). By adequately identifying costs for levels of injury, and providing evidence of patterns of where these injuries are occurring, it creates a more accurate image of how funds could be spent by councils to prevent further episodes.

In an environment where transparency is mandated, demonstrating actual costs to rectify proven problem areas addresses the tenets of willingness to pay which '*tends to reflect the minimum value that people put on a given level of environmental quality (University of Wollongong. 1996)*'.

### **Conclusion**

It is recognised that local government is not in a position to simply apply the above solution to rectify identified problems on a road network.

Funding arrangements for local government regarding road maintenance and treatment of known problem areas is involved and requires the use of data in its current form.

What this paper is intended to provide is a means of seeking to move beyond what is used for convenience sake to a solution which can more accurately address the specific requirements needed to continue to maintain a reduction in injuries and death on local government roads.

Development of this approach could be easily shown to provide considerable cost benefit. The challenge will be enabling such a change to be used to provide data to the various funding bodies in preference to currently used data.

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## Appendix A:

### Comparison of estimates of serious injuries

SOURCE	NUMBER OF SERIOUS INJURIES PER YEAR	TIME FRAME	DEFINITION OF SERIOUS INJURY	ALLOTTED COST PER PERSON
RTA	8874 (NSW)	2003	Data imputed from all injury categories.	\$397 000
BTE	5967 (NSW)	1990-1999	An injury which resulted in a person being admitted to hospital for at least 24 hours and survived (ATSB database used)	\$325 000
ATSB*	Approx. 21 000 (Australia)	1989-2001	An injury which resulted in a person being admitted to hospital for at least 24 hours and survived.	
NSW IRMRC**	Approx. 17 380 (NSW)	1998-1999	Admitted to hospital.	\$32 000p.a. Lifetime Costs
ITIM***	970 (NSW)	2002-2006	Injury Severity Score > 16 (based on Abbreviated Injury Score-AIS)	

\*Australian Transport Safety Bureau

\*\*NSW Injury Risk Management Research Centre

\*\*\*Institute of Trauma & Injury Management

## Appendix B:

Average cost of single and multiple injury crashes by injury severity level *The Cost of Trauma: Single and Multiple Injury Cases*, Measuring the burden of injury: *The 3rd International Conference Proceedings Baltimore, Maryland - May 15th and 16th, 2000 DOT HS 809 2 25April 2001*

<b>Average Cost of Road Crash Casualties with Single and Multiple Injuries by Injury Severity Level</b> Average Cost by Level of Injury Severity (\$000)						
<b>Number of Injuries</b>	<b>Minor (AIS 1)</b>	<b>Moderate (AIS 2)</b>	<b>Serious (AIS 3)</b>	<b>Severe (AIS 4)</b>	<b>Critical (AIS 5)</b>	<b>A I I (AIS 6)</b>
Single	11.7	28.7	61.0	243.6	860.4	17.3
Multiple	21.4	44.9	107.6	189.3	616.8	42.7
All Cases (average)	17.4	41.7	101.2	192.6	646.0	34.2

## Biography:

Paul Riley has a history in mechanical engineering, working for Jaguar Cars many years ago. He became involved in road safety during 19 years with the Ambulance Service of NSW, as a Paramedic, Educator and Project Officer (investigating dealing with trauma, speaking to community groups and planning for major events).

More recently his desire to help in reducing the impact of unnecessary road injury and death lead him to work as the Road Safety Project Manager for the IPWEA (NSW Division). Since then he has gained national accreditation of the Road Safety Auditor Course and managed the redesign of the Register of Road Safety Auditors. Managing the Local Government Road Safety Program involved working with Road Safety Officers in councils; Paul believes RSOs have the capacity to add significantly to community road safety.

Paul researched and wrote a recent report on motor vehicle crash costs for the Roads & Transport Directorate. The above paper is based on this work.

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