

IO REPORT

VOLUME 37/NUMBER 5 2005

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EMS IN CRITICAL CONDITION: MEETING THE CHALLENGE

The provision of emergency medical services (EMS) varies with tradition, funding, geography, politics, and level of need. One thing holds true, however, regardless of other differences: EMS systems are bending—and in some cases breaking—under the strain of rising costs, reduced subsidies, and increasing service expectations. The quest to improve performance while achieving savings usually involves complex financial, political, and medical issues, and scientific evidence to help guide the process is often scant. The good news is that in some communities, financial or medical crises have led to better public policy.

This report is designed to give community leaders insight into the challenges facing EMS providers. Benchmarks and examples included in the report can help communities evaluate policy decisions that may affect the care their citizens receive. The final section of the report introduces readers to key aspects of an effective procurement process for EMS.

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VOLUME 37/NUMBER 5
ITEM NO. E-43338

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EMS in Critical Condition: Meeting the Challenge

This report was compiled by Jay Fitch, Ph.D.; Richard Keller; and Dave William of Fitch & Associates, LLC. Other contributors were Jack Krakeel, director of public safety, Fayette County, Georgia; Ed Racht, M.D., medical director, City of Austin/Travis County EMS System, Austin, Texas; and Keith Griffiths, president, The RedFlash Group, Encinitas, California.

The provision of prehospital emergency medical care poses significant challenges. In urban areas, demand often overwhelms available services; in rural areas, shortage of trained staff and difficulty obtaining training are perennial problems.

There are many different ways to provide high-quality, cost-effective ambulance service (see Table 1). But because most providers believe that their approach is the best, successfully initiating change can be daunting. After all, these systems must be designed and operated to meet the most demanding clinical and operational standards. Understanding and appreciating the complexity of providing emergency medical services (EMS) is the first step in creating thoughtful solutions.

The most significant factors that contribute to the complexity of providing EMS are as follows:

- **Service levels and response times.** Service levels and response times are critical to patient outcomes and citizen satisfaction. In urban centers, citizens expect, at a minimum, paramedic-level service. But data on response times and service levels are sometimes misinterpreted by both officials and the press. The best practice is to set a defined target and then consistently measure and report the results. Data should be evaluated by the medical community to ensure appropriateness of service levels and response times.
- **Financial pressures.** Throughout North America, local governments are attempting to balance service expectations and limited fiscal resources. One result is that many ambulance services are using modern deployment plans and innovative operational strategies to increase their efficiency.
- **A variety of agencies.** Almost universally, the fire service provides first response (basic medical care) to critical calls. In addition, in urban areas, about 42 percent of overall EMS is provided by fire departments, followed closely by private organizations.¹ In rural areas, EMS is more likely to be provided by volunteers, and there are fewer private services than in urban areas. Because of conflicting interests among the fire service, private ambulance services, and volunteers, when lobbying is needed it is often ineffective; the result is that EMS often gets short shift when it comes to policy or funding at the local, state, and federal funding levels.
- **The changing labor environment.** Because of increasing competition from other job markets, paramedics are in short supply in many areas. Meanwhile, volunteerism continues to decline.
- **Increases in service hours.** As hospitals consolidate and hospital capacity decreases, ambulances must travel farther to reach an appropriate facility with space for incoming patients, which increases the hours when ambulances are in service. The authors of this report estimate that in 2005, there will be 30 million requests for service nationwide.
- **Abuse of the system.** Especially in poor urban areas, obtaining primary health care often means calling 9-1-1 and riding to the emergency department in an ambulance. And with an uninsured population of 45 million, this pattern is unlikely to change in the foreseeable future.
- **The added pressure of disaster preparedness and homeland security.** Homeland security has intensified

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Table 1. Approaches to Service Delivery

Communities often get locked into the belief that their way of providing EMS is the only way. It simply isn't so. This table summarizes the advantages and disadvantages of common delivery models.

Approach to Service Provision	Characteristics	Advantages	Disadvantages
Fire service	Fire EMS agencies typically categorized as either single role (when ambulance workers operate as a separate division within the fire department) or dual role (when the same staff provide both fire protection and emergency medical transport).	<ul style="list-style-type: none"> • Public confidence in the fire department • Integrated command and control • Public officials in direct control of day-to-day operations • Use of capacity currently available within the fire department 	<ul style="list-style-type: none"> • Primary reliance on twenty-four-hour shifts, which limits the ability to match resources with demand • Complexity of labor agreements • Higher labor costs • Requirements based on level of effort rather than on performance
Public utility model	A highly defined business structure in which a public agency provides oversight but contracts with a provider for day-to-day operations. Elected officials appoint the leadership of the agency and approve the agency's funding levels.	<ul style="list-style-type: none"> • Performance-based contracts • Public ownership of essential assets • Transparent transfer from one contractor to another during a bidding cycle • Flexibility to involve other jurisdictions and services in a regional approach 	<ul style="list-style-type: none"> • Complexity of the business relationship • Elected officials may be reluctant to develop a separate oversight entity • Employees may be required to change employers when a contract cycle ends • A limited number of qualified bidders
Third government service	Considered a uniformed public safety service (like police and fire), but typically employs civilians in a separate department or ambulance district. The parent government provides finance, purchasing, vehicle maintenance, and other support functions.	<ul style="list-style-type: none"> • Use of a civilian workforce, which increases scheduling flexibility and lowers personnel costs • Single-service delivery focus • Local government in direct control of day-to-day operations • Public sector ownership 	<ul style="list-style-type: none"> • Expenditure control dependent on the parent organization's budgetary and managerial processes • In general, no performance-based requirements • May be assigned less importance than other public safety departments
Private, for-profit agency	Service provided through an exclusive or nonexclusive contract with the local government that may or may not include rights to provide nonemergency services. Contracts may be based on level of effort or performance. Clinical performance, assets, capitalization, and day-to-day operations are managed wholly within the private sector.	<ul style="list-style-type: none"> • Little day-to-day involvement for the local government • Performance contracts generally define services provided, allowing for better evaluation and benchmarking • Labor costs generally lower than for public sector providers 	<ul style="list-style-type: none"> • Accountability and transparency issues associated with the use of private firms • Little financial oversight • Unregulated competition, which may compromise quality of care • Higher turnover because of lack of opportunity for career development • Risk of sudden service withdrawal
Community-based and/or volunteer nonprofit agency	Service provided by volunteers, paid staff, or a combination of the two. The agency is independently governed. Service may be supported by donations, user fees, government subsidies, or a combination. Assets, while often donated by the community, are typically under the control of the agency board.	<ul style="list-style-type: none"> • Lower cost structure • Little day-to-day local government involvement • Service demands, rather than an established infrastructure, generally determine staffing model (e.g., use of paid staff in addition to volunteer workforce) 	<ul style="list-style-type: none"> • Difficulty recruiting volunteers • Resistance to external demands for accountability and transparency • Leadership, clinical competencies, and tenure may vary widely, depending on the level of commitment of individual workers • Frequently undercapitalized; may require additional public funding to stay solvent
Hospital-based service	Service provided by a local hospital or by a stand-alone entity owned or controlled by a hospital. Contracts may be based on level of effort or performance. Services are frequently nonprofit and draw on the hospital's clinical and administrative resources.	<ul style="list-style-type: none"> • Public confidence in the health care institution providing the service • Robust opportunities for clinical improvements and career development • Capital usually provided by the hospital 	<ul style="list-style-type: none"> • Low priority within the hospital's financial and operational structures • May be isolated from top leadership • EMS revenue-recovery efforts may be overshadowed by hospital revenue-recovery efforts

Six Signs of a Service in Distress

How do you know if your ambulance service is performing adequately? Be on the lookout for these six common indicators of a service in need of intervention:

1. **Media or council investigations.** An increase in inquiries because of service complaints, deaths, crashes, hospitals being unavailable, poor care, or poor response times.
2. **Response-time troubles.** A pattern of response-time inequities between different areas in a community; failure to properly monitor or report response times.
3. **Internal issues.** Labor strife, ineffective leadership and development, sexual harassment complaints, inequities in compensation or workload, or difficulty recruiting or retaining workers.
4. **Turf battles.** Frequent skirmishes between public and private agencies or with other jurisdictions, or scuffles between EMS, fire, police, and emergency communications.
5. **Lack of accountability and transparency.** Hidden processes and goals (financial or otherwise), or undue exertion of political influence.
6. **Financial distress.** Failure to analyze the true cost of services, inefficient bill collection, inability to respond to unfunded mandates, or decreased levels of reimbursement.

the need to expand readiness capability and training for EMS and other first responders. Nevertheless, EMS continues to be underfunded compared with fire and police services, largely because EMS systems lack a unified front for presenting their needs to legislators.

- **Expanding medical treatments and technologies.** The best services, which are still in the minority, have tightly monitored quality improvement processes that motivate emergency medical technicians (EMTs) and paramedics to achieve the highest possible levels of performance, from the perspective of both clinical care and customer service. As in other areas of health care, new technology is improving patient care but is also increasing the cost of equipment and training.

Assessing an EMS system's "vital signs" is a way to judge its overall health—to help the community determine if the system requires minor treatment or major surgery. Key aspects to consider are the system's clinical, operational, and financial health.

CLINICAL VITAL SIGNS

Chief clinical aspects of an EMS system include medical direction, services provided, training and certification, and quality issues.

Medical Direction

The core purpose of EMS is to serve patients' needs. EMS workers are the portal to both public health services and the medical community. EMTs and paramedics function within a range of approved protocols and procedures—and, to do their job effectively, must have the support and oversight of a dedicated and active physician medical director. Medical directors in the United States are predominantly part time and typically commit fewer than twenty hours per week to EMS;² in smaller services, four to eight hours per month is common. Medical directors' duties often include quality management, protocol development, and verification of proficiency. Unfortunately, time limitations often reduce a director's effectiveness.

Several approaches can improve the quality of oversight from a part-time medical director.

- Find a physician who is interested in EMS and willing to commit the time required for your particular community. A physician specializing in emergency medicine is preferred but not essential. The National Association of EMS Physicians offers a short program for new EMS medical directors (see "Additional Resources"). This program should be a minimum requirement for every medical director, no matter how small the community.
- Ensure that the EMS organization and the physician agree on the director's time commitment and responsibilities, and that each understands how to support the other.
- Make every effort to use the director's time efficiently and effectively. This may include having the organization do data gathering and preparation, reporting, and coordination.
- Establish clear guidelines for (1) what actions EMS workers may take within their delegated scope of practice, (2) how management will handle clinical questions or errors, and (3) under what circumstances the director must be notified of an error or must address personnel issues.

The more the relationship between a physician and the EMS organization is discussed and understood in advance, the more effective the director's oversight will be.

Services

Patients receive services directly from first responders and from transport providers.

First response First responders cover a designated service area and can respond quickly to emergency calls, initiating care while an ambulance is on the way. Typically, they are firefighters who are certified as first responders or as EMTs.

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Because of the relatively short time needed to get to a scene, first responders can make a measurable difference in life-threatening situations but are not required on every 9-1-1 call. For example, a minor fall with no loss of consciousness or suspected fractures should not trigger a full response from all available resources (such as firefighters speeding on heavy fire apparatus) when an ambulance traveling “cold” will do.

First responders have the greatest effect in four areas: stopping bleeding; opening blocked airways; restarting a stopped heart with an automated defibrillator; and giving an injection of epinephrine, via a prefilled automated syringe, to a patient who is having an allergic reaction.³ Standards vary by jurisdiction, but these actions generally can be undertaken by personnel at the EMT level or below.

Wanting to get the highest level of care to patients as quickly as possible, some communities use paramedics as their first responders. For a number of reasons, however, paramedic-level first response may not always be the best solution:

- The pool of available paramedics is shrinking because of low pay, the increasing costs of training and continuing education, and competition from other job markets.
- Most calls don’t require advanced-level care.
- Because only a limited number of calls actually require advanced skills, the higher the number of paramedics, the less opportunity there is to become truly proficient. In fact, some members of the EMS community believe that having fewer paramedics *improves* care because it allows paramedics greater opportunity to hone their skills.

The right decision depends on the community’s needs, but first responder or EMT certifications are appropriate in most areas. First responders should be certified as EMTs whenever possible.

Transport provider Most people who see two ambulances pulling out of a hospital driveway would assume that they both provide the same level of care and have the same staffing, but this is not always true. While many possible variables can affect quality, three will be discussed here: services provided, staffing, and tiered response.

Services provided In some communities, the same EMS organization delivers on-scene emergency care, non-emergency care, and transportation. This arrangement is common for private or community not-for-profit providers. In other places, one service (such as the fire department) will respond to calls from “emergent” patients, and other services (such as a private ambulance company) will serve “nonemergent” patients. However, one study of calls classified as non-emergent found that almost 12 percent required paramedic-level

care. The study concluded that to ensure that no patient is missed, it is best not to classify calls into those categories.⁴

Ambulance staffing Staffing depends on the level of service provided. Basic life support (BLS) ambulances are traditionally staffed by two EMTs. Advanced life support (ALS) ambulances have a number of possible staffing combinations, including one EMT and one paramedic; one EMT-intermediate and one paramedic; and two paramedics. Each ALS option has its advantages, but all can satisfy the need for paramedic-level care.

Some communities use two paramedics because of the assumption that two advanced workers are better than one—and the belief that sharing the call volume will reduce burnout. But no study has shown that using two paramedics provides any advantage. Furthermore, a recent study sponsored by *USA Today* found that EMS systems with fewer paramedics actually save more lives.⁵ The fact that most calls do not require paramedic-level care, coupled with the difficulty of recruitment, is leading more communities to consider staffing ALS ambulances with one EMT and one paramedic.

Tiered response There is much debate about all-paramedic versus tiered ambulance systems. An all-paramedic system provides one level of service for all calls. A tiered system attempts to identify paramedic-level calls through standardized protocols used in the 9-1-1 dispatch interrogation process. Most of the units in a tiered system are staffed at the BLS level and are supplemented by ALS ambulances or by a single paramedic in a specially equipped vehicle. No studies have demonstrated that one model is better than the other, and the right choice depends on a host of local factors.

Training and Certification

When it comes to initial training and certification, EMS personnel have more in common with health care workers than they do with public safety colleagues. While police officers and firefighters are commonly hired from the local community and then trained to do their jobs, EMS workers typically pursue training on their own before seeking employment with an ambulance service.

The EMS Division of the U.S. National Highway Traffic Safety Administration establishes minimum standards for the training and certification of EMS workers. Each state is responsible for ensuring that those standards are satisfied and for regulating the certification process.

Nationwide, the four most typical levels of EMS certification are as follows:

- First responder
- Emergency medical technician–basic (EMT-B)
- Emergency medical technician–intermediate (EMT-I)
- Emergency medical technician–paramedic (EMT-P).

EMS and Quality Management

Given EMS's strong connection to health care and the role of physicians in providing oversight, it is not surprising that performance assessment strategies used in hospitals have been adopted in EMS. Quality management (QM), which originated in the manufacturing sector, has been a part of health care, including EMS, for more than thirty years.

Early QM initiatives focused on quality assurance (QA), which involved reviewing events that had already happened to see whether EMS staff had met a defined expectation. Later efforts focused on continuous quality improvement (CQI), a more systemic approach. CQI relies on data analysis to evaluate the system as a whole, ensuring that the structure and processes are effective and efficient so that people are able to perform at their best. CQI works through team building and by reducing the "us versus them" mentality that can characterize relations between workers and managers. Although identifying what to measure and developing CQI processes is not easy, new technology can help by automating data collection and making data analysis easier. Real-time data—information that is provided as it happens—is essential to management decisions that will lead to dramatic and lasting effects.

EMT-Ps, commonly referred to as paramedics, have achieved the highest level of EMS certification: in addition to having the training and skills of providers certified at the first three levels, paramedics are also trained in advanced assessment, airway management, and the treatment of a range of medical emergencies that may require the use of medication or advanced monitoring devices or interventions. Certification at the EMT-P level includes approximately ten times the training hours as EMT-B training and involves extensive clinical rotations in a hospital emergency department or an ambulance.

Common Clinical Issues and Risks

The clinical component of EMS carries significant risk from a number of quarters. EMS systems are high profile, and a mistake can land an ambulance service in the next morning's headlines. However, most risks can be reduced or eliminated through thoughtful effort. The following discussion describes how to minimize the risks associated with refusal of care, patient-care documentation, airway management, medication errors, and the assessment of spinal cord injury. These areas represent just a few of the risks involved in prehospital clinical care.

Refusal of care The goal of any EMS system should be to assess, treat, and transport every patient who requires care, yet only about 57 percent of EMS calls result in transport to a hospital.⁶ There are often good reasons for not transporting, such as false alarms and non-patient-related events, but it is estimated that 5 to 30 percent of patients who make contact with EMS workers *refuse* care, transport, or both.⁷

When a patient refuses treatment or transport, EMS personnel typically explain to the patient the results of their assessment and the risks of refusing treatment or transport; the goal is to ensure that the patient understands the significance of the decision.

Documentation of patient care The patient-care record documents each patient encounter and includes a description of what the patient said happened, the results of the assessment, and the treatment that was delivered. Effective documentation is critically important, not only to the patient but also to the organization providing the service. Failure to accurately document events leaves organizations vulnerable in the event of litigation; it may also reduce the potential for rightfully deserved reimbursement for services. Poor documentation of patient care is an avoidable risk for every system.

Airway management The first assessments performed by EMS workers involve checking that a patient's airway is open, that the patient is breathing, and that he or she has an adequate pulse. Intubation, in which a tube is inserted through the patient's mouth or nose into the trachea, is a key paramedic intervention used to facilitate breathing. While intubation is not difficult in routine cases, it does require an understanding of anatomy, and regular practice is needed to maintain competence. If done incorrectly, intubation can compromise the patient's oxygen supply and result in death.

The American Heart Association recommends that paramedics perform six to twelve intubations per year to maintain proficiency, but this is not possible in many communities.

Medication errors Paramedics are taught that before administering medication, they must check that they have the right patient, the right medication, and the right administration route. In addition, they learn to calculate dosage levels quickly and accurately in uncontrolled environments. Often, however, this initial introduction to medical mathematics may be the only instruction paramedics receive in how to make these important calculations; refresher training is rare, leaving many paramedics to figure things out as they go.

One study that gave a medical-calculation test to practicing paramedics found that only 50 percent of their answers were correct.⁸ Responses to questions requiring simpler calculations were correct two-thirds of the time, but responses to more complicated questions, involving patient weight, were correct only one-third of the time. The participating paramedics said that limited exposure and little continuing education contributed to their poor performance.

The potential for medication errors—and resulting adverse effects—is a major concern for three reasons: (1) paramedics administer medication relatively infrequently,

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(2) opportunities for continuing education are limited, and (3) providers' comfort level with complex math varies. Organizational commitment, active medical direction, and regular refresher training can ease the problem.

Spinal cord injury assessment and management Motor vehicle accidents and falls make up a significant percentage of traumatic injuries. Since these events carry the potential for spinal cord injury, proper assessment is key. Having to assess a patient for potential spinal injury is one of the most common scenarios for EMS workers.

For more than a decade, clinical researchers have been accumulating evidence on the value of specific assessment criteria in determining whether a patient has a potential spinal injury. Changing EMS procedures to be consistent with this growing body of research will reduce the risk of missing a potential injury, reduce the likelihood of over-treatment, relieve the workload of EMS personnel, and reduce hospital costs.

OPERATIONAL VITAL SIGNS

Key considerations when evaluating EMS operations include response times; communications services; recruitment, supervision, and development; and the effective use of technology.

Response Times

Because it has the appearance of objectivity, response time is the single key operational measure used to assess performance from the patient's perspective. Often, however, this seemingly straightforward measure is misunderstood, is calculated in ways that make benchmarking difficult, and is not independently validated.

Response time standards There is no universally accepted standard for response time. In urban areas, the most widely used standard is eight minutes and fifty-nine seconds (8:59), with 90 percent compliance (i.e., 90 percent of calls must be responded to within eight minutes and fifty-nine seconds).⁹ When adjusted to include call-processing time, this target is consistent with the response time recommended by the National Fire Protection Association. In fact, a recent survey of the 200 most populous cities in America found that 77 percent of respondents report a target of 8:59 or less.¹⁰

In the absence of a regulatory standard, court proceedings provide some guidance. In litigation, experts often cite 8:59 as the standard of care. In suburban and rural areas, however, or for non-life-threatening calls, it is common to set a slightly longer target response time on the basis of geography and call-density patterns.

Reporting response times The method by which response times are measured may be as significant as the target.

Historically, averages were used: for a designated period, all the response times were added, and the result was divided by the number of responses. Recently, however, the fractile method has become more widely accepted. This approach (1) sets a target response time for a particular type of call and (2) identifies a percentage that represents compliance for that goal. Thus, the target may be different for a response to a patient experiencing potential cardiac arrest than for a patient experiencing flulike symptoms.

Figure 1 outlines the anatomy of an EMS incident; Table 2 describes the subprocess components shown in Figure 1 and lists benchmark time intervals for each.

Improving response times Historical analysis of where and when calls occur can help predict demand. Best practice in busy systems is to plan resources and support services around demand rather than to use a static, one-size-fits-all shift pattern. Best practice also calls for deployment and redeployment strategies that reflect the ebb and flow of calls throughout a shift.

“Chute time”—the time it takes to get a unit rolling to a call—is a critical component of response time. Equally important is “at hospital” time—the time it takes for a crew to become available again after it arrives at a hospital. In the past two years, Las Vegas and a number of other cities have reported that overcrowding in the emergency department and reduced bed capacity have increased at-hospital times. These two factors prevent crews from quickly transferring a patient to a hospital stretcher or bed and becoming available for the next assignment. In one system, reducing at-hospital time had the net effect of adding another ambulance—staffed on a twenty-four-hour basis—to the system.¹¹

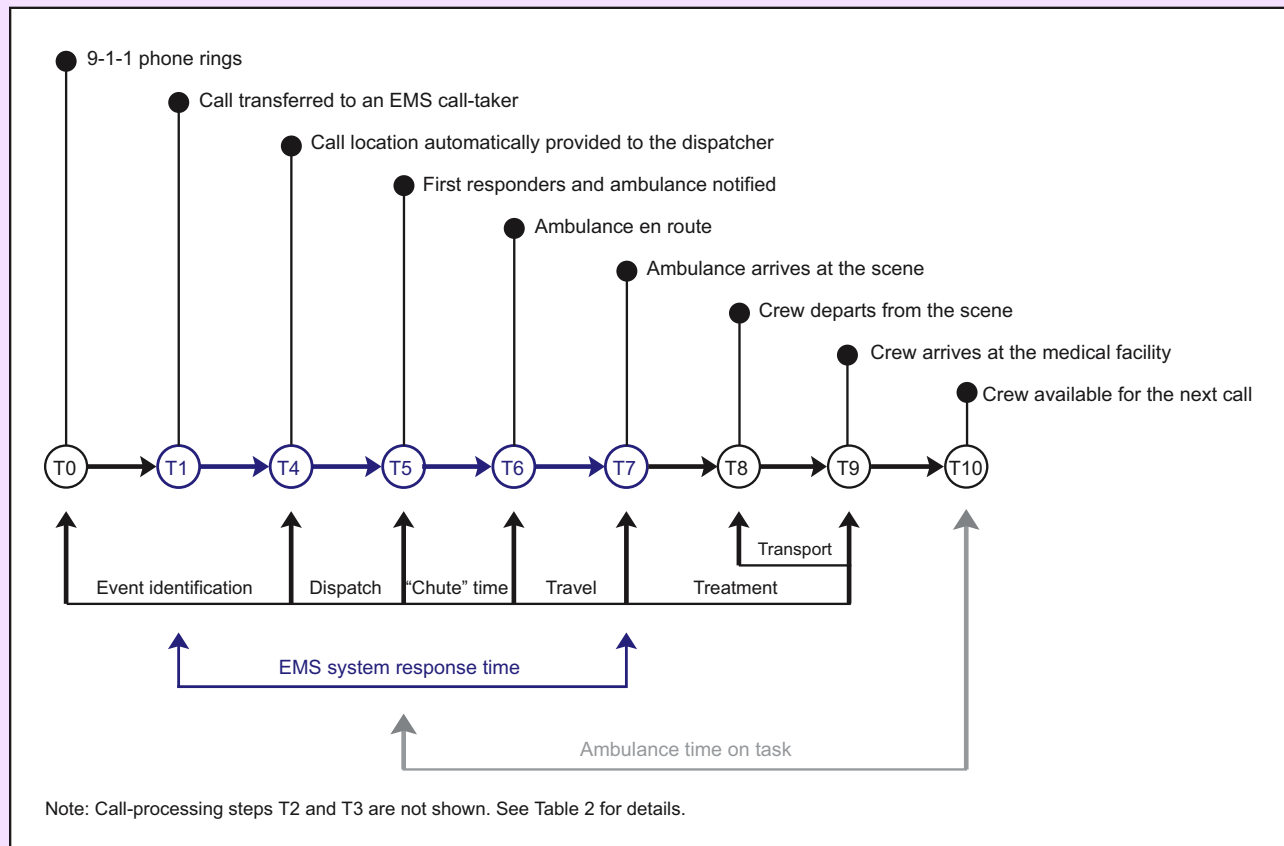
A number of steps can be taken to improve response times:

- Closely monitor subprocess component times (such as chute time and at-hospital time).
- Arrange for an objective third party to externally validate response times. Use an independent auditor to routinely check a random sample of response times against computer records and 9-1-1 tapes.
- Require reports (1) describing any exceptions to response times and the reasons that the exceptions occurred and (2) detailing any corrective actions taken.

9-1-1 Communications Services

A well-trained dispatcher can be the *first* first responder for the community and is critical to the smooth running of the EMS system. The goal of effective emergency medical dispatching (EMD) is to send the right EMS resources to the right person, at the right time, in the right way, and to provide the right instructions for patient care until help

Figure 1. Anatomy of an EMS Call



arrives. The five elements central to an effective EMD program are

- Use of medical dispatch protocols
- Provision of pre-arrival and post-dispatch instructions
- EMD training
- EMD certification
- EMD quality control and improvement processes.

At a minimum, effective provision of EMD requires (1) agreements on service levels between the 9-1-1 center and the provider and (2) problem-resolution procedures for the communications center. EMD staff should meet the training and certification standards established by the National Academies of Emergency Dispatch (NAED). Best-practice systems obtain NAED accreditation.¹²

Staff Recruitment, Supervision, and Development

The EMS workforce is changing. In some areas, volunteers provide much of EMS; yet it is increasingly difficult to recruit and retain volunteers. In other areas, paid staff are leaving the field at an alarming rate, often citing job stress,

poor working conditions, lack of promotional opportunities, and poor compensation. These changes are significantly affecting the way EMS organizations recruit, retain, and supervise staff.

EMS workers typically operate in a decentralized station environment, so contact with management is often limited. In addition, supervision is often split between clinical and administrative supervisors, and differences in style between these personnel can cause confusion for workers. Crew members work in high-stress environments and form tight bonds within working groups, so close friendships are not uncommon. These factors require particular attention when developing policies, facilitating professional interactions, and ensuring fairness.

Managers are often promoted from within the profession without adequate preparation, and development opportunities have historically been limited. The U.S. Fire Academy and the American Ambulance Association (AAA) offer certification programs for EMS managers. The AAA Ambulance Service Managers Program identifies forty-one “career compass competencies” needed for the industry.

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Table 2. EMS Time Intervals and Benchmarks

Time Interval	Description of Time Interval	Recommended Fractile Benchmark
T0–T1	Length of time between when the 9-1-1 call is received at the public safety answering point and when it is transferred to an EMS answering point	<30 seconds; 90% reliability
T1–T2	Length of time between when the phone rings at the EMS answering point and when the call-taker picks up	<5 seconds; 90% reliability
T2–T3	Length of time between when the call is picked up and when the incident type and location are verified	<25 seconds; 90% reliability
T3–T4	Length of time between verification of the incident location and transfer of the call details to the dispatcher's screen	<5 seconds; 90% reliability
T4–T4.1	Length of time between verification of the location and conclusion of emergency medical dispatch (may occur at any time between T4 and T7)	Establish benchmarks by call type
T4–T5	Length of time between when the call appears in the to-be-dispatched queue and when it is actually dispatched to a crew	<25 seconds; 90% reliability
T5–T6	Length of time between when the crew receives the call and when the crew is en route to the call (wheels turning)	<45 seconds; 90% reliability
T6–T7	Length of time between when the crew is en route and when it arrives at the incident scene	Actual travel time (assuming a total response time of 8:59, this component would be 434 seconds)
T7–T7.1	Length of time between when the crew arrives at the location and when it reaches the patient	Establish benchmarks for quality improvement purposes (e.g., for critical patients, patients in high-rise buildings, and inaccessible patients)
T7–T8	Length of time between when the crew arrives at the scene and when it departs for the destination	<15 minutes; 90% reliability (depending on protocols)
T8–T9	Length of time between when the crew departs from the scene and when it arrives at the destination	Actual travel time
T9–T10	Length of time between when the crew arrives at the destination and when the crew becomes available for further work	<15 minutes; 90% reliability (additional benchmarks may be required for incidents of varying severity)
T10–T11	Length of time between when the crew becomes available and when it departs from the destination	Establish internal benchmark
T11–T12	Length of time between when the crew departs from the destination and when it arrives at its designated post	Establish internal benchmark

Note: Response time is typically computed as the elapsed time between T2 and T7 for the first-arriving transport-capable ambulance. It is also appropriate to measure the same interval for first responders. However, to avoid confusion about reporting methods, response times for the first transport-capable ambulance and for first responders should be recorded and benchmarked separately.

Effective Use of Technology

In recent years, significant resources have been dedicated to technologies designed to improve medical documentation and productivity in the EMS environment. These technologies include clinical devices, communications devices, and computer-aided dispatch (CAD).

Clinical devices Before purchasing the latest technology, a community should seek guidance from physician medical directors and from articles published in peer-reviewed medical journals. In some cases, existing devices and phar-

maceutical treatments provide the same results at a fraction of the cost of the latest gizmo on the market.

Computer-aided dispatch Police, fire, and EMS systems use and process incident information differently. For example, fire dispatching is less stressful at call reception than either police or EMS dispatching but is often more intense when it comes to on-scene incident management.

The deployment and staging methodologies used by different agencies also affect the level of CAD sophistication required. Geographic information systems are critical

when planning ambulance deployment and future capital infrastructure requirements.

Medical documentation technology Taking information that has been recorded by medics and transferring it to a format that meets the needs of receiving hospitals, quality improvement and research staff, billing departments, and myriad other users is a constant challenge. Current methods include entering handwritten reports into a database, scanning paper forms, and using laptop computers in ambulances. The advantages created by (1) rapid processing, (2) the ability to integrate data into separate billing systems, and (3) paperless medical-record retrieval are moving agencies toward scanned and laptop solutions.

Biosurveillance First-generation integrated surveillance software systems have been installed by dozens of 9-1-1 centers in the United States, covering more than 17 million citizens. These systems poll 9-1-1 data in real time, searching for recorded symptoms that may be associated with a specific disease or event. These data are then compared with historical records to see if any significant trends occur; the system automatically triggers an alert when anomalies are found. These systems are designed so that an agency can switch on enhanced features as needed, as in the case of an elevated national alert or a local, regional, or statewide threat. When posted on a secure Web site, these data can be reported to, and monitored by, public safety agencies in an effort to discover trends that may signify a threat, such as an emerging epidemic or a bioterrorist attack.

FINANCE IN EMS SYSTEMS

Providing EMS at an appropriate level of responsiveness and quality requires a significant investment. Because EMS is a service industry, the majority of costs—between 55 and 80 percent—are allocated to personnel. (The wide variation is linked to the provider type and to whether the service is urban or rural.)

The most expensive aspect of EMS is ensuring that resources are adequate to achieve the targeted response times. In fact, target response times are the primary determinant of cost: similar systems will have significantly different costs if one is required to respond to 90 percent of life-threatening emergencies within eight minutes and the other is required to respond to 90 percent of such calls within ten minutes.

Funding Sources

Most EMS systems depend on multiple funding sources. Primary sources include fee-for-service reimbursement, tax subsidies, membership programs, and donations.

Most EMS systems derive the largest portion of their funding from fee-for-service reimbursement; for some systems, reimbursements are the sole funding source. The funds are collected from patients, Medicare, Medicaid, and insurance companies. Other EMS systems rely on a combination of reimbursements and local tax support. Many volunteer ambulance organizations depend on public donations or on the sale of memberships to support their operations. Hospitals that operate their own services may indirectly subsidize the cost of their EMS operations from other sources.

Many EMS systems are feeling the effects of decreased funding from both fee-for-service reimbursements and municipal support. This is happening for two principal reasons. First, payers for ambulance services—such as Medicare, Medicaid, and insurance companies—are limiting reimbursements for ambulance services. Second, in many municipalities, budgetary shortfalls have limited the amount of support available for EMS.

The decreases in insurance reimbursement and municipal support are endangering the financial viability of many ambulance services. In fact, many EMS systems have had to modify their design and performance requirements to increase efficiency, and a number have had to extend their response times to balance costs with available funds.

Reimbursement

This section examines a range of factors that can influence the level of reimbursement, including payer mix, subsidies, price increases, and billing processes.

Payer mix The payer mix, defined by the groups of primary payers for ambulance services, varies widely among EMS systems. Payers include Medicare, Medicaid, commercial insurance, private payers, and managed care organizations. An economically depressed community with a large portion of Medicaid recipients and indigent patients will have a significantly lower collection rate than a suburban community with a high percentage of patients covered by commercial insurance.

Medicare is the largest payer for ambulance services. Until 2002, Medicare based reimbursement for ambulance services on historical charges for the region and the type of service provided. As a result, EMS systems in some parts of the country received as much as 300 percent more than other systems for the same service. To address this disparity, in April 2002 Medicare began phasing in a national ambulance fee schedule. (The phasing-in process should be largely complete by January 2006.) Under the new schedule, reimbursements have increased for approximately half the ambulance services in the country and decreased for the other half—in some cases by as much as 50 percent.

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One of the most significant effects of the new schedule is that emergency response, whether ALS or BLS, has been recognized as the most expensive aspect of providing ambulance services and is now reimbursed at a higher rate.

Medicaid is a state-managed program that generally provides for reimbursement for health care, including ambulance services. Each state determines what services are covered and the reimbursement levels. Although the rules and regulations vary widely by state, one thing is common to all states: Medicaid reimbursements for EMS typically are far below the costs of service provision.

Commercial insurance companies typically reimburse 80 to 100 percent of charges. Many EMS agencies set their rates to include the cost of unreimbursed care provided to Medicare, Medicaid, and uninsured clients. This cost shifting is common among hospitals and other health care providers, but the result is that commercial insurance pays a disproportionate share of the cost for services.

A large percentage of the U.S. population is not covered by health insurance, and these people are therefore responsible for paying their own costs for ambulance services. A very small percentage of fees (between 5 and 15 percent) is collected when patients without health insurance are transported by ambulance services.

The relationship between subsidies and price To recoup funding lost through reductions in subsidies, EMS organizations must increase prices by significantly more than the dollar amount of the lost subsidy. Whether an EMS organization will succeed in recouping lost funding depends on its collection rate and average patient charge. For example, if an EMS system collects only 50 percent of its fees for services, it will need to charge an additional \$2 for every \$1 lost in subsidies.

Thus, if the ambulance service must *collect*, on average, \$270 per transport to fund its operations and if a subsidy of \$270 per transport is provided, the rate that must be charged equals zero. But if no subsidy is provided, the average patient charge goes up to \$500. Why is it that, in the absence of a subsidy, the average patient charge is so much higher? Because it is unlikely that the full \$500 will be collected.

Raising prices Raising prices is one strategy EMS systems often use to fund increases in operating costs. But because payers such as Medicare and Medicaid reimburse a fixed amount, regardless of the rate charged, this approach may provide a limited increase in the amount collected.

Figure 2 illustrates how rate increases affect collections: since Medicare and Medicaid reimbursements are fixed, and since patients who lack insurance or who are in the self-pay category will also bring minimal increases

Community Defibrillation Programs

One indicator of a superior EMS system is community involvement, and community defibrillation programs are an example of such involvement. More than 250,000 people die each year of sudden cardiac arrest. Although most victims of heart attacks can be saved if they are treated with an electric shock within the first few minutes, most ambulances cannot get to the scene quickly enough. Because automated external defibrillators (AEDs), machines used to deliver the electric shocks, can be used by anyone with minimum training, others already at the scene can become first responders. Champions within ambulance services often bring together business, public safety, and public health leaders to create a comprehensive early defibrillation program in their communities to augment the efforts of the formal EMS system.

in collections, the incremental increase in reimbursement that occurs when rates are raised will come from private insurance companies.

Billing process and benchmarks Because of variations in the mix of payers and service levels, it is difficult to compare reimbursement performance among services. Nevertheless, it is important to analyze four benchmarks internally as well as against similar services: the collection rate, the number of days in accounts receivable, the number of process days, and the denial rate.

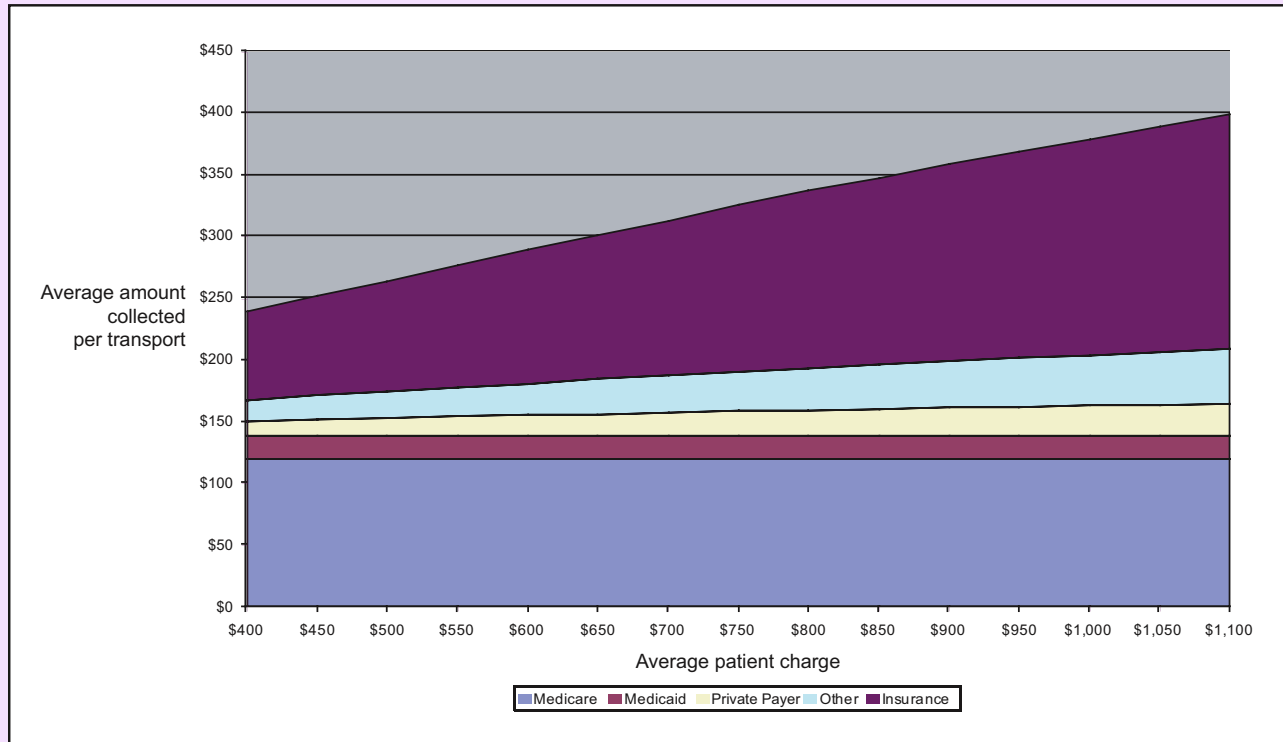
Collection rate Many services measure the collection rate by first eliminating contractual allowances—that is, those amounts that the service agrees to write off, as in the case of Medicare and Medicaid. Since EMS systems are obligated to accept what Medicare and Medicaid allow as payment in full, they may report a collection rate of 85 to 90 percent, but these figures do not reflect the prior adjustments and can be misleading.

A more accurate approach compares the gross charges (before contractual allowances and bad debt) to the actual cash receipts. Under this approach, a collection rate between 45 and 60 percent is a realistic expectation.

Days in accounts receivable The number of days in accounts receivable (AR) is calculated by taking the total amount owed to the service and dividing it by the average daily charges. The industry standard for reporting days in AR compares gross accounts receivable (prior to any write-offs of contractual allowances or bad debt) against average daily sales. Sixty to 90 days is an appropriate benchmark for days in AR.

Process days One important benchmark for billing processes is the timeliness of various activities, such as the filing of a claim for insurance reimbursement after the date of

Figure 2. How Rate Increases Affect Collections



service. Many services strive for a three-day turnaround between the date of service and the filing of claims.

Denial rate The Medicare denial rate represents the number of claims initially denied by Medicare. Often, denials are caused by poor documentation. Appropriate documentation and processing should limit the denial rate to less than 5 percent.

Billing Options

Because the rules and regulations for filing ambulance service claims, particularly with Medicare and Medicaid, are complex and change rapidly, many EMS systems outsource billing and collection to companies that specialize in these areas. These companies provide such services as proper coding (required for reimbursement), verification and data entry, and follow-up on delinquent accounts.

Organizations that outsource billing and collection can expect to pay between 6 and 10 percent of the net collections to the billing and collection company. Often, the expertise available from these companies increases collection rates, more than offsetting the cost of their services.

Organizations that retain billing and collection internally must allocate adequate resources to the function. It is also important to develop a comprehensive compliance

program to ensure that billing and collection comply with the various payers’ rules and regulations.

Comparing Private and Public Service Delivery Costs

Many communities find themselves needing to compare the cost of EMS provided by a private ambulance service with the cost of provision by a public entity or a hospital. This does not make for an easy “apples to apples” comparison.

Calculating the cost of a private service is generally straightforward. Under general accounting practices, all direct and indirect costs are typically available in the organization’s financial statements. In certain circumstances, however, costs may not be clearly attributable to a specific service area; for example, when a private company serves a number of contiguous communities, it may be difficult to isolate the costs for one municipality within that area.

Cost allocations should be based on the number of staffed ambulance hours required to provide the necessary level of response and transport for the specific area. Allocations for activities such as training and dispatch should also be included. Whenever the costs of a private service are evaluated, it is important to identify any corporate allocations for overhead or other expenses, and for expected profit margins.

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Most public agencies and hospital services intermingle the costs of EMS with those of other departmental activities, making it difficult to isolate costs. When attempting to compare costs, it is important to consider both direct and indirect costs. In the case of government and hospital services, indirect (overhead) costs include management and training expenses. For example, in a fire department, medical responses may account for 80 to 90 percent of a department's total response load, and overhead costs should be allocated accordingly.

Once *departmental* overhead costs have been identified, it is necessary to evaluate *municipal* overhead costs. Areas to examine include

- Legal expenses
- Liability risks and self-funded insurance
- Human resource expenses
- Benefits, including health insurance and retirement
- Accounting expenses
- Facility expenses
- Information technology costs.

Many public agencies attempt to identify the marginal or incremental cost of providing EMS. While this may be appropriate, activity-based costing processes must be used to ensure that *all* costs incurred in the provision of EMS are identified.

Comparing Urban and Rural Service Delivery Costs

As noted earlier, staffing ambulance crews is the most expensive aspect of emergency medical services. Even though the demand for service is significantly lower in rural areas, crews must be deployed over a wide geographic area, which drives up costs. In urban systems, where the number of transports is higher, overhead costs are distributed over a larger base, reducing the cost per transport. Also, because the time per call is typically less in urban areas, employee productivity is higher.

Table 3 compares costs per transport in urban and rural areas. The urban service transports one patient approximately every three hours of staffed ambulance time, while the rural service transports one patient every eight hours of staffed ambulance time. If each ambulance is staffed twenty-four hours a day, seven days a week, for the entire

year (8,760 hours per year), the urban transport rate results in approximately 2,920 transports per year, while the rural transport rate results in 1,095 transports per year. Even though the overall costs of the urban service are higher, the cost per patient transport in the rural system is more than twice that in the urban system.

The Centers for Medicare & Medicaid Services, which administers Medicare and works in partnership with states on Medicaid, has recognized the dramatically higher costs of providing EMS in rural settings. In fact, legislation is being considered to increase Medicare reimbursement rates for rural areas.

KEYS TO EFFECTIVE PROCUREMENT

The goal of an EMS procurement process is to establish a level playing field in which different vendors' offers can be objectively evaluated. Qualified providers cannot be expected to participate in a procurement process without reasonable assurance that the award will be made fairly and objectively.

If a municipal EMS system wants to submit a proposal, common practice is to ensure that the process is conducted by a panel of knowledgeable, independent reviewers (often including individuals from outside the local area) who evaluate the proposal against a set of defined criteria and make a recommendation to the local governing body.

The American Ambulance Association recommends five steps in the selection process:

1. Use staff who are experienced in EMS design.
2. Determine the competitive variables (e.g., service levels or price) for the procurement.
3. Establish standards for reviewers to apply to bids.
4. Create an impartial evaluation team with objectively identified competencies.
5. Clearly outline the proposal process, including how many points will be awarded for each criterion and how the criteria will be weighted and totaled.¹³

When a competitive sealed proposal is used, an evaluation panel composed of technical, financial, legal, and purchasing experts selects the proposal that represents the best combination of cost, qualifications, technical approach,

Table 3. Cost Comparison for Hypothetical Urban and Rural EMS Systems

	Number of Transports per Staffed Ambulance Hour	Annual Hours of Coverage	Annual Number of Transports	Cost of Service Provision (\$)	Cost per Transport (\$)
Urban	0.33	8,760	2,891	650,000	222.60
Rural	0.125	8,760	1,095	500,000	456.62

performance commitments, past performance, and other factors described in the request for proposals.

CONCLUSION

Ambulance service is often one of the highest-profile services a community provides or contracts for on behalf of its citizens; lives literally depend on emergency medical services—every second, every day, everywhere. Yet in most communities, EMS is regularly being asked to do more with less and exists in an environment characterized by labor difficulties, funding and reimbursement struggles, increasing service demands, and other challenges. Even in systems where everything seems fine, an otherwise excellent service can suddenly find itself facing public outrage because of a high-profile medical mistake or a serious traffic accident involving an ambulance.

With so much at stake, prudent civic leaders can reduce their risk by educating themselves about how EMS works and by becoming involved in their local EMS system. The knowledge gained, like the EMS system itself, is something that no one ever wants to have to use—but it's comforting to know it's there.

ADDITIONAL RESOURCES

Web Resources

For more on the attributes of a sustainable system (e.g., accountability, transparency, and economic efficiency) and to learn how to evaluate whether a service has them, visit www.fitchassoc.com/icma for a free whitepaper. This site will also provide quick Web links to other resources cited in this report.

American Ambulance Association, “Community Guide to Ensure High-Performance Emergency Ambulance Service”

“EMS Agenda for the Future” (a collaborative effort among EMS organizations to develop goals for improving emergency care)

Organizations

Advocates for EMS (www.advocatesforems.org/)

American Ambulance Association (www.the-aaa.org/)

Centers for Medicare & Medicaid Services, Ambulance Services Information Resource (www.cms.hhs.gov/suppliers/ambulance/)

Commission on Accreditation of Ambulance Services (www.caas.org/)

International Association of Fire Chiefs (www.iafc.org)

International Association of Fire Fighters (www.iaff.org)

National Academies of Emergency Dispatch (www.emergencydispatch.org/)

National Association of EMS Physicians (www.naemsp.org/)

National Association of State EMS Directors (www.nasemsd.org/)

National Highway Traffic Safety Administration (www.nhtsa.dot.gov)

National Registry of Emergency Medical Technicians (www.nremt.org)

Supplementary Documents

Click here to see the 2004 Community Report from the Mecklenburg EMS Agency in North Carolina. This report details the characteristics and achievements of Medic, the Mecklenburg County (North Carolina) Emergency Services Agency, an exemplary EMS program.

1 D. M. Williams, “2004 JEMS 200-City Survey: A Snap Shot of Facts and Trends to Allow You to Make Benchmarks for Your Service,” *Journal of Emergency Medical Services* 30, no. 2 (February 2005): 42–60.

2 Ibid.

3 E. M. Racht, personal communication, March 31, 2005.

4 B. Wilson et al., “Unexpected ALS Procedures on Non-Emergency Ambulance Calls: The Value of a Single-Tier System,” *Prehospital and Disaster Medicine* 7, no. 4 (October-December 1992): 380–382.

5 R. Davis, “Inverse Lifesaving Function? More Paramedics Does Not Equal More Lives Saved,” *USA Today*, 2 March 2005, D-1.

6 Williams, “200-City Survey.”

7 S. Knight et al., “Against All Advice: An Analysis of Out-of-Hospital Refusals of Care,” *Annals of Emergency Medicine* 42, no. 5 (November 2003): 689–696; J. E. Hipskind, J. M. Gren, and D. J. Barr, “Patients Who Refuse Transportation by Ambulance: A Case Series,” *Prehospital Disaster Medicine* 12, no. 4 (October-December 1997): 278–283.

8 M. W. Hubble, K. R. Paschal, and T. A. Sanders, “Medication Calculation Skills of Practicing Paramedics,” *Prehospital Emergency Care* 4, no. 3 (July-September 2000): 253–260.

9 Defined on a fractile, not average, basis, and including all time intervals between the time the service received enough information to initiate a response and the time when a properly equipped and staffed unit arrives at the scene.

10 Williams, “200-City Survey.”

11 KPMG/Fitch & Associates, *Emergency Response Department: Report to Council* (Edmonton, Canada: February 2000).

12 For additional information about communications, see Keith Griffiths and Greg Scott, “911 Center Operations,” *IQ Report* 36, no. 6 (June 2004).

13 Standards for conducting a performance-based contracting process are outlined in Stephen B. Gordon, “Performance-Based Contracting,” *IQ Report* 33, no. 6 (June 2001).

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**Volume 37/Number 5
2005**