INTRODUCTION

The medical care provided by rural EMS providers is no different than the care provided by urban and suburban EMS providers. Patients have the same acute and chronic medical conditions requiring EMS response, treatment, and transport. However, the operational challenges for rural EMS providers, services, and systems are different from those in non-rural settings.

There is no such thing as a “typical” rural EMS service. From design to funding to staffing to mutual aid, every rural EMS agency takes its own approach to delivering EMS care in the best way possible given its circumstances. Regardless, most rural agencies share a collection of similar challenges in personnel recruiting and retention, primary and continuing education, skills retention, maintaining adequate coverage with prolonged transport times, obtaining qualified medical oversight, and inadequate community healthcare resources of any sort. Roughly 20% of the U.S. population lives in a “primary medical care health professional shortage” area as designated by the Health Resources Service Administration (HRSA), and many of these areas are rural.

Despite these challenges, rural EMS epitomizes “neighbor helping neighbor,” and this sense of community service and spirit draws individuals to serve. Many providers are volunteers who may hold multiple other jobs but whose passion is the EMS, fire, or rescue agency to which they give their time. A small, dedicated core of two or three providers may be the entire response capacity for a service with less than 10 calls per year but 24/7/365 coverage responsibilities. And although the faces may change over time, this type of service continues.

The rural medical director also faces a number of challenges. Geography, the distance to travel to a service, the time commitment necessary to provide oversight for a low number of calls, lack of infrastructure investment for electronic record keeping, quality improvement, and issues of skill maintenance are but a few of the challenges a rural medical director will face. Nonetheless, the rewards for the rural medical director are similar to those of any rural EMS provider.

Rural EMS gives providers, agencies, and medical directors almost unlimited prospects for creativity unmatched in the urban and suburban setting. The challenges in education, operations, system design, and transport care that can extend for hours are opportunities for innovation.

Understanding the definitions, challenges, and opportunities of practicing EMS in a rural environment is fundamental to maximizing the delivery of care in this challenging environment.

DEFINITIONS

There are a number of institutions and agencies that define the term “rural.” These definitions reflect the missions and agendas of the defining agencies. However, most of them focus on defining rural areas as “not-urban” areas.

The U.S. Census Bureau uses population density as its basis for urban and rural designation. The 2000 Census defined any territory, population, and housing units in “urbanized areas” or “urban clusters” as urban. Urbanized areas and urban clusters encompass densely settled territory with core census block groups or blocks with a population density of...
at least 1,000 people per square mile and surrounding census blocks with an overall density of at least 500 people per square mile. The central area of an urban area must have a population of greater than 50,000. In addition, all persons living in areas such as cities, towns, and villages with a population of 2,500 or more outside of these urbanized areas are considered “urban.” Territory, population, and housing units not classified as urban are considered rural.

This definition is useful because population density is often used as a rough estimate for demand on EMS services as well as the availability of personnel to serve as EMS providers. Unfortunately, the principles of system status management, particularly call demand prediction, have not been proven reliable for service of populations smaller than 250,000.

A healthcare-specific definition of rural comes from the American College of Surgeons Committee on Trauma. Although not as formalized as the U.S. Census Bureau definition, this group’s definition describes rural as an area where geography, population density, weather, distance, or availability of professional or institutional resources combine to isolate trauma patients from definitive care. It is important to recognize that for this definition to be useful for planning, it must be considered to apply at most times. It is very useful for EMS evaluation and planning because it defines care in terms of access, often the greatest challenge for the provision of quality health care in rural areas.

The Public Health Service includes a definition for “frontier” areas with population densities of less than 6 per square mile. Although there are few of these areas in the United States, they do exist and are often characterized by extremes of the challenges faced in rural areas. For those EMS systems whose coverage areas include frontier areas, very little guidance exists for optimizing response capacity.

GENERAL CHALLENGES TO ACCESS TO HEALTH CARE IN RURAL AREAS

Rural healthcare delivery is challenging for many reasons. Closures or reductions in service of local hospitals, community health centers, physician practices, and local healthcare services are common in rural areas. The hospitals that remain open often opt for Critical Access Hospital status under the Medicare Rural Hospital Flexibility Grant Program, trading off capacity and capability for improved reimbursement. This combination of fewer hospitals and reduced services may force agencies to transport further and spend more committed time per incident than they had in the past. Whereas patients accessing EMS in urban areas experience delays in response because ambulances are being prioritized to multiple calls, in rural areas a delay in response may occur because the only ambulance is occupied with a several-hour response for another patient.

Rural EMS providers may be the only healthcare providers in their areas, resulting in citizens accessing EMS for nonemergent health issues. A survey by the Maine Seacoast Mission found that island EMS agencies received approximately 25 nonemergency “consults” for every one “emergency” EMS call. This results in a hybrid practice where rural EMS providers find themselves practicing care outside of their initial intent. Unless structures exist to support this sort of service, these providers may take licensure, regulatory, and legal risks in performing this care. Often times, these providers have to clearly delineate to their friends and neighbors when they are functioning as EMS providers and when they are “just neighbors” with some medical knowledge.

In spite of these challenges, there is research that suggests that outcomes for patients with certain conditions such as acute chest pain are identical regardless of urban or rural setting. It is unclear if this speaks to the quality of care delivered or the inherent stability of most patients transported by EMS. On the other hand, time sensitive interventions such as police-based automatic external defibrillator use have not shown efficacy, most likely reflective of scarcity of system resources that naturally leads to prolonged response times.

DEMOGRAPHICS AND HEALTH RISKS

Just as there is no “typical” rural EMS agency, there is no “typical” rural resident. However, as populations, there are significant differences between rural and urban residents. Although little research has been done in rural settings, there is a generally higher demand for ambulance services in rural areas for medical conditions. Rural residents tend to be older, and ambulance calls have been found to be more likely to be “urgent or critical” in rural areas of Texas and South Carolina.
than in urban settings, with higher admission rates for rural versus urban patients arriving by EMS.\textsuperscript{13}

Rural residents are almost 50\% more likely to die from trauma than their urban counterparts.\textsuperscript{14} Motor vehicle crashes are the single greatest cause of mortality for both urban and rural trauma victims, but the rural rate (29.5 per 100,000) is almost twice the urban rate (16.3 per 100,000).\textsuperscript{14} Suicide, homicide, and falls are the second, third, and fourth most common causes, respectively, of traumatic death in both rural and urban populations. In each of these categories, rural populations are at a greater risk of death (1.21, 1.25, and 1.50 relative risk, respectively).\textsuperscript{14} In addition, there is little data to show that trauma system implementation improves trauma survival for individuals injured in rural settings.\textsuperscript{15} Finally, pediatric trauma death rates have also been shown to be twice as high in rural areas. In one study, 87\% of fatally injured children never reached a hospital.\textsuperscript{16}

COMPONENTS OF RURAL EMS SYSTEMS

The \textit{Rural/Frontier EMS Agenda for the Future}\textsuperscript{17} describes rural EMS as systems based on 14 components. This document serves as a blueprint for the growth and maturation of rural EMS for planners, legislators, the public, EMS providers, and medical directors. With only minimal change from the original 14 components of the \textit{EMS Agenda for the Future},\textsuperscript{18} these components describe the necessary elements of a functional EMS system and will be discussed here. (“EMS Research” is combined with “Information Systems,” and “Public Education” with “Prevention,” for 12 sections that follow.)

Integration of Health Resources

Rural EMS has found itself, by necessity, becoming more tightly integrated into the local healthcare community. By developing linkages to other community health and public health initiatives, EMS services provide greater continuity of services and increased efficiency. Historically, EMS has been linked to the public safety sector along with law enforcement and the fire service. EMS must be more formally linked to the healthcare system to ensure that patients are referred or transported to the most appropriate facility. Although disappearing as a model in urban and suburban areas, there are many rural hospital-based EMS services that provide response to 9-1-1 calls (although most also provide some form of interfacility transfer).

Healthcare initiatives, including injury prevention, must incorporate EMS services. In many states, injury prevention activities by EMS and public health initiatives are already ongoing. Rural systems have a greater potential for success in this arena than urban systems due to their relatively low call volumes, their integration within the communities, and the paucity of competing agencies offering similar services. The Welcome to the World Project in Orange County, North Carolina, involved visits to the homes of newborns incorporating a home safety check with the distribution of public health educational materials about injuries to newborns and toddlers.\textsuperscript{19} The MEDICVAX project in western Pennsylvania used paramedics to perform influenza vaccination in the community.\textsuperscript{20} It should be pointed out that these initiatives must not interfere with the EMS services that the systems primarily provide. Further research is needed to better define the potential of these projects.

In addition, as healthcare resources are withdrawn from rural areas, there is a growing interest in EMS providers expanding both their scope of service (performing nontraditional services with the skills they already possess) and scope of practice (performing skills not traditionally considered part of the providers’ practice) into a field called, variously, “Expanded Scope EMS,” “Community Paramedicine,” and “EMS-Based Community Health Services.” The International Roundtable on Community Paramedicine (http://ircp.uncemsi.org) has taken a lead in bringing together individuals committed to the exploration and implementation of community paramedicine. The primary objective of these programs is typically to identify deficits in the local primary, urgent, and public health care and provide solutions that address these deficits and enhance, not compete with, existing services.

As mentioned, this type of practice is already occurring without design or oversight as rural EMS providers attend to the non-EMS medical needs of their friends, neighbors, and family. There is significant risk to this. The “Red River” community paramedicine project, originally felt to hold significant promise for rural paramedicine, ultimately failed due to lack of thorough medical oversight and quality assurance processes resulting in what was deemed to be inappropriate care.\textsuperscript{21} Although such programs are likely crucial to the continued delivery of healthcare in the
rural areas of the United States, they must be viewed as requiring significant investment in infrastructure and oversight.

At the federal level, there are current initiatives to promote innovative hospital conversions, such as essential access community hospitals, rural primary care hospitals, limited service hospitals, and medical assistance facilities, which recognize the importance of integrating EMS as part of the overall system of care in rural areas.

EMS Research/Information Systems

Rural EMS research remains a challenge due to the low call volumes and difficulty in collecting sufficient data to make meaningful conclusions. Oftentimes, statewide datasets are used for retrospective analyses. Nonetheless, every EMS system requires ongoing evaluation and oversight to monitor processes and outcomes. There appears to be a trend toward more rural research, even from larger urban academic institutions. A Medline search from 2005–2007 for “Rural Emergency Medical Services” found 259 citations. The same search from 2003–2005 found 139 citations. In addition, the Rural/Frontier EMS Agenda for the Future calls for the establishment of national EMS research centers with rural and frontier focus to drive rural EMS research in the future. The National EMS Information System (NEMSIS) project is coordinating the collection and management of uniform data elements with a goal of ultimately having every EMS agency in the United States contributing the same dataset from every call into the database. Currently over 400 potential data elements are identified, although the minimum national dataset is much smaller. This project should allow quantification of EMS performance with greater potential for comparison than has ever been available. The Institute of Medicine, in its Emergency Medical Services: At the Crossroads, also strongly advocates for systemization and streamlining of the EMS research process, which would also benefit rural EMS researchers.

With the move toward electronic medical records with database connectivity in health care in general and the NEMSIS project in particular, many EMS agencies are moving to electronic patient care reports. However, in rural areas where funding is limited, the expense of the necessary hardware may be deferred so the service can purchase basic supplies. Many states are requiring a move to electronic patient care reports because of their utility in quality assurance. As regulations are developed regarding these systems, consideration must be made to the cost and accessibility for rural agencies with a particular focus on web-based access and low-cost hardware options.

Legislation and Regulation

Federal, state, and local governments and their agencies all affect rural EMS systems. Collectively, they determine providers’ educational requirements and credentials, define scopes of practice, stipulate operating characteristics and requirements, and allocate resources.

Rural systems are often at odds with urban systems regarding many of these issues. As the EMS scope of service or practice expands, rural systems are often placed in difficult positions. Educational and equipment requirements may be increased when rural systems are already struggling. Although rural systems have, in general, gradually moved to more advanced level providers as the system matures, increased regulatory requirements have forced some rural systems to move back to less advanced levels of care due to increased federal and state regulations. Creative solutions can help maintain system integrity. These may include promulgation of “optional” protocols, such that those agencies without the abilities to immediately purchase the required expensive equipment or medication could still function at an otherwise high level. Additionally, it may be appropriate to allow agencies to provide care at a level commensurate with staffing levels at any given time, rather than at a level they can guarantee all the time.

System Finance

Many rural EMS systems were founded as and still exist as community resources, often provided at no cost to the individual patient. Although originally federal dollars supported the development of EMS systems, since the early 1990s EMS has had no federal support outside of specialty grant opportunities. Urban systems have migrated to various fee-based structures, and that transition is now taking place in rural systems.

Historically, EMS has been unable to obtain cost-based reimbursement for services. First, systems must maintain capacity that often significantly exceeds demand to assure an acceptable response to emergencies. Second, federal reimbursement through Medicare has always taken into account issues such as prevailing
historic rates and other factors that negatively affect most rural EMS systems. Rural systems typically have high operational costs to maintain reasonable response times. Transport times are considerably longer and utilization rates much lower than in urban systems. EMS tends to have very high fixed costs with very low marginal costs, and revenues are dependent on call volume. In the low call volume environment of the rural EMS agency, meeting fixed costs can be difficult if not impossible. As many healthcare payers reimburse only when a patient is transported, rural EMS agencies that attempt to mitigate medical emergencies, providing treatment of minor or easily stabilized problems without transport, find themselves uncompensated for care.

A number of methods are used to finance rural systems with a focus on local solutions, including raffles, bingo, and other fundraising activities. However, the cost and complexity of prehospital systems in terms of equipment, training, and level of commitment has continued to increase, requiring even more ambitious financing strategies. In addition, those volunteers who formerly provided both EMS response and fundraising services often find they don’t have time to do both. As personnel requirements increase and as the ability of a volunteer to leave his or her primary job to respond decreases, many rural systems require ongoing governmental support. For example, a county may hire paid staff to cover weekday hours for a volunteer service so that its members can work at their primary occupations. Hospitals in rural northern New York State hire providers to respond in the field during daytime working hours.

Subscription programs are successful in many areas. A subscription program allows citizens or families within the community to pay a small amount of money to the rural system in return for service they would need during the year. Subscription programs require that the EMS system bill those who are not subscribers. Other systems receive tax subsidies from the local government either at the county or city level. Finally, many systems are billing for services directly to customers or insurers. The Centers for Medicare and Medicaid Services (CMS) have attempted to address some of these discrepancies in terms of costs for urban and rural EMS services. One particularly innovative program is the “super rural bonus” of 22.6% for calls initiated from some extremely low population density zip codes. Despite these efforts, the reimbursement rural systems receive is typically inadequate, and most operate in extreme financial duress. The nature of the rural environment, with a sparse population and low unit hour utilization, coupled with a higher average of uninsured patients, creates an environment of financial challenges.

**Human Resources**

Rural EMS has always depended heavily on volunteer EMS providers to staff ambulances and response vehicles. Few proprietary ambulance companies find the rural setting financially viable, and therefore care goes to a voluntary mode of helping one’s neighbors. The psychology of volunteerism is diverse and the demographics are intriguing, reflecting some of the basic human needs for a sense of belonging and a desire for recognition.

The verb “volunteer” is defined as “to offer oneself for a particular task, of one’s own free will (often without being paid for such work).” Unpaid work, accepted with enthusiasm, is a key element of the workforce of rural EMS. Average time of duty for an EMS provider varies, but 16 to 24 hours weekly is not unusual. This time is divided into actual duty call, training, meetings, fundraising, and “chores,” including maintenance and cleaning of the equipment. This time usually comes out of spare time outside of the provider’s primary career or source of income. It also comes out of time with family and friends. Self-employment may increase the provider’s flexibility by allowing response to calls during work hours. Some employers willingly support their volunteer EMS employees by allowing them to leave work at a moment’s notice for calls, creating an environment of coverage and allotment. However, this is not universally the case. Many systems have developed contracts with members. These contracts formalize responsibilities and help the volunteer to better understand what time commitments exist and how they can participate based on their primary jobs or careers. Time constraints are often cited as reasons for leaving a volunteer EMS squad.

After considering the time requirements, training expectations, and job stresses of working in sometimes dangerous and unpredictable conditions, one might wonder why people volunteer at all for these positions. When volunteer EMS providers are asked why they do it, often the answer is altruistic. A chance to give back to one’s community, to ensure and take part in the health care of family, neighbors, and friends, and the ability to belong and make a difference are the most common answers. This is perhaps
best illustrated in a study of volunteers queried on possible incentives to facilitate and increase recruitment and retention. Continuing education, financial assistance, tax credits, and health benefits were the most popular options expressed, ranging from 60% to 64%, with “cash awards” trailing at the bottom, at 34%. Systems have applied this information to successful recruitment and retention programs. Age is often skewed toward the early adult years, particularly the 20s and 30s, which has given EMS a reputation as being a young person’s profession. However, the older the existence of the organization, the more likely there will be participants with longevity, particularly in the administrative roles. Gender is nearly equal and the race of volunteers tends to reflect the different ethnic and racial composition of the rural area. Pre-existing education varies from area to area, but in general the EMS volunteer has a higher accrued level of education than the average citizen.

Volunteerism remains the cornerstone of rural EMS, although current economic restraints sometimes require paid-volunteer assistance for shifts that remain uncovered. To retain volunteers, one must address and attempt to meet the needs of the volunteer as best as possible. An informal or formal needs assessment of what keeps people on and common reasons for leaving can go a long way. Community-based need, admission criteria, high visibility, strong medical oversight, interagency cooperation, a formal organizational structure, sound business operation, personal success, and a cohesive community environment have been found as characteristics and attributes of successful rural systems. Creativity, ingenuity, enthusiasm, and persistence have always been the hallmarks of EMS, and are necessary factors for continued survival in the changing healthcare arena. The Health Resources and Services Administration provides evidence-based tools for EMS leaders and agencies to use to recruit and retain providers.

State and federal government agencies sometimes work with local systems to provide leadership and technical support, through financial assistance with training, supplies, and equipment, or through health and retirement benefits. Leadership training, critical incident stress management services, safety training, and general information dissemination regarding successful programs are of value to rural EMS systems, and are often difficult for local systems to provide on their own.

One significant risk for volunteer agencies in general and rural EMS agencies in particular is the risk of attrition of the best-trained and most committed providers. Rural technicians who do receive training at the more advanced levels and hope for a career in EMS are less likely to stay in rural areas because they often find greater opportunities for paid work in urban settings.

Medical Oversight

Medical oversight is a particular challenge for rural EMS agencies. Rural systems may be isolated from healthcare facilities and from any physicians, let alone physicians experienced or interested in EMS. It has only been since the 1996 publication of the EMS Agenda for the Future that the importance of medical oversight has been documented and institutionalized. A recent joint statement from the National Association of EMS Physicians and the American College of Emergency Physicians has further supported the need for and value of medical direction, at least at the state level.

In the rural environment, however, the physicians who can be recruited may or may not be trained in EMS medical direction, and training for medical directors can be difficult to obtain. The National Highway Traffic Safety Administration has produced a 1-day training program for medical directors that has been used by various agencies and training organizations, including NAEMSP, to provide initial training. This content has now been converted to an on-line training program. NAEMSP also offers a multiday National EMS Medical Director’s Course and Practicum that provides more extensive training. Additionally, many states now provide a mandatory medical director class and require that physicians be trained prior to serving as medical directors.

Medical oversight is needed in all aspects of EMS: initial training, protocol development, quality assurance, resource planning and utilization, continuing education, community relations, and clinical care. Shortages of physicians in rural areas are a significant barrier, and many rural systems must look for alternatives to local medical oversight through regional or statewide oversight systems and through physician extenders such as physician assistants or nurse practitioners, or a combination of both. These physician extenders can perform a variety of medical oversight functions, including case reviews, continuing education, and quality management, either in conjunction with physicians, or as medical directors. Their scope of authority is limited only by the constraints of their licenses, which often restrict delegation of practice. Resident physicians are
also excellent resources as adjuncts and assistants in medical direction, although the turnover can result in a sense of discontinuity for an agency.

Although many rural medical directors are uncompensated, they are exposed to significant risk including medical, general, and civil rights liability, excessive time commitment, and potential demands for services the physician is not trained to provide. Because of this, there is a push for medical directors to be compensated and for liability issues to be addressed. Several contractual and compensation models have been developed. Each agency and medical director must select the model that works best for them. NAEMSP, the National Association of State EMS Officials (NASEMSO), and the American College of Emergency Physicians (ACEP) have developed documents to assist rural systems in the recruitment and training of medical directors.

Education Systems

EMS providers and potential EMS providers in rural areas have challenges in obtaining both primary (licensure) and continuing education. Rural systems are typically dependent on volunteers or a mixture of paid and volunteer providers. There is an increasing trend toward ALS care in the rural environment through service-level providers, regional aggregates of services with single provider “fly car” programs, or air medical services. This results in a growing demand for educational programs at all levels and easily accessible continuing education.

The Department of Transportation (DOT) national standard curricula contain the suggested initial training requirements of the various EMS technician levels. These requirements are typically formalized at the state level, with many states adopting the DOT standards verbatim. Education takes place at various locations and institutions, including community and 4-year degree granting colleges and universities, community colleges, vocational-technical schools, and through EMS agencies and/or agency-affiliated “EMS academies.” Many rural communities do not have access to postsecondary educational institutions. Initial or primary EMS education also requires significant amounts of clinical exposure, often in hospital settings. Rural communities often do not have this resource, forcing students to travel significant distances to complete clinical requirements.

Access to continuing education is another serious issue in rural EMS systems, as more continuing education requirements are being placed on EMS providers. For example, many EMT-Bs defibrillate with automated defibrillators. This skill requires ongoing education in addition to the standard EMT-B continuing education programs. Other requirements, such as blood-borne pathogen training and vehicle safety, require more time and commitment. Access to continuing education is a significant problem for many rural systems. Both the quality and content of continuing education programs are dependent on the quality of the teachers and the availability of teaching resources.

Technology is offering some solutions to this problem. Distance education is widely used in other health and professional educational fields to provide access to education without the burden of travel. Many hospitals, community colleges, and even high schools in rural states have Polycom or similar video educational system, and on-line educational platforms such as Moodle, WebCT, and others allow educators to develop highly polished, interactive, and effective educational sessions. Although many rural areas in the United States do not yet have broadband internet access, advocacy groups such as the Rural Broadband Coalition are pushing to bring this access to all parts of the United States. Montana and South Dakota have developed internet-based continuing education programs for their rural systems. The TENKIDS project provides every local EMS system in Montana with a multimedia computer plus access to an electronic bulletin board and CD-ROM training programs. In addition, the low price of jump drives, CD-ROM, and other transferable media allow high-quality educational programs to be developed and inexpensively distributed.

Some rural-specific training programs have also been developed. The FARMEDIC program was created in 1981 in New York State to train fire, rescue, and EMS providers in planning for agricultural emergencies. The course is now offered nationally, teaching providers how to assist patients with farm-related trauma due to machinery, confined spaces, chemicals, animals, electricity, and weather. Providers are trained in the management of tractor injuries, power take-off entanglements, pesticide toxicities, and silo fires. Other programs have been developed with rural EMS in mind: the Basic Trauma Life Support and PreHospital Trauma Life Support courses provide trauma care training to EMT-Bs.

The availability of interested and trained medical directors for educational program oversight has also
be a major issue for training programs. Medical directors need to review the medical content of training programs, ensure that instructors are delivering medically accurate information, review the quality of clinical rotations, and provide education for specific topics where a clinician can provide the broadest and most appropriate information. Additionally, the National Registry of EMTs plans to require all applicants to have graduated from a nationally accredited training program as of January 2013. Accreditation will require a medical director who actively participates in the program.

Rural EMS systems require innovative approaches to education that address quality, content, and accessibility for both initial training and continuing education. Problems that must be addressed include a limited student pool with a lower level of formal education, training scheduled around the full-time careers of volunteers, a small number of qualified instructors, insufficient educational materials and resources, limited access to healthcare facilities for clinical experience, limited exposure to clinical conditions and patient presentations, difficulties in skill maintenance due to low volumes (especially relating to children), limited physician supervision, and limited quality management of educational programs. Federal and state governments can work with rural agencies to help develop strategies to address these issues. Distance education can significantly assist rural systems if the financial and technological resources are available.

Public Education/Prevention

EMS agencies are uniquely qualified to contribute to public education and prevention initiatives. Particularly in rural areas, providers are typically well known and respected in the community. Examples of opportunities and previous successes include knowing when and how to access emergency services (9-1-1, for example), when and how to do CPR, how to properly install a child safety seat, and how to provide a safe environment in the home of a toddler.

It has been shown that the public has very little understanding of the capabilities and services provided by EMS. Low call volumes in rural systems may contribute to this ignorance; any opportunity to work in the community to promote awareness and improve community health can be invaluable. This exposure can also lead to increased community involvement, fundraising, and member recruitment and retention. Prevention through home safety checks, playground safety checks, buckle-up promotions, prom safety, farm equipment safety training, and injury prevention programs are a large part of many EMS agencies’ expanded scope of services programs.

Public Access

Communication infrastructure is generally less developed in rural communities. Although currently about 85% of the U.S. population is covered by 9-1-1 and 95% of all 9-1-1 services by population are E-9-1-1, only about 50% of the geography has 9-1-1 services and only 25% of the geography has E-9-1-1 service. This means that much of the nation's rural territory does not have 9-1-1 service, and many rural dispatchers lack the ability to automatically locate a caller. Systems without 9-1-1 often have a single seven-digit EMS access number, and the correct number must be dialed because dialing 9-1-1 may connect the caller to a distant, even out-of-state public safety answering point (PSAP).

Dispatch capabilities are generally less developed in rural communities. Emergency medical dispatch systems that allow dispatchers to define the emergency and provide the appropriate EMS response and prearrival instructions based on the problem are less common in rural PSAPs. This situation could significantly affect systems and patient care when response times are very long. There is a movement, however, toward states requiring all public safety answering points or dispatch centers to perform emergency medical dispatch. This in turn leads to consolidation of dispatch centers and more centralized services including multi-agency dispatch and automatic mutual aid. The ability to determine the appropriate level of care and provide prearrival care may significantly improve rural system resource utilization.

Communication System

Rural EMS systems are usually less developed with respect to intra-agency and inter-agency communications capabilities. The ability to talk between the dispatch center and the crew is often limited by dated technology. The ability to transmit data, such as 12-lead ECGs or video telemetry, is typically nonexistent or severely limited. Cellular communications are plagued by “dead areas,” dropped calls, and general low fidelity. A survey in 1999 by NASEMSO identified the communications infrastructure as the...
area of greatest need financially for rural systems.\textsuperscript{39} Since September 11, 2001, there has been significant financial investment in public safety communications. While urban systems work to develop interoperable communications between all public safety agencies, many rural EMS systems cannot guarantee their communications are even operable, let alone interoperable, on a day-to-day basis. Innovative communication approaches using satellite and internet-based technology can provide telemedicine services, distance learning, and an environment for improved information exchange and educational opportunities. However, until rural EMS systems have assured that basic, reliable communication infrastructure is in place, these more advanced systems provide only marginal benefit for high cost.

**Clinical Care and Transportation Decisions/Resources**

EMS continues to evolve as a business. Defining “who are the customers?” and “what are the products?” are keys to the future of rural EMS. The customers are usually the community and the individual patients. The products are services such as transportation and public safety and clinical care. To provide quality clinical care, each of the components discussed in this chapter must work as part of a system. Clinical care must be considered to be more than just patient transportation. Quality clinical care may not require transportation and the system performance may decline if every patient is transported. EMS systems must work with their communities, medical directors, state EMS offices, and patients to identify what services are of most benefit and how best to provide them. This process, which should be data driven through accepted quality-management principles, requires resources that rural systems seldom possess.

Many rural EMS systems provide services at the first responder or EMT-Basic level. The scope of practice of the level of technician is typically established by the state with, when applicable, variability based on local protocols. Most states allow EMT-Basic to defibrillate and treat medical and traumatic conditions with basic life support maneuvers. In some rural areas these basic-level technicians are backed up by providers at the EMT-Intermediate or paramedic level. Although the numbers of such providers in the rural setting is increasing, these advanced technicians remain uncommon due to the educational and training requirements.

There is debate about what level of provider is needed in rural environments and what skills and training are realistic for rural providers given their constraints. From a cardiac arrest perspective, the most important link for initial EMS response and treatment is based on early activation, early CPR, and early defibrillation. Many rural EMS systems cannot achieve recommended response times due to geographical limitations. From a trauma perspective, basic-level care can have a positive influence on patient outcome, but there are still issues of response times and destination hospital resources required for the critically injured. Some argue, therefore, that ALS care offers no advantage to BLS care. On the other hand, there is a belief held by others that there exists a rural “paramedic paradox.”\textsuperscript{1} Rural patients are more likely to benefit from ALS care than their urban counterparts due to prolonged transports and extended patient contact, but are less likely to be cared for by a paramedic. The underlying, unproven assumption is that there is a benefit to ALS care. Although no research supports this assertion in the rural setting, it does make sense in so much as, if ALS benefits anyone, it should benefit those individuals with the greatest challenges to rapidly accessing emergency department care.

Triage and appropriate transport of patients can significantly influence the availability of rural EMS resources. Systems are often required to transport patients who may not need urgent or emergent medical care; this situation leaves the community uncovered while the nonemergent patient is transported to receive a formal medical evaluation. Many rural systems therefore focus on developing processes to allow treatment without transport or transportation to alternate destinations that are more appropriate for the patient’s complaint and that decrease durations of unavailability for another call. Barriers to these processes include lack of reimbursement for non-transport patients as previously described and regulations regarding patient destination that usually require patients to be transported only to emergency departments.

**Evaluation**

Validating the quality and effectiveness of EMS services is critical to assuring the future of EMS, both as a practice of medicine and as a reimbursable service. Information systems, research, and attentive medical oversight are critical to assuring not only a thorough
evaluation but also that the findings are applied to refining, improving, and driving appropriate and quality care. Validated evaluation technologies and techniques, including simulation, oral interviews, and electronic methods will be necessary to ensure that the care delivered is of the highest quality.\(^{40}\) Just as CMS is beginning to base reimbursements for hospitals and clinical practices on core measure quality indicators, it is not unreasonable to expect that one day the same will be true for EMS reimbursement. EMS agencies, and rural EMS agencies in particular, would be well served to prepare for this eventuality.

**GENERAL RURAL ISSUES AND OPPORTUNITIES**

Several general system issues are important with respect to rural EMS. EMS delivery models have typically been proposed, implemented, and evaluated based on outcomes in two patient groups: trauma and cardiac arrest. Based on these encounters, the need for a rapid response is delineated and the needed skills, equipment, and personnel are defined. Current guidelines for response times of less than 5 minutes for early defibrillation in cardiac arrest and 8-minute response times for advanced medical care are unrealistic for rural EMS systems and are not based on research in this setting. EMS must make system-based decisions that take into account the entire patient population and the spectrum of complaint categories they will experience, while considering the overall financial picture of the system. There are national guidelines that describe the ideal EMS response to trauma, stroke, cardiac arrest, pediatric emergencies, seizures, and head injuries. These are guidelines and not standards of care. All EMS systems must evaluate themselves to ensure that essential components are in place and functioning adequately before less essential components are added. An example might be the addition of 12-lead ECG capabilities before all first responders have automated external defibrillators. Federal and state agencies may assist rural EMS agencies in making these decisions, prioritizing spending and promoting a systems approach to quality patient care.

Many rural systems have developed creative implementation schemes to address rural issues. Orange County, North Carolina, created an EMS structure where paramedic level care is separated from transport. Using emergency medical dispatch criteria, paramedics are often sent to calls in nontransport vehicles without an ambulance. On scene, the paramedics evaluate the patient through protocols and direct medical oversight to determine if the patient should be transported by the paramedics, transported by less advanced personnel, transported by private vehicle, or treated and released with medical follow-up. The Long and Brier Islands project in Nova Scotia focuses on community paramedicine on isolated islands. It is important to note that both of these examples were implemented with great detail to training, education, quality management, and medical oversight.\(^{41}\)

Rural disaster preparedness can be a tremendous challenge.\(^{42}\) Although there is an institutional isolationism often associated with rural life and rural public safety, rural agencies should not consider themselves as isolated response services. Rather, they should have mutual aid agreements with other adjacent systems, public safety agencies, search-and-rescue teams, air-transport services, and special rescue teams. Viewed as isolated agencies, the limited resources of a rural system may be overwhelmed by a single motor vehicle crash. Viewed as a system comprised of many different interacting services, there are few EMS challenges that cannot be overcome. Planning, interagency training and equipment, and communications interoperability are all key to rural disaster and mass casualty response.

One must also consider the resources that exist at the hospital level. Rural hospitals may not have the necessary resources and services for the entire range of emergencies encountered in a rural environment. Neighboring rural hospitals, air medical services, regional transfer plans, and other community resources and processes should be identified and incorporated into operational procedures as needed to account for local deficiencies.

Rural areas can have tremendous fluctuations in seasonal populations.\(^{43}\) Additionally, many rural areas are impacted by tourists, festivals, and other special events and mass gatherings. System planning needs to anticipate these short-term and seasonal fluctuations and develop plans to address all hazards and all events, with expanding and contracting operations as needed, including the development of mass gathering plans.

**SUMMARY**

Although the type of care delivered in rural areas is not significantly different from the care delivered in urban areas, the mechanisms, systems, and processes
by which it is delivered are different. EMS, as delivered in rural areas, must meet the same clinical standards and care for the same patients as in urban areas, but unique challenges, particularly in human resources, financing, and medical oversight, present barriers to meeting these goals. Creativity, flexibility, and an innate perseverance are the characteristics that allow the EMS services covering 20% of the population and 80% of the landmass of the United States to provide care in face of innumerable challenges.

REFERENCES


