



PREHOSPITAL 9-1-1 EMERGENCY MEDICAL RESPONSE:

The Role of the United States Fire Service
in Delivery and Coordination

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ABSTRACT

Prehospital 9-1-1 emergency response is one of the essential public safety functions provided by the United States fire service in support of community health, security and prosperity. Fire service-based emergency medical services (EMS) systems are strategically positioned to deliver time critical response and effective patient care. Fire service-based EMS provides this pivotal public safety service while also emphasizing responder safety, competent and compassionate workers, and cost-effective operations. As the federal, state, and local governments consider their strategic plans for an ‘all hazards’ emergency response system, EMS should be included in those considerations and decision makers should recognize that the U.S. fire service is the most ideal prehospital 9-1-1 emergency response agency.

INTRODUCTION TO FIRE SERVICE-BASED EMS

EMS is an essential component of the public services provided in the United States. The Federal EMS Act of 1973 defined an EMS system as “an entity that provides for the arrangement of personnel, facilities, and equipment for the effective and coordinated delivery of health care services under emergency conditions in an appropriate geographic area” (EMS Act 1973, (P.L. 93-154)). Much of the dialogue in the public arena today concerning prehospital 9-1-1 emergency medical care often focuses on ambulance services and, accordingly, may ignore the important distinction between prehospital 9-1-1 emergency medical response and the other key uses of the ambulance-based, out-of-hospital providers for non-emergency medical and transportation services.

The primary purpose of this discussion is to underscore the reality today that the fire service has become the first-line medical responder for critical illness and injury in virtually every community in America. Regardless of whatever agency provides medical transportation services, the fire service is the agency that first delivers on-scene health care services under most true emergency conditions. Therefore, prehospital 9-1-1 emergency response, in support of community health, security and prosperity, is not only a key function of each community; it has become, almost universally, a principal duty of the fire service as well. In addition, fire service-based EMS systems are strategically positioned to deliver time critical response and effective patient care rapidly. Furthermore, the fire service-based EMS accomplishes this rapid first response while emphasizing responder safety, sending competent and compassionate workers, and delivering cost-effective operations.

Although the role of the fire service is central in 9-1-1 emergency medical response, financial, political, cultural and organizational factors often can make the conversation about prehospital care providers confusing and complex for many decision makers in local communities. The goal of this discussion is to resolve and demonstrate that the use of fire service equipment and personnel to provide 9-1-1 emergency response is the best approach for a community regardless of size. This basic premise is consistent with recent Institute of Medicine publications that have placed EMS at the intersection of public safety, public health, and medical care. The U.S. Fire Service is uniquely qualified to be at that intersection and in the following pages, the history, evolution, and current medical capabilities of the fire service will be reviewed.

The Maltese Cross and Its Legacy for Fire-Service Based EMS

During the Middle Ages, the Knights of Malta, the forerunners of the fire service, took care of travelers and specifically burn victims from the Crusades and associated battles. Eventually, the Knights of Malta adopted the Maltese Cross as their emblem and it has created a revered legacy for fire departments.

The Knights originally began their work as the creators, administrators and care givers in a hospital in Jerusalem. As such, they were known as the Hospitallers of Jerusalem, starting their work before the year 1000 AD. For the next two hundred years, they helped the sick and poor and they set up hospitals and hospices across Europe.

Eventually, the Hospitallers became firefighters out of necessity. The conflict of the Crusades often threatened the hospitals that they had founded. So, they adapted and even engaged in battle to protect their hospitals. As a result, they also became firefighters because one of the weapons of war at that time was the glass fire bomb. The fire bomb, thrown by the enemy, created a horrendous inferno. After rescuing a fellow knight from the inferno and extinguishing the fire, a Hospitaller was awarded a medal, shaped like a Maltese Cross to honor those actions.

As conflict continued, the Hospitallers needed an identifying mark for their armor. This was necessary because without identifying markings, it was difficult to tell who was who because everyone was wearing similar armor in battle. They adopted the Maltese Cross as their identifying mark. (Maltese Cross, 2007, Foster, 2007)

In essence, more than 1200 years ago, some of the earliest ancestors of the fire service were “all-hazards responders.” They initially started as caregivers for the sick and then became firefighters to protect their own. These are two of the concepts firefighters still believe in today and hold as their most sacred responsibilities—caring for the sick and caring for their own.

Longstanding History of Fire Service-Based Medical Care in the U.S.

The fire service has formally been part of the 9-1-1 emergency care delivery system since EMS began in the late 1960's. Many of the original prehospital EMS providers were firefighters, who had “special” additional training in providing medical services during emergencies that occurred outside the hospital. Today, essentially every firefighter receives emergency medical training and the fire service provides the majority of medical services during emergencies that occur out of the hospital, just as it has done for the past

four decades. Of the 200 largest cities in the United States, 97% have fire service-based prehospital 9-1-1 emergency medical response (*JEMS* 200-City Survey, 2006) and the fire service provides advanced life support (ALS) response and care in 90% of the 30 most populated U.S. jurisdictions (cities and counties) (IAFF/IAFC Fire Operations Survey, 2005).

Although the origin of the modern relationship between emergency medicine and fire departments is cited as the 1960's, the involvement of the fire service in patient care began much earlier. For example, in 1937 a fire department ambulance in New York transported famous song writer Cole Porter to the hospital after a horseback riding accident.

While the fire service was involved in many famous anecdotal events, other accounts demonstrate its profound effect on public safety and patient care procedures. In 1921 Claude Beck, M.D., a surgeon at Western Reserve University in Cleveland, called the fire department so he could apply a "pulmotor," an artificial breathing apparatus, to attempt resuscitation in a patient who died unexpectedly during surgery (Beck, 1941). Dr. Beck continued to be involved in resuscitation and today is recognized as one of the founders of the science of resuscitation.

The following quote from the *Journal of the American Medical Association* in 1928 summarized the evolving relationship between fire department-based out-of-hospital emergency care and subsequent resuscitation in the hospital.

"...inhalators are introduced: Cases of gas asphyxiation occur; the rescue crew of the fire department is called and resuscitates the patient. A physician sees the resuscitation and is impressed by the effectiveness of the treatment. Some time thereafter he finds himself confronted with a child which he has delivered, and which has come through a prolonged labor. It refuses to breath effectively, in spite of the application of all the ancient practices. The respiratory center has been depressed by the diminished blood supply to the brain resulting from compression of the head, and needs more than the

normal amount of carbon dioxide to stimulate breathing. So the physician calls in the fire department. If, as is often the case, the fire department succeeds where his medical skill and knowledge have failed, he calls for it again the next time. Now the hospitals in some cities are adopting the practice of calling for the inhalator whenever they have a baby who breathes poorly. In effect, *they add the rescue crew of the fire department to their board of consultants, and these new consultants thus contribute another service to the community over and above that for which the fire department is primarily organized.* Obviously, it is the hospitals that should be equipped to treat asphyxia -- asphyxia of every form -- and thus to help firemen overcome by smoke and gas, instead of relying on the fire department to help the hospital in such a matter as asphyxia of the newborn.” (Henderson, *JAMA* 1928. note: italics added).

According to a historical account on the City’s website, in 1947 in the city of Virginia, Minnesota, “the Fire Department took full possession of the ambulance along with a Pulmotor Resuscitator ... This would be the first time that ambulance personnel would be properly trained in first aid, and resuscitation procedures of that time” (City of Virginia, MN, 2007).

Such widespread anecdotes not only indicate longstanding involvement of the fire service in medical care, but it demonstrates the often-quoted mission of the fire service established in the 19th Century, “To Protect and Save Lives and Property.” Clearly, protecting and saving lives is the first and foremost mission for these dedicated first responders.

Growth and Specialization of Fire Service-Based EMS

As illustrated by its history, the fire service has continuously adapted and changed to meet the current needs of a community. As EMS developed, the fire service was integrally involved. In the early stages, firefighters were chosen by expert physicians to take on the role of paramedic. This era of EMS in the fire service is represented well by

looking at the City of Miami Fire Rescue Department nearly half a century ago. The age-old firefighter mantra to “protect and save lives and property” is well-illustrated within the history books of the City of Miami Fire Rescue and serves as an important example of Fire Rescue today in the United States. Miami was the first city to call itself a “Fire Rescue” department. Miami Fire Rescue was also revolutionary in using the advancements of technology in 2-way radios to bridge physicians in the hospital with firefighter-paramedics in the prehospital setting.

In fact, the Rescue Division of Miami Fire Rescue was established in 1939 in order to give first aid to firefighters. Rescue One, the department’s first rescue truck used to treat citizens, came on-line in 1941. In these early days, “Rescue” services were limited to basic first aid with transportation usually performed by funeral homes.

In 1964, Dr. Eugene Nagel, started to teach first aid and basic cardiopulmonary resuscitation (CPR) to the firefighters of Miami Fire Rescue. Dr. Nagel’s goal was to improve out-of-hospital cardiac arrest survival in the community by using lessons learned from the “quick response” system in the hospitals and apply it to the prehospital setting. Dr. Nagel still reflects, “We chose firefighters because they were there, they were available, they were willing, and they were motivated. It was really quite simple” (Nagel interview, February 2007). According to Dr. Nagel, “The fire service is dispersed throughout America and is everywhere in our country. It is an efficient method for offering emergency care rather than creating a completely separate service with separate communications, vehicles, housing, and personnel. It worked well in Miami in the 1960’s and continues to work well when integrated into the fire service. It is a natural fit” (Nagel interview, February 2007). Firefighters in Miami clearly demonstrated in the pioneer days of EMS that firefighters are ideal candidates and willing dispensers of high-quality EMS. In Miami, this started with basic first aid, and progressed to CPR, intravenous therapy, electrocardiographs, telemetry, and advanced airway intervention. During this same time period, similar efforts were underway using firefighters in the cities such as Baltimore, Columbus, Seattle, and Los Angeles. Providing firefighters training in lifesaving techniques and procedures has allowed them to deliver advances in medicine to

the prehospital 9-1-1 emergency care patient in a cost-effective and time-sensitive manner. Just as fire departments have evolved since the 1960's to provide prehospital emergency medical care, government oversight must evolve to cohesively organize, coordinate, and supervise the integrated delivery of emergency medical care from the scene to the hospital and even the rehabilitation and recovery phase. A critical link in that chain of survival and recovery is the rapid on-scene response of the Fire service, a service that cannot be underestimated and truly emphasized in planning, funding, support, research, and quality assurance.

The protection of life and property has been the mission of the fire service for over 200 years, but the fire department of the 21st century is evolving into a multidisciplinary public safety department. It not only handles most aspects of public safety (beyond law enforcement security issues), but it also will continue to provide advances in emergency medical care and many developing public health needs such as preparations for pandemics, disasters, and weapons of mass effect.

Today, the community-based fire station, with its ready availability of personnel 24 hours a day, coupled with the unique nature of medicine outside of the hospital, creates a symbiotic blend of the traditional public concepts and duties of the fire service with the potential for the most rapid delivery of advanced prehospital 9-1-1 emergency response and care. Traditionally, fire stations are strategically placed across geographic regions, typically commensurate with population densities and workload needs. This creates an all-hazard response infrastructure meeting the routine and catastrophic emergency needs of all communities regardless of the nature of the emergency. Accordingly, the fire service helps ensure the prosperity and security of all communities and providing prehospital 9-1-1 emergency medical care is consistent with its legacy going back 1200 years.

Types of Fire Service-Based EMS Systems

The fire service can be configured many ways to deliver prehospital 9-1-1 emergency medical care such as the following general configurations:

- Fire service-based system using cross-trained/multi-role firefighters. Firefighters are all-hazards responders, prepared to handle any situation that may arise at a scene including patient care and transport.
- Fire service-based system using employees who are not cross-trained as fire suppression personnel. Single role EMS-trained responders accompanying firefighter first-responders on 9-1-1 emergency medical calls.
- Combined system using the fire department for emergency response and a private or “third service” (police, fire, EMS) provider for transportation support. Single role emergency medical technicians and paramedics accompany firefighter first responders to emergency scenes to provide patient transport in a private or third service ambulance.

While there are pros and cons to the various system approaches, the emergency medicine (EM) literature indicates that the most likely time to create error in medical care is when care is transferred from one provider to another in a relatively short encounter time. Such circumstances require that the fire service regularly exercise the leadership needed to ensure that integration of the parts of the prehospital emergency care system are coordinated well, with maximum benefit to the patient and minimum risk to the community. For example, in the fire service-based EMS model in which the fire department provides extrication, triage and treatment services, and a separate private provider transports the patients, appropriate quality assurance measures must be in place. This quality assurance is most effective when the fire department, as the public agency, administers and monitors the performance requirements on-scene and within the transportation agreement.

National Incident Management System

The U.S. Fire Service-based emergency response and medical care system is the most effective, coordinated system worldwide. The National Incident Management System (NIMS) and other nationally-defined coordination plans ensure that fire service-based 9-1-1 emergency response and medical care always provides skilled medical services to the patient regardless of the circumstances surrounding the location and condition of the patient. In addition, the fire service has the day-to-day experience and ability to work smoothly with other participants in the prehospital 9-1-1 emergency medical care arena: private ambulance companies, law enforcement agencies, health departments, public works departments, the American Red Cross and other government and non-government agencies involved in medical care, disaster response and patient services. This type of universal coordination takes leadership, work, and the willingness to subordinate fire service prerogatives to those of the greater public need. The fire service is the creator of the unified command concept that brings everyone to the table, at the same time. Using the National Incident Management System, the fire service has superior ability to coordinate incidents of any size. As a result, it provides the best return on investment of public dollars to provide the delivery of prehospital 9-1-1 emergency medical service.

Emergency 9-1-1 Response is Different from Non-emergency and In-hospital Care

For government decision makers who do not work in the public safety environment on a day-to-day basis, it may be difficult to appreciate the differences between emergency response and ambulance transport. Unless one actually has used the EMS system in a medical emergency, he or she might be likely to define a call to 9-1-1 in a medical emergency as ‘needing an ambulance.’ However, with the recent advances in resuscitative medical care, particularly in cardiac emergencies, we now know that what occurs in the first few minutes after onset of the medical emergency will change the long term outcome. In many of these critical circumstances, what happens on-scene determines whether the patient lives or dies. Therefore, rapid, efficient and effective delivery of emergency response and care is dependent on immediately sending nearby

trained personnel to the scene of an emergency regardless of the vehicle or mode of transportation.

Ambulances, of course, are necessary to transport patients to a hospital where more definitive care may be needed. However, because ambulances are often busy evacuating, transporting and turning over patients at the hospital, the most reliable vehicle to ensure a rapid response generally is the neighborhood fire truck. It should be realized that the first emergency care provider who is responsible for competent care may arrive on a fire truck separate from an ambulance. This is the case in most communities in America.

There are sub-specialties of ambulance service in the out-of-hospital arena that must not be confused with 9-1-1 emergency response. For example, ambulance services are often employed for interfacility transfers for specialty care or the need to transfer patients from one hospital to another can provide a higher level of required care. These transfers may include critical care transfers between hospitals, but more often they may also be non-emergent interfacility transports or day transport for persons with home-delivered chronic care services. Such services typically are not performed by fire departments as a fundamental public policy device to better ensure dedicated 9-1-1 emergency services and thus provide security and prosperity for the community served.

Multi-Role Firefighters: Patient Safety from Multiple Perspectives

To further emphasize that the prehospital 9-1-1 emergency care patient should be considered a separate and distinct type of patient in the continuum of health care, consider the setting and the circumstances of emergency medical care delivery. These patients not only have medical needs, but they also need simultaneous physical rescue, protection from the elements and the creation of a safe physical environment as well as management of non-medical surrounding sociologic concerns. The fire service is uniquely equipped to simultaneously address all of these needs.

The mission of the fire service is to protect and save lives and property. There are no other conflicting agendas. The fire service-based prehospital, 9-1-1 emergency response

medical care system is designed to be part of society's safety net. Fire and prehospital 9-1-1 emergency response medical care are intimately intertwined. Separating them from the EMS focus only serves to polarize our country's already fragmented emergency response system.

All out-of-hospital emergency care and ambulance transport professionals are taught that scene safety is the primary objective at every emergency scene. However, many of today's non-fire service-based EMS professionals do not have the additional resources and often do not have the training to effectively secure a scene. When there is a strict medical orientation in their professional training and practice, adequate preparation to appropriately and safely provide emergency medical care to an emergency patient may be compromised. Scene safety issues are often not apparent until a crew is on-scene to assess the incident.

Decision makers should consider, 'What does a non-fire based EMS crew do on the scene of a motor vehicle accident when the car is engulfed in flames and occupants are trapped inside, and fire crews were not dispatched?' In many cases, a non-fire service-based EMS provider would need to request dispatch of a fire company after the initial scene size-up, further delaying care, and further increasing risk to rescuers and victims. Streamlining this approach into the fire service-based prehospital 9-1-1 emergency medical care system is quite arguably more effective from the perspective of scene safety, short response time, integrated rescue and treatment, and then transport to a medical facility. Regardless, the firefighter response is a key element of patient safety, both medically and environmentally.

In the era of homeland security threats and the spiraling growth of the commercial transport industry, the threat of hazardous materials (Haz-Mat) is center-stage. Again, fire service Haz-Mat teams are the front-line of protection and rapid delivery of medical care can be pre-empted by such chem-bio threats, but where rapid care can be given, it can be expedited directly by cross-trained fire-service Haz-Mat care providers.

Fire Service-Based EMS as the Health Care System Safety Net

Prehospital 9-1-1 emergency patient medical care is a major part of the safety net for the American healthcare system. They may be the provider of last resort for the needy, yet they can be one more mechanism for overloading the health care system. Nevertheless, to its credit, the fire service-based, prehospital 9-1-1 emergency patient medical care provides unconditional service to all members of our population. Therefore, the fire service must now become an integral part of the public health system and work closely with medical and public health experts to help alleviate unnecessary burdens on already overburdened hospital, medical and public health systems. Already part of local government, the fire service may be best positioned to sit at the table and help provide important data to facilitate creating solutions to pressing health care public policy issues.

Above all, rapid response times are a pivotal advantage of fire service-based, prehospital 9-1-1 emergency EMS systems. Now equipped with automated defibrillators to reverse sudden cardiac arrest, the fire truck, coupled with bystander CPR, has become one of the greatest life-saving tools in medical history. With stroke centers to treat stroke within the golden 3 hour window, cardiac catheterization centers to treat heart attack in the 90 minute door-to-balloon time, and trauma centers to treat hemorrhaging patients, time efficiency is a key component of the best designed EMS systems. The service most capable of rapid multi-faceted response, rapid identification and triage to the appropriate facility is a fire service-based EMS system.

EMS is Not an Ambulance Ride

One of the central themes of this discussion is concern over the common misconception that EMS begins with the transport of a patient in an ambulance to a hospital. This misunderstanding resulted essentially in funding of transport service providers but not providers of emergency medical care rendered at the scene. This funding aberrancy occurred in the 1960s as Medicare provided reimbursement for transportation of trauma patients to the hospital, long before the contemporary EMS system developed. About the same time, fire service delivery of 9-1-1 emergency medical care was becoming part of the fabric of the fire service. It was managed and funded as an integral component of

public safety service provided by a fire department. Thus, it was funded solely as part of the fire department budget.

Payment for transportation does not fairly portray the full picture of 9-1-1 emergency response and medical care. As the need to pay for EMS was realized, federal dollars for “emergency medical services” went to the perceived greatest area of need at that time, the need for transportation. These federal dollars even provided payment of non-emergency ambulance transport for the care of chronic medical problems. Even though much of the life-saving effect of EMS in today’s circumstances will play out routinely on the scene long before ambulance arrival, the focus on transport and not medical care delivery remains. This distinction has been lost and, to this date, never totally reconciled. Especially considering the resource impact, educating the public and government officials about this distinction within the EMS system in the U.S. is a critical and timely issue in the era of homeland security and Haz-Mat threats.

Funding for Prehospital EMS

The fire service supports the recent Institute of Medicine recommendations for ensuring federal payment for emergency medical care not associated with transport. Although not labeled specifically for EMS activities, grant funds are received by fire departments and emergency management agencies to enhance EMS response capabilities throughout the United States. It is deceptive to imply that only funds awarded to single function EMS delivery agencies are the only dollars benefiting those receiving prehospital 9-1-1 emergency medical care services.

For example, Assistance to Firefighter Grants (AFG) are essential to ensuring that fire departments have the baseline response capability that prepares them to respond not only to local incidents but also to effectively participate in broader, national responses. Fire department ‘response’ is considered ‘all-hazards’, inclusive of emergency, prehospital 9-1-1 medical care services. The program is extraordinarily cost-effective, with low administrative overhead and direct payments to local fire departments. As almost all fire departments provide EMS at some level, AFG dollars support equipment purchases,

training efforts as well as public safety education and injury prevention efforts. In fiscal year 2006 (FY 2006), 4,726 grants were awarded to fire departments throughout the United States totaling \$461,092,358.

Another example of federal funding of local emergency response systems is the Staffing for Adequate Fire and Emergency Response (SAFER) Grants. The single most important obligation the federal government should fulfill to enhance local preparedness and protect Americans against all-hazards—natural and man-made—is to assure that every fire department in the nation has sufficient numbers of adequately trained and equipped fire fighter/ EMS responders. In FY 2006, there were 242 SAFER awards totaling \$96,151,433 provided to fire departments throughout the United States.

Both AFG and SAFER grants present the federal government with its best opportunity to assure a strong, emergency response component in every community in America.

Federal Oversight and Administration of EMS

EMS has many voices at the federal level including the Department of Health and Human Services, Department of Transportation, Department of Justice, and Department of Homeland Security. Each voice advocates for specific entities that provide EMS as part of its services. Congress appropriately has empowered all EMS-related agencies under the Federal Interagency Committee on Emergency Medical Services (FICEMS).

Recently, the FICEMS has been strengthened and provides the mechanism to accomplish this “coordination of the voices.” The leadership challenge is to bring all of the voices together. The FICEMS can do this, if given a chance and a mandate.

Conclusion

In terms of the rapid delivery of emergency medical care in the out-of-hospital environment, fire departments have the advantage of having a free-standing army ready to respond anytime and anywhere. Prehospital, 9-1-1 emergency response in support of community prosperity and security is one of the essential public safety functions provided by the United States fire service. Fire service-based EMS systems are strategically

positioned to deliver time critical response and effective patient care and scene safety. Fire service-based EMS accomplishes this while emphasizing responder and patient safety, providing competent and compassionate workers, and delivering cost-effective operations.

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