EMERGENCY MEDICAL SERVICES SYSTEMS IN THE UNITED STATES

Additional information on the following topics, prepared by Dr. David Boyd, Director of Emergency Medical Services in the U.S. Department of Health and Human Services gives a more complete picture of EMS systems in the United States: (1) The Emergency Medical Services Act of 1973; (2) Emergency Medical Care Issues; (3) EMS Systems Development; (4) EMS as a Component of the Total Health Care Delivery System; (5) EMS Systems Management; (6) The EMS Lead Agency; and (7) EMS Data Collection and System Evaluation.

THE EMERGENCY MEDICAL SERVICES SYSTEMS ACT OF 1973

The passage of the Emergency Medical Services Systems (EMSS) Act of 1973 (P.L. 93-154) by Congress* has provided the mechanism and funds for communities to develop regional emergency medical services delivery systems across the nation. With the passage of the EMSS Act, the U.S. Congress mandated that the emergency medical care programs funded with federal dollars must address, plan, and implement a "systems approach" for the provision of emergency response and medical care. In the EMSS Act, some fifteen component requirements have been identified to assist system planners, coordinators, and operators in their attempts to establish comprehensive, areawide and regional EMS programs. These components are listed below.

1. Provision of manpower
2. Training of personnel
3. Communications
4. Transportation
5. Facilities
6. Critical care units
7. Use of public safety agencies
8. Consumer participation
9. Accessibility to care
10. Transfer of patients
11. Standard medical record keeping
12. Consumer information and education
13. Independent review and evaluation
14. Disaster linkage
15. Mutual aid agreements

The Division of Emergency Medical Services (DEMS), Department of Health and Human Services (DHHS), the established federal lead agency, has

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* Public Law 93-154: Emergency Medical Services Systems Act of 1973. 93rd Congress, 5.2410. 1973; Law of 93rd Congress: Emergency Medical Services Systems Act of 1973, Public Law 93-154. Washington, D.C., 1976; Law of 94th Congress: Emergency Medical Services Amendments of Public Law 94-573, Washington, D.C., 1976.

developed Program Guidelines in which under Chapter III,* "Special Program Guidance," the clinical significance of the systems approach in developing an EMS system is described. While an EMS system must respond to all declared emergency calls within its appropriate geographic region (including the nonemergency 80 percent, the truly emergent 15 percent, and the critical cases -- 5 percent), there has been a special identification of those well identified critical patient groups which demand a competent system for survival. It is to the survival of these critical patients (trauma, burns, acute cardiac, high risk and premature infants, poisonings, psychiatric, drug and alcohol overdose) that a "system" conceptualization and initial system efforts must be directed in order to ensure the development of a sound, medically competent, and comprehensive EMS system.

EMERGENCY MEDICAL CARE ISSUES

The central theme and intent of the EMSS Act is to develop systems of emergency medical care that would significantly decrease current death and disability rates. The goal of the national EMS program is to initiate regional planning and integration of the fifteen mandatory components so as to provide the essential and appropriate EMS emergency and critical care services for all emergency patients.

The current EMS patient problem is compounded by the 65 million citizens who enter the system each year. At least 80 percent of these patients cannot be considered "true medical emergencies." Another 15 percent are real emergencies which require urgent care (i.e., minor trauma, infectious diseases, and other acute general medical and surgical problems). The remaining 5 percent are the critically ill and injured patients. This last group was not salvageable only a few years ago, but today these lives can be saved if initial, definitive, and rehabilitative care is given in time and the patient is moved through the regional system and provided essential medical care.

Specific planning and regional EMS response to the particular critical care categories assumes that, in time, all critical medical emergencies will receive better care, and will benefit from sound regional EMS systems planning and operations.

Likewise, certain local occupational and/or recreational hazards must also be addressed with a goal toward prevention. These special target patient groups provide each regional system with an opportunity to develop evaluation criteria for systems performance and patient outcomes (distribution and survival).

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* Emergency Medical Services Systems: Program Guidelines. U.S. Department of Health and Human Services, Health Services Administration, Division of Emergency Medical Services. Revised 1975. (HSA-75-2013).

EMS SYSTEMS DEVELOPMENT

Each regional emergency medical services plan must include a description of the general and specific protocols for the emergent and nonemergent patients in its delivery system. It must also include a detailed explanation of care and triage patterns for critical groups by identifying the patient treatment needs as well as the involvement of the systems operational components (vehicles, telecommunications, manpower, facilities). These care patterns will depend upon the clinical patient demands, the sophistication of the transportation capability, the level of care during transportation, the communications coordination, the delivery to a categorized general hospital or designated critical care facility, and the migration into the rehabilitation phase. These patient care programs must be established with appropriate backup relationships by written arrangements among the various provider elements in order to ensure a sound and competent regional EMS system.

When an individual becomes seriously ill or injured it is manifested in a specific way. People have accidents. They have heart attacks. They are burned. They have problems at birth. They are poisoned with alcohol, drugs, or other toxicants. They have emotional disturbances resulting in varying degrees of psychiatric instability. The planners of EMS systems must consider the general patient population and these easily identifiable and significant critical patient groups that exist within the geographic regional area. An indepth knowledge of the demography, epidemiology, and clinical requirements associated with these critical patient groups is mandatory to effective EMS planning and operations.

In many circumstances the initial patient access, response, and transportation considerations are general in nature until the severity of the patient's (diagnostic-specific) problem becomes clarified. As soon as this clarification develops, a rather specific patient treatment and triage plan must be activated to include the prehospital, hospital, interhospital phases, as well as the specialty care unit and later the specific rehabilitation services necessary for each illness and injury.

It is now a fairly well accepted position across the country that initial and definitive medical care for each of the target patient groups can be improved, and most of these patients can be salvaged by an effective EMS system. The design of an EMS system will need to include certain organizational and operational changes. There must also be additional adaptations of treatment in the prehospital, hospital, and interhospital phases with proper modification of existing and new technology that will enable paraprofessionals, and professionals to successfully manage and treat all emergent problems at the scene and during movement through the system, whether they occur in urban, metropolitan, rural, or wilderness areas.*

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* Selected Bibliography: Rural Emergency Medical Services. U.S. Department of Health and Human Services, Health Services Administration, Division of Emergency Medical Services. Revised 1975. (HSA-75-2013).

The development of an EMS system usually starts with an initial upgrading of existing resources and then progresses through periods of increasing sophistication. That is, following the establishment of a basic life support (BLS) system within the region, there usually is a logical progression to the advanced life support (ALS) system due to the increasing capabilities of the EMS region.

EMS AS A COMPONENT OF THE TOTAL HEALTH CARE DELIVERY SYSTEM

The coordination of established medical services and public safety efforts brings the emergency medical care program to an interface with community service activities heretofore outside the scope of established medical practice. Community involvement by a wide spectrum of the public, private, and governmental entities gives an emergency medical services system a new dimension to health care that has not previously been a major consideration in American medical practice. An additional result of the regional EMS system effort will be the demonstration of how other essential nonemergent health services and programs might be stylized similar to EMS on a geographic and service demand basis. Some experience already suggests that programs such as blood, organ transplantation, and rehabilitation services as well as quality assurance programs might be enhanced by regional systems models.

The national EMS system effort will improve the quality of care for the critically injured and ill citizens across the country. Due to its unique characteristics, emergency medical care provides a rare opportunity for experiences in many other phases of health care delivery. It is anticipated that the "ripple effect" in the EMS effort may extend beyond the limits of acute care phases to many functional component areas.

The success of any EMS system is dependent upon the wisdom of its leadership and appropriate integration of resources, operations management, and financial planning into an effective program. The major task of the Division of Emergency Medical Services is to provide current and timely technical assistance and guidance by communicating results of lessons learned from established and ongoing operational EMS projects.

EMS SYSTEMS MANAGEMENT

National experience with public and private funds has demonstrated that a few strategic factors are paramount to successful operations and management of an EMS system effort. The following elements must be addressed in order to develop and maintain an integrated total EMS system.

- Action Plan for EMSS Area -- A comprehensive, detailed, and progressive plan must be created for establishment, operation, and expansion of the EMS system.

- Lead Agency -- A lead agency must be identified as the responsible operations unit for the EMS system, including grants management control and operations coordination of the involved community and regional organizations and resources.

- Financial Support -- Appropriate means of financial support for initial and continued EMS operations must be considered. Such financial support may be derived from various federal programs, state and local funds, general revenue sharing funds, third-party payments, and direct payments from patients.

The intent of the EMSS Act is to fund EMS projects on a multigovernmental and multicommunity basis. At the present time there are a few regions in the country where an "ideal" appropriate regional health authority exists. Such an organization or special health consortium must be developed usually with reliance on the established state health office (or major Metropolitan Health Agency) with its established management and regulatory capability for successful program initiation and support.

THE EMS LEAD AGENCY

As a public health initiative the EMS system must be accountable to the public as well as health professionals for program effectiveness and appropriateness. In this regard a lead agency, under the auspices of the health authority, works to insure system medical control and overall program accountability.

The EMS lead agency serves as a focal point for system configuration design for all types of emergencies and all phases of the EMS system. This lead agency must be responsible for the conceptual design of the EMS system. Regional EMS planning and medical care programs must have input from credible physicians appointed by the lead agency's medical director. The actual systems operations by various medical and public safety providers must be in conformance with the EMS systems operations policy as established by the lead agency. This is accomplished by the lead agency's acceptance of responsibility for all EMS patients and by establishing protocols based on sound professional standards and practices developed through appropriate technical committees, medical societies, professional consultants, and lay/professional advocacy groups. The administrative (off-line) medical director of the lead agency delegates most on-line and some off-line responsibility in accordance with certain regulations, standards, and established policies for the EMS system (e.g., advanced life support (on-line) medical control, specialty care protocols, etc.). The clinical validity of each of the clinical subsystems (e.g., trauma, cardiac, poisoning) and the integration of the 15 systems components is the prime responsibility of the EMS lead agency's off-line medical director. The EMS lead agency provides medical accountability. For example, the lead agency:

- Designates an administrative (off-line) medical director who is responsible for the overall planning and development of a medically sound EMS system for regional prehospital, interhospital, and hospital care programs

- Develops regional medical control plans, including the designation of a resource/base station, associate/receiving hospitals, and advanced critical care centers

- Develops the regional and areawide treatment, triage, and transfer and operations protocols

- Designates supervising ALS (on-line) medical director physician for resource/base station hospital to establish and direct medical control of prehospital care in each region/area

- Directs the implementation of communications technology to link field paramedics with resource/base hospital physicians and resource/base hospital with associate/receiving hospitals and other critical care centers

- Determines "scope of practice" roles of each EMS systems provider

- Establishes competency criteria and competency maintenance programs for EMS systems providers

- Establishes evaluation methods for maintaining program review and accountability (records, case review, audits, etc.) for all clinical care programs and to monitor program effectiveness and impact on patient death and disability

State and regional lead agencies must be responsible for the overall coordination and management of entire regional EMS systems, including cooperation between communities, system operations, and organization of regional resources. The lead agency must have the medical and technical expertise to provide essential technical assistance appropriate to their respective regional EMS systems. Some lead agencies will have various additional regulatory responsibilities (e.g., certification of EMS system personnel, ambulance licensing, etc.) and some will have direct operational responsibilities (e.g., ambulance and/or dispatch services).

The administrative off-line responsibilities of the lead agency must be clearly understood by all concerned for effective interlevel communication and coordinated operations within regional systems. The success of the EMS system lead agency is dependent upon the wisdom of its leadership, the soundness of the medical care program, an informed and responsive community, and appropriate integration of components, resources, operations, management, evaluation, and financial planning.

EMS DATA COLLECTION AND SYSTEM EVALUATION

The Division of Emergency Medical Services in DHHS has recently developed a management information system called the Regional Emergency Medical Management Information System (REMMIS). The purpose of REMMIS is to improve the assessment of federal EMS grant programs. The system will provide well-defined and pertinent information on each of the 304 regional EMS systems.

REMMIS will provide data which describes the current capability of each component and each clinical area of an EMS system. The data will describe changes in the capability of each area over a four-year period. The system will enable the Division to perform select analyses and provide evaluation material to the Administrator in a consistent and reliable manner.

REMMIS will identify, collect, and maintain comparable information on EMS regional systems. It will assist states to better monitor and assess their EMS systems capabilities for operational and budgeting purposes. It will also greatly assist regional office to monitor and critique progress and performance against the stated grant objectives at various times during the grant period.

An annual report will be prepared summarizing the information collected. It will include a review of the components and resources among EMS regions at the planning, basic, and advanced levels of operational implementation; the volume of patients in all critical care groups impacted by the EMS; and reported changes in patient care outcomes.

Until REMMIS was instituted it was difficult to determine how many lives were being saved and the amount that disability was being reduced because of EMS systems. Formerly, evaluation of the emergency medical care programs was geared toward the survey approach, resources documentation, and data on sub-systems (e.g., transportation, training, etc.).

It is essential for every EMS system to obtain key data to evaluate the clinical effectiveness of regional EMS systems. New methodologies must be developed for "tracking" and evaluating emergency medical care for specific patient groups (e.g., trauma, burns, etc.) within the system. Analyses of these data will allow programmatic decisions as to the appropriateness of utilization of facilities, personnel, equipment, clinical treatment, and cost-effectiveness.

The following should be the basic ingredients for the development of an evaluation strategy. This is consistent with the relative development stage of most EMS systems at this time. As EMS projects grapple with the multiple components and organizational changes, they must also comprehend the basic precepts of evaluation methodology.

The following are basic to an evaluation strategy:

- Development of a descriptive narrative of the organization's operational components, and "clinical systems" design and implementation. A key evaluation task for each program will be that of the narrative description of the relative systems changes implemented and perceived as the EMS system develops. This essential evaluation component cannot be overlooked and is essential for subsequent steps described below.

- Structural analysis and resource development. In this area one must describe some of the key implementation aspects (radios installed, ambulances placed, etc.) that are well identified phenomena of an EMS program. These will be necessary in the area of organization and management, at least the six clinical tracer and impact groups, and at least one parameter for each of the fifteen components.

  This inventory assessment will describe these key structural phenomena and provide some guidance as to the quality of each parameter (implementation of "911" or similar centralized emergency telephone exchange, dispatch, categorization). Much of these data will include resources data for program information sources. Of these parameters within each of these areas, some will be of state or national significance.

- EMS activities or processes. Those structural components now implemented (e.g., communications, 911 dispatchers, ambulances, trauma units, etc.) all have activity levels which can be counted using operations data; for instance, counting trauma victims admitted to a specialized designated trauma unit, or the numbers of calls via the 911 access number. With this approach even during the initial years, a program will be capable of monitoring the very basic process elements of the system and will be able in future years to develop ratios, indices, and correlations among or between systems components.

  Rates of utilization and appropriate clinical and cost benefit data can subsequently be developed. Data on EMS activities or processes will also have some parameters of national significance but, more importantly, these data will be most useful to the actual operationa, management, and development of each system.

- Patient outcome and program impact. In this section, critical clinical questions must be enunciated in the evaluation strategy. The evolution from simple to complex evaluation approaches will parallel each system's growth and maturity. There are at least four types of impact evaluation essential to documentation of a comprehensive and successful system.