

Harmonization of Vehicle Regulations, such as airbags, seat-belt anchorages, electronic stability control and anti-lock braking systems (Global NCAP, 2015).

Bloomberg Philanthropies is supporting crash-testing of popular vehicles in Latin America, India and Asia; publishing test results so consumers can make informed decisions when purchasing a vehicle; and calling out car manufacturers who do not meet UN crash standards. Governments play a critical role in regulating vehicle safety standards, and many low- and middle-income countries lack these regulations (WHO, 2015). Since 2015, Bloomberg Philanthropies has supported crash-testing of 17 cars, some receiving 0 stars, the worst safety rating. Increasing awareness, advocating for strong regulations and holding car manufacturers accountable will help assure consumers can purchase safe vehicles regardless of where they live.

Road traffic deaths represent a public health epidemic. This global killer is beginning to receive well-deserved attention.

Bloomberg Philanthropies is committed to maintaining long overdue focused attention on the issue by applying established evidence to address the millions of preventable deaths and injuries each year through continued support to local, national and global efforts.

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The critical role of data, education and enforcement in road safety

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Introduction

As described by the World Health Organization (WHO) in the May 2016 special issue of this journal, the 2015 Global Status Report on Road Safety; the death toll on the world's roadways was 1.25 million per year (Peden et al, 2016).

While increased accessibility to motorised transportation may benefit countries, for many this boon has come with challenges for infrastructure, education, or enforcement. Leaving roadways in disarray where the largest vehicle often wins the ability to move first, usually ends with tragic and life altering crashes.

The WHO estimates that “3,400 people die on road[s] every day,” (UN, 2016) with “human error account[ing] for over 90 percent of [these] accidents.” (Olarde, 2011). It is time for the road safety community to change the narrative of these incidences by not referring to them as ‘accidents’ and to begin to recognise these crashes are preventable by modifying human behaviour (as well as other interventions).

When death or serious injury occurs on the roadways, its impact is far-reaching. Victims may die or suffer serious injuries requiring expensive hospital stays and lost wages, not to mention the emotional costs attached to these traffic crashes. For victims, these losses can send them and their families into an economic spiral, from which they may not be able to recover.

As countries' economies grow and the accessibility of motorised modes of transportation increases, law enforcement can play a key role in educating the public about dangerous driving behaviours, such as drink driving, distracted driving, speeding, and failure to wear a seat belt. By establishing clear educational and enforcement policies, law enforcement can provide the public with the knowledge they need to be safe on the roadways and follow up with enforcement actions to modify driver behaviour.

By reducing the number of roadway crashes, commerce is able to progress, allowing goods and services to be delivered to markets and economies to grow. People's lives ultimately improve in a safe driving environment.

The importance of data

Data plays an important role in helping law enforcement identify road safety problems. Before agencies can begin to properly address their road safety issues, they need to identify what the problems are, where the crashes are happening, and where the most pressing traffic safety problems are located. Through analysis of data, law enforcement agencies are able to develop appropriate countermeasures and strategically utilise their often limited resources.

Collecting and analysing data requires time, money, and people. Additionally, no universal way of collecting road safety data currently exists, and many agencies lack the internal capabilities to gather or analyse data. All agencies should look at what, if any, data they are collecting and review how and why they are collecting it. Even a limited amount of data can provide an agency with a starting point for developing beneficial educational and enforcement programs. If agencies are not collecting data, they should work to develop a reporting system that allows them the ability to capture the necessary data they need to better develop necessary road safety programs.

Once an agency begins to collect and analyse data, it can begin to determine how to apply the information to solve its road safety problems. Solutions need to have data behind them so the community understands and buys in to the educational and enforcement strategies the agency implements. Without the support from the community and the data to support these actions, agencies will see limited results.

The importance of education and enforcement

For far too long, people put little value on roadway safety and traffic enforcement. The reality is that traffic crashes have a great impact on communities as roadways are used by all individuals—pedestrians, bicyclists, motorcycles, cars and heavy vehicles.

The public has accepted that people dying on roadways is inevitable and assume it is part of doing business, which has created a culture of complacency. This culture of complacency is unacceptable, and it is up to law enforcement to change people's behaviours through education and enforcement (Bolton, 2008). The ultimate goal of enforcement and education is getting road users to take responsibility for their behaviour, thereby creating a safe road environment with reduced fatal and injury crashes. When combined, education and enforcement are highly effective methods to change driver behaviour.

Education

Through education and enforcement, law enforcement agencies can change the narrative and help their communities understand traffic safety is a priority, and this objective includes their safety, health, and economic stability.

One way law enforcement can modify driver behaviour is through public awareness campaigns. These campaigns can include a mixture of communication methods – mail, social media, newspapers, advertising, public forums, the media, or other localised means. Through these campaigns, coupled with the road safety data collected, law enforcement can educate community members about what they are doing, why they are doing it, and the role the community plays in making the roadways safe (Bolton, 2009).

Engaging other partners will also increase law enforcement's reach when conducting awareness efforts. These partnerships help to spread awareness messages, as well as reach audiences not accessed through some traditional outreach methods.

Once roadway users have been educated and provided with the opportunity to modify their behaviour, it is important to follow up with enforcement.

Enforcement

A robust enforcement program is a vital part of a healthy community and an effective tool to change driver behaviour. There are several ways in which law enforcement can effectively change driver behaviour: general deterrence and specific deterrence. A balanced combination of these two methods can have an impact on road users' behaviour.

General deterrence is a way of getting individuals to voluntarily comply because they perceive law enforcement is present and the risk of being caught is sufficient to deter. Specific deterrence is the actual legal punishment of an individual. (European Commission, 2016). Through an agency's educational efforts, the community should be made aware of the pervasive risk of enforcement activities taking place. Including enforcement into the efforts will help change behaviour and provide the voluntary compliance law enforcement is looking to achieve.

When conducting educational and enforcement efforts, it is important that they be goal-driven. This will allow the community and law enforcement to see the progress being made in improving roadway safety.

Finally, law enforcement agencies need to constantly evaluate what educational and enforcement activities they are doing with updated data, analysis, and input from the community and make the necessary modifications to their strategies and tactics to meet their goals.

Officer training and safety

(The authors would like to acknowledge Samuel Capogrossi, Project Manager, International Association of Chiefs of Police for contributing to the Officer training and safety section of this article)

All enforcement agencies should provide their officers with the education and training they need to conduct a roadway stop, and in doing so, maintain the professionalism of the organisation and ensure their own safety. To accomplish this, it is imperative that all road safety agencies develop policies and procedures for their road safety units.

The policies provide officers with the necessary instructions for how and when the enforcement action should be conducted. The rules and regulations also provide the department with the ability to ensure officers are working and conducting road safety activities within an appropriate and safe framework. Policies also provide agencies with the ability to dismiss or reprimand officers should it be revealed they are not following department policies.

Operational considerations

When training officers, it is important for agencies to consider the following operational considerations:

Communication: Officers must have the ability to communicate both location and motor vehicle stop details. The agency should always know the particulars of the motor vehicle stop.

Roadway considerations: Officers should know the roadways they are monitoring; for example, what type of roadway it is, and whether or not there are available shoulders, lane designation markings, construction zones, speed zones, intersections, roadway elevation, inclines, and declines.

Enforcement vehicle location: Officers should be aware of the location of the stop in relation to the flow of traffic, as well as the placement of the enforcement vehicle relative to the suspect vehicle. Is there an ability for oncoming traffic to take appropriate corrective actions to minimise dangers for collisions or bottlenecks at the traffic stop location?

Officer approach: The officer's approach to the vehicle depends on location, communication, and roadway considerations. Considerations need to be made for a passenger- or driver-side approach, as well as the number of occupants.

Environmental awareness: Officers should always consider location, traffic volume, and occupant activity, keeping in mind they may not be able to get back to the cruisers. Officers should therefore attempt to quickly become aware of the natural surroundings and the availability for cover and/or concealment, should the traffic stop turn into a dangerous situation.

Time of day: Oncoming traffic may have difficulties seeing a motor vehicle stop during dusk and dawn.

Vehicle lighting: Officers should ensure there is appropriate visibility for any oncoming traffic.

Finally, to engrain road safety into an agency's culture, the agency head must lead by example and place value and importance on safety, both on the roadway and in the department. This means explaining to officers why it is important to conduct road safety enforcement and holding the commanders accountable for the effective implementation of policies and procedures associated with the developed road safety strategy of the agency.

Member road safety programs

Developing road safety awareness programs and resources for law enforcement agencies to use has been a hallmark of the programs and services of the International Association of Chiefs of Police (IACP) throughout the association's 123 years. As an organization, IACP is committed to making roadways safe around the world.

The IACP has a global reach with more than 26,000 members representing 131 countries worldwide. Two of its member countries are Brazil, with the Federal Highway Police, and Canada, with the Ontario Provincial Police. These two agencies have implemented a variety of programs to improve safety on their countries' roadways.

Federal Highway Police (PRF), Brazil

(The authors would like to acknowledge the Federal Highway Police, Brazil, for contributing to the Member road safety programs section of this article).

The Federal Highway Police in Brazil, Polícia Rodoviária Federal (PRF), uses a number of approaches to improve road safety.

Statistics Control Project (SCP)

This program trains law enforcement officers on how to use statistical tools such as Business Intelligence and Microsoft Excel to build their own plans and use these tools to help them make better decisions not only about operations involving law enforcement, but also about managing their own responsibilities. The main goal is to show them how important it is to use data to find the main causes and "hot spots" where the most crashes and fatalities occur. With this information, officers are able to make better use of the resources available to them to reduce traffic violence.

Problem: High number of road crashes and fatalities.

Solution: Combining statistics knowledge and preventive actions.

Implementation: Training all managers in the country.

Benefits: Improved planning, use of resources, and a reduction of crash and fatality rates.

Problem: Need to implement a culture of safe transit.

Solution: Reach young students.

Implemented: Through visits and courses in schools and society.

Benefits: Formation of ethical citizens, able to reflect on the context in which they live and act as change agents for the construction of safer traffic.

Traffic Education and Citizenship

The Traffic Education and Citizenship program (road film and lecture theatre road truck) is aimed at raising awareness and modifying behaviour to promote safe roadway practices. The traffic education portion of the program focuses on preventing and reducing crashes, improving health, preserving the environment, and promoting citizenship. The program is also designed to change attitudes through interventions with traffic sectors: drivers, passengers, and pedestrians. The activities target changing behaviours by presenting the risks associated with transportation and encourages the adoption of individual choices that can protect life or reduce the risk of injuries caused by traffic crashes.

Problem: Inappropriate behaviour by drivers while in a vehicle.

Solution: Increase road users' awareness of behaviours.

Implementation: Through targeted activities – display of movies targeted at different audiences in a truck adapted to be a movie theatre over wheels.

Benefits: Increased awareness of traffic safety and behaviour change.

Thematic Student Festival Traffic – TSFT (FETRAN)

The Thematic Student Festival Traffic (TSFT) is a project that uses educational activities about traffic situations in everyday school life. In TSFT (FETRAN), students and teachers produce works on traffic issues in the form of plays, models, poetry, dance, music, and other methods to promote educational and cultural diversity. The developed materials are presented in the Thematic Exhibition of Traffic and Transit Theme Festival with the aim of integrating the PRF, school, and society.

Integrated Operations

Operation Rodovida Integrated is a major government effort involving the Federal Government, states, and municipalities to reduce crashes and traffic fatalities. Simultaneous and joint activities at predefined locations and times are designed to increase the presence and availability of government agencies in providing road safety, comfort, and fluidity.

Problem: Lack of standardisation of inspection between the levels of government.

Solution: Collaborative actions in enforcement activities.

Implementation: Preparatory meetings at the State Department, involving the Ministries of Justice, Cities, Transport, Health and the Secretariat of Communication for the President, combined within the respective axes of competence and performance, in order to join forces in combating violence in traffic.

Benefits: Approximation of Traffic Inspection agencies with consequent reduction of crashes.

Ontario Provincial Police (OPP), Canada

(The authors would like to acknowledge the Ontario Provincial Police, Canada, for contributing to the Member road safety programs section of this article).

The Ontario Provincial Police (OPP) Highway Safety Division utilises a number of innovative strategies toward road safety including the use of specialised Traffic Incident Management and Efficiency Teams and Unmanned Aerial Systems.

Traffic Incident Management and Efficiency (TIME)

The mandate of the Traffic Incident Management and Efficiency (TIME) Teams is to provide rapid clearance and investigative excellence for Benchmark Collisions in

the Highway Safety Division (HSD) – Greater Toronto Area (GTA). Benchmark Collisions include fatal and life-altering crashes, collisions involving government automobiles, suspect apprehension pursuits, and the Special Investigations Unit, as well as complex investigations involving commercial motor vehicles. These crashes typically result in highway closures to major transportation conduits throughout the GTA. Some estimates put the cost of a major highway closure at \$600,000 per hour (Transport Canada, 2007). The TIME teams are a collaborative approach to traffic incident management, providing support to all OPP detachments within the GTA over approximately 3,000 kilometres of highway.

Problem:	Need to provide rapid clearance and investigative excellence for benchmark collisions.
Solution:	Establish collaborative teams (TIME Teams) to deploy to collision scenes.
Implementation:	Four TIME teams covering the GTA on a 24/7 basis to ensure an immediate response, each consisting of 5–7 members deployed throughout the GTA, ensuring the appropriate investigative specialties are available at all times. The teams utilise Robotic Total Stations and Unmanned Aerial Systems.
Benefits:	Efficient evidence capture and clearance of roadways; reduced time needed for investigations while maintaining excellence, resulting in rapid clearance and related cost-savings.

A Robotic Total Station (RTS) is an electronic/optical instrument integrated with an electronic distance meter to read slope distances from the instrument to a particular point. An RTS allows the operator to control the instrument from a distance via remote control. This feature eliminates the need for an assistant officer as the operator holds the reflector and controls the total station from the observed point.

An Unmanned Aerial System (UAS) is available to teams for mapping. The UAS goes beyond the RTS, utilising aerial photography and video to create an ortho-mosaic aerial image. The system provides a photo “grid-map” of the scene. The software also allows for the traffic crash reconstructionist to manipulate both 2-D and 3-D images of the scene from various vantage points. The accuracy of the UAS is one centimetre per pixel and remarkably close to the accuracy of an RTS, which takes approximately two hours to map a collision scene. The UAS reduces this time to approximately 10 minutes. When deployed, the UAS greatly contributes to rapid clearance while maintaining investigative excellence.

Conclusion

Road safety continues to be a significant concern for all regions of the world, but, with the inclusion of law enforcement, road users can begin to identify the role they play in reducing road crashes. Through the use of data, education, and enforcement, road users’ behaviours will change, leading to safer roads. This paper provides guidance on best practice to achieve the desired behaviour change.

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