

CHAPTER FOUR EMERGENCY MEDICAL SERVICES

This chapter includes sections on the history of Emergency Medical Services (EMS) in the United States and the delivery of EMS in the State of South Carolina, the Town of Kiawah Island, and Charleston County.

OVERVIEW

The delivery of quality emergency medical care is one of the most basic services that a local government must ensure is available to its citizens. The actual delivery of such service is just one component of an EMS system. An EMS system consists of those organizations, resources, and individuals from whom some action is required in order to ensure a timely and medically appropriate response to medical emergencies. The basic goal of an EMS system is to get the patient to a definitive care facility in a timely manner so that no further harm occurs to the patient. Although an EMS system does not stop when the patient arrives at the hospital door, the delivery of pre-hospital care and patient transport are the most complex components of a community's EMS system. Traditionally, there are 13 recognized essential elements of the pre-hospital component of an EMS system.

1. Prevention and early recognition;
2. Bystander action and system access;
3. Call taking and dispatching function;
4. Telephone protocols and pre-arrival instructions;
5. First responder dispatch;
6. Ambulance dispatch;
7. First responder services;
8. Ambulance services—basic and advanced life support;
9. Direct on-line medical control;
10. Transport;
11. Receiving facility interface;
12. Off-line medical control; and,
13. Record keeping and evaluation.

Emergency medical care can be delivered through a variety of methods, which include: contracting the service through a private ambulance company; delegating the service to a volunteer agency in the community; providing direct service through government employees; or any of the above combination.

As EMS in the United States has evolved, so have the different models or profiles of organizational structures for the delivery of the service. In the early 1980s, the United States Fire Administration published *Fire Service/EMS, A Program Management Guide*. This publication identified 28 different profiles for the delivery of EMS. Twenty-six of the profiles included participation of the fire department in some aspect of the pre-hospital EMS system. Each profile has its own particular strengths and weaknesses. The profiles, identified thirty years ago, still accurately portray fire service based EMS today. The original profiles identified in the *Management Guide* are built around five primary variables:

1. Dual-role vs. cross-trained vs. “civilian” providers;
2. Career only vs. career & volunteer vs. volunteer only organizations;
3. First responder vs. EMT vs. paramedic certifications;
4. Transporting units vs. non-transporting units; and,
5. Engine or truck company first response vs. no engine or truck company first response.

These variables can be combined into 52 different ways of EMS delivery; it is most likely that every variable has been tried and is probably in service today somewhere in the United States. The variables also can be pieced together as necessary to meet the needs and resources of a particular community. Many jurisdictions have started out with one profile and changed to another as their EMS systems have grown and resources shifted.

The combination of these variables can be classified into one of four main categories of pre-hospital emergency medical service delivery:

1. *Third-Party Service*. EMS services are delivered by a separate public safety agency that usually holds equal status with other agencies in the community, such as the fire department and police department. Career, volunteer, or a combination of career and volunteer personnel may provide these third-party services.

2. *Hospital-based Service.* EMS services are delivered from a medical facility, normally a local or regional hospital. Personnel delivering the services are usually hospital or health care system employees and hospital funding commonly supports the services.
3. *Private Service.* EMS services are delivered by a privately owned company for a fee, on a for-profit basis. A local government would most likely enter into a written agreement with the private ambulance company identifying the level of services provided and cost of said services.
4. *Fire Department-based Service.* EMS services are delivered by fire department personnel (career, volunteer, or combination). Fire department personnel are trained as EMS care providers and are equipped to provide care and transport for sick and injured patients.

HISTORY OF EMS IN THE FIRE SERVICE

There is a long history of fire department involvement in the delivery of EMS services in the United States. As early as 1928, a few fire departments began providing first aid services to citizens suffering from heart attack symptoms or having trouble breathing. These services were provided with equipment that the firefighters carried to treat other firefighters who would be overcome with smoke at fire incidents. Later in the 1930s, fire departments began developing special vehicles that they used to provide assistance to citizens in their communities who became ill or injured. These specialized units included vehicles used for heavy rescue and extrication operations.

During the 1940s and 1950s, many fire departments continued to provide ambulance service, consisting primarily of basic first aid and transport operations. As new techniques were developed for the care of the ill or injured outside of the hospital setting, fire departments in major cities such as Baltimore, Seattle, Los Angeles, Milwaukee, and Columbus were the first to implement the techniques.

In 1966, the National Traffic and Motor Vehicle Safety Act was passed authorizing the U.S. Department of Transportation to set EMS guidelines and establish the National Highway Traffic Safety Administration, which was charged with improving emergency medical services. As pre-hospital care started to become more sophisticated with the

introduction of national standards for training of Emergency Medical Technicians (EMT) and Paramedics, fire department involvement in EMS grew throughout the United States.

In 2004, it was estimated that more than 60 percent of all fire departments in the United States were involved in providing some level of emergency medical service. Those fire departments that provided EMS services to their community found that at least 50 percent (and up to as high as 80 percent) of their total emergency incidents handled each year were EMS related.

For a fire department to deliver quality EMS service, local government officials, fire department leadership, and EMS care providers must all embrace the importance of the service and must all understand the demands that a quality EMS program places on departmental resources. This is critically important because, in some U.S. communities, the delivery of EMS services is being returned to the local fire department after struggling with various models of private sector involvement.

Many leaders in the fire service at the national level believe that the fire departments that have been involved in the direct delivery of EMS services have also been the fire departments that have remained the most stable through the difficult up-and-down economic times of the last 20 years. The fire service has truly taken on an “all-hazards” approach to its response capabilities in recent years, and those fire departments that only respond to the report of fire are the fire departments that will continue to have their future in jeopardy.

A well-staffed, well-trained, and well-equipped fire engine can mean so much more to a community than just a fire response vehicle. If that vehicle is staffed with trained and equipped medical providers, it becomes the neighborhood first-aid unit that helps people with cut hands, broken bones, asthma attacks, and life-threatening emergencies. Going on an EMS run should not be an inconvenience to a fire department; it should be an opportunity to aid and interact with the citizens that the department serves.

THE MODERN EMS AGENCY

The progressive EMS delivery agency is really a complex organization that has many customers—one of which is the patient receiving the care. EMS customers also include

the patient's family; the citizens of the community; local medical professionals; the local hospital emergency room staff; trauma and specialty referral centers; local nursing and long-term care facilities; health care insurance providers; health care educators; 911 call takers and dispatchers; and, of course, the EMS providers themselves.

Modern EMS delivery is actually a progressive approach that begins before the 911 call is initiated. Public health care awareness and injury prevention education are often delivered by local or regional hospital resources, as well as the EMS provider agency in hopes that the 911 call can be prevented or at least made early in the event. In communities where public health care education has been prioritized as an important part of the EMS system, the result is quite often improved patient survivability and outcome. As a community's population changes in age and cultural composition, the need for public health care education grows increasingly more important.

When the 911 call is made, the progressive EMS agency will answer with an Emergency Medical Dispatch (EMD) trained call taker who will also provide pre-arrival instructions to the calling party so that basic lifesaving interventions can be started prior to the arrival of trained EMS providers. That progressive agency will have in place a tiered-type of response system that brings both basic and advanced life support services to the patient within nationally accepted response time criteria. Ultimately, the patient will be properly diagnosed, treated, and transported to a medical facility capable of providing definitive care.

THE IDEAL CHAIN OF SURVIVAL EVENTS

In the "ideal" EMS system, a patient with a life-threatening medical emergency, such as a heart attack, should first encounter a family member or bystander who is CPR trained and who also recognizes the signs and symptoms of the medical emergency. The bystander or family member would activate the local EMS system through a 911 call and would initiate basic first aid and CPR care.

If needed, the EMD-trained 911 call taker would provide nationally recognized pre-arrival care instructions via telephone while emergency responders were being dispatched. These pre-arrival instructions would continue until the arrival of the trained emergency responders. If this emergency was occurring in a public venue, such as a

shopping mall or health club, an automatic external defibrillator (AED) would be immediately available for use along with an AED-trained staff member or security person.

The first emergency response personnel to arrive on the scene would be trained at least to the EMT-B (Basic) level and equipped with a first-aid bag, oxygen delivery equipment, and an AED. Within a few minutes, trained paramedic/s would arrive with advanced life support equipment capable of providing cardiac monitoring, intravenous medication therapy, and advanced airway management techniques. Using standing medical protocols, the patient would receive a 12-lead electrocardiogram, lifesaving medications, and other cardiac therapies in order to diagnose and treat the medical emergency.

The patient would be stabilized, loaded into a transport unit and begin a short trip to a definitive care facility capable of handling cardiac emergencies. While enroute to the care facility, the paramedics would consult via radio or telephone with emergency care physicians to obtain orders for further pre-hospital interventions. The patient would arrive at the care facility having received appropriate advanced life support (ALS) care within the delivery time criteria established by the American Heart Association.

Patient care would be transferred to the emergency room staff and an accurate and clearly written transfer report would be provided. The transfer would be seamless and timely and the care providers would ready their equipment for the next response with minimal delay.

Back at their station, the care providers would finalize any reports and file them using a computer-based data collection system. The data would be used for billing, state reporting, departmental analysis of service delivery, and EMS system master planning—in addition to simply documenting the incident.

Finally, a Quality Assurance staff member would review the care provider's written report for accuracy and protocol compliance and then send a customer service survey to the patient within 30 days of the incident.

As stated previously, how all these system components arrive in the time required is really a complex process that varies from community to community throughout the United States. When multiple agencies are required to provide the system components listed above, inter-agency cooperation and coordination are paramount to successful

patient outcome. Should one component fail, then the system fails to provide the best care.

EMS IN SOUTH CAROLINA

The South Carolina Department of Health and Environmental Control (DHEC) is the central agency responsible for the coordination and integration of all state activities concerning emergency medical services and the overall planning, evaluation, coordination, facilitation and regulation of EMS systems. The South Carolina DHEC EMS division includes: the Medical Control Committee, four regional EMS offices, and the supporting staff. Currently, EMS systems in South Carolina are regulated by Regulation 61-7 (latest update 2006) under the SC State Code section 44-61-30 (2004) and 44-78-65 (2002). In South Carolina, county-level governments typically provide EMS.

The 61-7 regulations affect several areas of EMS system operations: licensing of ambulance and emergency first responder services; establishing training and certification requirements for each level of emergency care provider; and inspecting vehicles and equipment to ensure that they meet inventory and operational requirements.

There are four basic levels of EMS providers recognized in South Carolina (SC) with each level facilitating a hierarchy of emergency care.

1. *First Responder (FR)*: Providers who are SC Licensed First Responders operate in the pre-hospital environment to perform basic lifesaving interventions under limited supervision usually before the ambulance arrives and do not have transporting capabilities (section 201J). Licensed First responders in SC perform at the Emergency Medical Technician (EMT)-Basic level.
2. *EMT-Basic (EMT-B)*. EMT-Basic is considered the entry-level point for EMS providers in the State of South Carolina. A person must be licensed (at least) as an EMT-B in order to provide unsupervised care in the patient compartment of an ambulance. The EMT-B curriculum includes medical emergencies, trauma emergencies, pediatrics, obstetrics, EMS operations, special patient populations, and others. EMT-B students must also complete observational clinical time in the hospital emergency department and an EMS agency ride-along.

Once licensed, EMT-Bs must maintain their certification through a combination of refresher training and continuing education requirements. At the scene of emergencies, EMT-Bs are versatile care providers who can perform basic life-saving functions such as:

- Cardio-Respiratory Skills:
 - One- and two-person CPR
 - Conscious and unconscious obstructed airway
 - Oxygen administration
 - OPA and NPA airways
 - One- and two-person use of BVM
 - Oral suction
 - Combitube
 - Laryngeal mask airway (LMA)
 - King airway
 - Sterile suction
 - Use of automated external defibrillators (AED)
 - Field application/acquisition of 12 lead ECG for transmission only (Transmission may be defined as direct paramedic interpretation and voice communication; automated computer algorithm interpretation, wireless transmission and physician interpretation, or any combination of these strategies)
- Bandage and Splint Skills:
 - Upper and lower extremities
 - Spinal immobilization (short and long board)
 - Pneumatic anti-shock garments
 - Hemorrhage control (direct pressure, pressure point, tourniquet, etc.)
- General Skills:
 - Patient assessment
 - Vital signs
 - Patient lifting
 - IV Maintenance (involves ONLY monitoring and maintenance of previously initiated IV lines as well as calculation and adjustment of flow rates—fluids NOT containing any medications or blood products).

- Monitoring of blood glucose with use of automated chem-strip analysis (Local option: training to be done by the individual EMS provider with medical control supervision).
 - EMT Administered Medications (oxygen, activated charcoal, ipecac, instant glucose)
 - EMT Patient Assisted Medications (nitroglycerin, epi auto-injectors, prescribed inhalers)
 - CPAP (Local option: training to be done by the individual EMS provider with medical control [physician supervision]).
 - Primary administration of epinephrine auto-injector for severe anaphylaxis (Local option: training be done by the individual EMS provider with medical control [physician supervision]).
3. *Emergency Medical Technician-Intermediate (EMT-I)*. The functions of an EMT-I include the functions of an EMT-B, plus intravenous/intraosseous therapy and some additional medication delivery. Quite often, the EMT-I is used to supplement the more advanced trained EMT-Paramedic by providing a caregiver, who can initiate intravenous therapy and advanced medication administration skills, as well as assist the paramedic with other ALS skills.
4. *Emergency Medical Technician-Paramedic (EMT-P)*. The functions of the EMT-P include the functions of the EMT-B and the provision of advanced life support techniques related to the treatment of cardiac and respiratory emergencies, major trauma, and other life threatening events. The EMT-P operates under the direct and indirect medical control of a licensed emergency care physician to provide such lifesaving interventions as controlled substance administration, endotracheal intubation, needle cricothyrotomy, CPAP, electrocardiogram, cardiac pace making.

Next to the quick deployment and actions of an AED-equipped EMT-B, the EMT-P is the EMS care provider most likely to make a significant difference in the outcome of a critical patient in the pre-hospital setting. In many locations across the United States, the generally accepted standard of care in the EMS industry is to deliver an EMT-P to the scene of every life threatening medical or trauma-related emergency.

Any agency delivering EMS services in SC must understand the organization of the DHEC EMS Division. It is impossible to provide services without knowing the roles and

responsibilities of all the agencies and players involved, and it is equally important that provider agencies be active participants in local, regional, and State councils and committees.

EMS IN CHARLESTON COUNTY

The history of EMS delivery in Charleston County dates back before 1973 when EMS was using the “third-service” model with two private providers and police “crash trucks” for motor-vehicle collisions. Concerns regarding the performance of the private providers led to the establishment of a county department service. Today, the Charleston County EMS Department is the primary 911 ground-level provider of urgent medical and trauma services for the entire 919 land square miles that include 372,803¹ residents, including the cities of Charleston, North Charleston, and Mount Pleasant along with several other smaller municipalities. This service received the Large System of the Year award in 2002 from the SC DHEC and more recently in 2010; it was awarded the EMS System of the Year by a national organization. This department does not perform any non-emergency transportation services, nor does it provide aeromedical helicopter service.

Because of the geography, accessibility for EMS to some areas can be a challenge. The City of Charleston is primarily a peninsula and the county contains several islands and limited bridge access to each. The department responds to over 57,000 calls countywide, the intensity of EMS demand typically correlates with human population level and activity.

¹ 2012 Estimate, U.S. Census Bureau

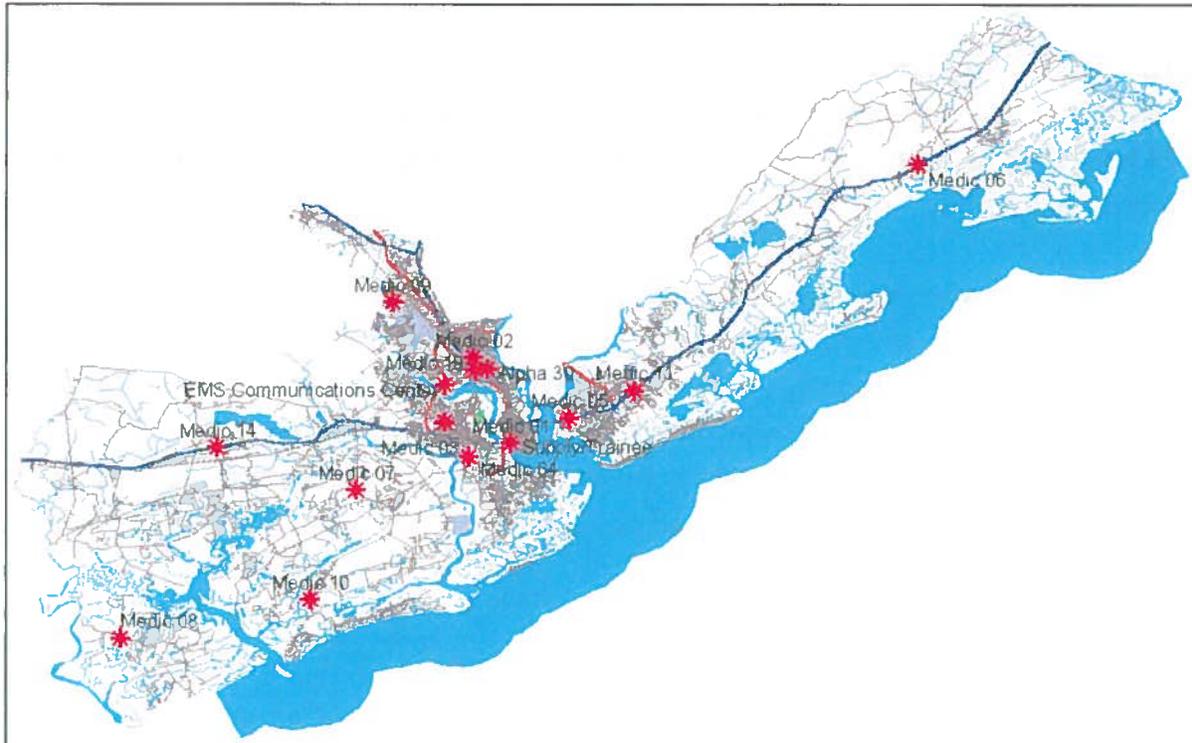
Figure 4.1
CHARLESTON COUNTY EMS UNIT



Charleston County EMS operates 18 transport units and 8 quick response (non-transporting) units out of 14 fixed location stations (see Figure 4.2²) as well as over 40 designated “street posts” throughout the county. These transport units are staffed 24 hours a day with at least an EMT-B and an EMT-P. The QRV units are staffed with supervisor paramedics.

² From Charleston County EMS Website

Figure 4.2
CHARLESTON COUNTY EMS STATION LOCATIONS



Medic 10 on the map is closest to Kiawah Island, with Medic 7 further up Main Street on John's Island being the primary back up. Station Medic 7 is also where the EMS district supervisor (QRV) is based.

Charleston County EMS deploys a varying number of ambulances during the day based upon historical demand by hour of day and day of week. During the busier hours, more ambulances are staffed and come on line to handle the expected demand. Where they are placed in the county depends on which zone they are assigned to, their base station assignment, and the demand at any given time according to the dispatch center. The software utilized for deployment of EMS unit strives to provide coverage for the expected 80% of incidents expected to occur for that hour of day and day of week. Charleston County EMS did not respond to a request for the specific deployment plan for unit levels in relation to time of day and by area but stated³ that at a minimum a unit is

³ Email Correspondence from CC EMS D/C Millican, 8/11/2014, 9:43am

placed within 20 minutes from the county border. Currently, the 168 person staff works a variety of shift lengths (either 8, 12, or 24 hours per shift). This will reportedly change to strictly 12 hours as 15 when more responders are hired.

The budget for Charleston County EMS in 2014 is nearly \$113M. This is \$3M more than last year to accommodate the staffing increase due to concerns of worker fatigue during 24 hour shifts and perhaps partly in response to an overtime lawsuit by some current and former employees.

EMS administrative personnel interviewed by the Study Team reported the importance of a countywide EMS system, warning that breakaway services would result in a disjointed and uncoordinated hodgepodge of services that would return EMS to the times before the Charleston County EMS Department was created and result in the reasons why it was created in the first place. They also believe that additional resources are needed system wide and are open to alternatives and to dedicated services for the Town of Kiawah Island.

Public Education and Early Recognition

The first important link in the American Heart Association's (AHA) Chain of Survival is the early recognition of a medical emergency. Public health education efforts in recent years look to focus the public's attention to the warning signs and symptoms of heart attack, cardiac arrest, stroke, and foreign body airway obstruction. In some communities, public health care education is a joint effort involving several health care agencies and often includes the EMS system.

Charleston County EMS has several public education efforts. These include (1) a citizen CPR program, (2) several programs for teenagers aimed at reducing under-age drinking and driving, and (3) a program dedicated to injury prevention. Charleston County EMS is evaluating the efficacy of a Community Paramedic Program, whereby EMS units visit frequent users of the service, those recently discharged from a hospital, and others known for chronic illnesses. This program's focus is to continue to educate patients in self-care and prevention and to monitor patients in an effort to reduce recurrence of illness and readmission into the hospital.

EMS System Access

The second critical link in the Chain of Survival is easy access to 911 and activation of the EMS system. South Carolina has designated 911 as the dedicated emergency telephone number for police, fire, and emergency medical assistance. There appears to be no major issues with 911 access in Charleston other than perhaps some language barrier issues, which is common in areas with such an ethnically diverse population. County of Charleston residents have access to 911 using either the traditional hard-wire or cellular telephone systems.

Bystander Action

The third critical link in the Chain of Survival is the delivery of bystander CPR. In order for bystander CPR to be effective, there has to be a bystander present who is trained to administer CPR. As already discussed, in many communities EMS is also involved in providing citizen CPR training. This training is often done in partnership with local health care facilities or civic organizations. Historically, in communities where CPR has been marketed, delivered, and accepted by the public, the survival rate of cardiac arrests has improved.

Another link in the Chain of Survival is the early access to cardiac defibrillation for the correction of lethal heart dysrhythmias. Originally, defibrillation was thought best in the hands of trained paramedics. As technology improved over the last decade, we now find the use of public access automatic external defibrillators (AEDs). The new AEDs are very simple to use and are practically failsafe in terms of accidental misuse. The Study Team learned that public access AEDs are widespread throughout the County and commends the parties responsible for the implementation of those public access AEDs. These AEDs have become ubiquitous and an accurate tally of the number and location of them is being attempted through a pilot program registry.

911 Call Taking and Dispatch

The Charleston County Consolidated Dispatch Center provides call taking, tracking, and deployment control for EMS. It uses software that seeks to predict EMS demand levels and areas based upon historical experience for that time of day and day of week. The

center is staffed 24 hours a day to answer 911 calls. It also provides radio dispatch for the fire and police departments throughout most of the county.

When an emergency incident occurs in Charleston County, the patient or bystander can obtain help by calling 911. The 911 call is answered by a call taker at the joint communications center, and the process is set in motion by which the most appropriate resource is dispatched to handle the emergency event. Dispatchers at the communications center are trained as State Certified Emergency Medial Dispatchers (EMD). They utilize software that is based on the Medical Priority Dispatch System to appropriately prioritize the incident.

EMD works by prioritizing 911 emergency medical calls into call types and categories. For example, a simple nosebleed would be categorized as a 21-A-02 call type (or in simple terms, an Alpha call). More serious types of medical emergencies might fall into Bravo, Charlie, Delta, and Echo call types—with the Echo call being the most life threatening and most likely requiring the greater number of emergency medical response resources. Figure 4.3 provides a summary of the codes used in the Medical Priority Dispatch System.

Figure 4.3

MEDICAL PRIORITY DISPATCH SYSTEM CODES

Type	Response Needed	Relative Response Action
Alpha	Basic Life Support	Cold (single unit)
Bravo	Basic Life Support	Hot (multiple units)
Charlie	Advanced Life Support	Cold (single unit)
Delta	Advanced Life Support	Hot (multiple units)
Echo	Advanced Life Support and special units	Hot (Multiple units) plus nontraditional responders

Code	Category	Code	Category
1	Abdominal Pain/Problems	20	Heat/Cold Exposure
2	Allergies (Reactions)/ Envenomations (Stings, Bites)	21	Hemorrhage/Lacerations
3	Animal Bites/Attacks	22	Inaccessible Incident/Entrapments
4	Assault/Sexual	23	Overdose/Poisoning (Ingestion)
5	Back Pain (Non-Traumatic/Non-Recent)	24	Pregnancy/Childbirth/Miscarriage
6	Breathing Problems	25	Psychiatric/Suicide Attempt

7	Burns (Scalds) /Explosions	26	Sick Person
8	Carbon Monoxide/Inhalation/HAZMAT/CBRN	27	Stab/Gunshot/Penetrating Trauma
9	Cardiac or Respiratory Arrest/Death	28	Stroke (CVA)/Transient Ischemic Attack (TIA)
10	Chest Pain	29	Traffic/Transportation Incidents
11	Choking	30	Traumatic Injuries
12	Convulsions/Seizures	31	Unconscious/Fainting(Near)
13	Diabetic Problems	32	Unknown Problem (Man Down)
14	Drowning/Diving/SCUBA Accident	33	Inter-Facility Transfer/Palliative Care
15	Electrocution/Lightning	34	Automatic Crash Notification (A.C.N.)
16	Eye Problems/Injuries	35	HCP (Health-Care Practitioner) Referral (United Kingdom only)
17	Falls	36	Flu-Like Symptoms (Possible H1N1)
18	Headache	37	Inter-Facility Transfer specific to medically trained callers
19	Heart Problems/A.I.C.D.		

Aeromedical Services

Aeromedical services are provided by two hospitals in the area who utilized dedicated landing zones (LZ) preferably. In Kiawah, one LZ is the soccer field in Night Heron Park (an open area behind Fresh Fields Shopping Center and near the Ocean Course Clubhouse at the far end of the island). The local fire department is responsible for clearing and appropriately marking the landing zone so that ground EMS and aeromedical crews can coordinate transfer and care of a critically ill or injured patient.

Specialized Rescue

While local fire departments provide automobile extraction services, the Charleston County Volunteer Rescue Squad in North Charleston provides specialty rescue services such as dive team, a marine division, swift-water rescue, rural search team, and a technical rescue team for a variety of situations. The St. John's Fire District also has a marine division, hazmat, and is evaluating trench rescue and high angle technical rescue. The hazmat unit is located at Station 1, while the Hazmat team is at Station 7, both on

John's Island. Also providing these services closer to downtown Charleston is the City Fire Department.

Hospitals

The area is served by seven hospitals; the closest to Kiawah Island are the Medical University of South Carolina (MUSC) hospital and the Roper Healthcare System facilities in downtown Charleston.

Roper Healthcare is a private, nonprofit organization operating three hospitals in the area with 657 beds. The three hospitals are Roper Hospital downtown, Bon Secours St Francis in West Ashley, and St Francis in Mount Pleasant. Roper Healthcare also includes more than 90 outpatient facilities and doctors' offices. MUSC is the region's referral hospital, offering services not available elsewhere. It is a Level I trauma center, a heart/vascular center, cancer treatment leader, and home to the local Children's Hospital. Combined with the pre-hospital care provided by the Charleston County EMS, visitors and citizens of Charleston have access to some of the best emergent care in the United States.

The Study Team is aware of no issues or concerns involving Charleston County EMS's interactions with any of the local hospitals except that from the center of Kiawah Island, it could be a lengthy 40-minute drive to a hospital. There are number of urgent care centers (not full emergency rooms) mostly on James Island closer to Charleston, however Roper Healthcare does provide one in the Fresh Fields Development at the traffic circle (Hours: 8 am-5 pm).

EMS Medical Director

In SC, like most states, EMS systems are required to have a medical director. The work of the EMS providers at the emergency scene falls under the auspices of the system's Medical Director. The role of Medical Director is an important role in any EMS system: it is a position of authority that should not be taken lightly. All EMS providers in a jurisdiction basically operate and perform their duties under the license of the Medical Director, thus the Medical Director must be carefully selected to ensure that the person chosen is engaged at all levels of EMS in the jurisdiction. Some jurisdictions have assistant or deputy medical directors to help provide oversight and direction to the EMS system.

The current Medical Director for Charleston County EMS is Dr. David French an emergency department physician at MUSC in Charleston where he currently also serves as the Department of Emergency Medicine's Associate Faculty for Pre-hospital Medicine. The Medical Director performs his duties and responsibilities under contract with the County. These contracts typically include stipend and insurance provisions.

Non-Emergency Ambulance Transportation

Several private ambulance and wheelchair transportation companies operate in Charleston County. They have no primary emergency medical responsibility and only operate at the EMT-B level as licensed by the state. They are not obligated to operate continuously, and the schedule of transports drive the amount of time and number of units are utilized.

Critical Inter-Hospital Transportation

Both hospital systems provide critical interfacility transportation, but may rely upon Charleston County EMS when demand exceeds resources available, but do not have primary 911 responsibilities. Charleston County EMS can also utilize and communicate with these resources in times that additional resources are needed. These are highly trained teams of paramedics, nurses, and therapists who attend to patients needing transportation services from or to their facilities. Therefore, they are a great asset in times of multi-casualty events and potential incidents.

EMS-BASED RESPONSE TIME CONSIDERATIONS

Time is one of the most important factors relating to patient outcomes in emergency medical situations. Rapid delivery of EMS is essential in the acute situation of cardio-respiratory arrest; a measurable factor is the time from heart stoppage and cessation of breathing (clinical death) to when irreversible brain damage begins (biological death). Although the time varies with patients and conditions, the generally recognized intervention time to prevent biological death from cardiac arrest is four to six minutes. Time is also critical in heart attacks, stroke, and major trauma where time interval recommendations for emergency crews have been established by the American Heart and

Stroke Associations and by trauma surgeons. These are time objectives to get the patient to hospital care. As component, the shorter a response time, the better in these critical situations. No standard response time for EMS by type of call has been adopted by any EMS national, state, or regional organization.

Other Relevant Standards

NFPA 1710 is an industry standard that serves as a benchmark for a fire department organization and deployment of services offered by firefighters. It is the standard for paid/career fire departments that describes the requirements for delivery of services, response capabilities, incident management, and strategy.

This Standard includes the following benchmarks related to call receipt and processing time, turnout time, and response (travel) time:

- Turnout time of eighty seconds on fire suppression calls and sixty seconds for EMS calls;
- The fire department's fire suppression resources deployed to provide for the arrival of an engine company within a four-minute travel time and/or the initial full alarm assignment within an eight-minute response time to 90 percent of the incidents;
- The fire department's EMS basic life support (BLS) resources with automatic defibrillator equipment deployed to provide for the arrival of a BLS unit (EMS first responder or transport unit) within a four-minute travel time; and,
- The fire department's EMS resources providing advanced life support (ALS) service deployed to provide for the arrival of an ALS company within an eight-minute travel time to 90 percent of the incidents.

It should be noted that the various standards and criteria discussed in other sections place a high priority on both the effective delivery of emergency services in the protection of life and property. Moreover, the safety of the firefighters and officers delivering the services and safety for the customer and stakeholder were important considerations to the development of these standards and to their application.

The Charleston County EMS has adopted a response time objective similar to the NFPA 1710 parameters for its goal in responding to emergent medical & trauma incidents. **Specifically, the objective seeks to have aid to the patient within 8 minutes and 59 seconds, 90% of the time for all calls except those considered less urgent** (Alpha & Omega dispatch codes). It allows for a 59-second turnout (or chute) time from being alerted to the call to when the unit begins enroute (radioed in, but conceptually when the provider(s) are in the unit and it begins to roll away from the station or location). Therefore, it relies upon SC Licensed First Responder Agencies to provide initial response to medical and trauma events. In Kiawah Island, the initial EMS incident responders are the security patrol, Charleston County Sheriff, and the St. John's Fire District. Charleston County EMS reports response time objective performance compliance in the 60% to 70% range for the last three years. Admittedly, it has fallen short of its own goal.

As stated previously, the closest stationed unit to Kiawah Island is at Station 10. While the unit may be in Kiawah Island or anywhere within its response area, it can be moved further away if demand according to the deployment software at the communication center suggests it would be better elsewhere. Requested information of Medic 10's unit and station posting history was not able to be generated according to the communications center. Figure 4.4 models the travel time of apparatus from this station. The model utilizes the street network of the surrounding area by calculating the travel time extent via distance and speed capability of streets. Actual posted speed limits were utilized and time penalties were assessed for negotiating turns, intersections, and traversing traffic gates on Kiawah Island. It does not take into account weather conditions, traffic congestion, construction, or detours. It does respect the one-way restrictions as they are in place.

The eight-minute travel time extent that is the allowable time under Charleston County EMS objectives extends about a mile beyond the first gate. Therefore, if leaving from Station 10, an ambulance would take longer to reach the majority of Kiawah Island.

The primary back-up for Medic 10, should it be unavailable due to being on assignment or out of position from returning from a hospital; would come from Medic 7 near the corner of Maybank Hwy. and Main Streets. Figure 4.5 illustrates its travel time extent from the station to several select locations within Kiawah Island.

Figure 4.4
TRAVEL TIME GEOGRAPHIC EXTENT FROM STATION 10

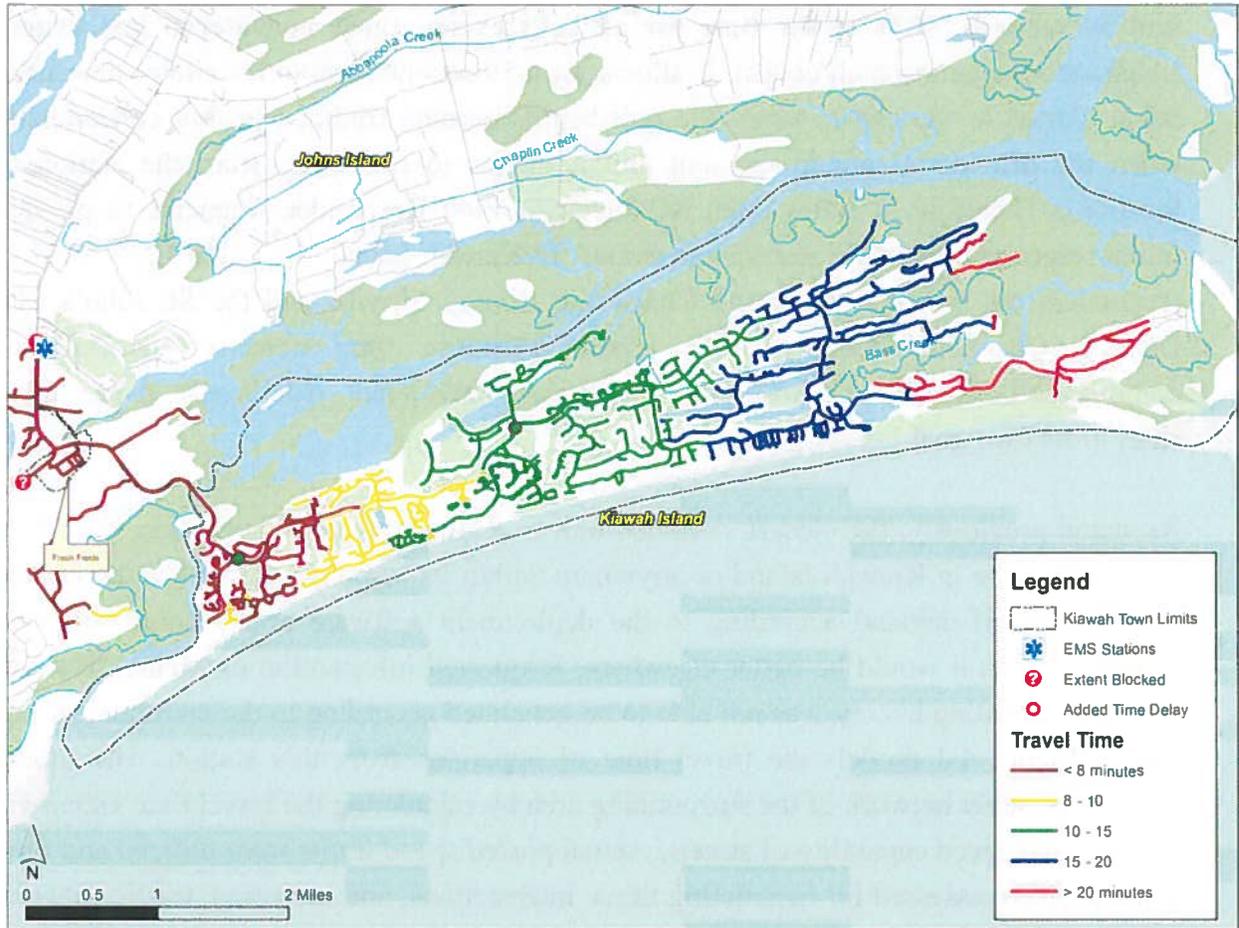
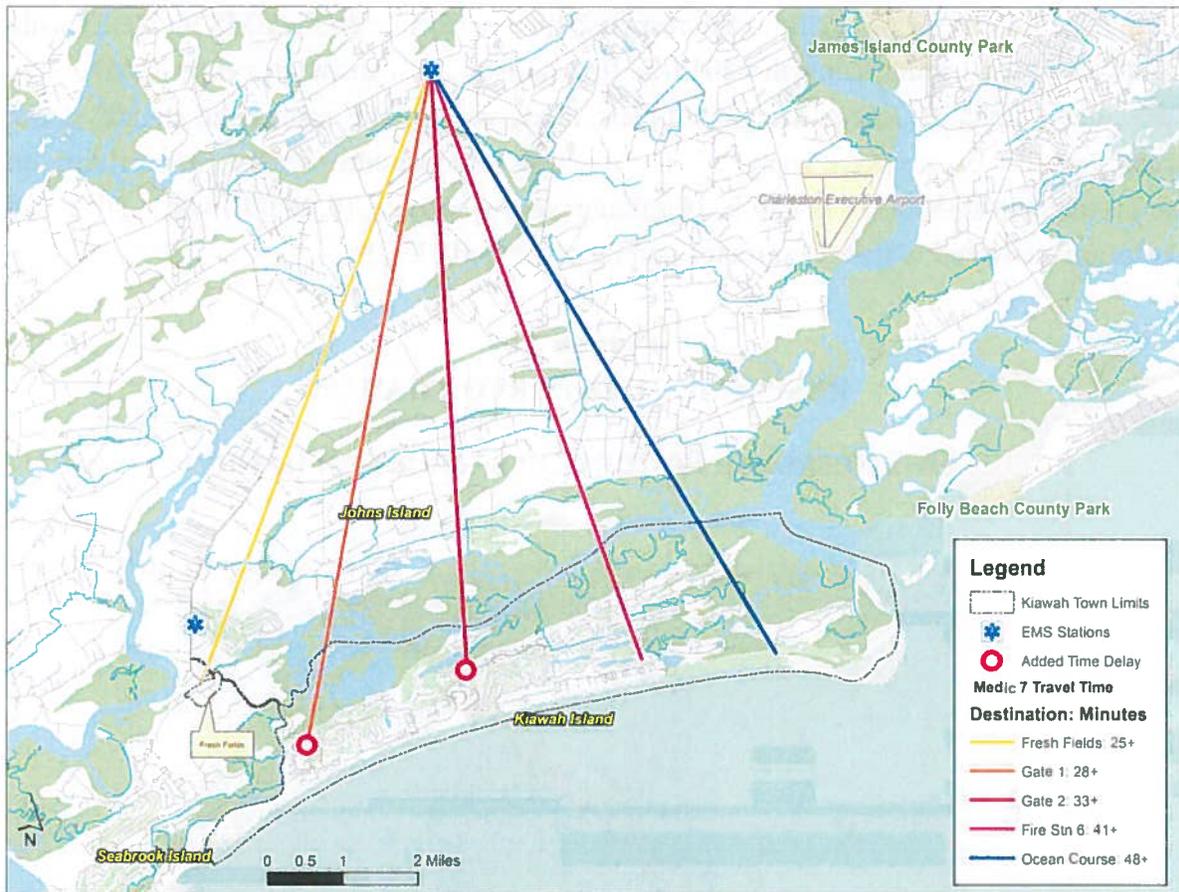


Figure 4.5
TRAVEL TIME GEOGRAPHIC EXTENT FROM STATION 7



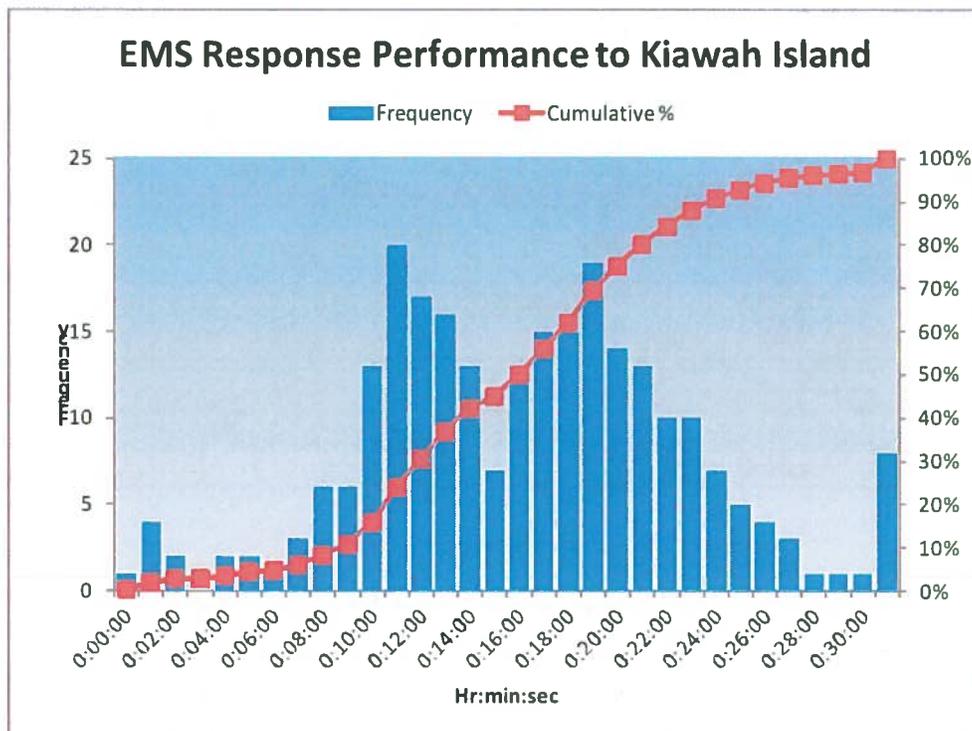
While Medic 7 may have been re-posted to Station 10 or one of the street posts closer to Kiawah Island, there is the potential it may not. Requests for specific posting plan and history from Charleston County EMS was not made available to the PSSi Study Team.

RESPONSE TIME ANALYSIS

The previous figures do not invoke confidence that response time performance for incidents on Kiawah Island will meet Charleston County EMS's self-imposed response time objective. In reality, the actual location of units when they respond to Kiawah is not known; units may have been positioned appropriately in respect to the demand for services on Kiawah Island. The bottom line is actual response time performance.

As a reminder, Charleston County EMS’s goal is that the first arriving apparatus to a medical emergency arrive 90% of the time within 8 minutes and 59 seconds of being dispatched. Figure 4.6 illustrates the response time performance for EMS incidents within Kiawah Town Limits using the 2013 & first half of 2014 dispatch center CAD dataset provided. Alpha & Omega designated calls, along with public assists and standbys, were removed; 394 events were analyzed. The average response time for the first arriving unit to an incident in Kiawah Island is 16 minutes and 9 seconds (0:16:09), while 90% of all calls are answered within 23 minutes and 29 seconds (0:23:29).

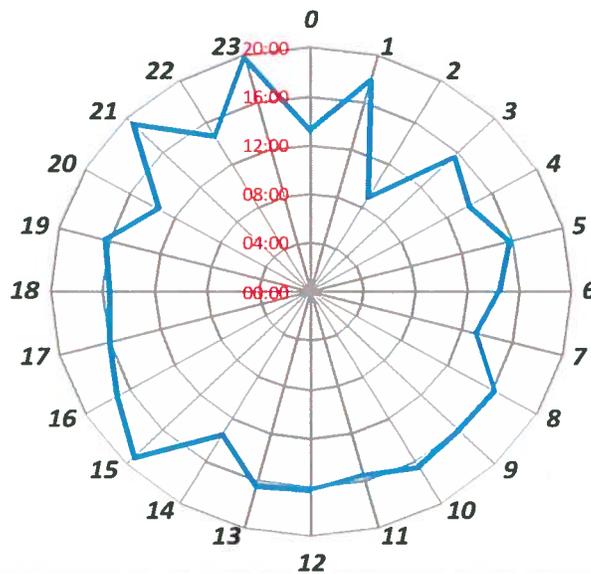
Figure 4.6
RESPONSE TIME PERFORMANCE



While not all events had extended response times over the stated goal of Charleston County EMS, the majority are and, therefore, resulted in a higher average and percentile marks. This does not reflect the overall response performance over the entire county, just for Kiawah Island. Only 8.33% of EMS events in Kiawah Island were reached within Charleston County EMS’s stated response time objective. Most calls were answered within the 10 and 23 minute time frame.

Examining the performance by time of day, it is interesting that in general, the response time performance for EMS to events in Kiawah Island worsens during the day. This could be due to increased traffic, pedestrian, and bicycle activity that impedes the unit response. It could also be that whichever EMS unit is responding is coming from further away. Remember, the deployment system used by Charleston County EMS may move Medic 10 away from its station as determined by the software just as it may move units closer to Station 10 if the system resource capability allows.

Figure 4.7
EMS AVERAGE HOURLY RESPONSE TIME

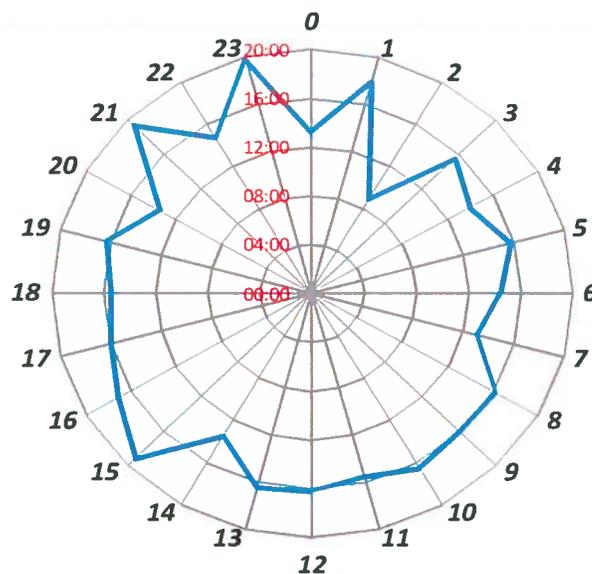


There are many factors that can contribute to delaying a response, such as weather and construction to name a few, but one that is ultimately controlled by the EMS crew is the chute time. Chute time is elapsed between the dispatch and the unit becoming enroute to the scene. For 24-hour shift workers, it is not unusual for this delay to extend during the overnight hours. In other cases, station design plays a role in the difficulty of a crew to reach the gear and apparatus to exit the station. A crew may not be in the station, but in another building or business when the alarm comes in, causing a longer turnout time. Alternatively, the crew could be within the ambulance cab when a dispatch comes in, resulting in a near zero chute time. This can also occur if they are “waved down” by a citizen looking for help for themselves or someone else.

Generally during the daytime and early evening hours, the average chute time is within the goals set forth by Charleston County EMS. This quickly changes at 11PM and does not consistently return to compliance until 6AM. It indicates that during the day, crews are responsive to dispatches compared to the overnight hours and that total response times during those hours could have been better. It is expected that the switch to 12 hour crew shifts will improve this performance by reducing lengthy shift fatigue.

Medic 10 responds to the majority of events dispatched to Kiawah Island and primarily responsible for the results in Figure 4.8. Other units (primarily Medic 7) provided back-up service to Medic 10 for Kiawah Island and when multiple units were requested. Medic 10 was usually the first on scene, but not always. While a micro-analysis by unit may be accomplished, it doesn't matter as an emergency in Kiawah Island was reported and Charleston County EMS is responsible to place units strategically to respond to 90% of the emergent calls within their time objective countywide. While this is not a comprehensive study of Charleston County EMS, poor response time performance (admitted to be in the 60% to 70% range countywide) could be a resource capacity issue. New units expected with the new approved budget would help undoubtedly. The following section delves into the details of EMS service demand on Kiawah Island.

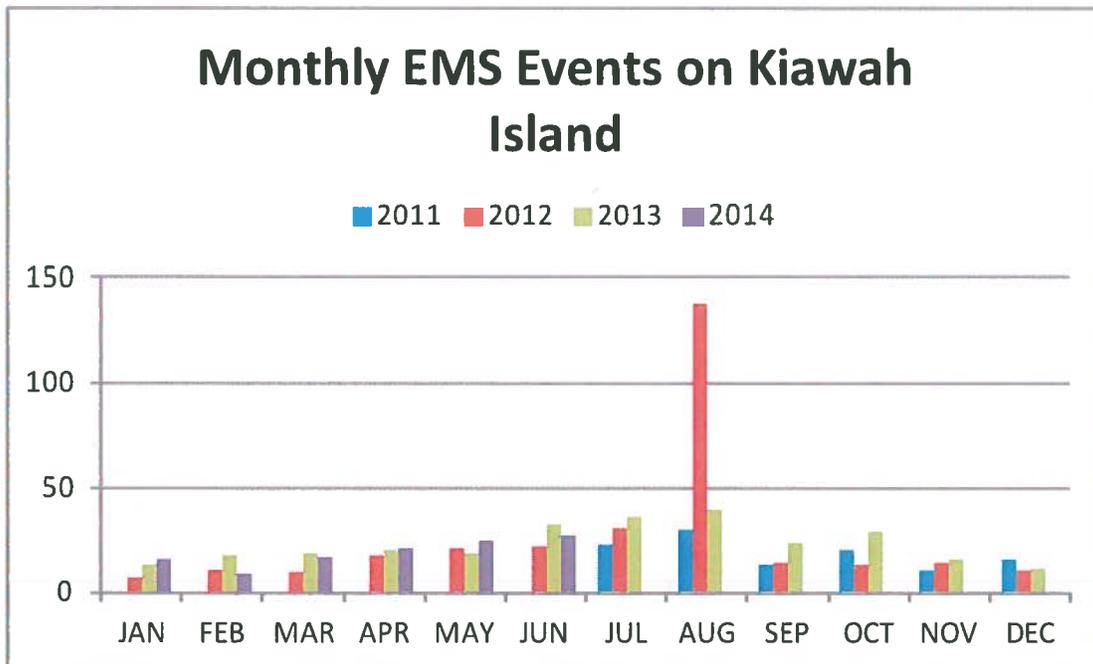
FIGURE 4.8
AVERAGE HOURLY EMS CHUTE TIMES



Service Demand

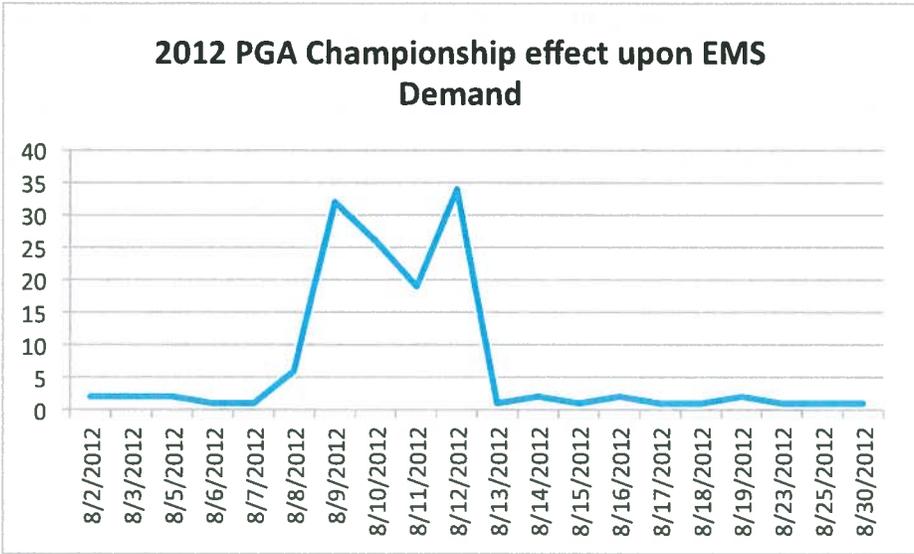
Records of incidents of Charleston County EMS were acquired through exported files from the computer-assisted dispatch (CAD) records from the Charleston County Consolidated Emergency Communications Center from July 1, 2011, to June 30, 2014. Normally, EMS demand on Kiawah Island amounts to less than 1% of countywide annual volume for the department. Annual EMS demand for Kiawah ranges between 225 and 280 events. Figure 4.9 illustrates the change in volume for EMS incidents over the past three years by month.

Figure 4.9
EMS HISTORIC SERVICE DEMAND



Despite the obvious special event in August of 2013, there is a seasonal trend of incidents on Kiawah Island. Demand for EMS increases as summer approaches and wanes in the autumn months. As a seaside resort, this is expected. From August 6-12, 2013, Kiawah Island played host to the Professional Golf Association (PGA) Championship at the Ocean Course at the far end of the island. It was estimated that over 27,000 fans each day watched the world's best golfers compete on one of the premier courses in the nation. The number of EMS incidents per day for August 2012 is plotted on the graph in Figure 4.10. During the event, EMS demand spiked. Expecting this, Charleston County EMS placed extra crews in service and on standby for the event.

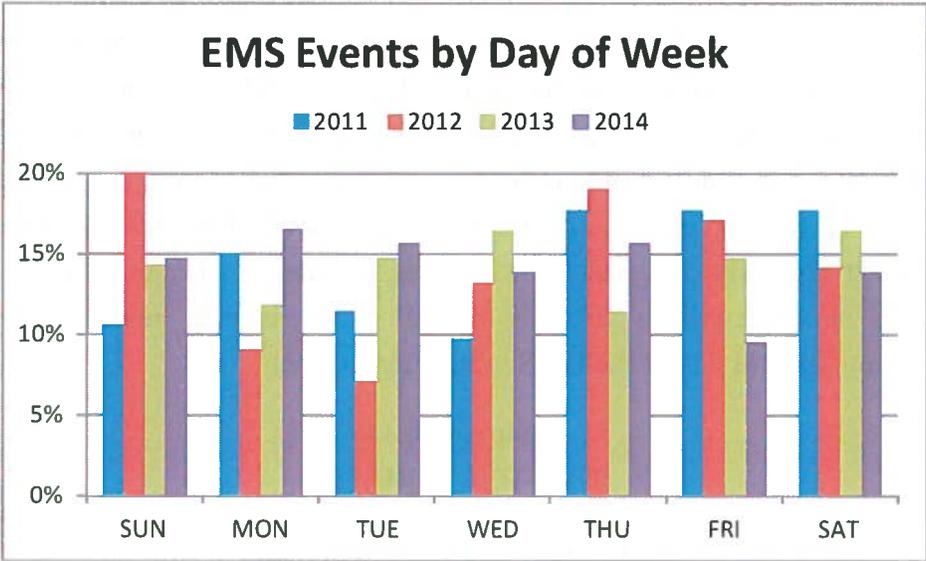
Figure 4.10
SPECIAL EVENT EFFECT UPON EMS DEMAND



Since there is a seasonal trend in monthly EMS demand due to its summer seaside resort destination, it would be expected a daily seasonal trend with perhaps more events recorded on the weekends. Figure 4.11 depicts the daily activity experienced.

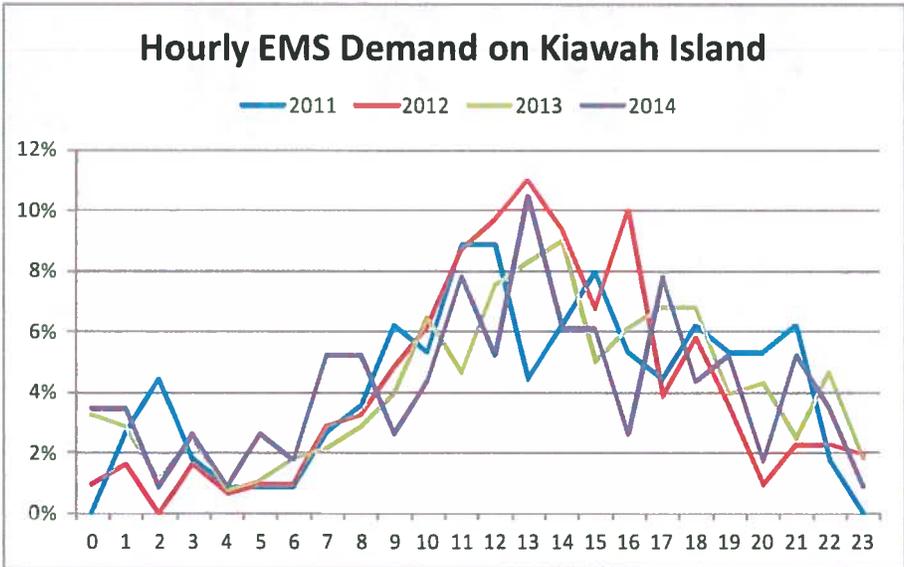
While the Thursday through Saturday stretch was busiest in 2011, it was Sundays and Thursdays the following year. In 2013, Wednesdays and Saturdays had more EMS demand, while this first half of 2014 has Mondays being the busiest for EMS in Kiawah Island.

Figure 4.11
EMS WORKLOAD BY DAY OF WEEK



The Study Team also examined the workload on an hourly basis. It can be seen in Figure 4.12 that service demand for EMS increases with daytime human activity. The peak hours for demand are from 7 AM until 6 PM, with the busiest seen at the 1PM hourly time frame.

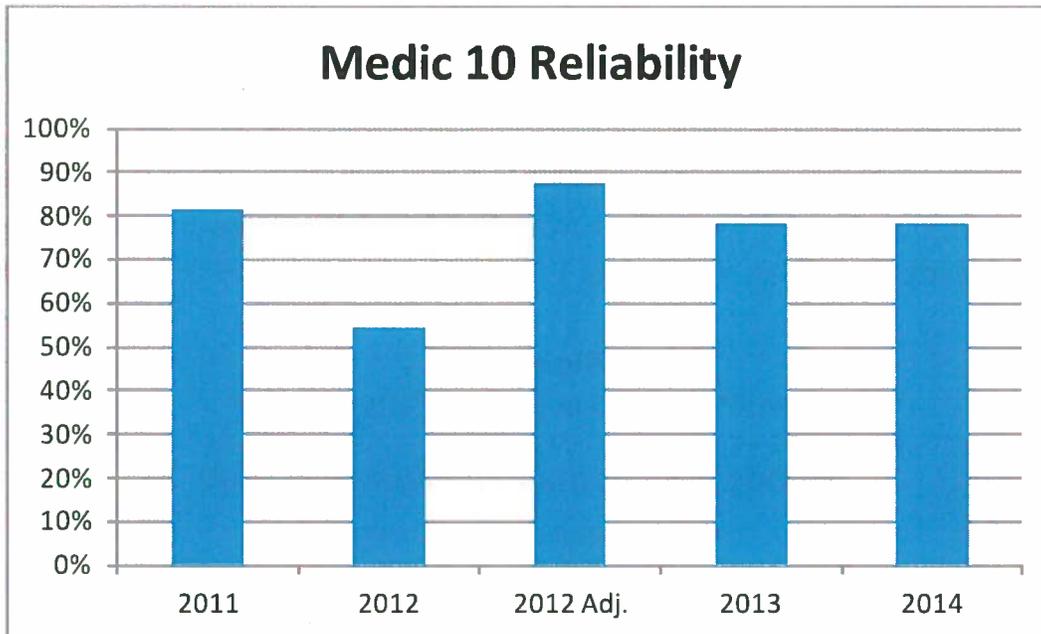
Figure 4.12
EMS WORKLOAD BY HOUR OF DAY



M10 Workload/Reliability

It must be remembered that Medic 10, the closest stationed EMS unit, is not solely dedicated to Kiawah Island and may be repositioned/dispatched as needed by the EMS system as a whole. It is not unusual for Medic 10 to respond to Seabrook and Wadmalaw Island, while the majority of its work is on John's Island. An insight into the demands upon Medic 10 is the amount of time it was available and in position to respond to an EMS incident on Kiawah Island. The graph in Figure 4.13 illustrates how reliable Medic 10, the closest regularly assigned EMS unit, is for Kiawah Island. An expectation of 100% would be unreasonable given its overall response area, being otherwise on an assignment, and its role within the EMS system as a whole.

Figure 4.13
EMS RELIABILITY



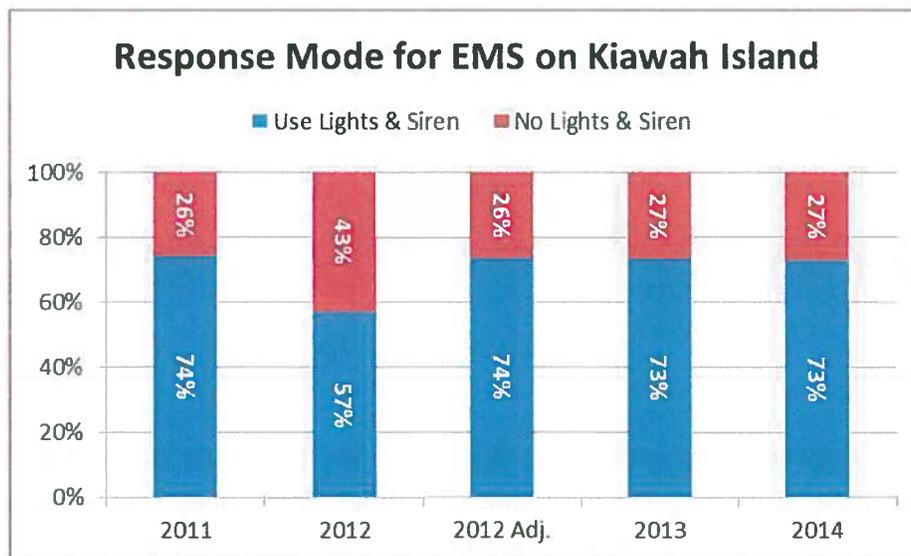
The 2012 figure was adjusted to reflect incidents during the PGA Championship that were handled by dedicated tournament EMS units. The graph indicates that approximately 20% of the time another EMS unit is dispatched to a call on Kiawah Island (most often Medic 7). Where that unit (and Medic 10, for that matter) is coming from is not recorded in the CAD record. Suffice it to say, that a lengthy response time above the modeled travel time may indicate that the unit is responding from further away than the distance to Station 10. The question is what should the reliability be? The answer is that you cannot expect to achieve a 90% response time objective when the primary unit is not

available that amount of time. A word of caution here: that response time objective by Charleston County EMS is countywide not specifically for Kiawah Island.

Response Modes for Kiawah

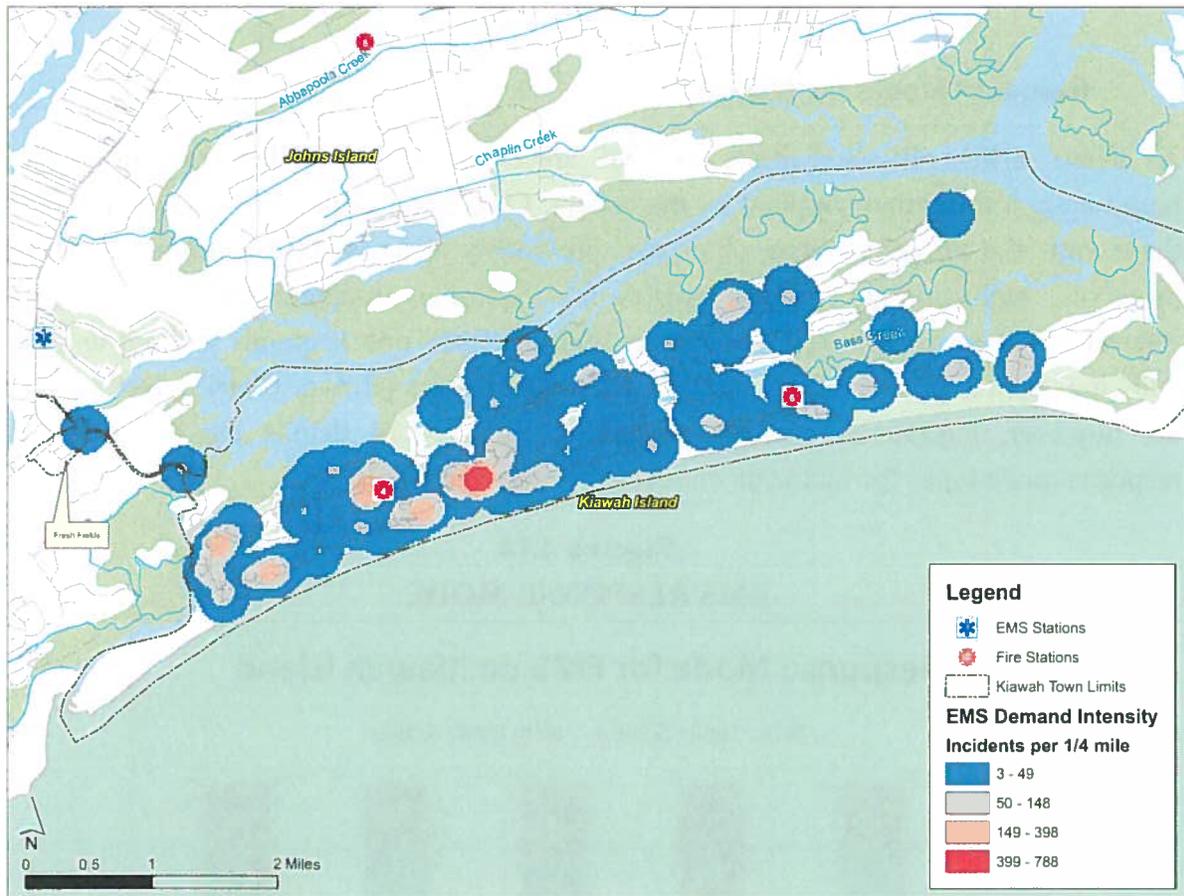
As stated earlier, not all requests for EMS are emergent. Dispatchers categorize these based upon information supplied by the callers. Charleston County EMS does not factor these into the response time objective, previously discussed. According to MPDS protocols, Alpha and Omega type calls do not require an emergent response, and in the interest of safety for the crews and the public, the EMS unit responds without its lights and siren operating. All other classifications of incidents (Bravo, Charlie, Delta, Echo) do, however, require an emergent response. Figure 4.14 details the breakdown in response mode types for incidents on record for Kiawah Island.

Figure 4.14
EMS RESPONSE MODE



Approximately 25% of the dispatches for EMS are classified as non-emergent. While these count for demand load, it, once again, does not for response time analysis. Demand for services also varies geographically. The map in Figure 4.15 shows the intensity of EMS events for Kiawah Island for 2013.

Figure 4.15
EMS SERVICE DEMAND



EMS demand appears to be greatest in the area of the Sanctuary resort, near fire station #4, the front gate, and along the west side shoreline where many rental properties exist. Perhaps in the cases of the front gate and the fire station, people are seeking help from places they've seen or know help is available. Comparing the Medic 10 travel model against the geographic demand of incidents, it could only reach 16% of their total incidents if they left from their station.

Summary

EMS demand in the Town of Kiawah Island is a fraction of the countywide demand for these services in more populated areas such as the City of Charleston and the Town of North Charleston. The award-winning county department of EMS is deeply concerned with reaching all emergent medical and trauma incidents in an acceptable response time with their first responder partners and the local fire services. One hundred percent compliance to a response-time goal is unrealistic for any emergency service, but Charleston County EMS has adopted a relatively high standard at 90%. However, the department has not been able to meet that objective countywide and certainly not with incidents on Kiawah Island. With a finite amount of resources potentially growing with an increased budget, they are shifted around by their deployment software in an effort to serve the most potential incidents with the resources available/not on an assignment. Areas with lower potential volume can suffer under this efficiency system. The system is focused on incident volume, usually driven by population levels that generate it. The system lacks the recognition of other risk factors. The poor, the elderly, the chronically ill, and minority groups historically are the most frequent users of ambulance services. Aside from the age demographic that, by and large, fits Kiawah residents, other factors such as affluence, ethnic homogeneity, and relative health conditions, which do not erode monetary assets, contribute to its low incident volume.

Despite being a government agency, Charleston County EMS operates not only on tax revenue, but also on user fees, usually paid by health insurance, including Medicare and Medicaid. Kiawah Island being an affluent community contributes greatly to the county through property tax assessments, and its residents likely have health insurance that pays the full bill for ambulance service, rather than fractional from social entities. The residents and visitors of the island deserve at least the promised high quality services in the response performance adopted by the County Department and its Medical Director that other more populated and, therefore, higher EMS incident volume areas receive. In its State Charter, Kiawah Island, as a municipality, is responsible for adequate public safety services; the lack thereof could become an action for a lawsuit wherein the Town could be found negligent in its provision of critical services. Therefore, it is imperative that the Town ensure that whoever is the provider of public safety, that the Town is reasonably shielded from liability.

In the next section, optional approaches to EMS delivery is discussed to help Kiawah Island decide which it may want to pursue in the provision ambulance services. All approaches have trade-offs, advantages, and disadvantages. Kiawah Island administrators and elected officials are encouraged to thoroughly review and debate these potential delivery methods.

OPTIONS FOR EMS DELIVERY FOR KIAWAH ISLAND

The following subsections are approaches to consider and the Study Team's recommended best choice for improving EMS coverage on Kiawah Island.

Status Quo

The “do nothing after all” approach is always an option. It must be remembered that the system employed by Charleston County EMS is, at its core, an efficiency system by doing more with less. This provides the County with a critical service with as low a cost as can be budgeted. However, it operates at the paramedic level, bringing highly trained providers to the scene of a medical or traumatic emergency. Because it is a busy system, these providers get a lot of practice. Therefore, they are more experienced than providers in lower demand areas. This experience ought to be coveted and not merely dismissed as easily replaceable. Although in these highly efficient, very mobile, shifting EMS systems, the relatively lower pay and lack of upward mobility drives many experienced providers away to other careers and to other slower, more statically deployed systems.

Revenue through billing can be a challenge as non-payers and discount payers, such as government social insurers, can strain the monetary resources of a department. Charleston County EMS should have a strong focus on billing and user fee payments, so that a reduced burden upon the county taxpayers can be realized. It is not likely, nor efficient, for Charleston County EMS to deploy a dedicated unit to Kiawah Island without some local revenue assistance to help with higher operational costs relative to revenue generation in this area of low demand.

While it is understandable that many property owners would balk given that they pay their fair share in county taxes already. Indeed they do; they pay to support a countywide EMS system that is striving to be as efficient as possible to operate under a limited

budget. However, what they (and perhaps other areas of the county) receive is not effective. An effective system that meets its response objective to all subsections of the county with highly trained, experienced providers delivering high quality care with measurable best clinical outcomes will simply cost more. More units on the road, retaining quality providers through better pay/benefits/ upward rank mobility, with a clinical training program to bring competent, cutting edge skills to the scene takes more money. Kiawah Island is part of the Charleston County EMS system and needs to decide to either do nothing or accept the status quo, hoping that the increased EMS budget brings better service to the island, or aid the system in providing critical, timely medical care to its residents and visitors. This can be accomplished in several ways discussed further here.

Dedicated Charleston County EMS Ambulance

The Town of Kiawah Public Safety Committee has already inquired about the cost of a dedicated ambulance for the town from the County EMS Department. The Chief of EMS has estimated a start-up cost of \$675,000 and \$432,000 per year personnel expense and \$62,000 per year operating expenses. The Chief admits though that this unit could be pulled in other directions as they return from a trip to a hospital in Charleston. While County EMS will try to assign another unit to the island in the meantime, there could be no guarantee of that. This defeats the purpose of the dedicated unit and not recommended by the Study Team.

Island EMS Organization

There are two options to supplement the County EMS Department, although these will not alleviate any county taxation. They both involve developing a separate organization dedicated to provide EMS services on the island. One is a volunteer service and the other is to create a municipal department staffed with either volunteers or career staffed personnel, or a combination there of.

While the creation of a volunteer service will still need municipal revenue support, the demographics of the residents on the island does not bode well to the success of this approach. The island has a low residential population to recruit adequate roster numbers. In addition, EMS is laborious work that the more senior population on Kiawah Island

may be unable to perform on a regular basis. In addition, many residents are retired and plan to stay that way. The administrative and training requirements may be unattractive to many of the potential recruits. EMT-B and Paramedic Training is intensive and continuous, requiring substantial time to accomplish and maintain. The Study Team feels that this is not a recommended approach in this setting and would fail in short order whether as a private association or as municipal department.

As a career-staffed department of the Town, this would solve the availability and response time issues currently experienced via Charleston County EMS. As a county service, Charleston County EMS would still be required to help if the municipal system needs its resources, but as now an officially secondary provider, it may relocate its resources in a different manner than its current methodology. This would be especially so if this Town EMS service becomes a joint venture with the Town of Seabrook to help defray costs. Here is a list of some decisions, responsibilities, and costs involved in developing and maintaining a municipal level EMS provider:

- Level of EMS to be provided, including performance standards to be met.
 - To replicate completely, a paramedic level service would be needed. A lower level EMT-B ambulance service could also be initiated, but during more critical events, a rendezvous with a Charleston County EMS paramedic ought to be standard protocol.
 - All emergency medical and trauma events require basic life support skills to be administered before more advanced level paramedic skills are employed. Given that, the skills of an EMT-B in the State of South Carolina can be utilized for the initial response to all incidents and in critical events, can administer life-saving skills (see previous discussion of skills) until a paramedic can reach the patient. Many calls do not need paramedic intervention identified either through initial dispatch protocols or by on-scene assessment by EMS providers. In these cases, the capability of the paramedic attending the patient to the hospital is being wasted. While it was shown that almost 25% of calls are Alpha rated and, therefore, easily handled by basic EMTs, the other 75% were identified as potentially needing a paramedic intervention. By experience, the Study Team can relate that a certain percentage are found upon patient assessment to be less emergent than initially reported despite the best efforts of dispatchers. These cases can be handled completely by a basic EMT crew. Unfortunately, this information of dispo-

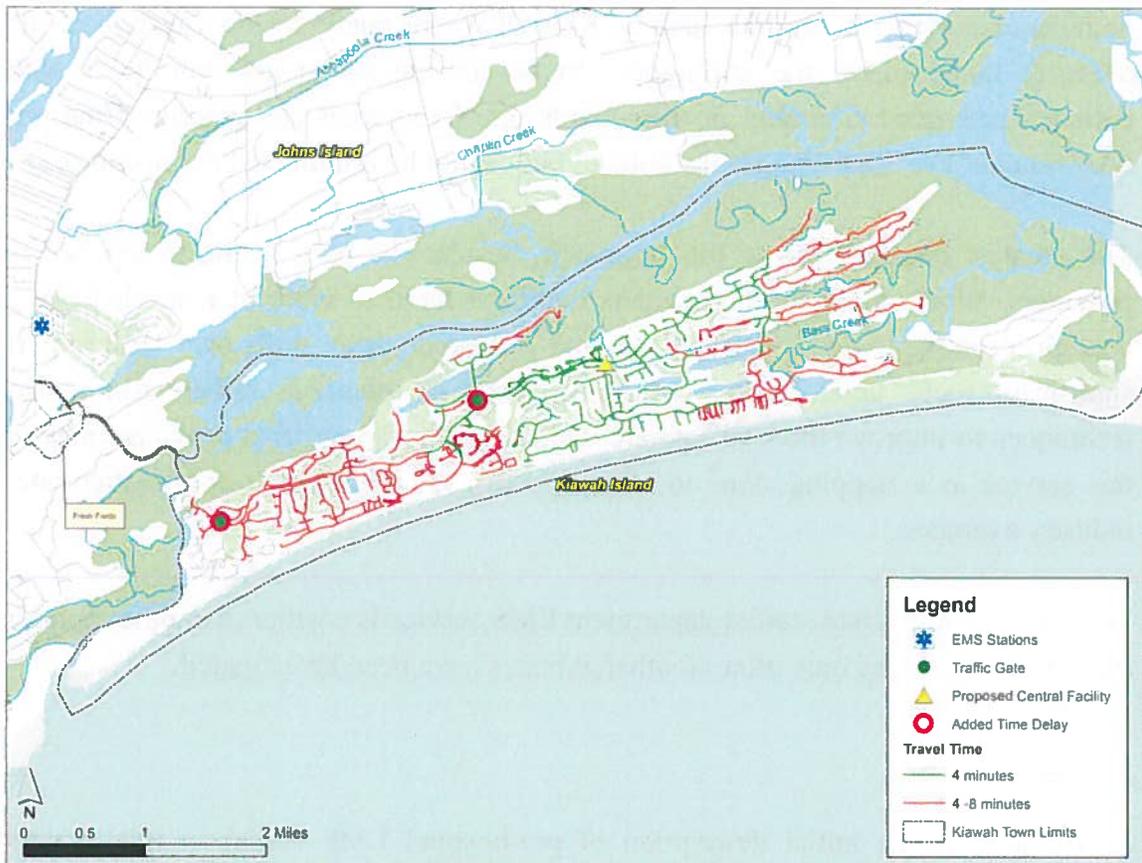
ition priority, though requested, was not provided. However, the Kiawah Island Public Safety Committee reported, based upon an analysis with County EMS officials, that, within a recent 12 month period, 63% of incidents resulted in a transport and 28% of those were emergent transports. Sometimes paramedic intervention is needed, but an emergent transportation is not _____?, for instance when a diabetic unconscious from low blood sugar is given intravenous glucose by a paramedic and is now awake and oriented. Many times these patients are encouraged to be seen at the hospital to be monitored.

- It would be reasonable to expect the service to have a lower response time objective more along the lines of NFPA 1710 for a first due engine or BLS unit because of its proximity to areas on the island.
- Provision of medical control in the case of a paramedic level provider.
 - While Charleston County EMS Medical Director may agree to serve in such capacity, it is unlikely to be without cost of stipend and insurance coverage. This would also be true of services provided by another qualified physician.
- Application to and inspection by the SC DHES.
 - All EMS providers must be licensed and meet the standards of state law concerning EMS delivery.
 - EMS providers are subject to inspection by state authorities and may face punitive action for deficiencies.
- Insurance coverage
 - Significant insurance coverage to include automotive and malpractice, among others, will need to be in place.
- Salary and Benefits
 - The largest ongoing cost of a labor intensive operation is salary and benefit costs. In order to attract staff, market rate wages must be offered. Current Town benefit package may suffice for EMS workers in Kiawah.
- Organizational Management
 - To include a director, training staff, quality assurance, secretarial, and other support administration
- Written policies and procedures to be maintained.
 - Initial policies and medical protocols along with disciplinary procedures must be established, maintained, and revised as necessary.
- Medical Supply

- An adequate supply of EMS related equipment and expendable materials such as oxygen, catheters, bandages, etc. must be ready for initial and on-going operations. A supply officer in charge of this task of ordering, delivery, and tracking is necessary.
- Professional uniform supply for staff
 - An adequate supply of uniforms for the staff including patches and insignia must be purchased and tracked.
- Number of ambulance units to be maintained in service by hour of day
 - More than one unit would need to be staffed in the cases of simultaneous but geographically disparate incidents, multiple casualty events, and for availability when one unit makes the long trip to a hospital.
- Dispatch provider.
 - This essential element also has many choices. One being provided by the Town. 911 callers on the island would need to be rerouted to this center, which needs, at the minimum, a place to operate, equipment, staff, and administration.
 - The other would be the current security provider. Many people call them for help of all sorts and island visitors are educated to call them as well. In an emergency, 911 is the default that panicked callers utilize. 911 on the island would need to be rerouted to security, which may not be acceptable to on the basis of legal liability.
 - Either solution should have callers trained as Emergency Medical Dispatchers who utilize MPDS protocols. This is an additional training cost.
 - The Charleston County Consolidated Dispatch Center may agree to continue to provide services to Kiawah Island callers, but, depending upon the funding agreement for the services it provides to the various agencies, this may incur a service fee.
- Maintenance of response vehicles.
 - Vehicles will need maintenance and a supply of replacement vehicles must be available when a primary unit breaks down or is out of service for routine maintenance. The method that the town uses for the rest of its vehicles can be utilized if qualified.
- Housing/location of response vehicles
 - It would be most reasonable to base these response vehicles centrally located so that they may reach either end of the island. They could be located at both ends similar to the current fire stations, or even rent space

- from the fire district, but one would need to move to the center when either gets a call for help on their end. Due to the scarcity of public owned property on which to build, rental from developer properties or donation of land/building for this purpose will be necessary.
- It can be seen in Figure 4.16 that from one central facility, the coverage is limited. In four minutes of travel, a centrally located unit can reach 24% of the EMS service demand. 78.5% can reach the demand within 8 minutes; better than the current situation, but clearly not optimal.

Figure 4.16
TRAVEL TIME FROM CENTRAL LOCATION



- Patient billing methodology and collection efforts
 - While the Town may elect to provide these services without a user fee much like fire service, police protection, parks and schools, it may decide to charge user fees. Nearly most important for the continual operations of

an EMS department that charges user fee is the collection of revenue from persons, insurance companies, Medicare, and Medicaid.

According to the US Government Accounting Office (GAO) report⁴, the median cost of an ambulance transportation ranged from \$374 to \$639. The lower variance depended most upon volume, Medicare transports, and level of government subsidy. In other words, the lower the transports, the higher the cost. While demographically Kiawah may have a large Medicare population in addition to private supplemental health insurance, it is a relatively low demand level area and would require significant government subsidy in order to operate. A patient must be transported in order for insurance to pay for services. Not all patients evaluated elect to be transported to the hospital by the ambulance service. In an area such as Kiawah where many are on vacation or at their alternate home place, the willingness to be transported greatly correlates with the patient's perceived criticality of their condition. Some areas are experimenting with an "Assessment Fee" that charges the patient, but cannot be reimbursed by insurance.

The greatest disadvantage to this approach, besides the cost, is the experience of the providers. While experienced providers could be lured to work at Kiawah EMS given enough incentive to do so, the low demand will erode these skills over time requiring a significant focus upon repetitive training for skill retention, rather than innovative techniques to improve the level of care. Otherwise newly certified providers may utilize this service as a stepping stone to other departments and careers at a greater rate than industry averages.

The cost of a municipal staffed department EMS service is costlier than other options and should be considered only after all other avenues have been investigated.

Private Provider

As outlined in the initial description of pre-hospital EMS earlier in this chapter, an approach taken to the delivery of EMS in many municipalities involves the provision of such services by one or more qualified private ambulance companies. With the private ambulance service approach, EMS services are delivered by a privately owned company on a for-profit basis. Typically, a local government would enter into a written agreement

⁴ US GAO 13-6 October 2012 Report to Congressional Committees <http://www.gao.gov/assets/650/649018.pdf>

with the private ambulance company identifying the level of services provided and the cost of said services.

The implementation of this optional approach to EMS delivery would require the development of a comprehensive request for proposals that would serve as the basis for receiving proposals from qualified firms and subsequently a provider contract for service provision that would address some of the same items faced by a municipal department, at a minimum, the following should be required in the contract:

- Level of EMS to be provided
- Performance standards
- Professional appearance of services provider staffing
- Number of ambulance units to be maintained in service by hour of day
- Minimum level of qualifications of service provider staff
- Level of maintenance of provider's response vehicles
- Amount of government subsidy, if any

Further, the successful bidder should be required to provide the following:

- Immediate stand-by coverage as requested by the local fire services and response to structure fire incidents.
- Stand-by services at sports/special events

Private ambulance companies are relied upon to provide high-quality pre-hospital EMS in many regions of the United States. Further, the Study Team has assessed a number of large municipalities served by private EMS providers, including Hartford, CT; Springfield, MA; Tacoma, WA; and the Phoenix, AZ, region. In general, with proper selection and contractual requirements in place, private for-profit ambulance companies can be successful in the delivery of EMS to a municipality.

The advantage of using a private provider is that it can be employed rather quickly, as there will be several private providers who may see Kiawah Island as an attractive investment. Its low volume will require a simpler operation and its affluent population might provide the level of reimbursement for a profitable operation. In addition, much of the administrative, logistical, and overhead management and cost can be outsourced and removed from day-to-day Town operations to become simply oversight of the contractor with the Town residents acting as consumers of the services.

When a municipality considers the transition from a public EMS system to a private provider system, there are a number of items that must be considered – most important is the quality of service provided to the citizens and visitors of the community. When EMS is based out of a government agency, the service providers are normally trained continually in EMS skills and are possibly more likely to make a career of being an EMS provider. Many private EMS providers do not train its providers and a high employee turnover rate is quite common because job advancement in a private ambulance company is often limited. As a for-profit organization, efficiency is also essential to maximize revenue. Effectiveness must be mandated by the Town service-provider contract.

Some communities who use private ambulance services often find inexperienced providers (newly certified EMT-Bs and EMT-Ps) and at times, a delay in transport service arrival. The use of inexperienced providers is simply a result of high-employee turnover in some private ambulance companies. In many places, newly certified providers are simply looking for an entry-level job until they can be hired elsewhere.

In terms of the “delay in transport arrival,” that issue is not only a direct function of the for-profit nature of the private provider system; some public agencies are guilty of the same. When a municipality provides EMS through a government-based system, there is usually no intent on making a profit, even if patient billing is used. Most citizens would agree that EMS is a core service provided by a municipality—a matter of public safety, similar to law enforcement. There is no expectation of making a profit on law enforcement and peace-keeping—safety from crime is a public good. The delivery of quality pre-hospital emergency medical care is the same. While patient billing helps offset the cost of EMS delivery by a municipality, it rarely supports a cost-neutral result.

Ambulance services often struggle to make a profit on 911 emergency service alone because the revenue generated through patient billing depends on the patients’ abilities to pay. This, conversely, may be an advantage for Kiawah Island in attracting bidders. When servicing an urban area such as the City of Charleston, the frequent users of 911 EMS may have limited ability to pay—either directly or through health care insurance. Therefore, an ambulance provider may have to cut corners in personnel, or vehicles, or service in order to remain within budget / profitable in an urban environment with high call volume and system users unable to pay for service. These are also the issues faced by the Charleston County EMS Department.

Often times, a private ambulance service also engages in inter-facility and non-emergent transports in the community to offset their losses in 911 emergency services. These transports are a “known entity” and payment is guaranteed—often at a level above what would be charged for a 911 emergency transport. A common approach sometimes taken by the private company is to use one or more of their 911 emergency response units to perform inter-facility transports when not running 911 emergency calls. Most of the time, this procedure could work flawlessly. But at some point, there will be an instance where a 911 call has a delayed response of a private ambulance because that ambulance is tied up with an inter-facility transport and a different ambulance has to be sent—often from farther away. Similar issues are found in government-based providers who do not routinely do these types of transports but are under-resourced in terms of unit availability.

Another issue regarding the changeover from a government-based to a private ambulance service provider model is the housing of transport units. Where will the private ambulance providers stay and how will their vehicles be housed? This issue is also faced if the Town elects to provide the service itself. Fire stations are logical places to house the providers and their vehicles because of station distribution in the community, but that would not be without controversy. The Study Team believes that a management “nightmare” could occur should any type of EMS providers that aren’t a part of the fire department be co-located in the fire stations.

When EMS is delivered by a private ambulance company there have been instances of these firms not being able to meet contractual performance standards or going out of business due to financial losses. When that happens, the municipality can suddenly find itself without an EMS provider and suddenly faced with significant expenditure to reinstitute the former system or be forced to find another private provider.

The other danger of course is the contract for service. Careful management of the contract is important, especially when considering uninterrupted service as the contract nears its renewal date. With the government-based EMS model, there is no concern over service contracts or if the provider company is going to go bankrupt.

Kiawah Island should evaluate the cost of a private ambulance provider to supplement the services offered by Charleston County EMS.

Alternative Non-Ambulance Options

The next several subsections discuss alternate approaches to providing faster response to emergency medical incidents with adequately trained and equipped providers without an ambulance. The single biggest drawback to this option is the lack of transporting capabilities that an ambulance is designed for and relying upon the existing service capability of Charleston County EMS for that service. The greatest advantage is that emergency medical treatment by a trained provider(s) will arrive at a scene in shorter order with skills, equipment, and medication to mitigate a medical emergency until the ambulance can arrive.

Quick Response Vehicle (QRV)

One idea offered to the Study Team by multiple stakeholders is the use of a dedicated EMS Quick Response Vehicle (QRV). A QRV is usually a sport utility vehicle (SUV) type of unit similar to a Chevrolet Tahoe or Ford Explorer. It can be as big or small as necessary to hold the crew and equipment only. The Study Team suggests a vehicle as small as possible given the narrow winding streets of Kiawah, traffic, pedestrians, and cyclists using the roadway. In many similar communities, a sedan is utilized.

Because the QRV is not transporting the patient, it can clear calls as quickly as when a synopsis of patient condition and treatment details are transferred to the arriving Charleston County EMS crew. With the low demand level within Kiawah Island, the likelihood of concurrent incidents is also low and does not warrant an additional unit presently. The QRV can be staffed either by one EMT-B or by a more highly trained paramedic. A double staff is not necessary in this convention.

The QRV could either be a municipal service, provided by Charleston County EMS, or any other licensed EMS provider in SC such as MUSC or the College of Charleston, to name a few. As a municipal service, the Town of Kiawah Island would be responsible for all of the aspects discussed earlier under the “Dedicated Island EMS Organization” subsection earlier. Cost savings would be realized in the following areas:

- A sedan costs less than an ambulance and uses less fuel.
- Unit staff of one versus two (salaries, benefits, uniforms, training costs).

As a town-funded service from Charleston County EMS, the QRV may also be utilized within the system; potentially pulled from Kiawah Island for calls in Seabrook and John's Island, unless a contract states otherwise. The advantage, though, is that it can be staffed with providers who have experience and training from serving in the more urban and busier areas of Charleston County.

A combination of the two can also be effected. The Town could own the capital assets and contract with another licensed EMS provider to provide the staffing, training, and dispatch services. A QRV cost analysis in this method was completed by the Public Safety Committee of the Town Council. It estimated initial capital costs of \$333,900 and on-going variable operating expenses of \$458,700 per year. The Study Team agrees with the committee that capital costs can be reduced and perhaps eliminated through charitable donations or grant funding.

Figure 4.17
QRV EXAMPLE



Although this concept may bring the skills of an EMT or a paramedic (depending upon adopted configuration) quicker to the patient's side, it does not solve the experienced delay in transporting capabilities of the county ambulance service.

Fire First Responder

The St. John's Fire District (STJFD) operates a career staff in two stations upon Kiawah Island as well as stations at Seabrook and upon John's Island (See separate section for detailed infrastructure). Presently, the fire district personnel assigned to Kiawah Island respond to medical and trauma incidents. Although STJFD is a licensed First Responder Agency in the State of South Carolina, not all the firefighters are trained as EMT-Basics. At minimum, their emergency medical training consists of a First Responder training that is less intense and, therefore, skills are limited. STJFD reports that it strives to have at least one EMT-B assigned to each apparatus daily.

Upgrading all firefighters to EMT-B would substantially improve the level of care that island residents and visitors receive already when an emergency medical incident occurs. The Town of Kiawah Island should encourage its representatives on the STJFD Fire Commission to adopt the higher training standards of EMT-B throughout the department. This does not solve the issues of delayed paramedic and transporting capability response that is occurring from Charleston County EMS. Upgrading to have a paramedic on the pumpers would require additional and intensive training and solve the paramedic level delay, but not the transporting capability delay. While this can be accomplished, even more medical equipment would need to be stored on the apparatus. Additionally, these personnel would have less experience in medical emergencies than the county EMS provider.

Figure 4.18 illustrates an innovative fire apparatus that doubles as an ambulance when needed. This could solve the transport capability delay issue to either complete the transport or rendezvous with County EMS. The disadvantage would be that the pumper would be unavailable to answer another fire call during the transportation process.

Figure 4.18
EXAMPLE OF FIRE MEDIC TRUCK



Sheriff First Responder

Like STJFD, the county sheriff has deployed units on the island (See detailed section on Law Enforcement). While they do respond to automobile accidents that may have injuries, they will respond to medical calls, if requested, but are not trained to the EMT-B level. Adopting the automatic response to EMS calls in Kiawah as EMT-B or even paramedic level would obviously bring higher level of care quicker to a patient, but they would have less experience in medical emergencies than a county EMS employee, and it does not solve the transporting delay issue. The demand for services of the sheriff is higher on the island than the STJFD and would add to their workload and reduce their patrol presence that serves as a deterrent and a public reassuring effect.

Security

Island Security provided by the developer groups is often sought for medical help. This group could be trained as EMT-Bs or paramedics to respond to incidents on the island. Similar issues apply that pertain to the previous non-transporting options. Gate security would not be able to normally serve in this capacity and it would rely upon the patrolling units.

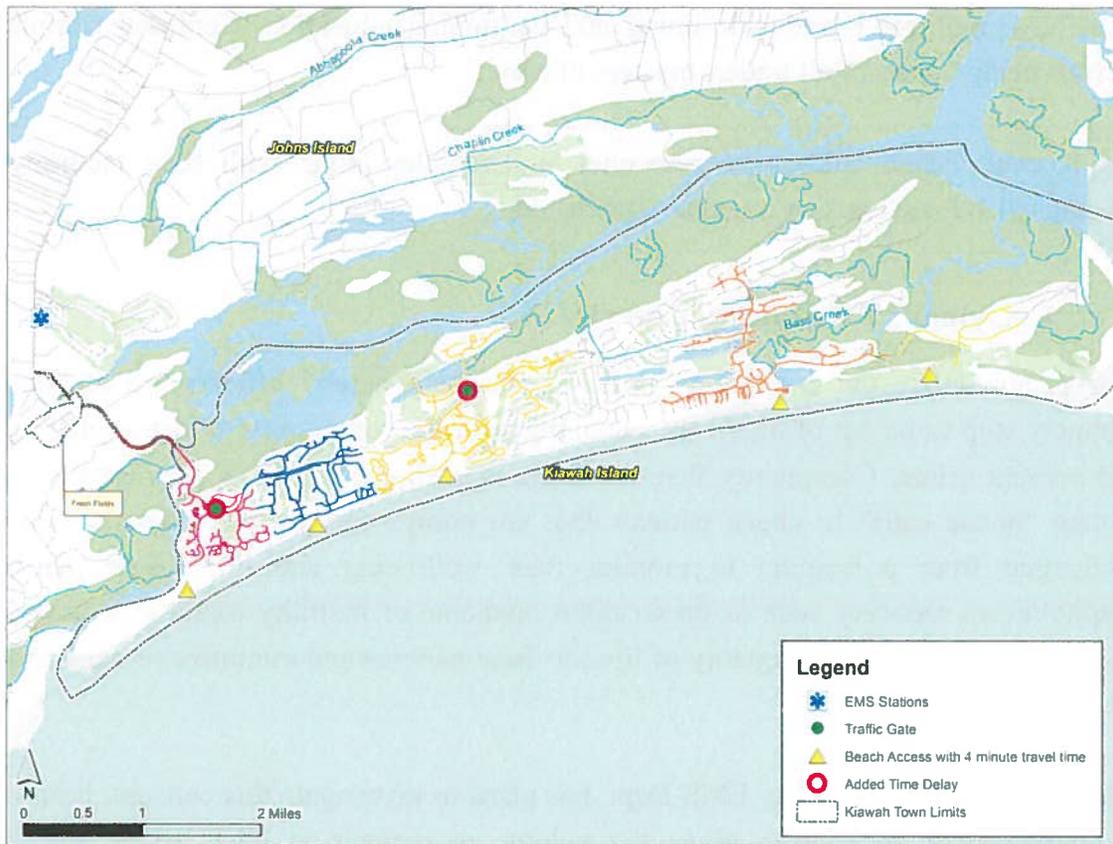
Beach Patrol

The Beach Patrol could be expanded to include that of medical first responder. As an ocean-side resort, many addresses in Kiawah Island can be reached from the beach. Typically, their vehicles are small and road worthy to respond off the beach rather effectively. Currently, they do not carry extensive equipment, but that could change if possible with their current fleet or obtaining an alternative mode of transportation that could leave the beach via vehicle access points and venture into the island interior as necessary for emergency medical incidents (see Figure 4.19). This vehicle can be covered in inclement weather and used to rendezvous with County EMS. Figure 4.20 shows the potential four minute travel time capability from beach patrol venturing into the island interior from vehicle beach access points. As a non-transporting option, this alternative does not solve the transport capability delay and relies upon less experienced providers, unless trained as paramedics.

Figure 4.19
EXAMPLE OF GOLF CART AMBULANCE



Figure 4.20
TRAVEL TIME EXTENT FROM BEACH ACCESS POINTS



Compared against the geographic service demand locations, beach patrol vehicles could have reached 79% of the medical incidents with four minutes of travel. A minute was allowed for the patrol to reach an access point from the beach.

Public Safety Department

In some communities, the concept of police, fire, and emergency medical services in one department has been embraced. The personnel spend much of their time providing security through patrols and responses to police related incidents. However, when a medical emergency occurs, they respond with medical equipment in their patrol vehicle, while others respond to where the ambulance is stored and bring it to the scene.

The advantages of public safety officers are that fewer personnel are waiting for an incident to occur and more officers can be on patrol. The disadvantage is that the officers must have multiple layers of training and continuing education. Common complaints include being “jacks of all trades, masters of none.”

For Kiawah Island, additional personnel and vehicles along with base facilities for specialized vehicle housing must be established.

Community Para-medicine Service

This is not unlike the community policing concept whereby officers are on foot, or routinely stop to be out of their cars, engaging with the community to foster relationship and prevent crime. Community Para-medicine is designed for EMS providers to make routine “house calls” to check patients that are known for chronic illness or recently discharged from a hospital to monitor their well-being and make sure that post hospital/event recovery such as prescription medicine or mobility training is on course. The hope is to increase the quality of life for these patients and minimize re-admission to the hospital.

While the Charleston County EMS Dept. has plans to investigate this concept, it may not be implemented on Kiawah given the volume of patients in other zones and finite resources. The local provider or first responder could easily adopt these practices on Kiawah due to the low service demand volume.

Alternative Care Destination

Currently, insurance reimbursement for ambulance services is only valid when transporting to a hospital. Many times, a full-fledge hospital’s emergency department is not necessary for more minor illnesses and injuries. These can be adequately handled, at least initially, through an urgent care center, such as the one that exist at Fresh Fields through the Roper Health System. While it is obvious that serious illness or injury should be taken directly to a hospital, more minor situations can be transferred later if necessary. This possibility exists currently, but the funding mechanism has yet to be worked out. If it were, there would be a certain number of events that would allow the transporting ambulance to remain near Kiawah Island after completing these types of calls, rather than become out of zone routinely by transporting to Charleston.

Summary of Alternative Options

In order to solve the two pressing issues regarding the services received currently from Charleston County EMS—delayed medical care and transportation—additional resources on the island will be necessary. As stated earlier, the level of service demand on Kiawah Island relative to countywide is detrimental to resource placement given the deployment system used by the EMS department.

While no one on Kiawah Island would withhold or limit these services to those in need, it is reasonable that they expect the same quality and level of service when they need them given their fair share of taxation.

Dedicating a unit to areas like Kiawah Island can certainly be achieved by Charleston County EMS with enough funding for these additional units and realignment of statistical reporting zones. Kiawah is not alone in its circumstance and perhaps can partner with other less served areas to press for a solution. That solution is to have county leaders appropriate more money for additional units and staff so that statistical area zones that measure response time compliance can be refined. However, this solution may end up costing taxpayers more than the other alternative solutions discussed here given the relative property values. Taxpayers in towns like Kiawah would then abdicate the control of these funds to county administration, perhaps without promise of resolution.

The Town of Kiawah Island can directly negotiate with the County EMS Department for a funded solution, such as an additional ambulances or the QRVs option. It must be contractual restrained to be dedicated to the Town. However, if a transport-capable unit is returning from the hospital to the island and is nearby a critical patient, it is reasonable that it would be assigned to assist. This could happen repeatedly, defeating the purpose intended. Ultimately, these units, as dedicated as they are supposed to be, end up in practice as part of the system, subject to reassignment. This happens, in the Study Team's experience, with every 'dedicated' unit operated by the local EMS provider. This is why many commercial facilities, college campuses, and amusement park fund their own system, if they choose. The tradeoff remains the loss of potentially⁵ more experienced practitioners, but this can be overcome as many full-time county EMS providers may seek either full-time or part-time employment in Kiawah.

⁵ Depending upon County EMS staff turnover, new providers routinely enter the system.

With that said, any alternative option to solve the two issues of delayed medical care and transportation will cost money to establish and maintain. The cheapest option is to accept the limitations that exist, hope for the best, and leave well enough alone. All of the alternative options discussed would reduce the delay in medical care, but unless they are at the paramedic level, the most critical events will still experience that delay. It may be difficult to convince various organizations to train and become paramedic-level providers. These organizations are not beholden to do so and may feel it is not an avenue that they want to pursue. Paramedic certification is more intense and costlier than EMT-B to obtain and to maintain. These agencies may feel that they would need to train a large majority of their staff due to rotation and shift patterns. This is especially a concern for agencies with more personnel.

As far as the transport delay, several of the options do not address this critical issue. Some options at the EMT-B level of service are able to transport but they would need to rendezvous with a county paramedic for more critical medical incidents. The issue then becomes billing. If the service is provided as a service to Town residents where an invoice is not expected, imagine the outcry when Charleston County EMS bills for paramedic services and/or transportation. If the Town service also bills, the patient can expect two separate billings, similar to hospital and physician both billing for different services. However, the most successful reimbursement through insurance goes to the transporting agency.

Figure 4.21 details the cost estimates of the various concept options discussed.

Figure 4.21

COST ESTIMATES FOR EMS DELIVERY OPTIONS FOR KIAWAH ISLAND

Concept	Provider	Estimates In Thousand Dollars							Other Costs	Other Considerations
		6 FTE Staff	Vehicle Cost	Capital Outlay	Operating Costs	EMTB Training	Paramedic Training	Total cost		
Ambulance	County EMS	\$435	\$225		\$62	Provided	Provided	\$722	Station	Not dedicated
Ambulance	Public Safety Dept	\$435	\$225		\$24	Hired with	Hired with	\$684	Station	911, MD Oversight
Ambulance	SJFD	\$435	\$225		\$20	Provided	\$22	\$702		Dedicated?
Ambulance	Private Co.	\$0	\$0	\$0	\$0	Provided	Provided	\$0	Station	Fiscal Support?
QRV	Public Safety Dept	\$435	\$36	\$84	\$24	Hired with	Hired with	\$579	Station	Patient Transport
QRV	County EMS	\$435	\$36	\$76	\$62	Provided	Provided	\$609	Station	Patient Transport
First Responder	Beach Patrol	\$0	\$15	\$84	\$24	\$7	\$22	\$145		Golf Cart/Seasonal
First Responder	Security	\$0	\$0	\$84	\$20	\$7	\$22	\$126		Patient Transport
First Responder	SJFD	\$0	\$0	\$50	\$20	Provided	\$22	\$92		Patient Transport
First Responder	Sheriff	\$0	\$0	\$84	\$20	\$7	\$22	\$126		Patient Transport

Note: Paramedic Level Care Delay not solved unless staff trained to that level.

Note: Training cost total based on staff of six

Note: Total Station Construction Estimate of \$200-\$300 per square foot.

OPTIONS & RECOMMENDATIONS

- 4-1 The Town of Kiawah Island should encourage its Fire District Commission representatives to encourage STJFD to continue the full deployment of EMT-B trained personnel within its ranks.
- 4-2 A single centrally located facility suggested at Governor’s Drive and Flyway is optimally inadequate to reach all areas of the island within industry suggested response parameters. Any adopted concept should include more than one station or units for positioning.
- 4-3 The Town of Kiawah Island should use alternate destinations of care for EMS units, where appropriate.
- 4-4 The Town of Kiawah Island should encourage its EMS providers to evaluate the feasibility of Community Paramedicine.
- 4-5 The Town of Kiawah ought to keep in the forefront of discussion that two critical elements of timely paramedic care include clinical skill and transportation capability.
- 4-6 The Town of Kiawah Island should contractually restrict any supplemental funded EMS concept option to be dedicated to incidents within the town limits.

- 4-7 The Town of Kiawah Island could elect to maintain the status quo. This will not solve the issues related to paramedic level care delay nor transportation delay.
- 4-8 The Town of Kiawah Island could fund a county ambulance stationed on Kiawah Island. While this would conceptually solve the paramedic level care and transportation delay issues, the County EMS organization cannot guarantee that this unit would not be incorporated into the system as a whole and be deployed elsewhere on a routine basis and especially upon returns from the hospitals nearest and within the City of Charleston. Many aspects of an EMS organization, such as skilled technicians, 911 dispatching, administrative and medical oversight, are already in place.
- 4-9 The Town of Kiawah Island could create a municipal EMS organization, either at a volunteer or career level. The volunteer option is not recommended due to the difficulty in staffing and reliability in response experienced in volunteer EMS organizations. A career staffed department would similarly require significant capital and recurring costs along with administrative oversights. Additionally, several aspects of staff hiring and training issues come along with logistical aspects of stationing and dispatch. The low volume of service calls within the Town of Kiawah Island will likely lead to less practiced providers.
- 4-10 The Town of Kiawah Island could encourage the STJFD to implement a transport engine vehicle to solve the transport delay issue that exists currently. If trained to the paramedic level, the firefighters would also reduce the time to advanced care for critically ill patients.
- 4-11 The Town of Kiawah Island should evaluate the costs of a private contracted EMS provider at the paramedic level. This would solve both the delays in paramedic care and transportation. Higher practiced technicians can be found in this model and overhead costs could significantly be reduced.
- 4-12 The Town of Kiawah Island could fund a county EMS QRV. While this would solve the paramedic care delay, it does not solve the transportation delay. High practiced providers lend a significant advantage to a critical patient.

- 4-13 The Town of Kiawah Island could municipally fund its own EMS QRV. Similar to 4-12 above, the transportation delay issue is left unresolved. Higher overhead costs and minimally practiced providers are concerns with this option.
- 4-14 The Town of Kiawah Island could encourage STJFD to pursue paramedic level training and service. However, this does not solve the transportation delay unless 4-10 above is also implemented. Lower practiced providers could result from the relatively lower volume of service calls on Kiawah Island, unless the firefighters are rotated through stations.
- 4-15 The Town of Kiawah Island could investigate the feasibility that the services from the Sheriff's Department include that of a first responder. Trained at the EMT-B level, Sheriff Department first responders would create additional resources to Town residents. Trained at the paramedic level, Sheriff Department first responders would solve the paramedic care delay issue, but not the transportation delay concern.
- 4-16 The Town of Kiawah Island could inquire if the Security organization has an interest in becoming first responders. Trained at the EMT-B level, the Security organization first responders would create additional resources to Town residents. Trained at the paramedic level, the Security organization first responders would solve the paramedic care delay issue, but not the transportation delay concern.
- 4-17 The Town of Kiawah Island could also utilize its Beach Patrol as first responders for off beach incidents with proper training and equipment. Trained at the EMT-B level, Beach Patrol first responders would create additional resources to Town residents. Trained at the paramedic level, Beach Patrol first responders would solve the paramedic care delay issue, but not the transportation delay concern.

