IOWA STRATEGIC HIGHWAY SAFETY PLAN

SMS

IOWA SAFETY MANAGEMENT SYSTEM

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Introduction

> The good news is that a child born today can expect to live an average of approximately 75 years. The bad news is that if the average crash rates recorded from 1991-1995 remain unchanged, over that 75-year lifetime one child out of every 84 born today will die violently in a motor vehicle crash. Furthermore, 6 out of every 10 children born today will be injured in a highway crash over a lifetime—many of them more than once. This is a disturbing look ahead at the life of a child born today—a life for which estimates of death, injury, and damage are unacceptably high. These statistics need not become reality. Heightened intervention by the diverse traffic safety community, both in its continuing daily efforts to improve highway safety and in the effective implementation of dramatic new initiatives it forges can reduce these ominous predictions
>
> -Excerpt from *AASHTO Strategic Highway Safety Plan*, 1998

The Iowa Initiative

The Iowa Safety Management System (SMS) Coordination Committee was formed and began regular monthly meetings in February 1995. At that time a federal mandate was in effect requiring states to implement safety management systems under ISTEA legislation. Therefore, the Iowa Department of Transportation (Iowa DOT) was designated as the "focal point," and the Iowa DOT Office of Transportation Safety Director identified as the coordination committee chair. This organization was retained in Iowa after the federal mandate was dropped. Since the earliest planning stages of the Iowa SMS, the Iowa Department of Public Safety's Governor's Traffic Safety Bureau has partnered with the Iowa DOT's Office of Transportation Safety to develop and sustain the Iowa SMS.

Participating Agencies/ Offices

The following agencies and offices have participated in the creation of this document (a complete listing of all the authors can be seen in the Appendix):

Bureau of Emergency Medical Services, Iowa Department of Public Health

Iowa Department of Education

Governor's Traffic Safety Bureau, Department of Public Safety

Fire Service Institute, Iowa State University

AAA Minnesota/ Iowa

American Public Works Association – municipalities representative

Iowa State Sheriffs and Deputies Association – Story County Sheriff

Iowa County Engineer's Association - Emmet County

Iowa State Patrol, Department of Public Safety

Cedar Rapids Police Department

Safety Circuit Rider - Center for Transportation Research and Education, Iowa State University

Iowa Traffic Control & Safety Association

Iowa Interstate Railroad

State Farm Insurance

Iowa Northland Regional Council of Governments

Iowa Department of Transportation Offices of: Transportation Safety, Local Systems, Transportation Data, Driver Services, Motor Vehicle Enforcement, Maintenance Operations, Design, Program Management, Data Services, and Traffic Engineering

Federal Highway Administration, Iowa Division

National Highway Transportation Safety Administration, Region VII

During its early years, the SMS coordination committee established communication and cooperation among its interdisciplinary members, identified new safety problems and areas in need of improvement, and established task forces to address these problems. Since 1996, the Speed Limit Task Force of SMS has produced timely, comprehensive summaries of speed-related crash data and risk assessment related to speed limits for use by state legislators. The Access Management Task Force launched a statewide study of the effectiveness of access management techniques and a program to educate businesses on the benefits. Another task force set into motion a study of the effects of major highway reconstruction on local fire, rescue, and emergency medical services, resulting in greater communication and understanding between local emergency providers and the central highway authority.

The Strategic Highway Safety Plan is comprehensive in nature and reflects input from the participating safety organizations composing the Iowa SMS Coordination Committee. It addresses traditional concerns for "infrastructure" as well as driver, occupant, vehicle, and post-crash responsibilities. Moreover, the initiatives within this Strategic Plan are built upon safety programs already in existence.

The Iowa SMS Coordination Committee believes that a comprehensive, integrated approach will produce an overall effort that has the strong potential to significantly reduce deaths, injuries, health care costs, and other losses on our highways.

AASHTO Strategic Highway Safety Plan

The American Association of State Highway Transportation Officials' (AASHTO) Strategic Highway Safety Plan, dated September 1997, was used as a model for developing the Iowa plan. The AASHTO Plan contained six major topics containing a total of 22 key emphasis areas. In the Iowa Plan, one emphasis area was deleted (Increasing Safety Enhancements in Vehicles), two were combined, and five were added: Ensuring School Bus Safety, Reducing Farm Vehicle Crashes, Reducing Deer-Vehicle Crashes, Implementing Road Safety Audits, and Accommodating Older Drivers. The Iowa Plan therefore contains 25 key emphasis areas.

Implementation Strategies

Highway safety is the shared responsibility of the federal, state, and local levels of government. Each branch is organized and positioned to make substantial, unique contributions to the entire effort. Safety management procedures such as those used by the Iowa SMS insure that program development and delivery attains the goals of saving lives, reducing injuries, and putting public funds to their best possible use.

Strategies have been developed for the key emphasis areas. These strategies are designed to address each area's major problems or to advance effective practices by means that are both cost effective and acceptable to a significant majority of Iowans. Some strategies will apply existing federal programs to Iowa, or apply such programs more effectively. Other strategies involve implementation of programs developed within the state. Still other strategies will require an initial model developmental or demonstration stage to determine how best to address Iowa's problems.

Cost effectiveness is critical to the success of this enterprise, and needs to be clearly established in the demonstration or pilot phases of the various emphasis areas. With credible documentation and history to demonstrate cost effectiveness, budget requests to fund the various strategies will be more realistic, more likely to succeed, and result in better public policy. Iowa is fortunate to have several funding resources for implementing its Strategic Highway Safety Plan. Currently, a variety of federal highway safety program funds and state funds are used to support SMS activities, task forces, and sponsored programs. Additional funding will be required if the Iowa Strategic Highway Safety Plan is to be fully implemented.

Another important highway safety initiative, *Intelligent Transportation Systems* (ITS), hold significant promise for improving safety above and beyond the goals of this safety initiative. This is especially true in areas of crash avoidance and general Intelligent Vehicle Initiatives. The Iowa ITS and Strategic Highway Safety Plans will generally address a different set of issues, although some of these issues, e.g., the use of electronic sensors as safety devices, may be investigated by both.

Drivers

1. Instituting Graduated Licensing for Young Drivers

Primary Authors: Scott Falb, Daron Van Helden, Loren Muench, Dwight Carlson

Background

For years, the high crash rate, injury and death rates for young first year drivers has been a concern of traffic safety experts. Iowa statistics show that 16 year olds are twice as likely to crash as 20 year old drivers and four times as likely to crash as 35 - 44 year olds. Young drivers have quick reflexes and good physical coordination skills, but they are short on actual driving experience and have had less time to develop decision making skills geared to driving safely. Young drivers also show a propensity to take greater risk in older drivers.

On January 1, 1999, the Iowa Graduated Driver Licensing (GDL) legislation went into effect. The Graduated Driver License program will use increased parental involvement and the restricted intermediate license to ease new drivers into unrestricted driving and decrease crash rates for first year 16 year old drivers.

Strategies

Develop and implement an improved competency based training and assessment procedure for entry drivers

The graduated license as passed by the legislature is viewed as the first step in this process. The second step (provided for in the GDL legislation) is to study the current state of driver education in the State of Iowa. This study will take place during the interim session, and will make recommendations to the legislature by January 1, 1999.

Develop and implement an evaluation system for drivers moving from the provisional to the regular license stage

A driver improvement interview program has been established to work with drivers who receive traffic citations to help them change their driving behavior so that they can complete their probation and move to an unrestricted license.

Improve some areas of Iowa's GDL System

The following list represents areas in which changes could be made to the recently adopted GDL legislation in Iowa (taking ideal models into account):

- The driver education provision could become two-tiered; by adding or shifting hours of instruction to the provisional phase
- A dedicated funding mechanism could fund the cost of additional instruction hours/ behind-the-wheel time
- Parental involvement hours could be increased from 30 hours to 50 hours
- The passenger restriction could be tightened beyond the "number of seat belts"

- The nighttime curfew could be moved from 12:00 AM back to 11:00 PM
- Speed and/or road type limitations could be placed on novice drivers
- Additional road tests could be administered at all licensing levels

2. Ensuring Drivers are Fully Licensed and Competent

Primary Authors: Scott Falb, Shirley McGuire, Bob Thompson

Background

Research indicates that substantial numbers of drivers continue to drive after their privileges have been suspended or revoked. For example, data for 1995 shows that nationally over 6,400 drivers with revoked licenses were involved in fatal crashes—approximately 15 percent of the total fatalities incurred. In addition, a number of drivers continue to drive even though their cognitive and/or motor skills have degenerated to levels that make them unsafe for driving. In light of the often serious reasons for which driving privileges are revoked or suspended, keeping these less than competent drivers off the highway is an important traffic safety objective.

Strategies

Increase the effectiveness of license suspension/ revocation

Iowa recently amended its OWI laws, especially as they relate to younger drivers.

Define and implement the strategies that most effectively keep suspended/ revoked drivers off of the road

Driving while revoked under OWI chapter or arrested for second or subsequent OWI-vehicle may be seized and impounded for 180 days or until revocation is completed.

Driver History Initiative Projects – FHWA will fund projects to evaluate citation issuance, conviction process and licensing procedures and policies for efficiency and accuracy.

Develop and deploy an informal assessment system that driver/ family/ medical personnel can use to assess an individual's capability to drive safely

The Iowa Department of Transportation currently allows examiners discretion to require medical evaluations if a condition that could potentially affect driving ability is present.

Develop and provide technical aids such as simulators and electronic media for private self assessment and improvement of driver skills

Assess the use of simulators and electronic media may to assess driving skills and provide training for new drivers.

Enhance the competency of drivers through an improved renewal system

Iowa's current "mail-in" renewal system may be a step in the wrong direction as this removes the only potential face-to-face contact with an individual to assess their qualifications, especially medically.

3. Sustaining Proficiency in Older Drivers

Primary Authors: Jim Hogan, Scott Falb, BobThompson, Steve Gent

Background

As of 1995, there were 16.5 million older licensed drivers in the United States--47 percent more than a decade earlier. This number will only continue to increase as the huge "Baby Boomer" population begins to swell the ranks of older drivers. In Iowa, there were 335,245 licensed drivers over the age of 65. That is 16 percent of all the licensed drivers in the state. One national survey listed Iowa as having the third highest percentage in the nation of licensed drivers over the age of 65 and second highest percentage of licensed drivers over age 85.

As with younger drivers, older drivers are associated with a distinctive set of safety issues and concerns that need to be addressed with a set of specific solutions. Older drivers often develop reduced visual and hearing capabilities. All drivers begin experiencing an increasing loss of depth perception beginning around age 50. Memory, physical and mental agility and physical strength all diminish in older drivers but the rates are not always uniform. These deficiencies create safety issues that need to be addressed in order to stem the growing number of older drivers involved in traffic crashes.

Strategies

Support national efforts to improve driving conditions for elderly drivers

Support national efforts—through comments, committees, or funding—to simplify the driving task for elderly drivers. Such efforts may include increasing the size of standard sign lettering, reducing the number and complexity of sign messages, designing and building cars that older drivers can maneuver safely yet still provide the comfort seniors need to stay attentive.

Pursue efforts at the state level that address elderly drivers

Simplify the visual task of driving by reducing the number of signs and using easier to read signs. Work to increase the use of graduated licensing for older drivers to make sure that what the license allows fit the driver's capabilities. Improve medical and vision reporting standards and reporting forms. Work with medical and law enforcement professionals to further standardize and improve the process for reporting and testing drivers who may be incapable of driving safely. Find ways to cut down on traffic congestion to allow qualified seniors more opportunities to use the roads in urban settings.

Assess the feasibility of Advanced Traveler Information Systems (ATIS) and Advanced Vehicle Control Systems (AVCS) for sustaining mobility and enhancing proficiency

Intelligent Transportation Systems (ITS) will be evaluated to determine if they can be refined to help safely sustain mobility and enhance proficiency for the older driver without distracting or confusing the older driver.

Promote older driver training and retraining

Promote voluntary programs such as “55 Alive” to help older drivers compensate for diminishing capabilities and also to stay abreast of current laws.

4. Curbing Aggressive Driving

Primary Authors: Loren Muench, Craig Markley, Jack Latterell, Scott Falb, Daron Van Helden, Roger Walton, Fred Walker

Background

Although there have always been aggressive drivers, incidents leading to crashes, injuries, and even fatalities are becoming more prevalent. Aggressive driving (at its worst - road rage) manifests itself as a combination of speeding and recklessness resulting in highway behavior dangerous to other roadway users. Coupled with anger, the whole array of deviant driver actions contributes to needless losses. Iowa is not immune. In fact there is increased sensitivity in Iowa to aggressive driving. Iowa has the second highest percent of elderly drivers. Aggressive drivers and elderly drivers operating together pose a unique safety challenge to Iowa.

One of the pressing needs prior to setting strategies to eliminate aggressive driving has been to develop definitions of the terms “aggressive driving” and “road rage”. The SMS committee in its June 1998 meeting adopted definitions from the American Automobile Association (AAA) as follows: Aggressive Driving - operation of a motor vehicle without regard for other roadway users’ safety, which at times is a result of anger or frustration. Road Rage - a deliberate attempt to harm other persons or property arising from an incident involving use of a motor vehicle. It is obvious that they are not the same thing.

The new federal highway bill, Transportation Equity Act for the 21st Century (TEA-21) contains no reference to mandates or requirements for states to address aggressive driving or road rage.

Strategies

Simply stated, the method for addressing aggressive driving/ road rage is satisfied through the development of strategies for implementing driver attitude change.

The following process for implementing a change in aggressive driving/ road rage behavior was determined after analyzing the SMS road rage brainstorming ideas. The following is an extremely simplified list of strategies and must be realized that each is made up of many different parts requiring efforts from various legislative, law enforcement, Iowa Department of Transportation, etc. entities in order to be successful.

Public awareness campaign

A media blitz should be organized in order to convey the message to the general public that a problem exists. Results of this campaign must be a change in driver attitudes by defining aggressive driving/ road rage and educating all drivers about the change in driving behavior that is needed. Examples of ways to convey messages are billboards, radio and TV announcements, and discussion in driver education classes.

For this strategy to be successful, this media blitz should result in public acceptance of the enforcement of aggressive driving/ road rage.

Establish aggressive driving/ road rage as a legal violation

State legislators must recognize aggressive driving/ road rage as a serious problem and enact legislation to designate as a formal offense, establish penalties and encourage police officers to cite violators. Also, pursue Intelligent Transportation System (ITS) applications (such as automated speed and red-light-running enforcement by using video camera images) to be allowable forms of enforcement.

Make drivers responsible for their actions

Encourage police officers to ticket for aggressive driving/ road rage related offenses. Raise public awareness of why, when, and where aggressive driving/ road rage occurs most often. Empower drivers with strategies to avoid aggressive drivers by educating them about the times, routes and behaviors that instigate aggressive driving/ road rage.

Mitigate non-driver related aggressive driving/ road rage causes

Identify and encourage highway engineering practices that facilitate efficient traffic flow thereby reducing frustration and major causes of aggressive driving/ road rage behavior. Some examples needing improvements are: signal timing, road construction configurations, traffic congestion, and access control.

Support the development/ implementation of future its solutions

Support the testing and implementation of ITS applications that can be utilized to increase driver safety awareness and curb/ eliminate aggressive driving. Examples include: video cameras and/or in-road vehicle detectors to enforce running of red traffic signals and speed limits, in-road weather sensors to better predict road conditions, and fully automated highways. The enforcement initiatives will require establishing the authority to issue traffic violation citations to owners of vehicles based on license plate numbers. It may also be beneficial to introduce these new approaches using pilot programs.

Support aggressive driver enforcement initiatives

Consider the use of unmarked enforcement vehicles equipped with a video camera and supported by marked enforcement vehicles. This method has been used elsewhere to fight aggressive driving and has been most effective when the local news media has been involved.

These six strategies should be developed into a business plan that would establish the in-depth methods in which each of these strategies would be implemented. It would include determining responsibilities between involved parties, distribution of costs, and ways to coordinate with other initiatives in this strategic plan.

5. Reducing Impaired Driving

Primary Authors: Russ Belz, Dave Goodwin, Denny Becker

Background

Among all traffic safety issues, impaired driving has perhaps the highest profile, and combating it has been vigorously pursued for decades with aggressive campaigns in both the public and private sectors. Despite all these efforts, impaired driving remains a priority issue. Nationally, the efforts of law enforcement, State legislatures, and citizens' organizations helped reduce the 1995 alcohol-related fatality rate 24 percent from its 1985 level-a laudable achievement. Still, there were 17,274 such deaths in 1995, and that number represented a 4 percent increase from the previous year.

Numerous statistics are generated on the various issues associated with alcohol and driving. The numbers and percentages are often staggeringly large. Alcohol was involved in 40 percent of fatal crashes in 1995-an average of one every half-hour. There were more than 300,000 injuries where alcohol was reported present. 1.4 million individuals were arrested in 1994 for driving under the influence of alcohol or drugs. An estimated two in every five Americans will be involved in an alcohol-related crash in their lifetimes. Intoxicated drivers 21-34 years old accounted for nearly 55 percent of fatal alcohol-related 1995 crashes.

Iowa's experience is slightly better, statistically, than the national averages. Alcohol was involved in 27 percent of the fatal crashes in 1997-the lowest year on record; alcohol-related traffic injuries totaled 3,014 in 1996. Approximately 19,000 persons were arrested for OWI in 1997; intoxicated drivers 16-25 years old accounted for nearly 30 percent of all fatal alcohol-related crashes from 1992 to 1997.

Iowa's traffic safety leaders have made great strides in reducing alcohol related traffic fatalities and injuries which is demonstrated by the fact that many of our statistical numbers are down from prior years. While Iowa's experience is better than the national average, there is room for improvement If present trends continue, during the next 10 years approximately 400 persons under the age of 25 will die in alcohol-related crashes in Iowa. We should continue to explore new ideas, as well as look at other states’ programs that are effective ways to save lives and reduce injuries from impaired drivers.

Strategies

Advance stronger legislation

Strong legislation acts as a deterrent to those that might consider driving after consuming alcohol or drugs but may not yet be impaired, and as punishment for those that drive after becoming impaired. The following legislation would have a direct impact on reducing alcohol-related deaths and injuries.

Lower the per se blood alcohol content (BAC) level from .10 to .08

There are many states that currently have a .08 BAC per se level. Many of those states show a significant statistical correlation in lowered alcohol-related fatalities after the .08 went into effect.

Create a drinking and driving citation

This would be a scheduled violation with a minimal fine. (A simple misdemeanor.) Nationally we recognize that impairment can begin with a BAC as low as .04 (Administrative License Revocation of a CDL). By having a scheduled violation with a .04 limit we would strongly encourage the use of designated drivers by persons whom have consumed any amount of alcohol. We would also be identifying those that are more likely to have an OWI. Colorado currently has a 2 level OWI law with .05 and .10 limits. However, the OWI charge should not be reduced to a drinking and driving citation, thereby reducing the effectiveness and seriousness of the criminal offense.

Administratively revoke the driver's license of anyone attempting to use it to purchase alcohol under age

A driver's license is an official license issued by the state. Any misuse of the license should be grounds for the revocation of the privilege that license offers. More specifically, anyone that uses, or attempts to use, a valid or invalid driver's license, including altered, expired, fraudulent driver's licenses, and documents not issued by the state but that are made to resemble state issued driver's license, or anyone whose driver's license is used, to purchase alcohol under the legal age shall have their driving privilege revoked. Illinois has a similar law that revokes the driving privilege for one year.

Improve the vehicle seizure process

Those that cannot learn from their first OWI not to drink and drive must be removed from the road on the second offense. Many times these drivers continue to drive without insurance while revoked. The only way to stop them from driving is to take away the vehicle at the time of arrest. Vehicle impoundment has proved to be largely ineffective for two reasons. First, it is only enforced as part of the sentencing order, and not all judges include it in the sentence (sporadic enforcement). And second, it only affects the vehicle driven at the time of the arrest. Usually, by the time the Judge orders impoundment at the sentencing the vehicle has been replaced by another that cannot be impounded. The first step to insuring that highest risk drivers do not have a vehicle available to them for endangering more lives is immediate seizure and sale of the vehicle the person was driving at the time of an OWI second offense or any Driving While Revoked offense following an OWI second offense. Removing the license plates of any vehicles registered to that person or jointly registered to that person would be step two. Step three would be to make vehicle owners responsible for ensuring that only valid drivers operate their vehicles. A serious misdemeanor would be appropriate for a vehicle owner to allow a suspended, revoked, or barred driver to operate their vehicle.

Consider alternative alcoholic beverage division enforcement

Many times enforcement of the code pertaining to licensee's sales of alcohol to under age consumers is left to local law enforcement. This results in inconsistent enforcement from county to county as well as city to town. Many law enforcement agencies are reluctant to routinely enforce these laws due to political pressures from local businesses. By creating and funding inspector positions at the Alcoholic Beverage Division we could insure continual and consistent enforcement throughout the state.

Continue strong enforcement

Saturation patrols can significantly deter drinking and driving if they are performed frequently and are well publicized. These enforcement initiatives would be performed using guidelines that insure effectiveness and cost efficiency, and would be enhanced by the use of incentive funds.

Reduce the incidence of drinking and driving by those in the 14 to 34 age group

This age group has the highest incidence of impaired driving, includes those not yet of legal age to consume alcohol, and has not been directly targeted nationally in the past. This group contains two sub-categories that in some instances overlap; those learning and beginning to drive, and those learning to drink alcohol. Several of the legislative issues previously addressed relate directly to one or both of these sub categories.

We also need to focus our educational efforts on these two sub-categories. New and innovative programs that target the 14 to 34 age group should be developed in cooperation with schools, private business, media, and government using incentive funds as well as private funding.

Create more effective ways to eliminate repeat OWI offenders

Many repeat OWI offenders continue to drive both drunk and unlicensed. These individuals are an obvious menace to society. This strategy has also been previously addressed in the legislation area, under Vehicle Seizure. The continued and expanded use of ignition interlock devices will allow those legally able to drive to safely resume driving.

Expand the Drug Recognition Expert program

This effort will build on the existing program that targets drug-impaired drivers. Iowa currently has 61 law enforcement officers trained as Drug Recognition Experts (DRE) located in and near major population areas. Nine of DREs are trained DRE Instructors who are officers that generally work the streets full time, and donate their time and expertise as instructors with the support of their departments. This obviously makes them a valuable yet limited resource.

Expansion of the program must involve three areas. First, we must train more, and eventually all, officers in the eight hour course so they know when the can recognize the signs of drug impairment, and know when to call for the assistance of a Drug Recognition Expert. Second, we must train more officers as Drug Recognition Experts so that there is always a DRE available when requested, anywhere in the state. Third, we must increase the number of DRE Instructors. This will allow our DRE program to properly staff the DRE schools without the assistance of out

of state Instructors, and without creating overwhelming demands on the time of the DRE Instructors.

Implement a comprehensive public awareness campaign

It is essential that awareness and knowledge of impaired driving issues continue through all available avenues. Educating our youth to the fact that drinking under the legal age is no longer socially acceptable, and that drinking and driving is never acceptable should be a primary focus.

Partnerships could be developed among those stakeholders who have a mutual interest in preventing impaired driving. This includes those that must deal with the impaired driver and victims (law enforcement officers, emergency room doctors and nurses, clergy) those that are financially affected (insurance companies, employers) those that rely on safe roads (trucking companies, rental car companies, delivery companies, retailers) and those concerned about community safety (PTAs, alcohol retailers, civic groups).

There are currently some partnership programs available that are largely unknown. The T.I.P.S. program teaches alcohol servers about signs of intoxication and how to safely intervene so the intoxicated customer does not drive home. Some insurance companies offer a reduced rate if all or most of the servers are T.I.P.S. trained.

These types of programs need to be identified and promoted through all related interest groups.

6. Keeping Drivers Alert

Primary Authors: Tim Simodynes, Dallas Scott, Daron Van Helden, Bob Thompson

Background

A fatigued or distracted driver can be as dangerous as an impaired driver. However, with no method of testing for fatigue or distraction after a crash, it is very difficult to quantify the problem of fatigued and distracted drivers. Nationally, drowsy and distracted drivers are known to be involved in four percent of all fatal crashes. Due to underreporting, they have been estimated to be involved in as many as one-third of all fatal crashes.

Driver fatigue impairs driving skills. It leads to poor judgment, slowed reaction times, and decreased awareness, which can lead to tunnel vision, wandering thoughts and a shortened attention span.

Current statistics show that 18 fatal crashes in Iowa in 1994 and 1995 involved fatigued drivers. National and Iowa drowsy driver trends show that males age 16 to 25 are most likely to be involved and that the incidence of crashes involving drowsy drivers increases at night and peaks around 2AM. In a recent Gallup poll, 31 percent of drivers admitted they had fallen asleep while driving.

Strategies

Improve the reporting of fatigued and distracted drivers as a cause of crashes

It is widely known that drowsiness and distractions are underreported as contributing factors in crashes. However, reliable base data is needed to quantify the problem and justify the expenditure of resources to prevent fatigued and drowsy driving.

Educate drivers about the warning signs and dangers of drowsy driving

Recent research has led to an increased understanding of sleep and fatigue. All drivers could benefit from better understanding how and why to avoid driving drowsy. This information needs to be distributed to drivers of all ages through driver education and public service announcements.

Prohibit the use of cellular telephones while driving except for emergencies

According to a report published in *The New England Journal of Medicine*, the risk of collision is four times greater when a driver is making a call on a cellular telephone[1].

The dangers of drivers operating cellular telephones while driving can be reduced through three approaches. Drivers can be educated regarding safe practices to follow when using a cellular

[1] Redelmeier, D. A., and R. J. Tibshirani. "Association between Cellular-Telephone calls and Motor Vehicle collissions," *The New England Journal of Medicine*, Vol. 336, No. 7, February 13, 1997, p. 453.

phone. Regulations can be passed mandating where and how long a phone can be used. Cellular telephones can be designed to minimize the effort needed for the driver to complete a call.

Accelerate efforts to add shoulder rumble strips to all roadways

Paved shoulders with rumble strips have been proven to increase safety at least in part by waking drowsy drivers who leave the road. Recent efforts have added rumble strips to some of Iowa's roadway network and this effort needs to be continued.

Monitor and support Intelligent Transportation Systems (ITS) research efforts aimed at preventing driver fatigue

Recent ITS, military, and industrial research has been conducted on the effects and prevention of operator fatigue. This valuable research needs support to be developed into practical and beneficial applications. This can be done in Iowa by monitoring efforts elsewhere and providing support through funding or field testing.

Decrease drowsy driving by commercial vehicle operators

A disproportionate number of commercial drivers are involved in crashes involving drowsy drivers. This may be mitigated in part by better implementing and enforcing hours of operation regulations for commercial vehicle operators. Hours of service regulations are being studied and motor carrier organizations, the Iowa Department of Transportation, and the FHWA should stay current on this issue and actively emphasize safety in any future regulatory or enforcement changes.

7. Increasing Driver Safety Awareness

Primary Authors: Loren Muench, Craig Markley, Jack Latterell, Scott Falb, Daron Van Helden, Roger Walton, Fred Walker

Background

Research indicates that approximately 85 percent of the causation factors associated with motor vehicle crashes are attributed to the driver. Many of these drivers are unaware or have underestimated the risks and consequences associated with their unsafe driving behaviors. States have a vested interest in ensuring that their drivers are as knowledgeable about safety awareness issues as is reasonably possible.

It is probable that the vast majority of drivers do actually know what constitutes good driver safety awareness. For many, this knowledge was gained through formal driver education. For others, experience has been the “teacher.” Unfortunately, their knowledge does not get translated into appropriate action. Fatigue, inattention, aging, distractions, simpler vehicle operation, and other factors, inhibit good awareness and consequent good action.

Strategies

Improve driver education

Education appears to be the most critical element in combating the problem. Driver education, emphasizing good awareness skills, must be encouraged by school administrators, commercial driving school operators, and safety authorities, as well as the general public. Courses are notoriously short on time for presenting academics and supervised practice time. The new graduated licensing in Iowa is a step in the right direction.

Experienced drivers, and particularly elderly drivers, also need additional education as new concepts, laws, vehicle design, etc. emerge. Driver improvement courses, other than those designated for violators, can fill a vital role in this regard. Availability and attendance needs to be expanded greatly.

Encourage personal responsibility

Perhaps nothing will be more effective in dealing with this issue than having drivers accept their implied obligation to be "safety aware" individuals. However, to reach and maintain that profile takes more self-discipline than most individuals seem to have. Consequently engineering and enforcement efforts are needed for "encouragement".

It should be noted that "driver safety awareness" can be interpreted in several ways:

1. Recognition of environmental factors-weather, roadside hazards, work zones, and other users

2. Recognition of personal limitations-fatigue, aging, reaction time, anger, and health problems

3. Recognition of driving behaviors which contribute to potential crash situations-drinking and driving, failure to buckle up, aggressive driving, tailgating, speeding, "cheating" on traffic control devices and laws, left lane "camping", and perhaps others

4. Ensure elderly drivers have access to and are aware of alternative means of transportation as a safer option

Iowa has had a long-standing dedication to safety on its highways. Thus the Iowa Department of Transportation, the Governor's Traffic Safety Bureau, the Minnesota/ Iowa AAA, the Department of Education (driver education and school transportation), as well as other entities, historically have addressed most of the issues in some way. The advent of SMS has helped to bring focus to a more comprehensive and cooperative effort.

Iowa should also welcome and cooperate with any federal efforts in this area.

8. Increasing Safety Belt Usage and Improving Air Bag Effectiveness

Primary Authors: Bob Thompson, Jim Hogan, Russ Belz, Daron Van Helden

Background

The use of occupant protection systems, including seat belts and child safety seats, has saved over 100,000 lives since 1983, based on estimates from the National Highway Traffic Safety Administration.

In Iowa alone, the Iowa Department of Transportation's "Life Toll" lists the names of over 3,600 persons spared death or life threatening injury because of seat belt use since Iowa's law was enacted in 1986. Current Iowa seat belt usage is 75 percent, the highest use rate among the 12 states in the greater Midwest. Iowa's seat belt use rate is also among the top 10 states in the nation. As recently as 1985, Iowa's seat belt use rate was just 18 percent. Iowa's child restraint use rate, based on the 1998 statewide survey, is 73 percent.

Strategies

Increase adoption of standard seat belt laws and eliminate gaps in child seat laws

Iowa is one of 13 states with standard or primary seat belt laws. Thirty-six states have secondary laws, and one state (New Hampshire) has no seat belt law.

Standard laws allow an officer to stop a vehicle when a seat belt violation is observed. Secondary laws do not allow an officer to stop a vehicle for a seat belt violation only. In secondary law states, an officer must observe another traffic law violation, such as expired plates, failure to use turn signal, speeding, etc., in order to stop a vehicle, then the officer may issue a citation for non-seat belt use.

Belt use rates in standard law states are substantially higher than those for secondary law states. In fact, nine of the top 10 belt use states have standard laws.

Iowa's seat belt law does not apply to rear seat passengers and our fine for seat belt violations is just $10. These are elements of our current law that could be strengthened or improved.

In regard to child safety seats, Iowa's current law requires that children under three be in an approved child safety seat and that all children under age six be restrained, regardless of seating position.

Iowa's law could be strengthened by requiring that all children under 12 be restrained. Expanding our current seat belt law to include rear seat passengers would also eliminate the current "gap" for children six and older in the rear seat.

Implement periodic, intensive, coordinated enforcement, and public information and education initiatives

Iowa has implemented periodic intensive enforcement with complimentary Public Information and Education (PIE) efforts. Iowa is one of 20 states to participate in Special Traffic Enforcement Program (STEP). STEP involves coordinated statewide seat belt enforcement efforts targeted at pre-selected weeks throughout the year. During the past three years, over 100 local police departments and sheriff's offices, as well as the Iowa State Patrol, have participated in STEP. Local radio, television and newspapers have been active participants in the STEP effort, interviewing local officers, elected officials and the motoring public.

Ten STEP waves over the past three years have generated a total of more than 20,000 seat belt enforcement actions. The Governor's Traffic Safety Bureau (GTSB) administers the STEP program in addition to federal 402 and 410 programs, which are designed to enhance public awareness and enforcement regarding traffic laws.

All GTSB enforcement contracts, which currently include more than 50 law enforcement agencies, require seat belt enforcement activity and complimentary PIE efforts.

In 1997, more than 80,000 seat belt violation convictions were recorded in Iowa, as well as nearly 6,000 child safety seat violations. Iowa has also been a national leader in promoting cooperative multi-agency enforcement events such as checkpoints, saturation patrols and corridor enforcement events.

Iowa will continue to aggressively enforce seat belt laws. During 1998, special emphasis was given to lower belt use areas of the state in an effort to boost statewide seat belt use to 80 percent. Iowa's benchmark goal in the state's 402 highway safety plan is 80 percent seat belt use and 75 percent child safety seat use.

Improve the effectiveness of airbags, create improved awareness of airbag safety effectiveness

Iowa is strongly supportive of NHTSA efforts to improve the effectiveness of air bags. Educational brochures regarding the use of seat belts in conjunction with air bags have been widely distributed. Special emphasis has been placed on informing the motoring public of the need to place infant seats in the rear seat of vehicles equipped with passenger side air bags. Other "at risk" groups such as unbelted children in the front passenger seat of air bag equipped vehicles and adult female drivers who are of short stature have also been targeted.

Because air bag performance issues are national in nature, the Governor's Traffic Safety Bureau has worked with safety counterparts at NHTSA and FHWA to encourage improvements in air bag deployment technology, which will decrease the risk of deployment-related serious injury or death, while maintaining the life saving benefits, which have been documented.

Special Users

9. Making Walking and Street Crossing Safer

Primary Authors: Bob Studer, Mary Harlan, Joyce Emery, Randy Schlei, Bob Thompson

Background

Walking is the oldest form of transportation and is used by almost everyone to, at a minimum, begin, make, or end a trip. All age groups use walking for transportation and walking is very popular for recreation and physical fitness. As our streets and highway systems developed for the motorist, walking was sometimes not given enough consideration, resulting in a conflict between the motorist and the pedestrian. In Iowa from 1991 through 1996 there were 4,400 such conflicts between motorist and pedestrian resulting in 4,100 injuries and 220 fatalities. Different age groups of both pedestrian and driver contribute to the conflicts between them by not understanding the risk and responsibility of this interaction. Pedestrians and motorists do not always comply with statutes governing the use of public highways. High use of Alcohol by both motorist and pedestrian is another factor in this conflict. Pedestrian issues not only include conflicts with the motorist but also the lack of providing adequate facilities for the pedestrian to use. Shopping centers and manufacturing areas do not always provide adequate pedestrian facilities and accessibility. Strategies are needed to address this issue and make walking and street crossing safer in Iowa.

Strategies

Utilize existing resources and programs to disseminate information on pedestrian safety for all ages of pedestrians with emphasis on children and the elderly

Pedestrian safety is particularly recognized as a transportation issue for cities and urban areas. Two-thirds of pedestrian fatalities and 85 percent of pedestrian collisions occur on city or suburban streets. Children and older adults are particularly at risk.

Safety programs for children walking to school and crossing streets have been utilized in states such as Florida. The American Automobile Association (AAA) has had programs for school children for many years, i.e. the School Safety Patrol. Other groups have formed a coalition to sponsor “Walk Our Children to School" day and make it an annual event to raise community awareness.

Pedestrian safety programs have been developed by coalitions of agencies and groups that are concerned with pedestrian safety, including the AAA and the U. S. Department of Transportation (USDOT). The AAA Pedestrian Protection Program, for instance, is designed to stimulate community concern and involvement in pedestrian safety.

The USDOT and other agencies have developed “Walkable America.” It targets safety issues through a checklist on pedestrian safety. It rates the condition of the sidewalks, driver behavior, and the ease of crossing streets. Any community can easily utilize the “Walkable America” program. Communities in Iowa using this guideline could improve the safety of their pedestrians.

Targeting children and older adults for pedestrian safety programs can benefit the entire community. Ultimately, everyone’s quality of life will improve.

Utilize and supplement existing resources and programs directed towards reducing the conflict between impaired pedestrian and driver

A recent study by the Federal Highway Administration identified that the most frequent type of crash involving impaired pedestrians occurred at intersections and/or mid block crossings. Approximately 38 percent of all pedestrians involved were impaired with alcohol compared to only 5 percent of the drivers. The study indicates that the majority of these crashes occurred in urban areas during daylight hours. Proposed projects initiated by the Federal Highway Administration are directed towards providing countermeasures to this type of crash. These countermeasures can be evaluated and modified as necessary to be applied in Iowa. Some of the countermeasures would include public awareness programs and the distribution of material identifying the dangers of walking while impaired, much like the public information on impaired driving.

Encourage local officials and citizens to assess pedestrian safety in their community and make use of pedestrian safety countermeasures relevant to the problems identified

Cities should evaluate areas in their communities that have experienced pedestrian safety problems. Information can be gathered through surveys, investigations, and studies and could identify a specific problem or a group of problems. Examples could be street crossings, multiple-use facilities, or the physical condition of the sidewalks, etc. This should be supported by crash information that can be used to analyze the condition and recommend improvements. Any improvement work should be done in a specific problem area. A survey of the area following the improvement, along with crash statistics, will identify its impact on improving pedestrian safety. This evaluation can then be used to recommend improvements to other identified problem areas. This is a continuing process and will provide the community with an ongoing program for identifying and improving pedestrian safety issues.

Develop and implement programs to make intersections and crosswalks more pedestrian friendly and reduce the conflict between motorist and pedestrian

Many existing intersections and crosswalks were designed and constructed without giving the pedestrian adequate facilities. Often, there is insufficient space to provide adequate crossings, and signals served the motorist only. Considerable progress has been made over the years to provide safer accommodations at our intersections. Much of this was prompted by the disabilities act that required sidewalks to accommodate the handicapped. Elimination of curbs not only helps disabled but also all levels of pedestrians, particularly the elderly. Wider, more visible, and raised crosswalks could be provided as well as pedestrian refuge islands on busy streets. Where the pedestrian traffic is frequent and high in volume, it may be necessary to separate pedestrian from vehicles with overpasses or underpasses. Traffic signals and their timing need to be improved to accommodate pedestrians. The “WALK” and “DON’T WALK” signals are often confusing to the elderly pedestrian crossing a signalized intersection. Many cities are now using the image of a person walking and the flashing hand to advise pedestrians. The signal phase length for walking should accommodate the elderly who may need more time to cross the street. Many cities have adopted an “all walk” signal for pedestrian travel across intersections. These and other innovative techniques will make intersections more pedestrian friendly and safer. The

Iowa Department of Transportation's *Bicycle and Pedestrian Accommodation Guidelines* address many of these issues.

Implement programs to establish sidewalk continuity in developed areas and to plan, construct and maintain designated hard-surfaced walking areas in parks and recreational areas

Many of our residential areas were developed without sidewalks, or sidewalks were an option to the homeowner. This forces the pedestrian to utilize the street or a parking area. In addition many residents have allowed their sidewalks to deteriorate, creating an unsafe walking facility. Ordinances associated with some type of tax abatement program may help provide continuity in residential sidewalks and make them safe for pedestrian travel. Parks and recreation areas have often been developed without sidewalks or hard surfaced paths to serve pedestrians. This not only results in an unsafe condition for the pedestrian but also results in poor grass maintenance where designated paths are not provided. Many cities have developed programs to provide accommodations, particularly where walking has been emphasized as recreational exercise. These efforts need to be expanded to parks and recreational areas in other jurisdictions. This can also be done in conjunction with the development of bicycle paths in these areas.

Include pedestrian accessibility and safety in the planning, construction and maintenance of residential, retail, service and manufacturing facilities

We have developed many of our major shopping centers and/or retail areas without considering the pedestrian. Often pedestrians have a sidewalk on residential streets and highways only to find that they must walk in the vehicular traveled way upon entering the shopping center parking area. Motorists parking their cars and walking to shopping center buildings are also forced to walk through parked and moving vehicles and run the risk of being struck by an inattentive motorist. This is also true in many other service and manufacturing areas. City ordinances and/or tax abatement programs are needed to provide adequate pedestrian facilities. In major downtown areas where a high volume of both pedestrian and vehicular movements exist the separation of these two modes is necessary. Many cities have developed a series of skywalks between buildings and parking facilities to accommodate the pedestrian. Other techniques such as traffic calming, park and ride or park and walk programs can also reduce this conflict.

Residential areas are also prone to this condition particularly where inadequate space exists for sidewalks or sidewalks are not provided and the streets are designed for local traffic only. Traffic calming techniques need to be incorporated in these areas to provide a facility that can accommodate both pedestrians and motorists.

Increase pedestrian (and bicycle) accommodation along state highway improvement projects

Currently, sidewalk construction is the responsibility of the local jurisdiction. It is important to recognize that a state highway through a community can also carry a high volume of pedestrians, and that pedestrian accommodations can be improved within the corridor as part of a highway improvement project.

10. Ensuring Safer Bicycle Travel

Primary Authors: Bob Studer, Mary Harlan, Dick Harmon, Ron Peterson, Bob Thompson

Background

Bicycle usage and travel in Iowa has continually increased over the past several years. There is more emphasis on bicycling as a form of recreation and fitness with both families and individuals. We now have more than 150 organized bicycle clubs in Iowa and more than 200 organized rides each year. The best known of these rides is RAGBRAI—the Register's Annual Great Bike Ride Across Iowa—with over 10,000 cyclists participating. With this increase in bicycle usage, we have had over 4,200 bicycle crashes involving 4,000 injuries and 52 fatalities from 1990 though 1996. Inappropriate use of the highway and not following the rules of the road contribute to injuries. Not wearing a helmet or its inappropriate use increases the severity of these injuries. The cyclist and the motorist often conflict on our highways with the motorist not seeing or recognizing the cyclist and the cyclist not wearing appropriate clothing to alert the motorist. While several local, county and state jurisdictions have made progress in accommodating bicyclists, there needs to be a continued emphasis in this area. Strategies involving education, recognition, enforcement, engineering, funding, etc are needed to make bicycle travel safer in Iowa.

Strategies

Increase bicycle helmet usage

Helmets can dramatically reduce the severity of head injuries in a bicycle crash. There needs to be a statewide effort to increase the usage of helmets. Media campaigns and educational material can be used to emphasize their usage. Parents can increase helmet usage by teaching their children helmet safety. Helmet safety can also be taught in our schools with local enforcement agencies and bicycle clubs participating. Many other states have age-specific bicycle helmet usage laws. Iowa should consider legislation requiring bicycle helmet usage. Implementing this strategy will contribute towards making bicycle travel safer in Iowa.

Promote educational/ informative programs on bicycle usage and safety

These programs need to be directed at all age groups of both beginner and advanced bicyclists. There are numerous organizations in Iowa that now promote bicycle usage and safety. These include both private and public organizations. The identification, funding sources and educational material of these groups needs to be identified to reduce duplication and maximize the existing programs and funding. In addition new funding sources should be sought to expand existing programs and develop new ones. Most programs on bicycle safety are directed towards elementary school children. With the increase in bicycle usage by adults, they should also be knowledgeable of bicycle safety. Resources such as bicycle clubs, enforcement agencies, etc. can be used to hold bicycle fairs and clinics promoting bicycle safety. Programs promoting the use of bicycle flags and reflective clothing that signalize the presence of a slower moving vehicle will help to reduce bicycle and motor vehicle conflicts. Programs directed towards the compliance of the rules of the road by the bicyclist are a critical and important component of increasing bicycle safety in Iowa.

Promote the adoption of policies and programs by cities, counties and state to accommodate bicycles on our highways and trails

Many cities in Iowa have identified existing city streets as bicycle routes and have constructed separate bicycle paths. The Iowa Department of Transportation (Iowa DOT) has included bicycle and pedestrian accommodation guidelines in its Highway Planning and Programming Guidance. Several counties have provided wide shoulders to accommodate bicyclists. Both public and private organizations have promoted and developed abandoned railroad lines into bicycle trails. These efforts have identified the need to accommodate bicyclists on our streets and highways. This work needs to be expanded to all areas of the state and all types of highways. Maps identifying existing bicycle-compatible highways need to be prepared and distributed.

Paved shoulders, widening of the pavement surface and/or providing separate bicycle paths will accommodate bicyclists on public highways. While bicyclists and motorists both share equal rights to our highways, separation of their travel on heavier traveled roadways will reduce conflict and increase the safety of the bicyclist. Iowa is one of few states that does not provide paved shoulders on selected highways. The Iowa DOT is currently evaluating its paved shoulder policy. The rails-to-trails program has promoted bicycle usage in Iowa. Emphasis now needs to be placed on making our highways leading to these facilities more bicycle friendly. The Iowa DOT's *Bicycle and Pedestrian Accommodation Guidelines* addresses several of these issues. Effort needs to be placed on identifying and maximizing all existing funding sources for bicycle facilities and seeking new funding sources through appropriate legislation. This strategy is needed to accommodate safer bicycle travel in Iowa.

Involve judicial and enforcement personnel in bicycle safety stressing the importance of effective enforcement of bicycle laws

Numerous bicycle safety publications and videos have been prepared on general bicycle safety, how to use our highways more safely, and identifying the consequences of not complying with bicycle laws. "Ride Right" Bicycle materials developed in cooperation with RAGBRAI, the Des Moines Register and the Iowa State Patrol is an example of this effort. Enforcement officers can also stress this responsibility by participating in bicycle training programs in our schools. A critical component of this effort is appropriate enforcement when these rules are violated by the bicyclist. Not taking action on these violations by not reprimanding and/or issuing a citation with an appropriate fine can lead to contempt of bicycle laws on our streets and highways. Enforcement officers and judicial personnel need to know that action on their part to appropriately enforce bicycle laws will promote bicycle safety on our streets and highways.

11. Ensuring School Bus Safety

Primary Authors: Terry Voy, Daron Van Helden, Russ Belz, Shirley McGuire

Background

Transportation by school bus is one of the safest forms of transportation safety in the United States. Every year, approximately 440,000 public school buses travel approximately 4.3 billion miles to transport 23.5 million children to and from school and school related activities. Each year, on average 11 on-board school bus passengers under the age of 19, die in school bus related crashes. Meanwhile, another 30 to 40 school bus passengers die as a result of being struck by other motor vehicles, or the school bus itself, during the loading and unloading process on roadways or at attendance sites. Although the transportation of students to and from school by school bus is many times safer that the family automobile, school transporters must continually strive to improve upon this excellent safety record.

Strategies

Establish a plan for ongoing review and reporting of school bus route hazards

School bus routes can be affected daily by numerous factors that may impact the safety of the transportation service being provided. Factors such as the addition or deletion of school bus stops, driver changes, changes in roadway condition due to weather, roadway maintenance or construction, and vehicular traffic and traffic patterns can have individual or collective impacts on school bus route safety. Public schools are required by administrative rule to review all school bus routes at least annually for safety hazards. However, school bus routes can change on a daily basis. For that reason, schools should establish a plan for daily and periodic school bus route evaluation, reporting and correction or avoidance of observed route hazards.

Note: A model “School Bus Route and Hazard Marking System” model has been developed by the National Association of State Directors of Pupil Transportation Services for the National Highway Traffic Safety Administration and will be made available to every school in the United States during the fall of 1998.

Promote increased awareness, observance and enforcement of motor vehicle laws relating to motorists approaching or following school buses that are about to stop on the highway to take on or discharge passengers

Numerous motor vehicles are observed by school bus drivers each day passing[2] school buses as the buses are in the process of approaching and stopping on the highway to load or unload student passengers. Because the majority of student fatalities occur outside the school bus during the loading and unloading process, increased awareness by motorists of their obligation when approaching or following a school bus is essential. Public education as to motorist's legal

[2] The term “passing” used here with school buses includes vehicles passing a school bus from either the same or the opposing direction. This specifically refers to when a bus is in the process of approaching a student passenger pick-up location and has its amber or red flashing warning lamp system activated.

obligations upon approach of a school bus is essential to this safety effort. This should include public information and awareness campaigns prior to the start of school each year, during National School Bus Safety Week in October and at other times throughout the school year. In addition, heightened awareness of driver responsibilities through roadside signage, student driver education programs, driver license examinations and in print form including the Iowa Driver's Manual and information brochures placed in driver's licensing stations and highway rest areas.

Identification and prosecution of persons violating Iowa's school bus stop law is extremely important. Law enforcement agencies and schools operating school buses should work cooperatively to report, investigate, and prosecute violators of the school bus stop law.

Promote school bus passenger safety through the systematic purchase and replacement of school buses and equipment meeting all state and federal school bus construction requirements and, which have been equipped with the latest driver and passenger safety technology based on scientific research and real-world experiences

Given that school bus crashes do occur, adequate funding resources for the purchase and replacement of school buses containing the latest design and construction technology available should be encouraged. School bus design and construction standards should be reviewed, safety recommendations researched and, where appropriate, adopted on a national level. Where construction and equipment options are to be considered at the state-level, decisions should be made based on available state-level data and input from state agencies and school transportation officials involved in the safe transportation of students.

Support and promote school bus driver and passenger safety education programs within schools

School bus driver and passenger safety education programs are essential to maintaining a safe student transportation system. Instructional programs in safe ridership for school bus passengers should be conducted at least twice per school year in accordance with rules established by the Iowa Department of Education. A safety plan for school bus passengers should be adopted by each school, including sanctions for improper student behavior on the bus and presented to each student passenger at intervals as prescribed by school district policy. Parents should be provided school bus safety information and encouraged to reinforce safety procedures with students in the home. Local, state and federal agencies having a public policy interest in highway traffic safety should make student school bus passenger safety programs and instructional materials readily available.

The school bus driver plays a key role in the safe transportation of students to and from school and related events and, therefore, must be knowledgeable and skilled in the operation of a school bus. Training and service opportunities should be provided for drivers on a regular basis to provide the knowledge and skills necessary to interact with students and the motoring public while operating the bus in a safe and efficient manner. To determine basic knowledge and skill levels specific to the operation of a school bus, the procedure for acquiring a Commercial Driver's License to operate a school bus should include “school bus specific” written and skill tests. Schools are encouraged to conduct initial and periodic performance evaluations of all school bus drivers at least annually.

12. Improving Motorcycle Safety and Increasing Motorcycle Awareness

Primary Authors: Steve Feldmann, Tom Erceg, Erik Erikson, Mark Sandler

Background

Although motorcycle fatalities have declined over 50 percent since 1985, there still remains room for improvement. In the six years from 1990 through 1995, 15,435 motorcyclists died in crashes; approximately 2,600 per year. In 1996, there were 41,907 traffic fatalities, of these 2,160 or 5.2 percent were killed riding a motorcycle.

Motorcycles account for 5 percent of all motor vehicle fatalities, and the victims are frequently males between the ages of 18 and 27. Alcohol, speed and an inadequate level of awareness of motorcycles by other drivers on the road are the most prevalent causes of motorcycle crashes.

Motorcycle riding is an activity with special needs and special concerns. Statistics indicate that wearing a helmet can be a lifesaver in a motorcycle crash. In 1995, 36 percent of the 1,089 two-vehicle fatal crashes involving a motorcycle and another vehicle were the result of the other vehicle turning left into the oncoming path of the motorcycle. Almost half of the 869 motorcycle operators who died in single-vehicle crashes in 1995 were intoxicated.

Per mile driven, a motorcyclist is 16 times more likely to die in a crash and 4 times more likely to suffer an injury than an automobile driver. Riders who don't wear helmets and crash are 40 percent more likely to sustain a fatal injury and 15 percent more likely to suffer a non-fatal head injury than a helmeted motorcycle rider. Wearing a motorcycle helmet reduces the risk of death and injury by 29 percent and the cost of medical costs by 36 percent. The economic loss to employers, insurance companies and families for those killed or injured not wearing a helmet is estimated to be in the millions of dollars.

Strategies

Increase motorcycle survival rates through the enactment of helmet laws

It is a proven scientific fact that helmets save lives. States that have enacted helmet laws have experienced significant reductions in motorcycle related fatalities. Only three states have not enacted some form of motorcycle helmet law (Iowa, Illinois and Colorado). The State of Iowa should explore enacting some form of helmet law to protect those age groups that are more apt to die and/or suffer serious head injuries in a motorcycle crash.

Solutions to this problem in Iowa are hotly debated and a resolution could be implemented in a series of legislative steps. Solutions include requiring all motorcyclists under a certain age to wear a helmet at all times, as most riders killed are between the ages of 18 and 27. Another solution would require all newly licensed riders to wear helmets by denoting a restriction on their license, and require all riders involved in a reportable accident to wear helmets and to take a rider safety course if they have not previously attended one or a refresher course if they have attended a previous rider safety course.

Helmet use can be promoted through public information and education campaigns with support of state and local highway safety organizations, law enforcement and motorcycle safety organizations.

Reduce motorcycle fatalities resulting from errors of other drivers

Many motorcycle crashes (36 percent) are attributed to other drivers pulling out in front of a motorcyclist. This is due to either the driver failing to see the motorcyclist or poor judgement of speed and/or distances.

The state needs to be more aggressive in its motorcycle awareness campaign in the spring to remind drivers that motorcyclist are also sharing the road. Public service announcements that cause drivers to think about looking for a motorcyclist prior to entering an intersection are needed. Motorcycle conspicuity could also be improved by placing signs at or near intersections that read “Watch for Motorcyclists” and placing bumper stickers on all state, county, and municipal vehicles, similar to current school and ethanol stickers. Manufactures could also develop modulation headlights, fluorescent helmets, reflective jackets and daytime running lights.

Increase comprehensive motorcycle rider education programs for novice and experienced riders

Motorcycles by their very nature are more difficult to operate and control than an automobile. This is true during normal driving conditions and increases exponentially in emergency situations.

Currently in Iowa, all riders under the age of 18 must pass a motorcycle rider course. This should be expanded to include all first time motorcycle-licensed riders. Rider education programs like Rider Course, Experienced Rider Course, and others should be expanded to include all first time motorcycle licensees regardless of age. All riders involved in a single motorcycle crash should be required to complete a rider safety course or have their license suspended.

Reduce the number of alcohol related motorcycle fatalities

Alcohol is involved in one-half of all motorcycle fatalities in North America. Studies have shown that 85 percent of alcohol-related motorcycle crashes result in rider injury, as opposed to 35 percent of car crashes. The safety community needs to include programs that focus on identifying the intoxicated motorcycle operator as a separate feature of their campaigns. State and local traffic safety officials need to address the problem of impaired motorcycle operators in future impaired driving programs.

Motorcyclist that are charged with Operating While Intoxicated should be required to attend a Motorcycle Rider Course and a rider-education seminar using the Riding Straight video in an attempt to influence rider attitude.

License motorcycle riders according to demonstrated proficiency

Riders should be licensed according to the size of the motorcycle they demonstrate proficiency to ride. Currently, a rider can ride any and all motorcycles on the market without demonstrating proficiency.

13. Making Truck Travel Safer

Primary Authors: Val Hunter, Shirley McGuire, Steve Feldmann

Background

Year after year, large trucks are involved in thousands of crashes--between 4,000 and 5,000 deaths annually during the decade of 1985 to 1995. By a wide margin, the fatalities are occupants of other vehicles as opposed to truck occupants (greater than 6:1 in 1995).

Poor driver performance, including fatigue is a major contributing factor, as is an adequate level of awareness of trucks by other drivers on the road.

The unsafe condition of many trucks, particularly their braking and steering systems and tires, is also a concern.

Strategies

Continue to focus on commercial vehicle programs and regulations to achieve crash reductions

As lead state in the Performance and Registration Information Systems Management (PRISM) program, continue to target carriers that have a disproportionate number of crashes. This process will identify and prioritize motor carriers for on-site reviews.

When a motor carrier has been placed out of service because they have been determined to be unfit by the Federal Highway Administration's Office of Motor Carriers, Iowa law allows for the denial, suspension or revocation of the vehicle registrations assigned to the motor carrier.

Continue a commercial driver inspection program statewide and in high-crash corridor areas to identify fatigued drivers, hours-of-service violations, unqualified drivers

Enhance the safe operating condition of trucks and buses by inspecting commercial motor vehicles for safety requirements to identify critical safety defects and remove unsafe vehicles from the roadways

Continue to expand our Share the Road/ No Zone campaign and other safety messages relevant to driver errors associated with commercial motor vehicles

Undertake a driver history initiative to track citations from issuance to disposition to identify adjudications to assure penalties assessed are commensurate with the seriousness of the violation

Continue educational outreaches to the motor carrier industry and commercial motor vehicle drivers to assure they are aware of motor carrier safety and hazardous materials regulatory requirements

Expand Iowa's Officer Information Manager (OIM) interactive inspection, accident, citation and operating while under the influence (OWI) consent forms to speed up the transmission and sharing of crash, driver and vehicle data

Continue to use license plate reader technology to identify the motor carrier and to select vehicles from motor carriers with poor safety performance and accidents for inspection

Continue to research new technologies that can identify driver fatigue

Determine the impact of out-of-service violations in commercial motor vehicle crashes

14. Reducing Farm Vehicle Crashes

Primary Authors: Charles Schwab, Scott Falb, Gary Harris

Background

Iowa roads provide a vital connection between the agricultural industry and the consumer markets. Millions of bushels of grain travel on public roadways to elevators and railheads by slow moving agricultural vehicles. Other agricultural operations utilize public roads to transport slow moving agricultural equipment from farmstead to field and field to field. These slow moving agricultural vehicles pose a unique traffic hazard.

Between 1988 and 1992, the Iowa Department of Transportation (Iowa DOT) reported 1,477 collisions on public road and right-of-ways that involved farm vehicles. These occurred throughout the year however October has nearly twice as many collisions as any other month. The three most common collisions reported were left-turn collisions (22 percent of total), rear-end collisions (20 percent of total), and passing collisions (4 percent of total). Although only a small percentage of vehicular collisions lead to a fatality, the National Safety Council and Iowa DOT data shows that a collision involving a slow moving agricultural vehicle is about five times more likely to produce a fatality than other types of collisions.

Strategies

Improve motor vehicle operators' understanding about slow moving agricultural vehicle hazards

Use existing materials and develop new educational materials to help motor vehicle operators understand the potential hazards associated with sharing the road with slow moving agricultural vehicles. Distribution of these existing and new resources can occur through an organized promotional campaign to increase awareness through driver education and public service announcements. The *Iowa Driver's Manual's* current reference to slow moving agricultural vehicles should be expanded to reflect the volume of agricultural traffic encountered in Iowa.

Strengthen slow moving agricultural vehicle operators' knowledge about public roadway issues

Use existing materials and develop new educational materials to help agricultural vehicle operators understand the potential hazards associated with sharing the road with motor vehicles. Distribution of these existing and new resources can occur through an organized promotional campaign to increase awareness through tractor and machinery certification programs and public service announcements.

Increase visibility of slow moving agricultural vehicles

New lighting and marking standards are being developed by national organizations and are ready to be promoted. Distribution of these new materials and information will be used to increase the visibility of slow moving agricultural vehicles. The promotion and distribution can occur through many volunteer groups with minimal organizational effort.

Establish joint research programs to identify and analyze agricultural collisions and develop additional preventative strategies

New networks and teams should be developed to examine previously collected information for analysis. These multi-disciplinary and multi-organizational teams will begin development of new preventative interventions for insuring the safety of agricultural vehicles on public roadways.

Highways

15. Reducing Train-Vehicle Crashes

Primary Authors: Mark Sandler, Rick Brown

Background

Each year thousands of collisions resulting in hundreds of fatalities and injuries are sustained at the nations' highway-rail grade crossings. Most of the crashes that occur at railroad highway grade crossings are the result of errant driver behavior. There also exists a general lack of public awareness about highway-rail crossings that may be traced in part to ineffectual licensing and driver education efforts throughout the country. Additionally, a slow highway-rail grade crossing investigation education process and a reactive rather than proactive law enforcement approach to motor vehicle and train collisions has affected the ability to eliminate crashes.

Strategies

Improve passive warning devices

Approximately 50 percent of crashes occur at railroad/ highway grade crossings with passive devices (signing). It is not feasible to upgrade all passive devices to active ones, but the effectiveness of passive devices can be improved through statewide passive signing upgrade projects, utilizing state of the art reflectorized signing in accord with the *Manual on Uniform Traffic Control Devices*.

Establish guidelines for highway-rail grade crossings

About 50 percent of the Railroad Highway Grade crossing crashes occur at crossings with active control devices. Select crossings for upgrading according to actual crash data or by the crash predictor formula. Crash data could be analyzed to determine the best upgrade possible in accordance with the Iowa Administrative Code Chapter 812.

Improve driver education and licensing relative to safe practices for approaching and traversing highway-rail crossings

Increase the information provided to potential drivers regarding highway-rail grade crossings. Increase the number of "railroad" questions on all permit and drivers tests. Increase the amount of "railroad" information in driver improvement courses. Provide Operation Lifesaver brochures at all Iowa Department of Transportation facilities and play Operation Lifesaver videos at all licensing stations.

Adopt more advanced technology for enforcement and crash prevention at Iowa's highway-rail grade crossings

A significant number of crashes occur at highway-rail grade crossings where motorists violate an active railroad traffic control device. A continued emphasis on railroad corridor reviews is recommended in order to identify appropriate safety improvements to be accomplished at Iowa's highway-rail grade crossings. Continued research on state of the art technology such as

automated horns, camera surveillance systems, four quadrant gates, and satellite technology is recommended.

Implement the findings and recommendations of the US DOT grade crossings safety report

The recommendations for improving certain aspects of highway-rail safety are contained in USDOT report, “Accidents That Shouldn’t Happen” and in a subsequent status report, “Implementation Report of the USDOT Grade Crossing Safety Task Force” dated June 1, 1997. Some of the recommendations are appropriate for immediate implementation.

16. Reducing Deer-Vehicle Crashes

Primary Authors: Jaime Reyes, Tom Welch

Background

Animal-vehicle collisions have occurred since the advent of the automobile. Wildlife mortality associated with roadways has continually increased as vehicle speed and traffic volumes have increased. It is estimated that 750,000 deer-vehicle crashes occur in the United States. The Iowa Department of Natural Resources (DNR) estimates about 11,000 deer-vehicle crashes in Iowa in 1995. In Iowa alone, the combined annual cost of deer-vehicle collisions to society could be as high as $25,000,000.

Strategies

Determining methods for reducing those crashes is important and most states have attempted to address this problem. Existing literature on methods used to reduce these collisions is very limited. The methods recommended, however, are not reliable because they lack follow-up analysis. Without statistically valid results, their findings have not been successfully repeated.

The Iowa Department of Transportation (Iowa DOT) and the DNR, as part of the Iowa Strategic Highway Plan, provided grants to the Department of Animal Ecology of Iowa State University to:

1. Identify and evaluate existing deer control methodologies.

2. Study deer control methodologies applicable to Iowa and to conduct controlled field tests to determine their effectiveness.

The Iowa study was both, comprehensive and conclusive. The researchers conducted, in the first phase of the study, an in-depth review of the effectiveness of past and current deer-control technologies. This initial review formed the basis for the development of a model that could predict the probability of a deer-vehicle crash. This model was the second phase part of this project.

The predictive model would require data such as, habitat types, vehicle traffic volumes, deer migration patterns, vegetation and feeding habits, deer population estimates, distance to rivers or marshes, distance to towns and season of the year. The Iowa DOT and DNR databases, and the latest GIS/GPS technologies, have been integrated into the model. The model predicting capabilities will depend upon the quantity and quality of the available data. Once fine-tuned, the model will be applied to areas within the state that were not used in creating the model. These areas will be used to validate the model and determine its predicting accuracy.

Conclusion

The researchers proposed a pilot project to test the validity of the model. This project would have combined remote sensing, warning devices and partial fencing. Twenty study sites would have been selected by the model in addition to a similar number of control (where no treatment is

applied) sites. The estimated cost for this four-year study was $2,617,725. Although the study could have produced information on the effectiveness of different technologies, no action was taken to pursue the pilot project.

17. Implementing Road Safety Audits

Primary Authors: Tom Welch

Background

Most transportation authorities have active programs concerned with crash reduction (the development of crash remedial measures for high crash frequency sites). Some are now also focusing on crash prevention (ensuring that the design of new road and traffic schemes will provide a high level of safety), attempting to prevent crashes from happening, or at least to ensure that any crash effects are minimized through a road safety audit process.

While the main objective of a road safety audit is to ensure a high level of safety for all new highway schemes, there are other secondary objectives including:

- reducing the whole-life costs of a design (unsatisfactory designs are expensive to correct after they are built)
- minimizing the risk of crashes on the adjacent road network, (particularly at intersections) as well as on the new road scheme
- enhancing the importance and relevance of road safety engineering in highway design work and to enhance consideration of the safety of all road users in all new and existing schemes.

Road safety audits work in two ways to ensure that safety is improved, namely:

- by removing preventable crash producing elements (such as inappropriate intersection layouts) at the design stages
- by mitigating the effects of remaining problems by the inclusion of suitable crash-reducing elements (such as anti-skid surfacing and crash barriers).

Strategies

Develop and implement a Road Safety Audit Program within the Iowa Department of Transportation

Initiate this program following receipt of the Federal Highway Administration guidance report on current Road Safety Audit Pilot Programs

18. Accommodating Older Drivers

Primary Authors: Tom Welch, Jim Hogan, Tim Simodynes

Background

The increasing numbers and percentages of older drivers using Iowa highways in the next twenty years will pose major challenges to Iowa transportation engineers, who must ensure system safety while increasing operational efficiency. Iowa has the third highest percentage of drivers age 65 and older and the second highest percent of drivers age 75 and older. The 65 and older age group in Iowa is expected to increase by about fifty percent in the next twenty years accounting for about twenty percent of the population of driver age. Given that highway design is controlled by the 85th percentile performance requirements, the "design driver" may soon be an individual over the age of 65.

There are important consequences of these changing demographics in Iowa's driving population. Traffic volumes will increase; problems with congestion will become more wide spread in our urban areas and on our rural interstate highways. The demands on drivers will grow beyond present day operating conditions. At the same time, a steady increasing proportion of drivers will experience:

- declining vision and visual field
- slowed decision making
- slowed - perception - reaction time
- increased difficulty in dividing attention between potential conflicts and traffic information
- reductions in strength and flexibility
- decreased motion sensitivity
- decreased dark adaptation
- increased sensitivity to glare
- restrictions in area of visual attention
- reductions in contrast sensitivity
- decreased working memory

Strategies

Implement the recommendations found in the FHWA's *Older Driver Highway Design Handbook: Recommendations and Guidelines*

Increase recognition of roadway features through the use of such strategies as increased lighting, more visible pavement markings, clearer signing, increased delineation, and clearer geometric design

There are a number of roadway design and operational countermeasures, which can mitigate the declining visual, physical and mental capabilities in Iowa's increasing elderly driving population. These include wider and more visible pavement markings, paved shoulders, more turn lanes at intersections, limiting the amount of information to be processed in short time frames etc. These issues should be reviewed by appropriate design and safety professionals.

In addition focus group meetings could be held with senior citizen groups to identify priority transportation issues and concerns.

Various design and operational countermeasures with regard to signing, pavement markings, traffic control, and geometric design will mitigate the declining visual, physical and mental capabilities of Iowa's increasing elderly driving population.

19. Keeping Vehicles on the Roadway and Minimizing the Consequences of Leaving the Road

Primary Authors: Dave Little, Tom McDonald, Randy Schlei, John Nervig

Background

There are many reasons why drivers and their vehicles involuntarily leave the roadway including: driver fatigue or inattention; excessive speed; driving under the influence of drugs or alcohol; collision avoidance; adverse environmental conditions such as rain, snow and ice; vehicle component failure; and poor visibility. Nationally, over 14,000 fatalities and nearly one million injuries result from roadside crashes. The annual societal cost of these roadside crashes is estimated at $30 billion, more than three times the amount spent to maintain and operate roads each year.[3] In Iowa, roadside crashes result in nearly 150 fatalities and 5,000 injuries annually. These crashes represent a societal cost to Iowa's citizens of $30 million each year.

In developing Strategies for Improving Roadside Safety, NCHRP formulated the following vision:

> A highway system where drivers rarely leave the road; but when they do, the vehicle and roadside work together to protect vehicle occupants and pedestrians from serious harm.

For Iowa, we adopt this vision statement and extend it to all the state's roadways, regardless of jurisdiction or surface type.

Strategies

Consider upgrading roadside hardware and strengthen existing highway safety programs

Consider routine upgrading of roadside safety devices as part of reconstruction and rehabilitation projects on all roadway systems. Evaluate the effectiveness of safety device upgrade programs on a continuing basis. Include formal review of roadside safety needs in development of all projects. Seek additional funding for highway safety programs as opportunities occur.

Form coalitions of public agencies and private organizations to be "champions" for roadside safety

Coalitions can heighten public awareness, coordinate safety initiatives, broaden the exchange of information, and promote funding for roadside safety programs and research. Consider initiatives to remove dangerous trees, utility poles and other obstructions. Develop methods for locating new plantings where they can contribute to highway aesthetics and environmental quality without diminishing safety. Consider the needs of an aging population in signing and marking programs.

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[3] Strategies for Improving Roadside Safety, NCHRP Research Results Digest 220, November 1997

Make the most of remedies known to be effective at improving roadside safety

They include installing rumble strips, painting edge lines, upgrading signing and markings, improving guardrails and barriers, and removing unnecessary objects from the roadside. Address pavement friction, edge ruts, and other problems through proactive maintenance programs. Consider ways to keep vehicles on the roadways on granular-surfaced roads as well as paved ones. Full or partial-width paved shoulders, wider lane markings, and raised pavement markers are measures that can be used in appropriate locations.

Improve information resources for monitoring and improving roadside safety

Improved decision support tools are needed to assist safety professionals in tracking changing conditions, analyzing the causes of crashes, selecting effective treatments to resolve roadside safety problems, and allocating highway safety funds effectively. Possible approaches include developing an ongoing inventory/ maintenance system for existing roadside safety features and conducting in-service performance studies of selected barrier systems. Seeks ways to link crash data, highway feature inventories, and traffic information to better understand the causes of roadside crashes.

Evaluate locations of high run-off-the-road crash history or where the potential for such events exists. Develop programs to address roadside safety in these locations and provide assistance to local governments in improving roadside safety, both urban and rural, emphasizing safe, forgivable roadside environments.

Support research to address the yet unanswered roadside safety questions

Seek a better understanding of the relationships between safety, roadside features and traffic. Promote the development of improved safety hardware systems and barriers, and consider alternatives to eliminate the use of barriers whenever possible.

Consider increasing the visibility of pavement lane markings

Because of our winter weather it is difficult to maintain highly visible lane markings in Iowa. Increased lane marking visibility would be of particular advantage to elderly drivers who find it very difficult to locate lane and edge lines. Some possibilities are increasing the width of lane markings from four inches to six or eight inches, or using special products with increased day, night, and wet visibility.

Consider raised pavement markers in selected areas

While raised pavement markers are prevalent in states south of Iowa. Their use in Iowa is very limited because of a durability issue with respect to snow plowing. However the installation of raised pavement markings through horizontal curves, could effectively reduce run off the road crashes.

20. Improving the Design and Operation of Highway Intersections

Primary Authors: John Nervig, Dave Matulac, Fred Cerka, Tim Crouch, Tim Simodynes

Background

Injury and fatality statistics for highway intersections are ample evidence that strategies to improve the safety of these crash-prone areas are urgently needed. In Iowa, about one-third of the fatal crashes and over half the injury crashes and resulting injuries occur at intersections. Traffic violations at intersections such as failure to yield the right-of-way and running stop signs or signals are among the most predominant crash-related driver errors.

Strategies

Improve intersection analysis techniques

Although intersections account for much of the crash and congestion related highway problems, Iowa does not have a database that contains detailed inventory data relating directly to intersections. A database, covering at least the major intersections in Iowa, should be developed through a joint effort between central and field staff of the Iowa Department of Transportation (Iowa DOT) and could be extended to include city and county participation. The database should include information about the classification, type, traffic control, lighting, channelization and configuration, existence of special signing or traffic control measures, and other pertinent inventory data. The database would be a valuable tool to improve the analysis of intersections and intersection features. PC-ALAS, Access-ALAS, GIS-ALAS programs and the Intersection Magic collision Diagram software provide analysts with excellent tools to analyze individual intersections. The intersection database would allow the analyst to group intersections by various features to deter-mine features and traffic control measures that produce either low or high crash incidence.

Evaluation of new intersections and safety countermeasures at existing intersections must also become a priority, to determine if our new designs and countermeasures are working, and also to provide Iowa crash data in the determination of crash reduction factors.

Use local campaigns and programs to target unsafe driver practices

Local safety campaigns targeting red-light-running call attention to this problem and initiate counter-measures to impact the problem. Iowa SMS should stress the value of this and other types of safety campaigns at the local level and assist in the planning and implementation of these initiatives. Publicity concerning crash-prone intersection and/or locations and predominant driver errors that cause crashes has more meaning when readers can relate it to familiar surroundings. An added benefit is the task forces or safety committees formed to initiate these campaigns may become ongoing local committees that would tackle other problems and campaigns. Campaigns should utilize publicity aimed at school age children because they can be reached in groups and can have an influence on their parents' driving habits.

Use automated methods to monitor and enforce intersection traffic control

This initiative is designed to advance the status of previous work by developing both conventional and second generation Intelligent Transportation System (ITS) solutions to the problem through continuous evaluation and advancement of new technologies. Examples of new technologies include automated video surveillance for enforcement and also the continuous video surveillance where crash noise triggers the system to capture and save the crash-related events prior to, during, and after the crash for sub- sequent detailed analysis of the event. Targeting these and other ITS strategies to high priority inter- sections should yield cost-effective improvements.

Upgrade signalized intersection controls to smooth traffic flow

Poor signal timing and coordination between adjacent intersections can cause crashes through violation of driver expectancy. Guidelines should be developed, incorporating the latest signal control technology to improve traffic signal control use in Iowa. This becomes more important as traffic and congestion increases and the use of traffic signals increases. The Iowa DOT could provide closer supervision of signal timing and coordination along state primary highways. As the use of traffic signals in high-speed suburban and rural locations increases in Iowa, guidelines for the safe design and operation of these installations must be emphasized.

Include more effective access management policies with a safety perspective

The effects of major developments can adversely impact the safety of adjacent highway facilities. Iowa has initiated an extensive study of access management policies, practices, and results. The findings from this study should be a catalyst to institute access management training for Iowa DOT Staff, Regional Planners, and Local developers on the effective integration of safety considerations into the design of access points. This effort is not limited to intersections, but should also address highway user needs related to median types, lane configurations, and frontage road access to major highways. For instance, studies have shown the safety advantages of three-lane two-way left-turn configurations compared to four-lane undivided configurations.

Reduce fixed objects in the clear zone near intersections

Intersections are common locations for many fixed objects including traffic signal poles, street light poles, utility poles, storm sewer culverts, manholes and intakes, and traffic signal controller boxes. Proper design and placement of these items would reduce the severity of crashes when a vehicle leaves the roadway at or near an intersection.

21. Reducing Head-On and Across-Median Crashes

Primary Authors: Randy Schlei, Dave Little, John Nervig, Mike Jorgensen

Background

One of the most severe types of crashes occurs when a vehicle shifts into an opposing flow traffic lane and crashes head on with an oncoming vehicle. Severe crashes of this sort can occur on rural two-lane highways and freeways with narrow medians. The severity of these crashes is compounded because of the additive nature of the vehicle speeds at the time of collision.

In Iowa 14.9 percent of fatal crashes from 1992 to 1996 were results of non-intersection, head-on or across-median crashes. Over the same period, this type of crash accounted for less than 1.3 percent of all crashes. While nearly 90 percent of these fatal, head-on crashes occurred on rural roads, occurrences were typically dispersed across the state and were not concentrated along specific highway segments.

Strategies

Head-on crashes in which one vehicle crosses the centerline or goes across the median of a divided highway are a major cause of death on Iowa roadways. The Iowa Department of Transportation (Iowa DOT) is already including countermeasures in their design of new divided highways. Rumble strips are installed on all median side paved shoulders that are six feet or more in width. A possible countermeasure for two-lane highways would involve some special type of centerline treatment. The Iowa DOT may wish to build an experimental two-lane highway segment with a three or four foot buffer strip down the center. This could be placed on a segment of roadway that is in need of reconstruction and has had a history of head-on crashes. The Minnesota DOT has proposed constructing a pilot project with this concept.

Promote additional analysis to identify roadway segments that may benefit from pilot projects aimed at reducing head-on and across-median crashes

Because of the dispersed nature of rural head-on and across-median crashes in Iowa, it is not economically feasible to address this problem on all roadways simultaneously. Iowa's across-median crashes may not be as significant as in states like California or North Carolina because of our lower lane densities. A greater potential benefit may be realized if Iowa's efforts in this area are concentrated on a select number of shorter roadway segments that have a higher frequency of head-on crashes. The Iowa DOT may want to promote analysis to better define the significance of the problem and to identify potential roadway segments for target projects.

Monitor the development of innovative centerline treatments to reduce head-on crashes on two-lane highways

Efforts by the federal government, other states, and other organizations such as the National Cooperative Highway Research Program should all be monitored for the development of other promising countermeasures. The Iowa DOT may wish to evaluate these alternatives to determine which ones are applicable to our state. Evaluations should consider the effect on pavement maintenance cost as well as how it might affect winter operations.

Consider providing paved shoulders on all State Primary Highways

Motorists who run off the right side of the roadway onto a granular shoulder often over steer back to the left and enter the opposing traffic lane. Along roadways with paved shoulders motorists tend to not over react in this manner when leaving the right side of their traffic lane. For this reason and for the benefit of reduced maintenance costs of paved over granular shoulders, the Iowa DOT may wish to consider installation of paved shoulders on all high volume primary roadways.

22. Designing Safer Work Zones

Primary Authors: Mark Bortle, Joyce Emery, Scott Falb, Craig Markley

Background

Highway work zones create a major safety concern for motorists and workers alike. From 1978 to 1995, Iowa experienced an average of over 300 work zone crashes per year. Of these, 200 were property damage crashes and over 100 resulted in motorist injuries. During the time frame, Iowa averaged almost five fatalities per year in work zones. Work zone crashes and fatalities occur in every functional highway classification. Work zone situations require increased attention because motorists are often faced with special situations and are required to take special care. Reliable, accurate work zone crash data are not presently available due to the lack of uniform reporting procedures.

Strategies

Implement improved methods to reduce the number and duration of work activities

Work zone activities increase crash potential and cause significant disruption of traffic. This initiative should make a thorough review of maintenance and construction practices, design standards, and contracting procedures to find ways to reduce the number and duration of work zones. Guidelines should be developed as a result of this review and should be demonstrated on actual projects and then evaluated and enhanced.

The Iowa Department of Transportation (Iowa DOT) has already used a progress schedule based incentive/ disincentive specification to reward contractors who complete work before the end of the contract period and penalize those who complete work late. The Iowa DOT also has doubled the design life of our pavements from 20 years to 40 years to lengthen the time between pavement reconstruction projects. After the Federal Highway Administration (FHWA) publishes the national Best Practices guidelines, the Iowa DOT should review and incorporate those that will work in our traffic environment.

Adopt improved procedures to ensure more effective practices, including traffic control devices for managing work zone operations

This initiative encompasses several actions, including upgrading the *Manual on Uniform Traffic Control Devices* (MUTCD) and *Traffic Control Device Handbook for Work Zones*, establishing more effective day and night work zone operation review procedures, developing more effective public information guidelines, and demonstrating more advanced technology applications for work zones. Guidelines should be developed and supplemented with training to ensure that the enhanced actions are incorporated in work zones.

The Iowa DOT currently has numerous committees and processes that constantly review our traffic control and traffic management processes. These committees include (among others) the Traffic Safety Committee (the Department's traffic control standards, specifications, policies, and philosophy review committee); and the Preliminary Traffic Control Committee (project level traffic control management review team).

The Iowa DOT also has developed a "Flagger's Handbook" which specifies the correct flagging procedures for flaggers working on Iowa's highways. A pocket sized Work Zone Safety Guideline for Utilities handbook has also been developed and distributed to Iowa's utility companies to enhance their work zone uniformity.

Enhance and extend training for the planning, implementation, and maintenance of work zones to maximize safety

The best strategies are nearly useless if they are not effectively implemented due to knowledge gaps. This initiative should enhance and extend comprehensive training programs for both government and industry at critical points in the work-zone program.

The Iowa DOT and the Iowa Division, FHWA have sponsored a series of Work Zone Safety Workshops since 1979. Over 700 participants attend these annual workshops from state, city, and county highway agencies; as well as contractors, utilities, and consultants from across Iowa to gain up-to-date knowledge from Iowa's work zone safety experts.

Enhance safe work zone driving through education and enforcement actions

Many crashes in work zones are caused by drivers who are inattentive, unsure of work zone traffic control directions, or who drive aggressively to minimize delay. This initiative will develop and implement enforcement guidelines in concert with engineering designs for work zone. In addition, coordinated public information and education campaigns should be constantly updated and expanded to increase driver knowledge and awareness of work zone dangers and the actions they can take to reduce the likelihood of a crash.

Iowa currently uses two separate work zone safety public relations programs. The generic work zone safety public relations (PR) program called "Expect the Unexpected in 'The Work Zone'" is being used to inform Iowa's motorists about generic work zone safety practices. This PR program includes both a media kit and an educational component that is aimed at raising the awareness and understanding of our public school age children from grade school through high school about highway work zone safety. Iowa's other work zone PR campaign; "Know Your Way Around" is aimed at specific highway construction project information dissemination. This campaign includes project specific information and is intended to inform motorists about their travel options regarding these high volume, complex projects.

Iowa also has used Extra-Enforcement in our high volume work zones. Through the Extra-Enforcement program, law enforcement officers are specifically funded to traverse our projects during peak travel periods so motorists will be encouraged to drive responsibly and safety through our work zones. Since 1993, Iowa has had a Double Fine Law that doubles the statuary fine for moving operation violations in our work zones.

Iowa also has a multi-agency, multi-disciplinary task force, the Construction Area Safety Study that pulls together safety officials from the Iowa DOT, Department of Public Safety, and the Iowa Associated General Contractors. Through this task force, employees from the engineering, enforcement, and construction industries work together to improve and promote traffic safety in all of Iowa work zones.

Emergency Response

23. Enhancing Emergency Response Capabilities to Increase Survivability

Primary Authors: Dick Harmon, Scott Falb, Pat Cain, Bob Thompson, Joyce Emery, George Oster

Background

No amount of preventive action will eliminate all crashes and injuries from the highway. The minutes directly following the sustaining of traumatic injuries are often critical to saving the victim's life or reducing the effects of injuries. Emergency response refers to fire, rescue, and emergency medical services (EMS). Both the timeliness and the level of expertise within these response modes are critical factors in the equation. Emergency care scenarios are markedly different in urban, rural, and remote settings and require strategies tailored to meet the realities of each.

Strategies

Develop and implement a model comprehensive approach that will ensure appropriate and timely response to the emergency needs of crash victims

Many crash victims die before emergency medical technicians (EMTs) or other emergency responders arrive at the scene. This initiative is designed to address the needs for management techniques, coordination practices, training, and equipment for fire, rescue, and emergency medical responders. It is also intended to reduce emergency responders' arrival time and to implement bystander care programs that can be used until appropriate personnel do arrive.

Sub-strategies:

- Implement bystander care training programs targeting new drivers, rural residents, truck drivers, and tow truck operators on a volunteer basis.
- Promote and support the Bystander Trauma Care training program throughout Iowa.
- Implement emergency medical dispatch programs for dispatchers who process EMS calls.
- Support the passage of legislation requiring dispatch training for EMS dispatchers.
- Require emergency medical training for all public safety emergency response personnel, including police.
- Continue support of the Iowa Law Enforcement Emergency Care Provider Program.
- Develop models to optimize EMS staffing patterns for pre-hospital care to include recruitment and retention strategies.
- Continue to develop the area of investigation initiated by the SMS pilot project "Changes in Emergency Response Patterns Due to the Construction of the Avenue of the Saints in Washington, Henry, and Lee Counties in Iowa."

Develop and implement a plan to increase education and involvement of EMS personnel in the principles of traffic safety

This initiative will include the principles of traffic safety and injury prevention as part of the EMS educational core contents and will integrate EMS systems into the Safe Communities effort.

- In cooperation with the Iowa Department of Public Health, design and implement a curriculum to be incorporated into current EMS certification programs that cover the principles of highway safety and injury prevention.

Develop and implement an emergency preparedness model in three high-incident interstate highway settings (urban, rural, and wilderness), and use this demonstration to study their effectiveness in reducing fatalities and health costs

While interstates have the lowest fatality rate of any highway types, they also have one of the highest densities of fatalities because of the higher volume of traffic.

- Pilot in an urban, rural, and wilderness area an EMS system that integrates all emergency response agencies to be significantly prepared for such severe crashes

Implement and/or enhance implementation of an Iowa Trauma Care Delivery System in Iowa

Effective trauma systems can improve the survivability of severe crashes for people in near-death situations. This initiative will help conduct assessments of the requirements to achieve an adequate level of performance in a trauma care facility, strengthen protocols for destination triage, treatment, and hospital transfer, and ensure adequate air and ground transportation systems.

- Provide support and involvement in the development and implementation of the Iowa Trauma Care Delivery System.

Develop and support integrated EMS/ public heath/ public safety information and program activities

Crash data alone are unable to convey the magnitude of the medical and financial consequences of the injuries resulting from motor vehicle crashes or the success of highway safety decision making to prevent them. Outcome information describing what happens to all persons involved in motor vehicle crashes, regardless of injury, is needed. This initiative will develop and implement integrated information systems and highway safety activities.

Sub-strategies:

- Support data linkage activities to include a Crash Outcome Data Evaluation System (CODES) for the state of Iowa.
- Support activities of the Strategic Traffic Records Advisory Committee (STRAC) in the development of integration highway safety information systems.

- Support the implementation of the Model Minimum Uniform Crash Data Elements in Iowa.
- Support the study of emergency response patterns with respect to roadways, crash sites, and other features such as locations of dispatch points and destinations (trauma centers) by enhancing the available data layers and mapping capabilities of the analysis tool “GIS-ALAS” (Accident Location and Analysis System on a geographic information systems platform).

Management

24. Improving Information and Decision Support Systems

Primary Authors: Joyce Emery, Bob Thompson, Pat Cain, Jack Latterell, STRAC Committee

Background

Rationale

Good information, when properly used, is one of the underpinnings of a sound traffic safety enterprise. The how, who, when, where, and why of crashes need to be recorded and the data made available for analysis and use in the formation of safety policy. The technology exists to gather, integrate, and utilize information on a wide variety of important traffic safety issues. Understanding and using information technology to the greatest advantage is a critical challenge to traffic safety programs nationwide.

In order to attain a state traffic records system capable of meeting all the needs, those with a vested interest in system performance must communicate and cooperate. They must organize into an ongoing committee, engage in system assessments and strategic planning, build consensus and leverage resources to get the job done.

Role of STRAC

The Iowa Strategic Traffic Records Advisory Committee (STRAC) was organized in 1994 to conduct a statewide traffic records assessment and draft a statewide strategic plan, completed the following year. Most strategies in that first plan were successfully implemented. In preparation for TEA-21 Section 411 funding for traffic records improvements, the STRAC wrote a new strategic plan in 1998. Highlights from that plan are included in this document. For a full listing of strategies and a nine-point multi-year work program, see the entire report titled, “1998 Iowa Strategic Plan for Highway Safety Information Systems.”

Strategies

Continue the Strategic Traffic Records Advisory Committee (STRAC) as a means to enhance existing coordination of the collection, management, and use of highway safety information among organizations at all jurisdictional levels

STRAC is organized in much the same way as the SMS Coordination Committee in that it is a multidisciplinary safety group from all levels of government meeting quarterly to guide the development of highway safety information systems in Iowa through strategic planning. It plays an important role in the development and coordination of the National Model (National Model for the Statewide Application of Data Collection & Management Technology to Improve Highway Safety) and software tools such as the Accident Location and Analysis System (ALAS). Technology sharing is enhanced through the Center for Transportation Research and Education, Iowa State University, statewide and regional conferences and the International Forum on Traffic Records and Information Systems for Highway Safety.

Improve the value of safety data statewide by implementing quality-enhancing practices and programs within agencies responsible for collecting and managing safety data

Good crash data is the backbone of an effective safety management system. The concept of quality as applied to safety data includes capturing the right data by knowledgeable data collectors and continues through the storage and retrieval processes to maintain accuracy, completeness, timeliness, and accessibility to users.

Quality information is essential for the application of analytical tools to generate descriptive and inferential statistics upon which highway safety decisions are made. Safety data is affected by many factors which can threaten quality, and if quality is to be achieved at all, it requires vigilance and effort at every stage of data collection and processing. This begins with standard definitions of terms understood by both collectors and users, continues with a system that minimizes opportunity for human error, and ends by finding and correcting any remaining discrepancies in key data fields.

The quality projects already underway need to be implemented on a much broader scale throughout the state if the benefits are to be fully attained. A number of supporting program areas need improvement. For example, some safety data systems already have data element dictionaries, training manuals for data collectors, training programs, and editing procedures. Others need to be put into place. Virtually all of them will require updating as technology and systems improve over the next few years.

It is recognized that when data must be collected from numerous independent agencies, quality of the aggregated data is particularly difficult to achieve. That is why improvements to such systems require considerable effort to implement successfully.

Technical standards for Iowa's highway safety information system that are critical to operating the Iowa Safety Management System need to be established, or existing standards reviewed, for all types of safety data. Several STRAC members have been engaged in the national project conducted by the National Association of Governor's Highway Safety Representatives (NAGHSR) and the National Highway Traffic Safety Administration (NHTSA) to develop guidelines for Model Minimum Uniform Crash Criteria (MMUCC).

Finally, a body of metadata must be developed for safety data so that users can learn where the data comes from, how it has been processed, and what applications are appropriate. As safety data becomes available to more users, it is especially important that they recognize both the power and the limitations of its use.

Continue the integration of safety data with other data systems and information sources when appropriate

Safety data file integration has long been an objective in the traffic records field. Most major questions in highway safety require multiple types of information to be answered. Without the ability to match and correlate various data related to persons, events, and locations, key problem areas cannot be effectively researched. Two major initiatives addressing this concern are GIS-ALAS (safety data in a geographic information system) and the Crash Outcome Data Evaluation System (CODES).

Historically, the integration of traffic records meant crash, roadway, traffic citation, court, and emergency medical service run report files. Today those information categories are naturally considered part of the highway safety information system. Highway safety information systems proponents are now looking at the total spectrum of information technology that has bearing on highway safety goals.

Safety data and the concerns of highway safety overlap with a number of other public and private entities. Fire, rescue, and emergency medical services have already been mentioned above. Other areas are enhanced-911, hazardous materials spill response, incident management, disaster preparedness, access management, deer management, roadway inventories, and farm safety. Many of these disciplines are developing information systems of their own. Some communities are already using computer-aided dispatch and automated vehicle location. Communications should be opened and maintained with these groups so that opportunities for future cooperation and collaboration are not lost.

Provide managers and users of highway safety information with the resources needed to make the most effective use of the data

In order to influence and impact critical public policy decisions, highway safety data should be summarized and formatted (graphs, charts, etc.) to reflect trends relating to significant safety issues such as fatalities, alcohol-related fatalities, injuries, serious injuries, single vehicle crashes, fixed objects, serious violations, driver behavior issues, and seat belt use. The database should be easily accessible so other significant highway safety problems can be identified, analyzed, and presented.

There is a need for progress in the following areas: Analysis tools, Data timeliness, Training for analysts, Expansion of Engineering strategies, and Data summary and presentation.

25. Creating More Effective Processes and Safety Management Systems

Primary Authors: Tom Welch, Fred Walker, Jack Latterell, Joyce Emery, Roger Walton, Mark Campbell

Background

Like other complicated endeavors, traffic safety programs need to be managed well to perform well. Sound methodology and effective, integrated information systems are essential. Using the best among them as examples, existing systems must be upgraded and then begin looking at all phases of highway life, from roadway design to maintenance, from driver attitudes and capabilities to actual performance, and from environmental conditions to their influence on the driving task.

Experience has shown that local government and community institutions are often effective at addressing their traffic safety issues, but can improve on their successes through cooperative efforts at all jurisdictional levels. Additionally, a multi-disciplinary approach involving the "four Es" (education, enforcement, engineering, and emergency services) is most effective. Community-based coalitions representing the 4Es and interested parties have resulted in fewer crashes and reduced crash severity. Community-based responses to traffic safety problems should be strongly encouraged.

Iowa currently has a safety management system effort which was implemented in February, 1995 and operates under the Iowa Safety Management System Coordination Committee. Membership is multi-disciplinary, representing private industry as well as governmental agencies. Committee efforts have initially emphasized statewide objectives.

Strategies

Promote coordination, cooperation, and communication within and between jurisdictions on all matters relating to highway traffic safety

This initiative promotes a multi-disciplinary approach (including engineering, enforcement, education and emergency response), identifying means for integrating the roadway, driver, and vehicle into a safer highway traffic environment. The sharing of information, effective safety management processes, and examples of successes is to be encouraged. Information may be disseminated through the *Crossroads* publication of the Governor's Traffic Safety Bureau and *Technology News* from the Center for Transportation Research and Education. The Safety Management System Coordination Committee should consider a newsletter. Iowa regional traffic safety workshops may be offered.

Initiate, support, and facilitate community-based programs by providing expertise and assistance in the area of the 4Es

Task forces focus on identifying high crash locations and locations resulting in crashes of unusual severity. Special effort should be made to encourage participation from the EMS, fire safety, and hazardous materials fields (*E*mergency response), as well as *E*ngineering,

*E*nforcement, and *E*ducation. An overall view should be taken of high traffic corridors—possibly extending to neighboring communities. Follow-up efforts to enhance safety should remain community-based, but draw on outside expertise as needed.

Integrate highway safety programs and highway safety information systems

Effective use of safety information systems forms the backbone of a safety management system. The Iowa Safety Management System Coordination Committee has a subcommittee, the Strategic Traffic Records Advisory Committee (STRAC), charged with the responsibility of monitoring and improving highway safety information systems. Points of key decision making that may significantly impact highway safety are to be identified and guidance provided to facilitate the use of safety data to support decision making.

Establish an ongoing performance measurement system to evaluate the cost effectiveness of safety investments at both project and program levels

Iowa has developed a computerized crash reduction program to measure "after results" for safety enhancement projects. Emphasis on "Asset Management" is beginning to receive attention at various management levels and should be explored for possible safety applications. Iowa is initiating a road safety audit process and is conducting considerable research in the area of work zone safety. In the event a model performance measure and evaluation system is developed, Iowa should review and adopt it with modifications as deemed necessary.

Conduct a safety program peer exchange

The Iowa Safety Management System and the Iowa Department of Transportation could benefit from inviting safety professionals from other states to observe Iowa's transportation safety processes. The peer exchange could provide the opportunity for a team of invited, top-level managers from other departments of transportation to met with Iowa safety staff and discuss and review Iowa's safety program management process. The objective of a peer exchange program would be to give Iowa a means to improve the quality and effectiveness of their transportation safety management processes.

Appendix
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