

Major Factors That Affect the Costs of Providing EMS Services

The cost of providing EMS services varies considerably among EMS systems, and it has been historically difficult and even politically challenging to document and characterize those differences. During the negotiated rule-making for the ambulance fee schedule in 1999, attempts by the Project Hope Foundation to study the cost of providing EMS services were frustrated by a limited access to data, difficulties in defining marginal, direct, and indirect costs, the significant variations in the organization and funding of EMS systems, and other factors.⁴ Although we might not be able to accurately characterize the relative cost by system type (volunteer, career, fire, private, public utility), we are able to describe the various factors that influence the cost of care provided by an EMS system.

Personnel

Personnel costs can be a significant percentage of the overall cost of providing EMS, and they vary considerably depending on the type of service. Government services such as fire departments tend to have higher personnel costs than private services. There are regional variations in the costs of labor, with costs tending to be somewhat higher in urban areas.⁵ Personnel costs also increase with the level of service provided, especially at the specialty care level. The cost of a medical director is a small but important factor in systems that pay or otherwise reimburse this person.

Volunteer systems generally have lower personnel costs than career systems, but there can be costs associated with recruitment and retention, which are quite challenging. Also, volunteers might receive certain benefits, including Worker's Compensation, tax credits, scholarships, training, and others. Frequently, volunteer EMS organizations are combination systems with career providers on duty during certain times of the day or week and volunteers at other times.

Personnel costs associated with training can be significant, especially in career systems that provide the initial and continuing education training for EMS providers.

Supplies

Supplies and equipment are generally not as significant a cost factor for EMS services as that of person-

nel. The cost of supplies and equipment varies significantly depending on the level of service provided. There are somewhat less regional variations in the costs of supplies and equipment than with personnel. Protocols can have significant impact on the cost of medications or medical equipment. Bulk or cooperative strategies for purchasing can reduce costs.

Call Volume

The volume of calls for EMS services varies considerably based on population and demographics. Total operating expenses go up as patient volume increases; however, the actual cost of service per patient is greater in low-volume services because insufficient numbers of patients consume the fixed costs of providing service.⁶ In Maryland and other states, there is a bimodal increase in demand by age, with a slight increase in demand between ages 15 and 25 and a sharp increase in demand after age 65. Communities with older populations can have higher utilization rates.⁷ Urban communities also experience higher utilization rates than suburban or rural communities.⁸

Call Time

The average time spent on a call can affect the cost. Situations that increase the time required to access, treat, or transport patients all contribute to increasing the average time on a call. In rural areas, geographic barriers and long distances can have a significant impact. In urban areas, heavy traffic, high-rise buildings, and crowds are factors. Emergency department crowding that prevents EMS providers from unloading patients or causes them to seek alternative destinations can have an impact on both urban and rural EMS systems.

Quality

EMS systems vary considerably in the level and quality of the services they provide to their communities. Generally speaking, quality EMS comes at a cost. This is not intended to imply that cost is the only factor that has an impact on the quality of care. Certainly, many EMS systems have improved the quality of care without increasing costs through vigorous quality management processes and improved efficiency. However, providing ALS service is more expensive than providing BLS service only. More ambulances and/or the use of first responders might be necessary to achieve acceptable response times. In

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systems with large geographic areas to cover, air medical transport services might be needed, adding significant costs. Communities and their EMS systems must balance the cost of providing quality EMS with the resources available and the demands for service. This is frequently a difficult task in which the medical director should have a central role. In particular, the medical director must be prepared to explain the cost and benefit of various options under consideration.

Negative and Positive Cost-Affecting Factors

Just as EMS systems vary in their configurations, they also vary considerably in their ability to provide an equivalent service at a given cost.² The inherent efficiency of a given EMS system can be affected both positively and negatively by a variety of factors. Some of these factors are fixed characteristics of the system or community, while others are affected by efforts to improve efficiency.

Organizational Configuration

The organizational configuration of the service can have a major impact on costs. Volunteer systems reduce the cost of labor, and in many communities in the United States they provide efficient and reliable, quality EMS services. Volunteer services, however, are not without other characteristics that negatively affect performance. Volunteerism tends to be cyclic, and there are times when it is not possible to maintain enough volunteers to adequately respond to calls for service. Volunteer systems also begin to have increasing difficulty recruiting and maintaining personnel when call volumes begin to place excessive demands on the volunteers, or when economic downturns require volunteers to seek supplemental employment. In communities that have the resources, career EMS providers might be employed to supplement the volunteers. In these combination systems, the community still benefits from lower labor costs while maintaining a level of service acceptable to the community.

Fire Departments

Fire departments provide EMS services in many communities, and some have a role in one or more of the components of the EMS system. Typically, fire departments are able to provide timely first responder

service. Most capacity fires in a decade signify additional existing firefighter. Fire fighting the achievement balance can be cost-effective.

Match

Low-volume more cannot many patients per care to award limit the low-population. In that the 1 and 911 nature established overall revenues from are used to ically have patients. The provide (ity) offered awarded the incorporated with the go costs. A number of agencies can be in status in

System Status System status matching res services is fa day of week

service area. When these patterns are known, staffing and placement of units can be matched to demand for services. When successfully implemented, SSM results in maximal performance for the investment. On the negative side, some have argued that SSM creates excessive stress for providers because personnel typically have little idle time and might have no fixed base to which they can return.¹⁰

Tiered-Response Systems

Other strategies have been used with varied success in attempts to increase EMS system efficiency. Some systems have deviated from trends toward a specialized production model (which typically has a tiered response with ALS and BLS units) and have moved toward a single production model with ALS only.¹¹ The argument for tiered-response systems is that the need to provide a rapid ALS response can be reduced by deploying more readily available BLS units that can respond more quickly and can handle most transports. Others have argued that tiered systems are inherently inefficient because specialized units reduce the flexibility of system managers to match resources to demand and commonly require two ALS providers on each ALS unit.

Protocol Development

Although many of these approaches to reduce costs require the implementation of moderately sophisticated strategies, there are less onerous approaches that also yield cost savings. Some of these approaches involve development of medical and dispatch protocols that guide the appropriate use of resources such as first responders and air medical transport. Protocols might also be useful in reducing the routine use of interventions that are likely to have little or no benefit to the patient. The stocking of expensive medications that will have a low frequency of use and that will not result in any improvement in outcome in a particular community is one such example.¹² In such cases, the participation of a knowledgeable medical director who has good system and patient data is essential to safely ensure that the community gets the best outcome for the least cost. By using a public health approach, a medical director can balance resource availability with community needs to achieve the best outcomes.²

Cost Versus Outcome

When considering variables that have an impact on the cost of providing service, the impact on outcome of



Figure 8-1 In a study of the effectiveness of helicopter transport of trauma patients, the magnitude of survival benefit was the most important factor in determining cost-effectiveness.

those variables must be considered. **Cost-effectiveness** can be measured as a ratio of total cost to outcome benefit. This model, in theory, can be used to compare the cost-effectiveness of one EMS system to another or a particular EMS intervention to other medical interventions. Unfortunately, EMS has been and remains challenged in measuring both the cost and the outcome of EMS systems and interventions.¹³

The importance of outcome cannot be overstated. In a study of the effectiveness of helicopter transport of trauma patients, the magnitude of survival benefit was the most important factor in determining cost-effectiveness¹⁴ (Figure 8-1). However, relatively few EMS systems have good data on patient outcomes; overall, relatively little evidence has been published as to the overall clinical effectiveness of EMS or its effectiveness in treating specific clinical conditions.^{15,16} Additionally, many of the studies have conflicting conclusions, likely confounded by the myriad of variables that exist in complex EMS systems. These factors make it difficult for EMS system managers and medical directors to make decisions regarding which clinical interventions a system should implement, curtail, or eliminate. One project funded by the National Highway Traffic Safety Administration (NHTSA) has published a list of outcomes referred to as the **five D's (death, disability, discomfort, destitution, and dissatisfaction)** in an attempt to standardize future research efforts to measure the effectiveness of EMS.¹⁷

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One study has suggested that two-tiered systems have reduced response times and have resulted in better outcomes with out-of-hospital cardiac arrests.^{18,19} On the other hand, the relative benefit of two-tiered versus all-ALS response remains unclear and could depend on the characteristics and resources of the community.¹¹

Studies have looked at the outcomes for specific EMS interventions, such as endotracheal intubation. In one study of trauma patients, out-of-hospital endotracheal intubation was associated with a favorable impact on survival with good neurologic outcome.²⁰ In another study, endotracheal intubation of children was not associated with an improvement in outcome.²¹

Despite the limitations, there have been studies that have attempted to compare EMS interventions to other traditional health care interventions. In Tucson, Arizona, the cost-effectiveness of EMS treatment of out-of-hospital cardiac arrest was greater than heart, liver, and bone marrow transplants, as well as curative chemotherapy for acute leukemia.²² In Ontario, a study of the cost-effectiveness of rural first responder defibrillation demonstrated a higher cost per life saved than in urban areas, but it was still economical when compared to other common treatments for life-threatening illnesses.²³

What is clear is that more research is required.²⁴

Funding EMS Systems

There are two major categories of funding for EMS systems: **public funding** and **fee-for-service reimbursement** (which includes nongovernment contracts for service). There is, however, significant variation in the type of public funding and in the relative contribution of each category used to support EMS systems. Generally speaking, the organization configuration of the EMS system is a significant factor in determining how EMS services will be funded. Although private providers have traditionally relied more on fee-for-service reimbursement and government providers have relied more on public funding, those differences have lessened over the past several decades, especially in regard to responding to 911 calls. Increasingly, government and volunteer providers are billing for services, and private ambulance companies that provide 911 responses are increasingly dependent on some form of public funding. Even when the local EMS service provider is entirely funded by fees for service, certain com-

ponents of the EMS are funded, such as the response. The exception is ambulance companies that provide transport services and support services and, though technically they do not have the capacity, they do not have the requests for service ambulance companies generate alone.

The significant funding of EMS systems and the essential nature of EMS is an essential provider, or part of EMS is all of these funded by fees for service. Party payers are not for standby time, restructure such as systems, and maintain mass casualty situations the federally funded reimbursing below will pay only if the

Public Funding

Government-based departments and those funded through local taxes. In some cases, they receive funding through registration surcharges, vehicle violations. Some agency's funding, frequent particular advantages less affected by tax revenues.

Volunteer EMS on donations from significant challenges, especially since volunteer recruit and retain their time, particularly. Donations, like the economic downturn contract with them; however, significant percent