



International EMS Systems: The United States: past, present, and future

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Abstract

Emergency medical services (EMS) is an organised system designed to transport sick or injured patients to the hospital. Though EMS system configurations can be quite varied in design depending on locale, we provide an overview of EMS as it has evolved and is currently modelled in the US. We outline the history of EMS in the US, including the major events and legislation that shaped the current models that are in existence. We provide an overview of provider training, system design, system funding, and dispatch issues. The concepts of medical direction for physician surrogates, as well as EMS as it relates to specialty care are also elucidated.

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Keywords: Emergency medical services; EMT; Advanced life support

Resumo

Os Serviços de Emergência Médica (EMS) são um sistema organizado desenhado para transportar doentes para o hospital. Embora a configuração do EMS possa variar no que se refere ao desenho da sua logística de local para local, é possível fornecer uma visão global dos EMS, da sua evolução e do estado actual nos EUA. Descreve-se a história dos EMS nos EUA, os acontecimentos mais importantes e a legislação que condicionaram os modelos de organização actualmente existentes. Fornecemos uma visão global do treino, organização dos sistemas, financiamento e modelos de activação. Elucidam-se conceitos de direcção médica e médicos de referência, bem como a relação dos EMS com as especialidades.

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Palavras chave: Serviços de Emergência Médica; EMT; Suporte Avançado de vida

Resumen

Un servicio de emergencias médicas (EMS) es un sistema diseñado para el transporte de pacientes enfermos o lesionados al hospital. Aunque las configuraciones del sistema EMS pueden ser de diseños bastante variados según las condiciones locales, proporcionamos una visión de los EMS, como han evolucionado y como están actualmente modelados en los EEUU. Destacamos la historia de EMS en los EEUU, incluyendo los eventos mayores y la legislación que le ha dado forma a los actuales modelos en existencia. Proporcionamos una visión del entrenamiento de los proveedores de servicios, diseño de sistema, financiamiento del sistema, y temas en relación al despacho. También se aclaran los conceptos de dirección médica para subrogantes médicos, al igual que EMS en su relación con cuidados de especialidad.

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Palabras clave: Servicios de emergencias médicas; EMT; Soporte vital avanzado

1. Emergency medical services in the United States

Emergency medical services (EMS) is an organised system designed to transport sick or injured patients to the

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hospital. One of the earliest descriptions of the systematic management of pre-hospital injuries and illness occurred during the Italian campaign of the French revolution in 1794 [1]. Baron Dominique Jean Larrey recognised that permitting wounded soldiers to remain on the battlefield for days without treatment increased both their morbidity and mortality. As a result, he instituted a system where trained medical personnel initiated treatment and transported the wounded to a field hospital [2,3]. In the battlefields of American history, both the Union and Confederate armies of the American Civil War attempted to emulate Larrey's innovative medical system, however, a lack of money, governmental support, and dedicated personnel prevented any initial success. Following the Second Battle of the Bull Run in August 1862, several thousand Union soldiers lay wounded on the battlefield for days before any medical treatment commenced, which clearly contributed to their high mortality. As a result, medical care was transferred to General Jonathan Letterman, a military surgeon, who reinstated Larrey's original concepts, and subsequently created the first organised system in the US to treat and transport injured patients [4].

Shortly after Letterman's successes, the civilian community recognised the importance of an EMS system. In 1865, the Commercial Hospital of Cincinnati (now Cincinnati General) developed the first civilian-run, hospital-based ambulance service. Shortly thereafter, New York city developed the first municipal-based emergency medical service, which was run from Bellevue hospital [5]. Despite the development of EMS systems however, until the second half of the 20th century, most "ambulances" were actually hearses from local funeral homes, which would transport patients to the hospital [6,7].

During the first and second world wars, many advances were made in military EMS, but these were not replicated in the civilian setting until well into the 1950s when JD "Deke" Farrington and Sam Banks, two civilian physicians, established a first-aid training program for the Chicago Fire Department. This became the prototype for the first basic emergency medical technician (EMT) training program in the US.

By the 1960s, the face of EMS was changing. During this rapid time of growth in EMS, two distinct advanced care models were emerging in the US. The first model used paramedics, trained in advanced life support (ALS) procedures including defibrillation, rudimentary airway management, and the administration of some medications. This model was employed in Los Angeles, Miami, and Seattle [6,8]. Another model used a "heartmobile" [8], which was designed exclusively to care for patients suffering acute myocardial infarction [9,10]. Staffed by physicians and nurses, these "heartmobiles" were modelled after Pantridge and Geddes's system in Belfast, Northern Ireland [11]. This model later became common in US cities such as Cincinnati.

The year 1966 marked the beginning of the modern era of EMS in the US. The National Academy of Sciences (NAS) released a paper entitled "Accidental death and disability:

the neglected disease of modern society," which outlined the inadequacies of pre-hospital and emergency department (ED) care in the US, and presented 24 recommendations for improvement [12]. The NAS paper served as a stimulus for the federal government to create an organised EMS and trauma system. Later that year, in response to the NAS paper, the federal government passed the Highway Safety Act, thus creating the US Department of Transportation (DOT) [3]. Among its functions, the DOT was charged with improving EMS in the US and developed a 70-h basic EMT curriculum. This became the first standard EMT training program in the US; a more extensive ALS curriculum was created several years later.

In 1970, the then governor of California Ronald Regan signed the Wedworth Townsend Act of 1970 into law, having important implications for the future of EMS in California and the US [13]. It permitted paramedics to act as physician surrogates providing advanced-level care for patients under the direction of off-site physicians. Prior to this law, paramedics required a nurse or physician to be present in the ambulance in order to administer medications. Similar acts were subsequently passed throughout the nation.

In 1973, the federal government passed the EMS Act of 1973 (Public Law 93–154) [14], the intent of which was to improve and coordinate EMS care throughout the country [15]. Millions of dollars were earmarked for EMS training, equipment, and research. The law identified 15 essential elements to be included in the development of an EMS system [13]:

- (1) Personnel
- (2) Training
- (3) Communication
- (4) Transport
- (5) Emergency facilities
- (6) Critical-care units
- (7) Public safety agency
- (8) Consumer participation
- (9) Access to care
- (10) Patient transfer
- (11) Standard record keeping
- (12) Public teaching/education
- (13) System review/evaluation
- (14) Disaster planning
- (15) Mutual aid

Though the result was to be the development of a well-co-ordinated system of well-trained and equipped providers of pre-hospital care, EMS development progressed in a disorganised manner resulting in a heterogeneous mosaic of systems, some of which met the intended goals, others falling short.

The Omnibus Budget Reconciliation Act (OBRA), enacted in 1981, effectively brought an end to the golden era of EMS [8]. Federal funding under this legislation, was changed to create block grants, each state charged with appropriating these funds, as they deemed necessary. Some

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