

Strategies to Advance Road Safety in Australia

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Abstract

As part of a review of the 2011 Australian National Road Safety Strategy research was undertaken to both assess new developments in road safety, including new and improved countermeasures, and to analyse crash and other data to identify any necessary changes in the priority areas for reducing road trauma. The research consisted of three components; a literature review, stakeholder consultation and data analysis. The literature review included recent publications, national and international strategies and current research in Australia and overseas. Strategies from the most successful road safety countries were of particular interest. The major areas covered were vehicle technologies, vulnerable road users, innovative infrastructure treatments, integration of road safety with other society goals and communication with the community. Consultation was carried out with a range of stakeholders and road safety experts. They were asked to identify significant countermeasures implemented in the last three years, to suggest where major problems still exist and to discuss where further progress could be made. Analyses were carried out using crash data and hospital injury data to help in understanding patterns of crashes and injury and focus countermeasures to the most relevant crash types, locations, driver behaviours and road user types. Other data sources used included speed surveys, reviews of the composition and safety of the vehicle fleet and exposure data. This paper will bring together the different components of the project to discuss new developments in road safety and help set strategic directions for the future.

Introduction

The National Road Safety Strategy (NRSS) (ATC 2011) was released in May 2011 based on Safe System principles. At its core is the aspiration that no one should be seriously injured or killed as a result of using the road system. The strategy provides a guide for road safety directions, priorities and initiatives until 2020 and was initially supported by an action plan (the “First Steps” agenda) covering the years 2011-13.

The strategy included a requirement for a review in 2014. As part of this review research was undertaken to identify new opportunities to reduce road trauma, examine any changes in crash and injury patterns and identify priority areas to assist in the development of a second action plan.

The research included a targeted literature review, consultation with road safety experts and stakeholders, data analysis including an examination of hospital separations data and the identification of priority areas for reducing road trauma.

Targeted Literature Review

The literature review was mainly restricted to documents published between 2011 and 2014, although some earlier work was included if considered relevant. Additional unpublished reports were also sourced where possible. The initial literature search identified that new information was available for a limited number of areas including vulnerable road users, older drivers, road safety communication and vehicle technology. Only the major findings and key references of the literature review are reported here, the full review will be reported in a future Austroads publication (Austroads 2014).

The review found evidence of a need to direct increased effort to countermeasures aimed at vulnerable road users as these road users are not receiving the same benefits as vehicle occupants from safer vehicles (ITF 2014). Infrastructure and vehicle based countermeasures were identified together with a requirement for research to better understand what constitutes a Safe System for vulnerable road users.

National and international research has also shown that older drivers are driving longer and further than in previous years and that countermeasures beyond ensuring fitness to drive will be required. In particular there is a need to develop information resources especially designed to encourage older drivers to purchase safer vehicles. In the US a “silver fleet” NCAP rating has been suggested (NHTSA 2013).

Road infrastructure improvements that benefit older drivers in areas such as improved sign visibility and enhanced intersection design have been established for many years and have been shown to result in more stable and confident driving manoeuvres by not just older drivers but drivers of all ages (Staplin and Freund 2013).

Considerable literature on road safety communication was found, particularly exploring the role of social media in both road safety education and raising awareness of road trauma, but it is clear this is still a developing area. More work is required to understand how best to take advantage of the opportunities provided by new communication methods (Murray and Lewis 2011).

Vehicle technology has already produced considerable road safety benefits. For the remainder of the period of the NRSS, additional benefits from vehicle technology will come from ongoing improvements in crashworthiness as newer, safer vehicles filter into the fleet. However benefits from the new technologies will mainly be achieved in the following decade. The most promising of these new vehicle technologies in the medium and long term are Autonomous Emergency Braking (AEB), Vehicle to Vehicle Communication (V2V) and Vehicle to Infrastructure Communication (V2I) (Searson, Ponte, Hutchinson, Anderson, & Lydon 2014).

Of the other emerging technologies considered, Intelligent Speed Adaptation (ISA) appears to have the second-highest potential to prevent crashes. This is true particularly for limiting ISA systems that prevent the driver from speeding through control of the engine. In the United Kingdom Lai, Carsten and Tate (2012) suggested that, in the UK, encouraging ISA uptake through vehicle regulation could prevent twice as many accidents compared to a market-driven approach.

Major road trauma reductions could result from an accelerated take up of new technologies. These benefits will largely accrue in the next decade but action will need to be taken now to maximise this impact. It is possible that the benefits of ISA could be realised quicker than those of other technologies because of the possibility of retrofitting ISA to existing vehicles.

Consultation

Seventeen national road safety stakeholder organisations were consulted to obtain their perspectives on the NRSS and identify issues that need to be addressed in future. The stakeholders were chosen to represent the full range of road safety interests.

The conversations were guided by six questions circulated ahead of time, covering: major contributions to road safety by stakeholder organisations, major achievements at the national level, partners, acceptance of the Safe System, candidates for national priority actions and barriers to progress. This paper is concerned with the identification of national priorities, a complete description of the results of the consultation will be provided in Austroads (2014).

When discussing future priorities the most common response was the need for improved injury data. One stakeholder also mentioned better estimation of the cost of road trauma to the community, and several stakeholders identified the need for better and/or much greater investment in research and development projects. In this area, reference was made to the large-scale research projects attracting commitment in the United States into significant technology issues, including V2V and V2I Co-operative Intelligent Transport Systems (C-ITS).

A number of stakeholders began their response by identifying national leadership as an issue which needs to be addressed. One said that road safety was not on the national radar, and there were no national debates. One stakeholder asked who was the face of road safety, and another asked who “owned” road safety. Another pointed to the need for greater ambition for road safety. The lack of an ongoing collaborative engagement with stakeholders outside of the responsible state and territory and Commonwealth agencies was noted.

More and better infrastructure investment was identified as an issue that needed to be addressed by a number of stakeholders. One suggested that the fuel excise indexation should be reinstated and allocated to road safety, and another felt that federal expenditure for road safety was an issue that often received lip service. The quality of current expenditure by the Commonwealth was criticised by several stakeholders who said it seemed to be dominated by very conventional expenditures and was poorly aligned with Safe System principles. Reference was made in contrast to the efforts made by the Transport Accident Commission (VIC) and Motor Accident Commission (SA) to use its infrastructure safety investment as a key means of demonstrating these principles in practice.

Continued improvement in the vehicles arena was regularly mentioned. A couple of stakeholders said there needed to be another big push in this area which was seen as consistent with the industry change that is occurring. There were some differences in the area, with one stakeholder lamenting the much larger number of vehicle manufacturers present in the Australian market than the United States market. Another stakeholder was clear that there needed to be more consistent alignment and harmonisation between the ADR and the United Nations regulations. Increasing the adoption of five-star safety rating fleet policies, for example by local government, and a review of the luxury car tax were specific suggestions, as was possibly mandating event data recorders. Work in C-ITS and investment in infrastructure to support a highly intelligent vehicle fleet was also identified as a need at the national level.

Pedestrian and cyclist safety was mentioned regularly by stakeholders, with one observing that there does not seem to have been any response from government to the surge in cyclist injury, and another noting the same for motorcyclist injuries. The sharing of spaces between pedestrians, cyclists and motor vehicles was identified as a particular issue, as was greater separation of pedestrians and cyclists from motor vehicles, and consistency in safety messages relating to pedestrian and cyclist safety. More support for proven cycling programs was sought by one stakeholder in addition to ensuring that the next generation of cyclists obtain better cycling skills. A review of the Australian Road Rules from a cyclist and pedestrian perspective was proposed.

Heavy vehicle (predominantly freight) safety issues were raised by several stakeholders. Fleet purchasing and vehicle safety standards were mentioned, including AEB, and mandatory stability control for dangerous goods vehicles. The extension of chain of responsibility laws to vehicle maintenance was proposed by one stakeholder, as was a greater focus on customers by compliance agencies. A specific proposal was for the establishment of a no-blame investigation capability for truck crashes within the Australian Transport Safety Bureau (ATSB).

A number of other issues were raised including nationally consistent licensing rules, speed limits, road rules and enforcement strategies as well as a suggestion of more sharing of mass media resources. There was a concern to address the road safety issues of indigenous communities and

again develop a national approach to this issue. Better integration of safety with urban planning, active transport and public transport issues was also discussed.

Fatalities and Serious Injuries

National fatal crash and fatality data was obtained from the Bureau of Infrastructure, Transport and Regional Economics (BITRE) and from the annual report of road deaths. Analyses were carried out to examine any changes in trends compared to the data used in the development of the NRSS. Given the short time period since the release of the strategy no statistical testing could be usefully carried out.

The main road trauma indicators for the three years before the strategy and the two years of the strategy show that fatalities, fatal crashes and deaths per 100,000 population are falling (see Table 1). There was evidence that motorcyclist and cyclist fatalities are not decreasing at the same rate as shown for vehicle occupants.

Table 1. Indicators 2008-2013

| | 2008-10 | 2012 | 2013 |
|---|----------------|-------------|-------------|
| Number of deaths from road crashes | 1,426 | 1,301 | 1,193 |
| Number of crashes resulting in death | 1,297 | 1,191 | 1,106 |
| Number of deaths per 100,000 population | 6.5 | 5.7 | 5.2 |
| Number of deaths per 100 mvkm | 0.65 | 0.56 | 0.56 |
| Number of deaths per 10,000 registered vehicles | 0.91 | 0.76 | 0.70 |

Fatalities of older road users are also not reducing at the same rate as fatalities for young road users and this effect is still present when deaths per 100,000 population are considered. There was some indication that fatal crashes in regional areas are reducing at a slower rate than in metropolitan areas.

Serious injury and injury data were obtained from BITRE for 2008-2012 but data issues meant that they could not be used to obtain a reliable national figure.

Exposure Data

An examination of the exposure data provided by BITRE showed that even with a slow-down in growth in 2008 and 2009, vehicle kilometres travelled by passenger vehicles and light commercials grew by 4% between 2010 and 2012 and by 7% between 2005 and 2012. In contrast, vehicle kilometres travelled by motorcycles grew by 12% between 2010 and 2012 and by 72% between 2005 and 2012. Of course, motorcycling still represents a very small part of total travel, rising from 0.8% in 2005 to 1.3% in 2012. Anecdotally bicycle riding is said to be rising at a faster rate than motorcycling but no reliable measures of cycling exposure are available.

Vehicle Speeds

Speed data was obtained from Western Australia and South Australia. Although it is not possible to present a national picture, it is worth noting that speeds are gradually reducing in both states, although this is a clearer trend for urban areas.

Safety of New Vehicles

There has been an ongoing improvement in the safety of new vehicles (see Table 2) with 80% of new passenger vehicles sold in 2013 having a five-star ANCAP rating. The improvement was most

marked for commercial vehicles with the percentage of new vehicles with a four- or five-star ratings rising from 40% in 2010 to over 65% in 2013.

Table 2. New vehicle safety improvements 2010-2013

| | 2010 | 2012 | 2013 |
|--|-------------|-------------|-------------|
| Average age of the Australian vehicle fleet | 9.96 | 10 | 10 |
| Percentage of new vehicles sold with a 5-star ANCAP rating | 40.26 | 56.67 | 64.98 |
| Percentage of new passenger vehicles sold with a 5-star ANCAP rating | 49.50 | 75.56 | 80.23 |
| Percentage of new commercial vehicles sold with a 4 or 5-star ANCAP rating | 40.69 | 61.03 | 67.24 |
| Percentage of new vehicles sold with key safety features | | | |
| Electronic Stability Control | 57.2 | 78.7 | 93 |
| Pre-collision safety system | 1.3 | 2.5 | 5.2 |

Table 2 also shows the success of the inclusion of Electronic Stability Control (ESC) in the requirements for a five-star rating and the subsequent regulation in achieving rapid uptake, compared to the slow uptake of forward collision avoidance systems.

Exploration of Hospital Injury Data

This analysis used data from the National Hospital Morbidity Database (NHMD), which is operated by the Australian Institute of Health and Welfare (AIHW) and included records concerning nearly all episodes of admitted patient care in Australia for ten calendar years ending with 2010. The focus was on looking at how trends in road related injuries have changed in recent years and how they differ from trends in road related fatalities.

Rates of hospitalised serious traffic injury rose by about 10% from the level in 2001 then returned to it, while road death rates fell by almost one-third. Analysis of the hospital data showed the rise in serious injuries was largely due to substantial increases in the numbers of injured motorcyclists and cyclists. Although the numbers of drivers injured also rose, the absolute increase for drivers was smaller than for motorcyclists or cyclists, and the percentage rise was much smaller than for those types.

Further analysis showed that the upward trend of motorcyclist and cyclist cases was especially steep for men aged 45 to 64 years, and that the rise was much more marked for cases that occurred in traffic (on road) than for non-traffic cases. The rise in the rate of cyclist cases was more marked for residents of major cities than for people who lived elsewhere.

Priority Areas

The main aim of the research was to identify the priority areas for road safety activity in Australia. Twelve areas were identified based on the literature review, changing crash patterns, stakeholder input or a real or perceived lack of activity.

Vulnerable Road Users

The Safe System philosophy for vulnerable road users is not as well developed as for vehicle occupants. This has been found to be true nationally and internationally, with even leading countries such as Sweden increasing their focus on vulnerable road users. The main finding of the recent

review of road safety from the International Transport Forum was that vulnerable road users are receiving smaller benefits from recent road safety improvements than vehicle occupants.

The analysis of fatal crashes in Australia from 2008-13 showed the same pattern as internationally, with vehicle occupants accounting for most of the reduction in fatalities. There was almost no change in total fatalities involving vulnerable road users, with fatalities of motorcyclists and cyclists rising over the period. The analysis of hospital separations data found a much higher proportion of road-related injuries involving motorcycling and cycling than shown by the police-collected data. It also showed that injury cases among these road user types are increasing.

Motorcycling exposure has grown since 2008 with a sharp increase in vehicle kilometres travelled relative to other motorised vehicles. Cycling exposure is also thought to be increasing rapidly although there is no reliable measure. These relative increases in exposure would be expected to account for some of the difference between road user types, together with cyclists and motorcyclists not gaining the benefit from increased vehicle crashworthiness.

A number of infrastructure improvements have been shown to improve safety for vulnerable road users; these include improved pedestrian crossings, cyclist friendly intersection design, separation of bicycles and motor vehicles and improved road surfaces. There is also evidence that pedestrian safety would be enhanced by the rapid introduction of forward collision avoidance systems such as AEB. With the encouragement of active travel modes it is expected that walking and cycling will continue to increase. Both the safety and amenity provided to cyclists could be improved by better cooperation between road safety professionals and urban planners.

There is a need for research to better understand what constitutes a Safe System for vulnerable road users. Although pedestrians, cyclists and motorcyclists are often grouped together as vulnerable road users, the three modes demonstrate different crash patterns and have different requirements of a Safe System.

Older Road Users

Fatalities of older road users are reducing at a slower rate than road user fatalities overall and particularly compared with younger road users. This is true for the total number of deaths and deaths per 100,000 people. The differences are likely to be related, in some part at least, to changing driving patterns of older people, with research showing people are driving further and into older ages and that this is increasingly applying to both males and females. It is also possible that the difference between older and younger drivers is related to road safety measures such as enhanced graduated licensing systems that have targeted younger drivers.

Research indicates that older drivers can benefit from receiving better information regarding vehicle choice, and from a range of infrastructure changes. In general, changes of benefit to older drivers, addressing basic failures to provide a Safe System and improving the system, will be of benefit to all road users.

Indigenous Road Users

While various initiatives have been undertaken to address the disproportionate risk faced by Indigenous Australians on the road, there is continued concern about inequitable outcomes. A large proportion of Indigenous Australians live in remote and very remote regions, and so the overall impact of the higher rates experienced by residents of remote areas is greater for Indigenous than other Australians. Patterns of road injury also differ between Indigenous and non-Indigenous road users including higher rates of injury as a motor vehicle passenger (not a driver) and as a pedestrian.

An Austroads project demonstrating the application of the Safe System with an Indigenous community in Western Australia was completed in 2012 (Senserrick 2013). The project highlighted the need for improved cooperation between agencies if more projects of this nature are to be carried out.

National Indigenous Road Safety Forums were held every two years from 2002 to 2010. The five forums were convened by the Commonwealth Department of Infrastructure and Regional Development. Re-establishing the Forums would provide a valuable opportunity for the limited number of people working in this area to consult and share experiences.

Speed Management

Speed management is a core component of a Safe System and remains the best opportunity for a rapid reduction in road trauma. Since 2011 some attempts at implementing safer speed limits have been made, however only limited progress has been made on major urban and rural arterial roads. The critical role of speed in the Safe System was recognised by the strategy and Safe Speeds was treated as a cornerstone area.

The stakeholder consultation suggested further exploration of technological solutions to speed management, including extending the use of ISA. It was also suggested that national approaches to speed management and speed-related media campaigns be adopted.

Remote Areas

The data analysis has shown that deaths are reducing at a slower rate on rural and remote roads than in urban areas. Remote areas present a particular challenge; low volumes mean investment in infrastructure on these roads is always going to be given a low priority by traditional assessment methods and traditional enforcement is unlikely to be effective given the vast distances, extremely limited enforcement resources and infrequency of vehicles.

In time, vehicle safety technology may be the most effective countermeasure for remote areas where single vehicle road departures are a significant issue. The increasing use of ESC, for example, would be expected to result in a reduction in loss of control crashes in these areas. Unfortunately new technology takes considerable time to be taken up by the majority of the fleet, and those most at risk, such as young drivers in remote areas, are likely to be amongst the last to receive the benefits.

Stakeholders suggested development of a separate remote area strategy following the Western Australian model from 2009. This would need to include the potential of vehicle technologies and low cost infrastructure solutions that address core Safe System issues. As a first step, the challenges of remote area road safety need to be acknowledged by the wider road safety community.

Vehicle Safety

Improvements to vehicles have been a major contributor to trauma reductions for over 15 years through developments in crashworthiness and occupant protection. These improvements will continue to deliver trauma reductions throughout the life of the strategy as more and more new vehicles achieve high safety standards and the older vehicles driven by the most at risk drivers improve over time.

New technologies are now being developed to assist in crash avoidance as well as occupant protection but these are likely to have most impact in trauma reductions as part of the next national road safety strategy. AEB holds the most potential and will also benefit vulnerable road users.

ISA appears to have the second highest potential to prevent crashes after AEB. The availability of accurate and reliable digital speed maps remains a challenge for the deployment of ISA in Australia, although in 2014 New South Wales made their map available via a smartphone application.

A rapid take up of technologies into the vehicle fleet will bring forward the benefits of these technologies. The Australian automotive market is characterised by low entry barriers and a high level of competition. The resultant strong competition means that regulation, plus good, easily understood consumer information is vital to ensure the safety of vehicles and to promote vehicle choice based on issues other than price.

Cooperative ITS

There have been considerable developments in ITS since 2011. Most significant has been the imminent feasibility of connected vehicle solutions, known as C-ITS, which have the potential to significantly improve road safety. Research and technical capacity exists within Australia but there is no clear path to implementation and a variety of approaches and operation scenarios are possible.

There is a high level of confidence that V2V and V2I technologies can deliver considerable safety benefits. While V2V has no dependence on the surrounding infrastructure, it requires both vehicles to have the technology in order to avoid the crash. Rapid changes since 2011 mean that the area needs to be revisited. Activity needs to be aligned with the Austroads C-ITS Strategic Plan to ensure that a safety perspective guides major policy positions. Given the potential paradigm shift in traffic management possible with C-ITS, it would be a missed opportunity if solutions were primarily based on traffic efficiency.

Communication Strategies

Communication of road safety messages is essential in gaining support for road safety initiatives. All jurisdictions face similar challenges in communicating Safe System principles and shifting community perceptions in favour of interventions that will work. The literature review found some innovative and promising communication campaigns, reflecting a variety of approaches. The cooperative development of resources and guidelines to assist jurisdictions in communication activities could be part of the action plan.

Monitoring Non-fatal Injuries and Crashes

Road safety has long relied upon road fatality counts as the main outcome indicator. It has been recognised that this provides an incomplete basis for planning and monitoring because initiatives directed at reducing deaths are not necessarily effective at reducing other harm, particularly persisting disability.

Measurement of non-fatal road injury is necessary because of the large numbers of cases, the substantial burden of disability resulting from many of the cases, and the differences in trends and other aspects of the data between fatalities and non-fatal injuries.

The measurement and monitoring of non-fatal injuries is a complex issue, and improving the availability and reliability of data needs to be a priority of the next action plan. The Road Safety Committee of the Parliament of Victoria (Road Safety Committee 2014) has recently published a report of its extensive investigation into measuring serious road injury. The findings and recommendations provide guidance on the steps needed to establish useful measures of non-fatal road related injuries.

Infrastructure Investment

There is stakeholder support for both increased infrastructure investment and modified targeting of the available funds, including increased investment to address trauma on country roads, and trauma facing vulnerable road users on urban roads. The analytical tools Australian Road Assessment Program (AusRAP) and Australian National Risk Assessment Model (ANRAM) offer considerable potential to provide a better focus for investment.

Coordination with Urban Planning

Although fatal crashes are reducing in urban areas there is still a major problem with injury and serious injury crashes. The planning context within which towns and cities are managed will play an important role in determining the extent to which these injuries are reduced, particularly in relation to encouraging active travel and injuries to vulnerable road users.

The recent Victorian Parliamentary Road Safety Committee Inquiry into Serious Injury (2014) highlighted the issue of bringing together urban planning and road safety. That committee noted the absence of a link to road safety in city plans and to urban planning in road safety strategies. The report considered active engagement of road safety with planning to be essential in encouraging increased use of active transport modes. The inquiry also endorsed the Organisation for Economic Co-operation and Development (OECD) recommendation that a functional road hierarchy catering for all modes is fundamental to producing a Safe System urban design.

There are clear indications of the need for engagement between safety, transport planning and urban design professionals but there has been limited success in making this happen. The Dutch Sustainable Safety approach has had some success and this is being extended, with regional governments in the Netherlands providing specific resources to make sure this engagement happens with transport policy and urban planning professionals.

Workplace Road Safety

Work-related road crashes in Australia account for about half of all occupational fatalities and a significant proportion of all road-related fatalities. Despite the road being the dominant setting for occupational fatalities, not all government agencies with occupational safety and health responsibilities identify work-related road trauma as an occupational safety priority.

Employers and fleet managers have a pivotal role in the composition of the vehicle fleet and influence the safety of very high volumes of trips each day, therefore playing an important role in the safety of the road transport system as a whole.

Workplace road safety was identified as an issue to be addressed in the way forward for the National Road Safety Strategy but was not specifically included in the First or Future sSteps agendas.

Engagement with occupational safety and health agencies is important and could build on the progress of the National Road Safety Partnership Program (NRSPP). There is still an unclear picture of the scale of work-related road trauma. Incorporating purpose of trip data in crash reports could be considered to provide a more complete picture of this significant issue.

National Leadership

Internationally, road safety management is a growing focus of attention as various institutions and jurisdictions recognise that the limits to improved road safety performance are, in part, shaped by the capacity of the road safety management system operating in a country.

Stakeholders thought that the accountability for road safety is unclear and does not assist the leadership task. Improvement in institutional structures, capacities and delivery arrangements at a national level were identified as part of the “First Steps” agenda. Governance arrangements for road safety under the Transport and Infrastructure Council have been modified in the last two years to improve national oversight and coordination of the NRSS and provision of policy advice to ministers.

A review of governance and management arrangements for road safety could be considered to assist subsequent decision-making. Internationally, a common tool for addressing these matters is a road safety management capacity review and this methodology (or aspects of it) would be useful.

There was also concern about a lack of engagement in the implementation of the NRSS. Many of the non-government stakeholders referred to a lack of engagement on the national road safety issue. Consideration could be given to establishing and formalising a strong stakeholder engagement process.

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