

A Total Emergency Medical System for the State of Maryland

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Introduction

The failure to provide for emergency illness, accidental death and disability can no longer be tolerated as an insoluble health problem. In Maryland, the medical expertise and technology are now available to reduce accidental death and disability rates in our state. Through better utilization of these existing emergency resources using a total systems approach to emergency health care delivery, immediate improvement in emergency medical care can be realized. Furthermore, geographic factors and the current medical environment in Maryland lend themselves to the initiation of a statewide system of emergency medical services (EMS).

When every American has access to first-rate emergency care, we will have satisfied the most urgent demand of our current crisis in health care and guarantee to the consumer the most fundamental health right of all—the right to life.¹

Magnitude of the Problem

The Committee on Emergency Medical Services, Division of Medical Sciences of the National Research Council, has stated that accidental injury and acute illness generate a staggering demand on ambulance and rescue services, allied health personnel, physicians, nurses and hospitals for the delivery of emergency medical services. According to their report, accidental injury is the leading cause of death among all persons aged 1-38.

Each year more than 52 million US citizens are injured. Of these, more than 110,000 die, 11 million require bed care for a day or more and 400,000 suffer lasting disability at a cost of nearly \$3 billion in medical fees and hospital expenses and over \$4 billion in lost wages. Those requiring hospitalization occupy an average of 65,000 beds for 22 million bed days under the care of 88,000 hospital personnel. This hospital load is equivalent to 30 500-bed hospitals. One out of every eight beds in a general hospital is occupied by an accident victim.

To compound these tragic statistics, accidents take the lives of young and healthy individuals who otherwise could expect to enjoy long and productive lives. In addition to the human loss, the cost to society in terms of productive manhours is devastating.² The total cost is over \$29 billion a year.³

According to the *JAMA* supplement on *Standards for Cardiopulmonary Resuscitation and Emergency Cardiac Care*, it is estimated that 1,000,000 persons in the United States experience acute myocardial infarction each year and more than 650,000 die annually of ischemic heart disease. About 350,000 of these deaths occur outside the hospital, usually within two hours of

the onset of symptoms. Thus, sudden death from heart attack remains the gravest medical emergency today.⁴

This emergency is closely followed by accidental death as a result of drowning, electrocution, suffocation, drug and alcohol intoxication, falls, poisonings, attempted suicide and automobile accidents. Together, sudden death from heart attack and accidental death are responsible for one-fourth of all mortalities in the US annually. However, aggressive emergency medical care without delay, made possible by a preplanned, well-organized system of response, could save many of these victims.

Although transportation is an important aspect, emergency transportation alone, without capability for care in transit, does not constitute emergency care. The major elements of emergency health care delivery are life support through resuscitation and stabilization of the victim at the scene of the life-threatening emergency, stabilization during transportation, continuing care at a definitive center appropriately equipped to manage that life-threatening problem and rehabilitative care. These and other variables of emergency service combine, often randomly at present, to determine the survival of the patient. This is unacceptable in the Maryland system.

The success of a system of emergency medical care depends on the cooperation and participation of numerous elements in the community. Initial planning and determination of resources and needs must be the responsibility of local residents, representatives of health care providers and consumers. Multi-jurisdictional councils must be formed to insure compatibility of equipment, standards and procedures among elements in the system and between adjacent systems.

State and national guidelines and standards must be adhered to and ongoing critical evaluation of the system must provide the basis for continual modification and growth. These activities should remain the responsibility of the local regional council working in close cooperation with other councils and state authorities.

When all of these resources are brought together and focused on the emergency victim, we will be able to offer all citizens the best emergency medical care that science can provide and consequently decrease death and disability in our state due to life-threatening medical emergencies.⁵

Program Goal and Objectives

Governor Marvin Mandel and the Legislature have mandated the development of a statewide emergency medical services system through the creation, by Executive Order in February, 1973, of the Division of Emergency Medical Services (DEMS) and the Maryland Institute for Emergency Medicine (MIEM), formerly known as the Center for the Study of Trauma. The DEMS, a service organization, is working with providers of emergency care throughout the

state. The MIEM serves as a resource center devoted to developing and disseminating new concepts in therapy, teaching, research, management and systems engineering applied to EMS problems.

The overall goal is to insure that every citizen will receive the best emergency medical care regardless of type of illness or injury, its severity, the citizen's personal circumstances, or his geographical location.

The Division has defined the following objectives for the statewide emergency medical services system:

1. To establish a statewide EMS system consisting of regions, subregions, local subsystems and specialty referral facilities coordinated by a communication and transportation network as an integral part of the health delivery system.
2. To provide total emergency care from the time of the emergency through resuscitation, definitive care and rehabilitation by the maximum use of technological support throughout the cycle.
3. To develop all phases of the program utilizing community and areawide planning and cooperation with existing Federal, State and local agencies.
4. To develop and implement subsystems in capabilities of hospitals, communications, transportation, training and education, public information and evaluation.
5. To promote the latest concepts of patient management within the hospital environment so that the patient is not in a system of medical care which leads only to the hospital door.
6. To use the MIEM as a true State Institute and employ it as the nucleus to develop broad programs in patient care management, professional training and research. This Institute will provide an environment wherein all agencies and educational institutions interested in the improvement of emergency health care delivery may participate.
7. To promote a close liaison with the State Medical Examiner so that pertinent information regarding accidental deaths and injury can be evaluated and correlated to improve EMS.
8. To develop methodology utilizing systems analysis techniques for evaluating patient care, education and research so that changes in management of the program may be implemented as required.
9. To develop a system of cost-analysis and cost-effectiveness of the delivery of EMS so that with appropriate modifications and restructuring of the mechanisms of delivery these costs may be ordered or rechannelled for improved care.
10. To develop a total system that will be financially and administratively self-supporting within the community so that continued subsidization from other resources will be required only for new and unusual projects.

Thus, the purpose of the statewide EMS program is to improve the delivery of emergency medical care and thereby decrease mortality, morbidity, hospitalization and disability. Current knowledge and technology are applied to the maximum extent, limited only by the availability of resources. Detailed evaluation and effectiveness studies will be an underlying theme throughout the program's evolution.

Inventory and Planning

The outcome of any medical emergency depends on two basic factors: the quality of initial, definitive and rehabilitative care and the time intervals involved in the delivery of that care. This requires a preconceived and coordinated plan, a communication system and professional and allied health personnel cooperating with hospitals, transportation services and the public.

A plan was developed in March, 1971, entitled *A Plan for the Organization of a Statewide System of Trauma Facilities Utilizing the Already Available Resources within the State of Maryland for the Care of the Critically-Injured Patient* and submitted to Governor Mandel at his request.

This plan described all the components needed for a systematized EMS program.⁶ After a careful inventory of resources available throughout the state, encompassing all of the ingredients for an emergency health care delivery system, a second, more detailed plan was submitted to the Secretary of Health and Mental Hygiene in May, 1973.

This plan, again based on the regional concept, further identified the EMS problem, goals and objectives. It encompassed communications, transportation, education, training, implementation and evaluation. Approved at the state level, it became the foundation for Maryland's statewide Emergency Medical Services System.⁷

Regionalization

Five EMS regions, defined according to the Executive Order to encompass the entire state, were formed on the basis of jurisdictional patient flow patterns, medical capability and geographical factors (Figure 1).

Region 1 (Appalachia) consists of Garrett and Allegany Counties; it operates in collaboration with contiguous areas of Pennsylvania and West Virginia with traditionally reciprocal patient flow.

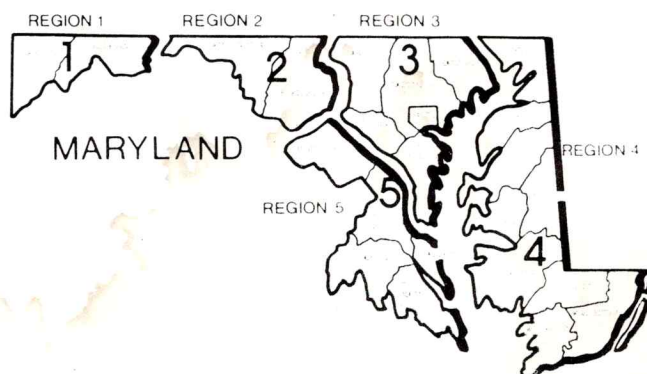


FIG. 1: Maryland EMS Regions by County.

Region II (Mid-Maryland) encompasses Frederick and Washington Counties; it operates in collaboration with contiguous areas of southern Pennsylvania, West Virginia and Virginia.

Region III (Metropolitan Baltimore) includes Baltimore City and the Counties of Baltimore, Anne Arundel, Harford, Howard and Carroll; it operates in collaboration with contiguous areas of Pennsylvania.

Region IV (Eastern Shore) encompasses Cecil, Kent, Queen Anne's, Caroline, Talbot, Dorchester, Somerset, Wicomico and Worcester counties; it operates in collaboration with parts of Delaware and Virginia.

Region V (Metropolitan Washington) consists of Montgomery, Prince George's Charles, Calvert, and St. Mary's Counties and, by mutual agreement, the District of Columbia and four counties and two cities in northern Virginia.

Most agencies and institutions dealing with emergency services agree that the system must not only be regionalized but coordinated to avoid delays in patient care. As a first step, the regions must assess their current capabilities and needs in three areas: rescue equipment (ambulance and communication equipment), rescue manpower and emergency facilities. Once identified, the necessary equipment can be obtained, training programs begun and emergency care moved on its way toward a uniformly high level statewide.

Regional EMS Advisory Councils

In keeping with the State plan, a volunteer EMS Advisory Council has been organized in each region to provide for lay and professional participation in developing and instituting an emergency service system.

Council members include hospital authorities, physicians, nurses, County and State health department officials, consumers, representatives of ambulance and rescue organizations, fire and police departments, municipal government and civil defense.

In each region, the EMS Advisory Council determines local EMS needs, coordinates local emergency medical resources and provides regional input into the statewide program. A major program undertaken by all the Regional EMS Advisory Councils was to develop a regional plan in conjunction with the State plan. Based on guidelines established by Congress in the Emergency Medical Service System Act of 1973, this plan provides for Federal financial support for the development of better emergency medical services.

In developing this plan, each regional council was required to address the following components of an EMS system: 1) the 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 and 15) mutual aid agreements.

Resource requirements identified in these regional

plans were combined into a statewide grant request which was recently submitted to HEW.

The Regional EMS Advisory Councils have already made much progress in defining and providing for local EMS needs. Some highlights of their activities are presented below.

Appalachia Region

Garrett and Allegany Counties are each represented by 15 members on the Council which is officially recognized and operated under the authority of the two County Commissions. As noted above, the Council recently completed its regional EMS plan utilizing planning funds obtained in a Federal grant.

The Council has performed a detailed survey of ambulance service needs in the region which included a study of the ambulance vehicles and equipment, ambulance staffing and the geographic coverage of the present ambulance services. The Council has been instrumental in obtaining Federal funds from various sources to bring the ambulance services up to a high standard, and it has developed standards within the region for the training levels of ambulance dispatches and attendants.

The Council has provided leadership within the region which will soon result in the establishment of central alarms in both Allegany and Garrett Counties. (A central alarm is a communication center for dispatching all fire and ambulance equipment in a county. All but five Maryland counties presently operate alarms, and of these five, four are working to establish the system in their counties.)

The Council also has been a driving force behind the establishment of the Appalachia Interstate EMS Consortium (discussed more fully below) and has been participating with the Consortium in evaluation of the current hospital capabilities within their region.

Among its other activities, the Council continues to collaborate with the Western Maryland Heart Association in the establishment of Cardiac Rescue Technician programs. It has sponsored the development and conduct of a specialized ambulance drivers' training course which may well become a model for use throughout Maryland where volunteer ambulance attendants are used.

Dr. William Buser, Garrett County, was the first chairman of the Council; Lieutenant William Turnbull, Maryland State Police, is the current chairman.

Mid-Maryland

This two-county council consists of 34 members with equal representation from Frederick and Washington Counties. Also recognized and operating under the aegis of the two County Commissions, the Council recently completed its regional plan for emergency medical services.

The Council has been assisting Washington County officials in the establishment of the Washington County Central Alarm which will soon be operational. Like the Appalachia Council, the Mid-Maryland EMS Advisory Council has been involved in establishing a

Cardiac Rescue Technician training program within its region, has identified deficiencies in the ambulance service within the region, and has worked with the ambulance companies in obtaining Federal grants to correct these deficiencies.

It has also actively collaborated with the Appalachia Interstate EMS Consortium in the hospital capabilities evaluation. This Council has been particularly concerned with developing an increased Med-Evac helicopter capability within the region and, as has the Appalachia Regional EMS Advisory Council, initiated actions with the telephone company and the two County Commissions leading toward the establishment of 9-1-1 within the region.

Dr. R. R. Roberts of Frederick County was the first chairman of the Council and he has recently been succeeded by Dr. John Marsh of Washington County.

Metropolitan Baltimore

The Board of Directors of a private, non-profit corporation, Emergency Medical Services Development, Inc. (EMS DI), serves as the regional council. EMS DI has developed and implemented a national demonstration project involving a regional EMS communications system. The system has been funded by a \$1.2 million Federal grant and provides a coordinated ambulance-to-hospital communication system through a centralized emergency medical resource center.

In conjunction with the system, 28 ambulance telemetry units have already been installed. In addition, the Council has been working with the Regional Planning Council of Metropolitan Baltimore to establish 9-1-1 throughout the metropolitan area.

EMS DI has coordinated the training of approximately 200 Cardiac Rescue Technicians within its region. It continues its effort to improve the ambulance service capability for the five counties and the city of Baltimore that comprise its region.

The present Chairman of the Board of EMS DI, Mr. Paul Becker, is the Administrator of the Greater Baltimore Medical Center. He has succeeded Dr. Joseph Berman of Sinai Hospital.

Eastern Shore

Having obtained a \$40,000 Federal planning grant, the Eastern Shore Region has completed its regional EMS plan. Working with the Comprehensive Health Planning Council of the Eastern Shore which administered the grant, the Eastern Shore EMS Advisory Council has addressed considerable attention to the problems of ambulance attendant training in remote rural areas. The Council recently completed a region-wide evaluation of hospital emergency service capabilities which involved development of written questionnaires as well as site visits to each hospital. The Council is currently working with Peninsula General Hospital and ambulance services to develop the first Cardiac Rescue Technician training program on the Eastern Shore. Dr. Frank Drew of Eastern Memorial Hospital recently completed his term as the first chairman of the council; he has been succeeded by Dr. George Himes of Peninsula General Hospital.

Metropolitan Washington

This Council consists of representatives from the District of Columbia and the surrounding counties of Virginia and Maryland. In addition to regional representation, each of the State EMS offices within Maryland, Virginia and in the District of Columbia are represented on the Council.

Six local EMS councils have been formed within the region, three of them in Maryland. Representatives from these local councils make up the majority of the Regional EMS Advisory Council. The Council, collaborating with the Metropolitan Washington Regional Medical Program which obtained a \$45,000 Federal grant for the purpose, recently completed its regional EMS plan. It has been conducting a hospital capabilities evaluation throughout the three-state area and it also has been instrumental in obtaining a design for a regional EMS communication system.

The latter has been conducted with the assistance of the technical consultants retained to design the remainder of the Maryland EMS communication system; this insures compatibility throughout the state and within this large metropolitan region.

The current chairman of the Council, is Dr. Alan Kaplan from Maryland. In accordance with the Council bylaws, the next chairman would be from the District of Columbia.

Regional Coordinators

Each of the Regional EMS Advisory Councils is supported by a regional coordinator and his secretary who serve a liaison function between the central division office, regional councils and providers of emergency care. They assist the regional councils in writing grants, developing budgets and assessing EMS needs. The regional coordinators are also one of the immediate channels of communication through which regional councils contribute their ideas to the statewide system.

They attend council meetings and work closely with hospital administrators, physicians, nurses, ambulance personnel and other providers in their region. They assist the regions and central office in coordinating the various EMS workshops and seminars conducted throughout the state. Each regional coordinator reports to the chief coordinator who is responsible for their activities and rapport with both the professional and public elements in the system.

All parties involved in emergency medical services are encouraged to utilize the resources provided by the regional coordinators to solve their EMS problems.

Other Councils

The Division seeks the aid and guidance of many citizens, professional and lay, providers and consumers, in developing a statewide EMS system. Various councils have been formed to insure adequate representation of all interested persons.

The *Regional EMS Advisory Council* (REMSAC) is composed of four members from each of the five Regional EMS Advisory Councils and representatives

of the following organizations: the Maryland Hospital Association, the Maryland Department of Planning, the Maryland State Police, the Maryland Department of Transportation, the Comprehensive Health Planning Agency, the Maryland Department of Education, the Maryland State Firemen's Association, the Maryland State Ambulance and Rescue Association and the Medical and Chirurgical Faculty of Maryland.

This Council provides a forum for the discussion of regional problems as they relate to other regions and the statewide program.

The *Emergency Medical Services Technical Advisory Council* (EMSTAC) was established by the Secretary of Health and Mental Hygiene to advise the Department in developing and implementing the Highway Safety Program Standards for the improvement of EMS in the State.

Members represent all participants in the statewide system including Med-Chi, the MD Hospital Association, the MD State Police, Municipal and County Governments, MD State Ambulance and Rescue Association, MD State Firemen's Association and the Division of Emergency Medical Services.

A *Medical Management Consultant Group* has been established to assist in determining medical needs in the delivery of emergency medical care that require further study and implementation. Members were selected on the basis of specialty area, geographic location and representation of organizations involved in EMS.

Members of this group are: Drs. Robert Wilder, Wallace Sadowsky, Donald Wenger, Donald Gann, John Clark, Leonard Schleris, A. Gibson Packard, Ernest Austin, Gina Glick, Peter Fahrney, Richard Myers, Elliott Fishel, Benjamin White, Paul Joliet, Robert Adkins; Larry Lawrence; Drs. Sam Seeley, John Stafford, Nathan Schnaper; Agnes Kemerer, RN; Drs. Russell Fisher, John Harvey, Ronald Gutberlet, George Simons and John Marsh.

The following organizations are represented by physician membership in the Medical Management Consultant Group: American Heart Association, American Academy of Orthopedic Surgery, American College of Emergency Physicians; MD Hospital Association, Trauma Committee, American College of Surgeons, County Health Officers of MD; Department of Health and Mental Hygiene, Johns Hopkins Hospital, Baltimore City and County Fire Department Training, American Trauma Society and Critical Care Medicine.

To date, such items as the Cardiac Rescue Technician program, proposed legislation including the Good Samaritan and Cardiac Rescue Technician Laws and Guidelines for Statewide Uniformity of Care have been discussed and acted upon by this group at their bi-monthly meetings.

The following task forces have also been formed: EMS Training Committee—Dr. Robert Wilder, Chairman; Medical-Legal Committee—Dr. Donald Wenger,

Chairman; Categorization Committee—Dr. John Harvey, Chairman and Cardiac Rescue Training Committee—Dr. Leonard Schleris, Chairman.

In Western Maryland and the surrounding counties in West Virginia and Pennsylvania, there is a significant amount of patient flow across State lines and, with respect to ambulance services and physicians, provider flow across State lines. Thus, to provide a properly-integrated regional emergency medical services system, interstate collaboration and coordination are required. This is being accomplished through an *Appalachia Interstate Emergency Medical Services Consortium* composed of eight representatives from each of the three states, appointed by the three State Governors.

The Consortium operates on an interstate basis much as Regional EMS Advisory Council within Maryland operates on an intrastate basis. The Interstate Consortium is concerned only with those emergency medical service activities that demand interstate coordination.

An example is in the field of Emergency Medical Technician-Ambulance (EMT-A) training. Each of the three states operates its own EMT-A training program under the Federal Department of Transportation and HEW guidelines. The Consortium has arranged for the recognition of reciprocal certification of EMT-A's among the states.

Other areas of involvement of the Consortium have been the compatibility of State laws pertaining to EMS such as standard ambulance markings and Good Samaritan laws, the integration of EMS communication systems that are being developed in each of the three states and joint funding of regional EMS projects that cross state lines.

The Consortium is in the process of a regional hospital capability evaluation involving over 30 hospitals in the three-state area. It recently incorporated as a private, non-profit corporation and has received a small Federal grant to sustain its first year of operation.

Recognizing the need to foster interstate cooperation and communication, DEMS organized Maryland, Delaware, Pennsylvania, Virginia and West Virginia, and the District of Columbia into a *Mid-Atlantic EMS Council*. Through officially-designated state representatives, the Council negotiates cooperative agreements and fosters the development and adoption of compatible State legislation and standards in order to insure reciprocity.

The Council also facilitates the sharing of resources across State boundaries, and works toward a larger regional concept for EMS. Ideally, other states would participate in the creation of similar regional groups.

These councils assure all citizens the opportunity to participate in the development and implementation of a statewide and interstate EMS system. The system is founded on the concept of volunteerism, already well-established in Maryland, and its success ultimately depends on voluntary cooperation and participation.

Maryland EMS System Components

What are the detailed elements of this system? It has

been recognized that what happens in the first hour after injury will largely determine a critically-injured person's chances for survival. Specifically, victims of life-threatening medical emergencies must be treated quickly by properly-trained rescue personnel, immediately brought to a medical facility capable of aggressive management of their particular medical emergencies without delay and kept alive during transport.

Translated, survival depends on training of rescue personnel, communications, rapid evacuation and transportation, availability of and access to specialized medical facilities and public education and participation.

Training and Continuing Education

During the first critical minutes following injury or sudden severe illness, the ambulance attendant may well be the first medically-trained person to care for the emergency victim. The attendant's competence and level of skill could be the single most important factor in the victim's chances for survival with minimum disability.

To achieve maximum training for ambulance attendants in Maryland, the State has recognized and accepted the course curriculum as approved by the DOT, National Highway Traffic Safety Administration, for the 81-hour EMT-A course. This course is specifically designed to prepare individuals to be ambulance attendants, i.e., to operate all standard ambulance equipment and provide basic life support to critically ill and injured persons at the scene and in transit.

To date over 4,000 of the state's 8,000 ambulance attendants are certified EMT-As. The DEMS objective is to train every ambulance attendant in the state to EMT-A level. Following initial certification, refresher courses are planned at three-year intervals.

Standardized training programs for Cardiac Rescue Technicians (CRTs) with unified program standards, skills maintenance and certification methods have recently been introduced. CRTs are trained on telemetry equipment, taught administration of IVs and certain drugs ordered by a physician and many other advanced emergency life-saving skills. These programs are currently offered on a limited scale and will be expanded as funds and staffing permit.

A variety of educational programs for physicians, nurses and others involved in the delivery of emergency health care are also underway throughout the state. In an innovative pilot program, physicians from emergency departments throughout the state will participate this fall in an intensive seven-day residential training program conducted under the auspices of MIEM.

The visiting physicians will be exposed to a variety of emergency treatment and clinical skills and receive a thorough introduction to the statewide system through briefings at the various specialty referral centers. Transportation, accommodations and a stipend are awarded the attending physicians. The DEMS objective is to offer the program each year to one physician from the emergency department of each hospital in the state.

An intensive continuing education program is also underway for emergency department nurses. Building

upon skills gained from a series of regional workshops which include such subject areas as *Crisis Intervention*, *The Changing Role of the Emergency Room Nurse*, *Burns* and *Pediatric Emergencies*, nurses will be invited to attend a month-long residential program conducted under the auspices of MIEM.

Focusing on specific skills required by the trauma nurse such as physical diagnosis, pathophysiology and patient management, the program will also include sessions conducted at the specialty referral centers. The DEMS objective is to offer the program annually to two nurses from the emergency department of each hospital in the state.

A large number of nursing workshops and specialized physician's seminars have been presented in cooperation with various hospitals throughout the state, and final planning is currently underway for a multi-track three-day workshop to be held in the fall. This statewide workshop, with specialized sessions for physicians, nurses and ambulance attendants, will focus on specific skills, as well as on national trends in emergency health care delivery.

Rapid Evacuation and Transportation

The state's volunteer and paid ambulance and rescue squad system and the State Police Med-Evac Helicopter Program combine to form the finest emergency medical transportation and evacuation system in the country. The Med-Evac Helicopter Program, a key component in the system, was developed by MIEM and the MD State Police and it now operates in collaboration with MIEM and DEMS.⁸

To provide better coverage for the Air Med-Evac Program, the Aviation Section of the MD State Police, the MIEM and the DEMS are working out formal agreements to incorporate the services of the National Park Services Aviation Section and the 247th Medical Detachment stationed at Fort Meade.

This additional support will provide citizens with total helicopter coverage for emergency transports.

Traditionally in Maryland, emergency patients were routinely transported to the nearest hospital regardless of the severity of illness or injury, or the medical capabilities of the destination facility. Though response time was quite good, too many severely ill or injured patients were not receiving the immediate aggressive care they required. (It will be the responsibility of the regions to evaluate EMS hospital care capability so that the patients in their regions are directed to the facility that can provide care for the injuries incurred.) While it is estimated that 85% or more of emergency victims can be effectively treated at the nearest local or area-wide hospital, an additional 10% may require more comprehensive treatment as typified by a larger multi-disciplinary-staffed general hospital. The remaining 5% require rapid evacuation to a specialty care center where thorough and aggressive treatment of a particular life-threatening illness or injury is provided.

The presence of such specialty referral centers in Maryland and the rapid evacuation and transportation capabilities of the Med-Evac program enable care pro-

viders to move their emergency patients to the appropriate facility, usually within one hour, from almost anywhere in the state.

Experience with the Med-Evac program since its implementation in 1969 has clearly demonstrated that rapid evacuation and transportation via helicopter to a specialty care facility does indeed have a dramatic impact on the survival of critically ill multiple trauma victims, and the system continues to grow.

In 1973, 840 medical transports were made, while in 1974, over 1,000 emergency critically ill or injured persons were transported by State Police helicopters to specialty referral centers for specialized medical care.

Specialty Referral Centers

The State of Maryland is fortunate in having several sophisticated, specialized treatment facilities centrally-located in Baltimore and accessible to the entire state.

The State Police Med-Evac helicopters are utilized to transport emergency critically ill or injured patients to these designated referral centers only. At a physician's request, patients can be transported to the following referral facilities: the MD Institute for Emergency Medicine, the Pediatric Emergency Trauma Center at Johns Hopkins Hospital, the Baltimore City Hospitals Kiwanis Burn Unit and the MD State Intensive Care Neonatal Programs at Baltimore City and University of MD Hospitals.

The MD Institute for Emergency Medicine provides care for those persons with emergency life-threatening illness or injury in addition to its research and teaching functions. A majority of patients are victims of multiple trauma and shock resulting from highway crashes, violence, drownings, poisonings, industrial mishaps, falls and accidents of all kinds.

Ever-ready teams of surgeons, anesthesiologists, physicians, nurses and physician assistants provide aggressive, life-saving treatment around the clock. The facilities and the staff are geared specifically to treat the direct multiple trauma victim and the interhospital transfers whatever the life-threatening problem. The MIEM also treats gas gangrene patients from all over the East Coast in its pressurized hyperbaric oxygen chamber.

Additionally, MIEM traumatologists remain available for consultation at all times through the Systems Communication Center.

The Johns Hopkins Hospital Pediatric Emergency Trauma Center provides services for children similar to those which MIEM provides for adults. The program at Hopkins is tailored to meet the special needs—emotional, physical and psychological—of critically ill or injured children. Pediatricians and pediatric surgeons render specialized medical and surgical care to the child with a life-threatening problem in carefully designed and equipped facilities.

The casual, cheerful atmosphere is intended to be as non-threatening and afford as much privacy as possible to the injured or ill child. Patients are brought to the children's unit via State Police helicopter or local

ambulance from Baltimore as well as from outlying regions of the state.

The Baltimore City Hospitals Kiwanis Burn Unit provides intensive management of approximately 100 burn patients annually. Critical burn victims of all ages are admitted from anywhere in the state. The nine-bed unit offers long-term comprehensive therapy to the burn victim. The medical team consists of special nursing personnel, plastic surgeons, general surgeons, psychiatrists, pediatricians, anesthesiologists and internists. A social worker, physical and occupational therapists and volunteer workers from the Burn Victims Aid Society of MD are involved daily with the patient's psychological, rehabilitative and social readjustment problems.

The MD State Intensive Care Neonatal Program at Baltimore City and University of MD hospitals have been combined into a cooperative program. Critically sick and premature, newborn infants are referred by physicians from anywhere in the state and are transported by the State Police Med-Evac helicopters in portable incubators with their own oxygen supply.

In 1972 and 1973, 510 infants were referred: 314 to Baltimore City Hospitals, 196 to the University of MD Hospital.⁹ Some hospitals may refer all of their premature infants, while others may refer only those with severe abnormalities. Referring physicians and families are continually informed of the baby's status and frequent visits to the baby's bedside are encouraged.

All of these specialty referral centers are serviced by MD State Police Med-Evac helicopters and offer specialized medical care to any person in the state with particular life-threatening emergencies.

Physicians throughout Maryland are encouraged to utilize the services of these facilities for those patients whose exceptional medical needs cannot be met by local resources. As required, other specialty referral centers will be established.

Communications

The MIEM has demonstrated through forewarning of patient arrival, including patient status and extent of injuries, that emergencies can arrive by appointment.¹⁰

Many hospital emergency rooms in Maryland are not forewarned of the arrival by ambulance of seriously ill or injured patients. It is only after the arrival of the ambulance at the emergency room door that the emergency room physician has an opportunity to assess the problem and gather the necessary resources to manage the emergency.

Valuable time is lost seeking qualified staff specialists, equipment and other needs. Similarly, ambulance crews have no way of knowing if a particular hospital can manage a certain case because of temporary work loads, staffing and bed space. They cannot receive medical consultation at the scene or in transit from a physician in the destination facility.

Ambulances out of their local area (e.g., on a long distance transport to Baltimore) are usually out of radio contact with anyone and have no easy means to

summon aid in the event of an emergency. The State Police Med-Evac helicopters cannot communicate directly with either ambulance or hospitals throughout the state and, until the establishment of the Systems Communication Center (SYSCOM) at MIEM, there was no single way of requesting their service and coordinating their missions.

These are some of the problems that will be corrected with the implementation of the MD EMS Communication System (EMSCS). The Metropolitan Baltimore region has recently christened its regionwide communications system which will be a part of the statewide EMSCS.

Specifically, the EMSCS will provide the following capabilities:

1. Direct medical communications linking the scene of the emergency locations, ambulances, hospitals, specialty care centers, central alarms and Med-Evac helicopters without disturbing present ambulance dispatch methods and equipment.
2. Ease and flexibility in operation utilizing, rather than duplicating, systems currently in operation within the state.
3. The statewide communication center (SYSCOM), located at MIEM, is already partially operational. Its function is to coordinate the Med-Evac effort, to coordinate EMS activities between regions, provide for medical consultation with traumatologists at MIEM and provide a backup communication resource for local and national disasters. It will also provide an information resource center for the State (Figures 2 and 3).

Consumer Education and Information

An ambitious public information and education program has been initiated. It is intended that every Marylander or visitor to the state will know how to gain access to the emergency medical system. Marylanders will be acquainted with the EMS system and

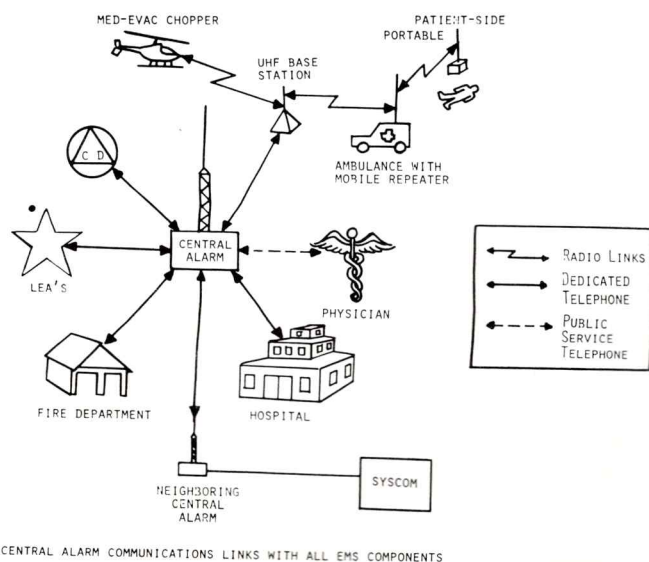


FIG. 2: Typical county central alarm communication system. All central alarms throughout the State are directly connected to SYSCOM.

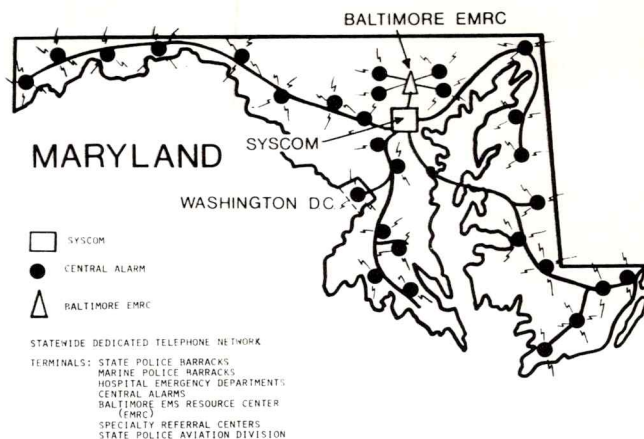


FIG. 3: Schematic of the Maryland Emergency Medical Services communication system. The Baltimore Emergency Medical Resource Center (EMRC), located at Sinai Hospital, is the communication center for Metropolitan Baltimore and provides total service for this region. It is connected by a telephone line to SYSCOM which acts as an Emergency Resource Center for the rest of the state.

the availability of medical training programs. Through the school system, students will learn how to access the EMS system and how to provide medial self-help.

An education staff has been formed at the DEMS which has begun making improvements in instructional techniques, and devising and providing multimedia materials. Speakers and audiovisual material and equipment are now available for presentations to groups, clubs and societies.

Future Development

Unlike other diseases which require a medical breakthrough before significant savings in lives can be made, death and disability of the emergency victim can be reduced using existing medical knowledge and equipment utilizing a systems approach.

Maryland is unique as a state in the development of an emergency medical services system because the Governor and Legislature have made a firm commitment to improve emergency care by providing resources for training, communications, equipment and evaluation.

The critical factor, however, is people, both the user and provider of emergency medical care. The emergency medical services plan for Maryland is an evacuation system founded on voluntary participation. The concept is not to regulate, but to serve and assist.

The degree to which emergency care is improved will depend upon the voluntary participation.

References

1. Duval, Merlin K.: The Hidden Crisis in Health Care. (paper presented at the Second National Conference on Emergency Health Services, Bethesda, MD, Dec. 3, 1971), p. 10.
2. National Research Council. Accidental Death and Disability: The Neglected Disease of Modern Society, Public Health Service Publication, 1970, pp. 1-9.
3. Accident Facts. Chicago, National Safety Council, 1972.
4. American Medical Association. Standards for Cardiopulmonary Resuscitation and Emergency Cardiac Care, *JAMA*, Feb. 18, 1974, Vol. 227, No. 7 (supplement), p. 838.

5. Cowley, R.A.: A Study of Shock and Trauma in Man Utilizing the Resources of a Clinical Shock Trauma Unit, *Maryland State Medical Journal*, March, 1967, Vol. 16, No. 3, p. 63.
6. Center for the Study of Trauma, University of Maryland. A Plan for the Organization of a Statewide System of Trauma Facilities Utilizing the Already Available Resources Within the State of Maryland for the Care of the Critically-Injured Patient. March, 1971.
7. Division of Emergency Medical Services, Maryland State Department of Health and Mental Hygiene. A Plan for an Emergency Medical Service Program for the State of Maryland.
8. Cowley, R.A., et al: A Economical and Proved Helicopter Program for Transporting the Emergency Critically Ill and Injured Patient in Maryland, *J. of Trauma*, Dec., 1973, Vol. 13, No. 12, p. 1029.
9. Maryland State Police Statistics.
10. Cowley, R.A., A.B. Cooper III, D.E. Towson, L. Scherlis: A Statewide Communication System to Support a Regional Program for Emergency Health Care Delivery in Maryland, *Maryland State Medical Journal*, January, 1973, Vol. 22, No. 1, p. 61. ☐