

The Prehospital Emergency Care System in Mexico City: A System's Performance Evaluation

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Abbreviations:

AAA = American Ambulance Association
AAA Guide = *American Ambulance Association Guide for Controlling Emergency Health Services*
ALS = advanced life support
BLS = basic life support
EMS = emergency medical services
EMT = emergency medical technician
IPN = National Polytechnic Institute (Mexico)
min = minutes
INEGI = National Institute of Statistics, Geography, and Informatics (Mexico)
NOM = Normas Oficiales Mexicanas (Official Mexican Standards)
RT = response time
SSP = Public Safety Secretariat
STPS = Social Provision and Labor Ministry
UNAM = National Autonomous University of Mexico

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Abstract

Introduction: Mexico City has one of the highest mortality rates in Mexico, with non-intentional injuries as a leading cause of death among persons 1–44 years of age. Emergency medical services (EMS) in Mexico can achieve high levels of efficiency by offering high quality medical care at a low cost through adequate system design.

Objective: The objective of this study was to determine whether the prehospital EMS system in Mexico City meets the criteria standards established by the *American Ambulance Association Guide for Contracting Emergency Medical Services* (AAA Guide) for highly efficient EMS systems.

Methods: This retrospective, descriptive study, evaluated the structure of Mexico City's EMS system and analyzed EMS response times, clinical capacity, economic efficiency, and customer satisfaction. These results were compared with the AAA guide, according to the social, economic, and political context in Mexico. This paper describes the healthcare system structure in Mexico, followed by a description of the basic structure of EMS in Mexico City, and of each tenet described in the AAA guide. The paper includes data obtained from official documents and databases of government agencies, and operative and administrative data from public and private EMS providers.

Results: The quality of the data for response times (RT) were insufficient and widely varied among providers, with a minimum RT of 6.79 minutes (min) and a maximum RT of 61 min. Providers did not define RT clearly, and measured it with averages, which can hide potentially poor performance practices. Training institutions are not required to follow a standardized curriculum. Certifications are the responsibility of the individual training centers and have no government regulation. There was no evidence of active medical control involvement in direct patient care, and providers did not report that quality assurance programs were in place. There also are limited career advancement opportunities for EMS personnel. Small economies of scale may not allow providers to be economically efficient, unit hours are difficult to calculate, and few economic data are available. There is no evidence of customer satisfaction data.

Conclusions: Emergency medical services in Mexico City did not meet the AAA requirements for high-quality, prehospital, emergency care. Coordination among EMS providers is difficult to achieve, due, in part, to the lack of: (1) an authoritative structure; (2) sound system design; and (3) appropriate legislation. The government, EMS providers, stakeholders, and community members should work together to build a high quality EMS system at the lowest possible cost.

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Introduction

According to the National Institute of Statistics, Geography and Informatics (INEGI), the estimated population of Mexico City in 2000 was 21.7 million, including co-urban areas, from which 13,096,686 persons lived within proper city limits.¹ Of the 437,667 total deaths among rural and urban areas in the country, 46,029 (10.5%) occurred in Mexico City. From these deaths, 8,744 (18.9%) had

heart disease, 6,441 (13.9%) had diabetes mellitus, 2,870 (6.2%) suffered cerebrovascular disorders, and 2,140 (4.6%) were related to accidents. These figures did not change significantly through 2002.² During 2003, the INEGI reported 472,140 deaths countrywide, from which 48,586 (9.7%) occurred in Mexico City, where mortality rates increased slightly for heart disease, diabetes, and accidents.³ During 2003, accidents represented 4.8% of total deaths compared to 4.6% during 2002. In 1995, Mexico City had the highest total mortality rate in the country (5.8 deaths per 1,000 persons), which remained unchanged through 2002,² with non-intentional injuries caused by road-traffic incidents as a leading cause of death among ages 1–44 years countrywide.⁴

By 2004, Mexico City had the second highest mortality rate, tied with Veracruz de Ignacio de la Llave and Zacatecas, with 5.1 deaths per 1,000 inhabitants. Accidents remained the leading cause of death among ages 1–30 years, and the fourth and fifth for ages <1 and >64-years-old, respectively.⁵ On a global scale, non-intentional injuries account for an estimated 2.8% of all deaths and cause incapacitating injuries and permanent disabilities of those surviving these events, worldwide.^{6–8}

Emergency medical services in Mexico City were developed without clinical or administrative standards and without proper planning. This allowed many providers to offer services without regulation, standardized medical protocols, or medical guidance. Therefore, some interventions provided may be detrimental to patient care and overall system performance.

The prehospital EMS organization in Mexico City follows two basic models: (1) the Anglo-American model; or (2) the Franco-German model.⁹ The organizational system was developed during the last decades, especially in the aftermath of the earthquake of 1985 in Mexico City. Prior to this earthquake, the community had no formal organization to respond effectively to emergencies and health care was limited in terms of access and dependability.¹⁰ Moreover, there was no structural design for the prehospital emergency systems, emphasizing the need for a stable and equitable emergency healthcare system with multidisciplinary collaboration, standardization, and professionalism,¹¹ including prehospital emergency care services.

The efficiency and performance of EMS for patients in Mexico City remains unknown, and few researchers have focused their attention on therapeutic procedures related to patient outcomes.¹² Moreover, some studies have identified organizations that provide prehospital emergency care using personnel without proper qualifications and/or training in prehospital medicine.^{13,14} This may be the case for many other prehospital providers throughout the country. The number of EMS providers available to serve Mexico City exceeds the number found to be adequate to provide efficient prehospital care, as identified by Stout in 1985.¹⁵ Stout estimated that one EMS provider could serve populations of about one million, where average costs and production volumes reach their best financial performance through the highest unit-hour-utilization ratio and uncompromised RT performance. According to data from the Public Safety Secretariat (SSP), there are approximately 10 private organizations offering EMS in Mexico City

and >100 voluntary organizations, but no responsible organization controls or regulates the organizations.^{16–17} In an attempt to regulate this activity, the Health Secretariat enacted an Official Mexican Norm (NOM) called NOM 020-SSA2-19941 (recently revised under the name PROY-NOM-237-SSA1-2004¹⁹), which is still pending for publication. This NOM establishes the conditions under which EMS agencies must provide emergency care, including ground and air transport. However, the norm does not implement specific requirements for providers' qualifications, patient care documentation, education, financing, medical control, and other key system components. The scope of training and field practices is delegated to EMS providers, allowing them to establish their own criteria for prehospital emergency care based on their selected standards;¹⁸ limiting accountability for both the government and the providers. The revised norm more clearly addresses the specific training and educational requirements for prehospital providers, regulating centers, the role of medical direction, and operative requirements for services. Nevertheless, the revised version remains vague and imprecise in other areas, such as medications that can be administered, personnel qualifications, and service regulation, and it still does not address key performance indicators or administrative requirements that are essential for adequate provision of services.

Recently, the government announced modifications to the General Health Law, which recognizes individuals with technical degrees in the paramedical field as health professionals, including emergency medical technicians (EMTs). This is an important step forward in EMS improvement around the country. It also provides guidelines for the legal recognition of prehospital practice,²⁰ although systematic changes must occur for this legislation to have a widespread impact.

A great number of patients served by EMS providers suffer from traumatic injuries,^{21,22} but there is a lack of data on the evaluation and/or transportation of patients in Mexico City, even though the need is recognized.²³ From the 1980s until 2002, accidents have been ranked among the 10 leading causes of mortality in all ages nationwide, and it has not changed significantly over the last 15 years.¹⁰ From 1990–2003, these events were the leading cause of death for ages 1–29 years, fifth for ages 30–64 years, and eighth for ages >65 years (Table 1).²⁴ Still, studies that concern patients suffering injuries from non-intentional incidents do not include any information related to prehospital care. Incidents that cause injury account for a significant amount of disability in the community and the number of years of potential life lost.^{25,26}

Therefore, researchers cannot study the conditions in which patients were transported and treated, and then relate the data to patient outcomes or even to in-hospital evaluation, despite evidence supporting prehospital system performance and its influence in patient care.^{27–29} Much controversy still exists regarding the true benefits of advanced versus basic levels of care.

High-quality EMS services must "consistently meet customers' needs and expectations, and develop the full potential of resources used in the process."³⁰ This concept

1980	%	1990	%	2000	%	2002	%	2003	%
Heart disease	11.6	Heart disease	12.5	Heart disease	15.7	Heart disease	16.2	Heart disease	16.4
Accidents ^a	11.0	Malignant tumors	9.7	Malignant tumors	2.6	Malignant tumors	12.7	Malignant tumors	12.7
Influenza/ Pneumonia	8.8	Diabetes M.	6.1	Diabetes	10.7	Diabetes M.	11.9	Diabetes M.	12.5
Enteritis	8.6	Accidents ^a	9.3	Accidents ^a	8.1	Accidents ^a	7.8	Accidents ^a	7.5
Malignant tumors	6.1	Hepatic disease	4.2	Hepatic disease	6.3	Hepatic disease	6.2	Hepatic disease	6.2
Perinatal illnesses	6.0	CVD	4.7	CVD	5.8	CVD	5.8	CVD	5.7
CVD	3.5	Perinatal illnesses	5.5	Perinatal illnesses	4.4	Perinatal illnesses	4.0	Perinatal illnesses	3.6
Cirrhosis	3.4	COPD	N/A	COPD	2.5	COPD	2.6	COPD	2.8
Diabetes M.	3.4	Influenza/ pneumonia	5.3	Influenza/ pneumonia	2.8	Influenza/ pneumonia	2.5	Influenza/ pneumonia	2.5
Nephritis/ Nephritic sx.	1.6	Aggressions/ Homicides ^b	3.4	Aggression/ Homicides ^b	2.5	Aggressions/ Homicides ^b	2.2	Aggressions/ Homicides ^b	2.1

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Table 1—Top ten leading causes of death in Mexico for selected years (COPD = Chronic Obstructive Pulmonary Disease; CVD = Cerebrovascular Disease)

^aAll non-intentional injuries

^bHomicide and injuries intentionally caused by another person

supports actions that consider the patient as the first priority in terms of quality of service; all activities must focus on patients' needs and expectations as the forces driving change in any organization that provides goods and/or services, including prehospital care.

Hypothesis

Mexico City's prehospital emergency medical care system meets the criteria set by the AAA guidelines for high-quality EMS systems.

Methods

This is a retrospective, descriptive study performed during January-July 2004. The study did not involve human subjects, nor did it collect personally-identifiable information, therefore, it was not subject to review by the Institutional Review Board. The project included a thorough search of official documents, including data from the Ministry of Health, the INEGI, the National Institute of Public Health, the Mexican Red Cross, the Amber Cross, and other available private and non-profit EMS providers. It also involved contacting other training centers including The National Polytechnic Institute (IPN), the National Autonomous University of Mexico (UNAM), SOS, and a search on other official documents from the Public Safety Secretariat, the Mexican Institute of Social Security, and

the Security and Social Services for State Workers Institute. Official Internet sites from several prehospital providers were another source of data. The statistical databases for INEGI were available through the Ministry of Health's search engine, as well as through the library of the National Institute of Public Health's journal. Information on EMS agencies was available online.³¹ A survey specifically developed for this project was available to general managers, EMS coordinators, area managers, and other contacts for each agency identified, and asked for their voluntary participation in this research by providing all of the available data indicated.

The data obtained were compared to the standards for high-performance EMS systems (HPEMS) published in the *AAA Guide for Contracting Emergency Health Services* (AAA Guide), including RT reliability, clinical excellence, economic efficiency, and customer satisfaction.³²

Response times included studies performed in Mexico City and in other Mexican States.^{31,33,34} These values were compared to the RT standard for all emergency calls suggested by Stout.¹⁵

According to the AAA Guide,³² the best measure of EMS performance is the response to cardiac arrest victims, a concept supported by research by Eisenberg and the Mayo clinic, which noted that a cardiac arrest victim must receive basic life support (BLS) and advanced life support

Study	Response time (minutes)	Measure	Minimum value (minutes)	Maximum value (minutes)	City
Fraga-Sastrias, 2004 ³⁴	47% in <30	Percentile	N/A	N/A	Mexico
Arreola-Risa, 2000 ³³	15.5	Mean	10.4	20.6	Monterrey
Arreola-Risa, 1995 ¹³	34.7	Mean	7.3	62.1	Monterrey
XE Ingenieria Medica ³⁶	6.79	Unknown	N/A	N/A	Mexico DF
SPAM ³⁷	15	Unknown	N/A	N/A	Mexico DF

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Table 2—Emergency medical services response times for Mexico City and Monterrey (N/A = data not available)

(ALS) within four and eight minutes, respectively. After this time has elapsed, the victim's chance of survival falls dramatically, making every second critically important. Many services established this as the benchmark for EMS systems in the United States, and since then, it has become an international standard for urban systems.

According to the AAA guidelines, clinical excellence indicates that services achieve the best care through a full, all-ALS service, or through the highest level of care possible. In Mexico City, the great majority of certified, EMS-trained personnel practice at the basic level. Therefore, the desired level of clinical sophistication was set at the all-BLS type.³²

Results

Response Time Performance

The RTs reported in the literature,^{33,34} and from available providers in Mexico City^{36,37} and Monterrey are listed in Table 2.

Arreola-Risa and colleagues reported mean values for RTs of 15.5 ±5.1 minutes (min) and 9.5 ±2.7 min in Monterrey. These values represent times before and after the prehospital trauma life support training.³¹ Providers from Mexico City reported RTs ranging from 6.8–62.1 minutes. However, they did not specify any measure used for reporting the data that could be used to describe the relationship between RTs and prehospital services. In addition, the reported RTs did not specify whether they represented cardiac arrest victims only or overall emergency services, thus making the data difficult to interpret.

Clinical Quality and Sophistication

Many institutions involved in prehospital care in Mexico and the Federal District offer training for EMS in Mexico City, including the Mexican Red Cross, Amber Cross, the National Polytechnic Institute (IPN), and the National Autonomous University of Mexico (UNAM). The programs used for training at the basic level do not differ significantly among programs and follow a similar, general format.³⁶ But two training institutions had a valid registration with the Social Provision and Labor Ministry (STPS),³⁸ one had registered with the Public Education

Ministry (SEP),⁴⁰ and two independent instructors with STPS registration also were identified. Recently, the Federal District Ministry of Health announced the creation of a voluntary registry for EMTs from the three recognized levels of care: (1) basic; (2) intermediate; and (3) advanced.⁴¹ In order to achieve registration, EMTs were required to pass an evaluation process including written and practical examinations, in accordance with the level of care indicated by the individual EMT. Of the 542 individuals who took these examinations, 112 tested at the basic level, 317 at the intermediate level, and 113 at the advanced level of care. From those who took the basic test, only 57 (50.9%) passed the examination. No data for the remaining levels has been reported.

There is no information indicating that a physician was involved in the clinical aspects of patient care, protocol development, or clinical quality assurance, excluding those services that provide patient care with a physician as a team member. There is no supporting evidence of the existence of medical protocols, either on- or off-line, intended to provide clinical direction to prehospital providers.

No information suggests that EMS providers have a quality control and/or quality assurance program in place in Mexico City, such as the ones suggested by the [US] National Highway Traffic Safety Administration.⁴² The equipment that must be on board an ambulance, as determined by the NOM, defines an ALS unit. It could not be determined whether ambulance services in Mexico City comply with this law, although it is accepted widely that compliance with the law is minimal at best.

Economic Efficiency

Information related to financial and ambulance operations were difficult to obtain; services considered them confidential and refused to provide the information or it was just not available. Due to the large number of EMS providers and the very few responses received, total system costs were impossible to calculate, and thus, subsidy/price tradeoff chart is not included.

According to the Mexican Red Cross's profile,⁴³ expenditure totaled the equivalent to (US)\$42,954,091 (exchange rate of Swiss Francs to USD 0.798, rate valid as of 06 July

No. units*	UH**	UH cost	UHU ratio	Number of responses
6	12,960	N/A	0.27	6.66

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Table 3—Daily number of ambulances and services provided by the Mexican Red Cross in Mexico City in 2004³⁸ (number of services = 3,600) (UH = unit hours; UHU = unit-hour-utilization ratio)

*per shift (8 hours)

**per month

2004). According to this document, the Red Cross carried out >3,000,000 acts of prehospital care in the country in 2001, although it does not specify whether these were emergency responses only or if they included other services, such as simple transports, urban and specialized rescues, or special services. According to these numbers, each act of prehospital care in the country cost (US)\$14.32. The Mexican Red Cross⁴⁴ chapter in Mexico City indicated that in 2001, there were 15 units per eight-hour shifts responding to 300 services per day. As of 2004, these numbers have decreased to six units and 100–120 services per day, mainly due to financial constraints. No data were available that refer to the total annual costs related to EMS; therefore, it is not possible to know their financial performance and the costs associated with their services. Table 3 depicts unit hours (UH), the unit-hour-utilization ratio (UHU), and the number of services per unit per shift related to the data provided. There was no difference in productivity between 2001 and 2004, since reductions due to financial constraints affected both number of units and responses.

The INEGI⁴⁵ and the Ministry of Health⁴⁶ reported costs associated with the provision of health services nationally and by entity, as well as for related services that include EMS. However, the *Escuadrón de Rescates y Urgencias Médicas* Public Safety Secretariat EMS provider (ERUM), did not report this information for unknown reasons. Therefore, it was not possible to determine costs associated with prehospital care or community costs for providing EMS services.

Customer satisfaction

There is no evidence of actionable data reported by EMS services related to the degree of satisfaction of their customers, both internal and external. While some prehospital providers collect this information through the patient care report, such data were not available.

Discussion

Response times for EMS in Mexico City are not defined in the NOM, and do not have a required standard for measurement, collection, and analysis. The responsibility to define and measure reaction times and to collect data,

belongs to each EMS provider. Since there is no established standard for the city, providers define this metric—if they define it at all—based on criteria that apply to their own expectations and needs and not to those of the patients they serve. Moreover, since there are no legal requirements as to how long it should take to reach a patient, and no need to comply with specific times or even to measure reaction times, it is possible that EMS providers are not collecting this information. In addition, collecting RT data does nothing if the provider does not interpret the data, and if the provider does not use the information derived for quality management, assurance, and improvement.

Because institutions providing prehospital care and/or training in Mexico City do not follow a standard educational curriculum, do not have medical control, do not establish quality control programs, and provide little or no continuing education, the quality of care provided in the field mostly depends on the responder's training institution and the continuing education providers pursue independently. In the field, these differences may affect patient care significantly, since patients are receiving emergency care at different levels of competence within the same technical training standard, defined in this study at the basic level. There can occur significant differences between training institutions and within basic providers, decreasing the overall quality of direct clinical care. In addition, training program registration does not guarantee quality training, since no evidence of guidelines or standards required to attain registration was found.

The voluntary registry implemented recently by the Federal District Ministry of Health represents an important initiative in terms of the recognition and standardization of prehospital practice in Mexico City. Instructors and evaluators involved in the implementation of this examination had a solid background in either emergency medicine and/or prehospital care, further improving the quality and reliability of the testing tools and processes.

Nevertheless, considering this was a voluntary initiative, and that only 50.9% of those who attempted the examination passed it, many questions remain regarding the true quality of care EMTs can deliver. Roughly half of the basic EMTs who took the test have the necessary skills to provide competent prehospital care. Only a very small number of EMTs decided to take this examination, and were most likely the ones who felt best prepared and who had the highest expectations for passing the exam. The remaining EMTs did not take the test due to many reasons, including not limited to trusting their skills, suspecting they would not pass the tests, not being certified EMTs, not being able to show proof of training, or not being aware of the examination. In order for care to be standardized and for the quality of care to be measurable, this registry must be required to practice prehospital care, even when an agency has granted a training certificate.

It also remains undetermined if all of ambulances services comply with the NOM regarding the equipment that should be available in every ambulance. Although private services are more likely to have the equipment, human capabilities,

and technology required by law, there is no assurance that this is, in fact, the case. Nevertheless, for public and volunteer services, which also have fewer financial resources available, there is a greater possibility that compliance is minimal. Based on the author's experience in the field, this problem is widespread throughout EMS services in Mexico City, in the private, public, and volunteer services.

Because each provider controls its own communication systems, any medical direction effort also depends on the availability of a physician who will take responsibility for the clinical care provided by a prehospital team. Medical direction is unlikely to guide field treatments, since there is no evidence of field protocols and/or requirements for clinical competencies. In addition, clinical requirements may vary significantly between services, offering poorly standardized patient care. Without medical direction, EMS managers are unlikely to identify poor clinical performance in their organization or agency.

There is limited information supporting career advancement opportunities for EMS personnel in Mexico City. Most EMS personnel do not have managerial skills, and training programs do not provide any additional lectures or modules concerning prehospital services administration. Based on the author's experience in EMS management in Mexico City, administrators and physicians traditionally have held managerial positions, and EMS systems have provided few opportunities to EMTs to hold leadership positions with high levels of responsibility. To develop adequate trauma systems and EMS research, EMTs and paramedics must participate in leadership roles.^{47,48}

Currently, the provision of EMS services in the City is the responsibility of >30 ambulance companies, which compete within the market, in a geographically-limited area with a highly concentrated population, and with no rights over specific regions or jurisdictions. This means that providers must follow strategies for retail competition—not the market for quality EMS providers—searching for customers in the same areas as other providers, significantly reducing the number of customers and services available without decreasing their overall costs, and sometimes increasing them because of the increased marketing efforts. As expected from retail market competition, service fees increase while quality of care decreases, because providers' financial investments for establishing and operating a prehospital care are significant and the provider must recuperate these costs in order for the provider to remain in the market. Clearly, an expensive and clinically poor prehospital service is not what communities normally would expect. For EMS costs to reduce and quality to improve, providers need large economies of scale that should not depend just on jurisdictional boundaries. Providers must be able to serve large enough populations and have the rights for them as well to avoid competition within the market.

Because of the difficulty in obtaining financial information it was not possible to obtain this did not allow an objective description of how economically efficient the services are. Some possible explanations of why services do not want to share this information include its possible financial and/or political implications, especially if it sup-

ports evidence of poor performance practices. Lack of information sharing also may be due to the fact EMS services do not want to let others know if they are successful in some areas of their operations. They could be risking part of their market and could lose it once other services learn their techniques. Because providers compete within the market, strategies meant to attract customers may be kept confidential, limiting the opportunities for benchmarking and protecting the markets they already have.

In terms of subsidy, there is no information available to facilitate understanding of the amount the government has invested in prehospital and emergency care. No evidence was found that indicated an EMS system received any subsidy, including the services under the control of the Public Safety Secretariat (SSP). In fact, the SSP did not provide any financial data reported through INEGI from 1997–2000.

Because of the large number of providers in Mexico City and the few responses received from them that related to their financial structures, there is insufficient data to create a subsidy/price tradeoff chart, considered “the single most useful tool available for comparing the financial performance of various EMS systems.”⁴⁹ This chart can describe the amount of money providers require to sustain the ambulance service through user fees and subsidy—if any—and it is useful to identify those providers offering the highest quality of care at the lowest price. In order to perform these evaluations and analyses, researchers need more detailed information.

Since there are no customer satisfaction data available for any of the EMS providers, it is not possible to evaluate how EMS services treat their patients and if patients are content with the services EMS have provided. Although the media has addressed some of the complaints customers have regarding EMS services, it is unclear how these customers perceive prehospital care and if they understand what services are provided.^{50–52} Also, the role of the media is important in maintaining constant surveillance on the performance of several EMS providers in Mexico City and other Mexican cities as well, with most of these reports criticizing RTs, quality of care and costs, as well as resource utilization.^{49,53–56}

Conclusions

Based on the findings described in this study, EMS in Mexico City does not meet the requirements as outlined in the AAA guide for high-quality prehospital EMS systems. In order for services to provide high-quality prehospital care, providers in Mexico City must gather data representative of their own performance and act upon them to improve their services. Also, authorities must establish appropriate requirements, and standards, and incentives for compliance, with these requirements and standards.

An important limitation in the present study is that it may not be possible to import an evaluation methodology directly, such as that offered by the AAA guide, into another cultural, political, and economic system, and have it offer the same analytic power that it provided in its place of origin. While the AAA guide is difficult to use in many US or European systems because of the extensive data that it

requires in order to be useful, this study demonstrated that it is limited by the restricted quantity and quality of data provided by Mexican EMS, as well as the Mexican Government. One might argue that the lack of data in Mexico indicates a poor quality of EMS available to the public, but this ignores many valuable services EMS provides in most societies without significant data recording them. Researchers should look at the basic concepts provided by the AAA model, and derive methods of examining the EMS system within its current data parameters. Once completed, they can use this preliminary information as evidence for the collection of more data in a culture that previously did not recognize the need for them.

One last important finding in the current study is that there is no EMS system in place in Mexico City. Emergency medical services resources, including structural and operational components, are not working in a coordinated fashion under standardized regulatory mechanisms, and do not share the responsibility of providing prehospital

emergency care for their community. Educational standards are set by each institution without any guidelines, and physical, human, communication, and financial resources are spread over >30 EMS services. All phases of emergency response depend on each EMS service's needs.

These are important considerations for Mexico City, because the financial resources available are limited. In order to provide what flexible systems require, services in Mexico City must provide an all-BLS response initially, then gradually upgrade to an all-ALS service—if possible and if needed—while constantly meeting the standards at the specified level of care. Even with an all-BLS system, Mexico City's EMS system can implement a flexible strategy, as long as it complies with the four tenets described in this study. It also is important to consider that in Mexico City, a jurisdiction with multiple providers, coordination is difficult to achieve due in part to the lack of an authoritative structure. Authorities, EMS services, stakeholders, and the community could partially address this conflict through more appropriate legislation regarding system design and service performance.⁵⁷

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