National Association of State EMS Officials
201 Park Washington Court • Falls Church, VA 22046-4527 • www.nasemso.org
703-538-1799 • fax 703-241-5603 • info@nasemso.org

NASEMSO Input to NHTSA Strategic Plan
Docket No. NHTSA-2009-0171

(A1) What are the critical highway safety issues facing the nation today?
Despite over 40 years of focus on highway safety strategies, programs, and research, deaths and disability from injuries sustained as a result of motor vehicle crashes and other motor vehicle related incidents continue to occur. The historic triad of engineering, enforcement, and education has been augmented with the important addition of emergency medical services (EMS), but it is imperative that this “4th E" be promoted to a level of greater parity with the more traditional highway safety partners. Until and unless prevention and mitigation strategies are 100% successful (i.e., zero deaths and zero permanent disabilities), emergency medical services systems are the only means of reducing morbidity and mortality in the wake of an injury-causing incident in any transportation mode. In contrast to their potential role as highway safety advocates and leaders effecting change, EMS systems throughout the country are a very unique user of the transportation system as well. A preliminary review of the limited data available suggests that ambulances may crash at a rate several times higher than heavy trucks, and the concern exists that when they do crash, the incidence of fatalities and severe injuries may be greater. Ambulances are very unique vehicles carrying severely ill and injured persons as cargo, yet they and other EMS response vehicles do not benefit from the standards, safety features, and innovative research available to other vehicle types such as heavy trucks, commercial vehicles, motorcoaches, and transit. In this vein, the "missing mode" of EMS may in fact be part of the highway safety problem.

(A2) What will future key demographic and social influences be on highway safety?
Numerous shifts in conditions in society are of concern to emergency medical services systems nationwide. Foremost among them are the decrease in citizens' willingness and ability to volunteer as EMS personnel in their communities; this directly compromises the capacity of local EMS agencies to respond to day-to-day incidents let alone multi-vehicle or motor carrier mass casualty crashes. Another evolving challenge is the increasing prevalence of special medical populations traveling in passenger vehicles and other forms of transit. In the past 'these patients would remain hospitalized or have survived due to advances in medical science but are technology- or device-dependent and as such are a more complex patient to treat or transport. Finally, the imminent growth in the proportion of the US population that is over 65 years of age may result in more crashes as a greater percent of drivers suffer cognitive and/or psychomotor impairment as they age. There is also widespread anticipation of increases in ambulance and other emergency medical services call volume as this population is prone to heart attacks, strokes, and other acute medical emergencies. This will result in more frequent emergency responses and “lights and siren transports” of patients on the nation’s roadways.

(A4) What changes in the auto fleet, including size and mix, will impact highway safety?
A greater mixture of vehicle types and vehicle subsystems is believed to have already compromised the performance of some local EMS systems due to the difficulty to maintain a body of knowledge about vehicle subsystems, especially electrical and occupant protection devices that pose a hazard to EMS personnel. These risks present themselves as EMS personnel enter a vehicle post crash to stabilize the patient, during extrication (cutting or other forced movement of vehicle parts using heavy and hydraulic equipment machinery to allow for safe removal of a patient), as well as removal of the immobilized patient. The public and policymakers often assume that extrication is performed by well prepared and equipped fire departments, however, access to quality standardized training and equipment varies widely nationwide. Additionally, many ambulances are operated by organizations other than fire departments, and no standards or standardized training for extrication exists nationally common to all types of the organizations that provide this service.

(A9) What changes in medical insurance might affect highway safety?

(A12) What are new and emerging areas of automotive safety research that would enable NHTSA and the auto industry to improve motor vehicle safety?

There are several areas where some activity has occurred yet much greater potential research exists: vehicle telematics, vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) specific to public safety emergency response, and the problem of EMS transport safety.

Vehicle Telematics
Advanced automatic crash notification and other telematically derived data show great promise for contributing to safer, smarter response for EMS systems in the United States. Beyond the obvious reduction in incident detection time, automatic entry of the data into an urgency algorithm yielding a probability of severe injury "score" is possible. Research questions such as "In what ways are public safety answering points' (PSAPs, i.e., 911 centers) dispatch practices affected by the availability of the score or its magnitude?" Further, "In what ways does the availability of or magnitude of the score change resource deployment decisions by the first due ambulance?" and "Is there an actual statistical correlation between the score and subsequent conclusive scores measuring actual injury severity provided by hospitals?" Finally, research is warranted to identify the existing and possible mechanisms by which critical passenger or cargo data can be wirelessly transmitted to emergency medical and other public safety personnel in the vicinity of the crash incident.

V2V and V2I
The importance of vehicle to vehicle transmissions is perhaps most graphically conveyed by the example of an ambulance responding with lights and sirens that is automatically alerting cars ahead of it that it is approaching. This would give other roadway drivers more time to select a safe means of complying with laws requiring them to pull over and reduce the risk of crashes, especially those that might involve or otherwise impede the ambulance response. Conversely, a passenger vehicle detecting an emergency response vehicle approaching could advise that it is in its way or stopped on the roadway, electronically augmenting what the emergency vehicle driver can see, especially in low visibility conditions. V2I research could center on the unique

risks and vulnerability of ambulances and other emergency response vehicles which are often legally permitted to exceed the speed limit, are likely the prone to rollovers, and drive on roadway elements (e.g. shoulders, medians, etc.) not intended for such use. A research agenda and prototype ideas for both V2V and V2I applications unique to the modal needs of ambulances and other emergency response vehicles during the upcoming strategic planning period is strongly encouraged by NASEMSO.

(A13) What are new and emerging areas of behavioral safety research that would enable NHTSA to improve highway safety countermeasures?

NHTSA should consider turning to the behavioral science subject matter experts, such as the Board on Behavioral, Cognitive, and Sensory Sciences (BBCSS) and its standing Committee on Human-Systems Integration (COHSI). BBCSS and COHSI are in the Division of Behavioral and Social Sciences and Education (DBASSE) of the National Research Council (NRC), an operating arm of The National Academies. Those immersed in the behavioral research field, especially those with an interest in risky behavior and safety may be new partners to help reveal where highway safety related countermeasures may be most effective.

(A14) What additional analytical data need to be collected with respect to motor vehicle and highway safety? How might data and information be combined for more effective and valuable results? How might these data be collected, linked, analyzed and made available in a more efficient and cost effective manner?

Unless and until prevention efforts are 100% effective, aggregate data about the medical consequences of crashes and other motor vehicle related incidents are the best measure of impact to society that is readily available. This clinical information can also point to next generation engineering, education, and enforcement activities that may be most effective as well. Unfortunately, these data are not yet collected in a universal manner or deposited centrally at a national level. NHTSA is to be commended for its work to date on the National Emergency Medical Services Information System (NEMSIS); specifically the Office of EMS in the conceptualization and cooperative agreements making the project possible and more recently the National Center for Statistics and Analysis for housing the data voluntarily submitted by states. Additional resources and effort must be directed to overall data collection efforts related to the post crash care of crash and incident victims, further NEMSIS refinement, and incentives for adoption by states. Specific examples of refinement include the incorporation of telematics data, data downloaded from on-board vehicle operations monitors (e.g., fleet "black boxes" such as those provided by Road Safety International) and indicators that a crash involved or was related to an emergency vehicle. This comment also constitutes a strong recommendation that NHTSA identify means for the direct incorporation, or where necessary, linkage of trauma registry records as part of the traffic records initiative at the federal level. To the extent that this is not feasible within NHTSA, demonstration projects for which states; offices of highway safety and emergency medical services should be jointly responsible for identifying contemporary means (i.e., post-CODES) by which direct linkage can be effected, and the manner in which probabilistic linkage would serve to rule out other record matches. Aggressive analysis of these data, even if only available on a per-state basis initially, should be performed to illustrate the additional dimensions of insight made possible by the availability of the medical information.

(A15) What are critical data elements that NHTSA does not collect that should be collected to identify areas to target to reduce traffic fatalities and injuries?
Vehicle telematics and clinical data, even if through linkage, as described in the response to (A14), above.
There is currently no incident reporting system or emergency response-specific subset of another reporting system through which information about emergency vehicle involved collisions, emergency vehicle related collisions, or roadway emergency responders struck are housed in a central repository. The ability to report on the number of highway emergency responders injured or killed in roadside collisions in each state and nationally and analyze those data is critical to highway emergency responder safety.

(B1) How will advanced vehicle technologies (i.e., crash avoidance) impact the future of motor vehicles and highway safety?
Ultimately, through the achievement of the vision of Zero Deaths. This however, will not be the end of the toil, as Toward Zero Disabilities, and then Toward Zero Injuries should follow. These comments plead for NHTSA to consider likely vehicle to human technology interfaces, especially in the biomedical realm. In this case crash avoidance is secondary to another medical or physical condition affecting the driver, such as a seizure or diabetic coma. As one example, an implanted cardiac pacemaker may be configured to signal the vehicle that it is about to fire and have the vehicle slowly decelerate and guide itself to the edge of the road using V2I technology, and activate the onboard communications device to dial 911, including the transmission of cardiac and victim-authorized medical information to the ambulance as it is dispatched. Even in the world when all crashes are avoided, there will still be medical emergencies and victims of trauma occupying motor vehicles (other than ambulances) for whom technology can serve to assure vehicle control and informed decision-making.

Another concern is that advanced vehicle technologies may actually contribute to and enable more distraction among drivers than occurs today as complacency with the technology becomes commonplace. This could be especially hazardous in emergency vehicles, as special interests may argue control of those should always rest with the ve

(B2) What future technologies should be researched and encouraged to enhance highway safety?
The ability for information to transfer automatically from a vehicle or vehicle occupant wirelessly (e.g., via Bluetooth or narrow area transmission) actively alerting and warning emergency response personnel of vehicle hazards (non-deployed airbags, electrical systems, etc.); vehicle contents (bills of lading, placards, etc.); or occupant/victim information (passenger beacon “I have cerebral palsy”). Research should be performed to determine if this could be accomplished with 4G terminals in vehicles by approaching emergency response personnel with an authenticated handheld device, smart sensors and meters, or other M2M (machine to machine) or V2V innovative applications.

Other research should be performed to determine the feasibility of retransmission of Remote Weather Information Stations, traffic volume sensors, and incident posting in Condition Acquisition Reporting Systems (CARS) to ambulances transporting patients far enough in advance of encountering the traffic incidents or weather to make alternate route, alternate

destination or alternate transportation type (i.e., helicopter) decisions. Today there is dependency on the 911 Center to detect and relay this information (if it happens at all) or the limited application of automated text messaging if arranged in advance through a CARS system. But ambulances in EMS systems, unlike their police and fire counterparts, regularly leave the county in which the patient originated, effectively losing their ability to "see" the hazard or congestion ahead of them. Delay in patient transport has a deleterious effect on patients experiencing acute illness s or severe trauma and this work is an important option to mitigate this form of delay.

(B4) What changes in medical technology and emergency medical services will impact motor vehicle and highway safety and health outcomes?

Products such as LifeBot® (digital EMS workstations allowing video capture and retransmission, clinical data transfers, and digital messaging between EMS personnel and hospital department staff, and other clinicians) are emerging in the market today. The extent to which this may affect improved patient outcomes is unknown. Other applications (e.g., the use of Wimax to transmit incident scene images to medical command and receiving facilities) have long been believed to assist in the assessment of the incident and provision of instructions to EMS and other rescue personnel, especially at rural mass casualty sites, but this has not been researched on a widespread basis. The electronic availability of CARS information for emergency response vehicle crews to select routes to emergency scenes based on real-time traffic conditions is also feasible but not known to be a widespread practice yet. Preliminary work is underway to link NEMSIS compliant prehospital patient care data to competency triggers so that local EMS agency personnel with chief administrative, training, and physician oversight duties can automatically detect anomalies or excellence in performance and reward or correct situations on a contemporaneous basis, resulting in more focused and immediate improvements to the care provided to motor vehicle related crash victims.

(B5) How can the development and implementation of crash notification technologies (i.e., automatic advanced crash notification) and crash victim triage protocols impact health outcomes related to motor vehicle crashes?

The introduction of raw telematics data into an urgency algorithm that calculates the probability of severe injury among occupants is promising but not proven. Research is essential to determine the feasibility of programming such calculations to occur automatically and embed that information, ideally coupled with location information, on a "screen" that would be visible in and compatible for data transfer with a computer-aided dispatch system. Additional research of a behavioral nature is necessary to understand the actions and decisions of dispatchers as well as EMS personnel upon receipt of such information. Does it change their resource deployment on a case by case basis, if so how, and at what thresholds? Do these judgment call based decisions get replaced with standing protocols for alternate resource deployment (e.g., placing a helicopter emergency medical service on standby, dispatching vehicle extrication agencies, etc.) and if so, what are the characteristics of those deployments? Ultimately, the effect of AACN data, urgency algorithms and others that may follow also much be evaluated for their effect on response structures, processes and patient outcomes.

(C1) How do you and/or your organization interact with NHTSA? Please explain the dynamics of this relationship.

The National Association of State Emergency Medical Services Officials works closely with NHTSA's Office of EMS. For the past decade OEMS has supported NASEMSO's efforts in many areas to strengthen the EMS infrastructure within the United States. Projects have included creation of a mentoring and leadership development program for state EMS officials, establishment of an online portal to EMS resources and searchable database of EMS state legislation and protocols, development of EMS pandemic flu guidelines and 9-1-1 protocols, production of a model state EMS plan and model legislation, production of the national EMS scope of practice and assistance with implementation of EMS education standards, creation of the National EMS Information System, and much more. NHTSA's continued support through OEMS is vital to sustain and pursue these and related initiatives.

NASEMSO's current interaction is predominantly channeled through the NHTSA OEMS. Because NHTSA's current mission overlaps with many facets of EMS, NASEMSO seeks a broader relationship with the Administration. NASEMSO's intent is to work more directly with relevant NHTSA offices coordinating with the OEMS as appropriate to offer EMS considerations and expertise to reduce traffic crashes and the deaths, injuries and economic losses they cause. NASEMSO offers the breadth of perspectives of all state EMS offices in the United States and territories.

(C2) How could NHTSA strengthen its relationship with your organization and with other organizations and institutions engaged in traffic safety programs?

NASEMSO has begun work to build relationships between state EMS offices and state offices of highway safety. NHTSA can assist by providing incentives to highway safety offices to build and strengthen working relationships with state EMS offices.

NHTSA would also be appreciated in identifying opportunities and resources that may lie within FHWA and RITA that would benefit from NASEMSO involvement.

NHTSA also could help NASEMSO and state EMS officials strengthen relationships with NHTSA regional offices as well help enhance their understanding of the role and importance of the 4th E, including pre- and post-crash roles, not just as a component of crash response.

NASEMSO Contacts

Highway Incident and Transportation Systems Chair Dia Gainor, GainorD@dhw.idaho.gov
President Steven L. Blessing, Steven.Blessing@state.de.us
Executive Director Elizabeth B. Armstrong, Armstrong@nasemso.org