TEXAS MOTORCYCLE CRASH COUNTERMEASURE WORKSHOP

by

Patricia Turner
Research Scientist
Texas A&M Transportation Institute

Laura Higgins
Associate Research Scientist
Texas A&M Transportation Institute

and

Marcelina Perez
Research Associate
Texas A&M Transportation Institute

Product 0-6712-P1
Project 0-6712
Project Title: Evaluation of the Measures and the Development of a Plan to Reduce the Number and Mitigate the Severity of Crashes Involving Motorcyclists on Texas Highways

Performed in cooperation with the
Texas Department of Transportation
and the
Federal Highway Administration

Published: June 2013

TEXAS A&M TRANSPORTATION INSTITUTE
College Station, Texas 77843-3135

DISCLAIMER

This research was performed in cooperation with the Texas Department of Transportation (TxDOT) and the Federal Highway Administration (FHWA). The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the FHWA or TxDOT. This report does not constitute a standard, specification, or regulation.

The United States Government and the State of Texas do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

ACKNOWLEDGMENTS

This project was conducted in cooperation with TxDOT and FHWA. The authors thank Frank Phillips, the first project director, and Wade O'Dell, who finished as project director. The authors also thank the members of the project monitoring committee:

- Debra Vermillion.
- James Bailey.
- Josh Verastique.
- Lloyd Wolf.
- Maurice Maness.
- Michael Jedlicka.
- Nicholas Nemec.
- Shirley Ashbrook.
- Victor Vargas.
- Will Bozeman

Motorcycle Crash Countermeasures Workshop

The Texas Department of Transportation (TxDOT) contracted with the Texas A&M Transportation Institute (TTI) to develop a 5-year strategic plan for improving motorcycle safety in the State of Texas. The *"Texas Strategic Action Plan for Motorcycles: 2013-2018"* uses an integrated approach to identify implementable actions to make the road environment and infrastructure safer for motorcyclists and other powered two and three wheelers, and address driver and rider actions that contribute to the number of motorcycle-involved crashes on the roadway system. The plan ensures that motorcycles receive appropriate recognition in future transportation policy and planning in the State of Texas.

Your participation in the workshop will help to shape a new strategic direction for the use of motorcycles and the safety of motorcyclists over the next five years in the State. The plan targets several possible areas for action:

- Motorcycle/rider conspicuity
- Motorist awareness of motorcycles
- Licensing
- Training and Education
- Impaired riding
- Speeding
- Personal protective gear
- Roadway / Infrastructure
- Legislation and regulations
- Law enforcement
- Program management
- Program evaluation and data
- Motorcycle and vehicle technologies/ITS

The materials summarize the literature on countermeasures to improve motorcycle safety. When reviewing each countermeasure, please consider their **effectiveness** in preventing motorcycle crashes, and their **effectiveness** in reducing the severity of injuries to a crash-involved rider. Please add any additional strategies for consideration and / or eliminate those that you consider less effective in achieving the goals of the strategic action plan.

When you arrive to the workshop, please obtain a temporary parking pass from Cody Stewart located in the office to the left of Room 103 in TTI's Gibb Gilchrist Bldg. Please contact Patricia Turner @ p-turner@tamu.edu, or call (979) 587-0307, if you have any questions. We look forward to seeing you at the workshop tomorrow! Drive and ride safe!

KEY AREA/GOAL (S)	*COUNTERMEASURES*
Motorcycle/Rider Conspicuity	• Educate motorcycle riders in conspicuity products, techniques, and strategies. • Increase motorcyclists' use of high-visibility clothing, conspicuity products. • Enhance training on strategic lane positioning for increasing motorcyclist conspicuity in traffic. • Encourage visibility enhancements for motorcycles, such as auxiliary headlights, auxiliary brake lights, headlight modulators, position lamps, underbody LED lighting, etc.
Motorist Awareness of Motorcycles	• Increase motorists' knowledge about sharing the road with motorcyclists and other vulnerable road users. • Produce brochure on TxDOT's "Share the Road" sign program and process to request a sign. • Include up-to-date information on sharing the road and rider conspicuity in the Texas driver's education handbook. • Add questions about sharing the road with motorcycles on Texas driver's license exam. • Consider legislation allowing drivers ticketed for right-a-way violations involving a motorcycle to attend a motorcycle safety class for a ticket dismissal. • Support the use of emerging vehicle technologies (e.g., blind spot and forward collision warning systems, collision avoidance systems, etc.) to improve motorists' awareness of motorcycles.

Licensing

- Revise licensing regulations to require specific license for operators of 3-wheel motorcycles.
- Encourage law enforcement to take a zero-tolerance approach regarding unlicensed riders.
- Require proof of motorcycle endorsement before issuing parking permits (large employers, state and local government agencies, university campuses, etc.)
- Engage other groups (i.e., dealerships, insurance, drivers instructors, etc.) to provide information or brochures about motorcycle licensing requirements to motorcycle purchasers.
- Increase rider awareness about crash involvement of unlicensed or untrained motorcyclists.
- Implement graduated licensing system for motorcyclists.

Other Licensing countermeasures listed under Legislation and Regulations:

- Enact legislation to allow law enforcement to impound motorcycle if operator is not properly licensed.
- Implement stricter penalties for riding without a license.
- Require motorcycle license or endorsement prior to purchasing a motorcycle.

Rider Education/Training

- Expand course availability for three-wheeled vehicles classified as motorcycles.
- Educate riders on potential roadway obstacles (pavement makers, manhole covers, steel plates, etc.) and collision avoidance.
- Integrate rider training with licensing.
- Revise and update motorcycle operator's manual and translate into Spanish.
- Improve type and quantity of motorcycles used for rider training.
- Increase/reallocate funding for motorcycle safety training.
- Update and / or implement better system to monitor training course certificates and end-of-course examinations.
- Update quality assurance plan to increase the number of site and instructor visits and standardizes the review and remediation process.
- Promote (PI&E) importance of rider training to new and experienced motorcyclists.

Impaired Riding

- Promote peer-to-peer outreach among riders discouraging drinking and riding.
- Reach out to rider group leadership to develop strategies to prevent impaired riding at motorcycle events.
- Engage motorcycle-friendly businesses that serve alcohol to create awareness.
- Explore expanding the use of alcohol interlock devices for motorcycles.
- Require alcohol/drug education as well as rider education for DUI convictions.
- Distribute NHTSA's "Detecting DWI Motorcyclists" guide to law enforcement agencies.
- Develop materials on impaired riding and motorcycle laws for prosecutors, judges, and judicial employees.

- **Additional Impaired Riding countermeasures listed under Legislation and Regulations:**
- Encourage implementation of zero BAC/reduced BAC laws for beginning motorcycle riders.
- Encourage zero BAC/reduced BAC laws for all motorcycle riders.
- Encourage enhanced penalties for BAC of 0.16 and up.
- Require mandatory BAC check in all death and injury crashes.

Speeding

- Include speeding enforcement
- Develop outreach/education to riders about dangers of excessive speed.
- Educate riders about selecting a motorcycle compatible with skill level.

Additional Speeding countermeasure listed under Legislation and Regulations:

- Require beginning riders to use motorcycles with speed limiters.

Personal Protective Gear

.

- Conduct PI&E campaign to promote using motorcycle safety gear (helmets, leg protection, footwear, etc.). All the Gear All the Time (ATGATT)
- Provide training for law enforcement on identifying non-DOT compliant helmets.
- Work with riders' groups and dealerships to promote the use of protective gear.

Roadway / Infrastructure

- Communicate roadway condition information (construction, maintenance, hazardous locations) on DOT web sites, social media, and 511).
- Identify pavement markings, surface materials, and other treatments that reduce traction for motorcycles and treat or replace with high-traction materials.
- Establish maintenance policies that require milled surfaces be paved during the same day.
- Post specific warnings for motorcyclists where unavoidable hazardous conditions exist (reduced traction, roadway surface irregularities).
- Consider motorcycles during routine roadway inspections.
- Educate road design and maintenance personnel about conditions that pose hazards to motorcyclists.
- Provide full paved shoulders to accommodate roadside motorcycle recovery and breakdowns.
- Consider motorcycles in the selection and placement of roadside barriers.
- Maintain roadway to minimize surface irregularities and discontinuities that are hazardous to motorcycles.
- Maintain roadway surfaces in work zones to facilitate safe passage of motorcycles.

Legislation and Regulations

- Require mandatory helmet use for all newly licensed riders. [Personal Protective Gear]
- Implement stricter penalties for riding without a license. [Licensing]
- Implement legislation allowing law enforcement to impound motorcycles if riders are not properly licensed. [Licensing]
- Require motorcycle license/endorsement before motorcycle purchase. [Licensing]
- Implement zero BAC/reduced BAC laws for newly licensed riders [Impaired Riding, Licensing]
- Require zero BAC/reduced BAC laws for all motorcycle riders. [Impaired Riding]
- Greater penalties for BAC of 0.16 and up.[Impaired Riding]
- Mandatory BAC testing in all death and injury crashes. [Impaired Riding]

Law Enforcement

- Include motorcycles in crash investigation training for law enforcement officers.
- Develop educational materials for justice system personnel on motorcycle-related laws.
- Create a quick reference guide for law enforcement officers specific to motorcycles with statute references.
- Conduct high visibility enforcement (HVE) campaigns in counties with the highest number of motorcycle crashes (Top 10) for speeding and impaired riding.

Program Management

- Increase funding for motorcycle safety by elevating their importance to state highway safety office.
- Focus resources in the top 10 counties for motorcycle fatalities and identify countermeasures that work then develop best practices tools for use **statewide.**

Evaluation, Data & Research

- Conduct detailed evaluation of police-reported motorcycle crash reports to determine contributing crash causation factors. Compare findings to existing training materials and adjust curricula to address the issues.
- Use crash location data to help identify needs for additional signage, improved roadway friction, wider shoulders, modification of traffic controls, etc.
- Conduct research to determine why motorcyclists are unlicensed and how to reach out to this group.
- Develop partnerships with trauma centers, health department, insurance agencies, and dealerships for data sharing.
- Add motorcycle specific information to the Texas traffic crash report for increased understanding of motorcycle crashes.
- Promote inter- and intra-agency efforts to link crash, injury, licensing, violation, training, and registration records.
- Determine the impact of funded research and programs on reducing motorcycle crashes, injuries, and fatalities.
- Investigate simulation and computer modeling to better understand motorcycle crash risk and injury.
- Undertake research to examine the role of fatigue in motorcycle crashes.

Motorcycle/Vehicle Technologies

- Promote availability and benefits of technologies that improve motorcyclist safety and increase rider conspicuity.
- Engage with the motorcycle industry to encourage the development and promotion of motorcycles with safety-related technologies.

Motorcycle and Vehicle ITS Technologies

Technology	Definition	Status
Electronic Stability System	Enables the stability of the car to be maintained during critical maneuvering and to correct potential under-steering or over-steering	Existing
Curve Speed Warnings	Warns riders about upcoming curves by using GPS and digital mapping	Emerging
Lane Keeping and Departure Warnings	Uses forward-facing cameras to scan roadway and determine if the vehicle is migrating towards to the lane markings. All systems vibrate the wheel to ensure the driver is awake, while others also lightly apply the brakes to keep the vehicle in line	Existing in passenger vehicles
Adaptive Front Lighting	Uses steering wheel angle and vehicle speed to ensure that headlight illuminates the roadway in front of the vehicle operator	Emerging
Anti-lock Braking Systems	Monitors wheel speed and adjusts braking pressure evenly among wheels to ensure that brakes do not lock when applied to avoid a crash	Existing
Brake Assist	Applies maximum pressure under sudden braking conditions	Existing in passenger vehicles
Linked Braking Systems	Applies pressure to both brakes simultaneously to ensure balance	Existing for MC
Pedestrian Detection System	Uses radar sensors and data from an on-board camera to automatically brake to reduce or mitigate the risk of hitting a pedestrian	Emerging
Collision Warning and Avoidance Systems	Uses radar to monitor the forward roadway and warn the driver audibly and visibly that they are nearing an object or vehicle in their lane. As the object gets closer, the warning becomes more intense	Emerging
Driver Status Monitoring	Uses facial detection technology to analyze driver facial features to ensure driver alertness	Emerging
Electronic Licenses or Smart Cards	Requires smart card be placed into the ignition to operate the motorcycle to prevent unlicensed riding. This would also allow the ability to monitor drivers who are inexperienced or deemed at-risk	Emerging
Road Surface Condition Monitoring	Laser linked to ABS or speed-limiting systems, scans road and alerts drivers to potential road hazards. System can be combined with information from roadside beacons or other sources of data	Emerging
Helmet Mounted Displays	Projects information from the instruments to a display inside the operator's helmet, reducing the need to fully take their eyes off the road and look at the panel.	Emerging
Rearview Displays	Helmet or vehicle based, rearview displays use backward facing cameras to project real time images of the road environment behind the motorcycle to increase visibility over traditional rear-view mirrors	Emerging
Speed Alert/Limiting Systems	System warns drivers when they have exceeded the posted speed limit or exceed the maximum limit set by the motorcycle operator in order to minimize the role that excessive speed plays in motorcycle crashes	Existing

Technology	Definition	Status
Airbag System	Airbag systems deploy upon impact at a certain intensity level and can assist in reducing injuries to riders involved in crashes	Existing
Airbag Vest	Vest protects front and back of the body if rider is ejected from the motorcycle	Existing
Automated Crash Notification System	System automatically notifies emergency personnel of a crash so that help can arrive more quickly; advanced systems also collect crash severity data from sensors, airbag deployment and other cues	Emerging
Crash Data Recorder	Located in the airbag control or powertrain control on vehicles, crash data recorders can record information such as driver's pre-impact speeds, seatbelt use, driver's brake or throttle position pre-crash and crash severity	Existing in some passenger vehicles