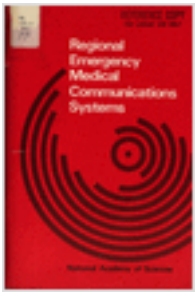

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Regional Emergency Medical Communications Systems

A Final Report of the
Committee on Regional Emergency
Medical Communications Systems
Assembly of Life Sciences Division of Medical Sciences
National Research Council

NATIONAL ACADEMY OF SCIENCES
Washington, D.C. 1978

NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the Councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the Committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of Members of the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine.

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Contents

Conclusions and Recommendations

Since August 1973, the Committee on Regional Emergency Medical Communications Systems of the National Academy of Sciences-National Research Council (NAS-NRC) has conducted with the Robert Wood Johnson Foundation a program for the selection, funding, and follow-up of 44 emergency medical services (EMS) systems in 32 states and Puerto Rico. These projects range in size from single-city to state-wide, and in character from urban to wilderness. The Committee's principal conclusions and recommendations, based on annual site visits and on reports and completed questionnaires from the projects, represent a consensus of the Committee members regarding this program and EMS in general.

I. The Committee finds that the program has achieved its objectives of upgrading the availability, quality, and efficiency of emergency medical care in the 44 project areas and of stimulating the development of new and more satisfactory administrative arrangements for managing interjurisdictional EMS systems. Further, the Committee feels that the program has had a major impact on EMS development in the United States in the following ways:

A. The program prospectus, (Appendix A), which constituted the first nationally promulgated description of what a regional EMS system should be, provided guidance, at a minimum, to the 260 applicant organizations in planning their EMS systems, and anticipated many of the provisions of the federal program delineated in the federal Emergency Medical Services Systems (EMSS) Act of 1973.

B. The program stimulated cooperation, in many instances for the first time, among emergency care providers, political and public service jurisdictions, and other concerned organizations throughout the country, for the provision of sound emergency medical care.

C. The program demonstrated that regionalization of resource management for emergency medical care, requiring cooperation and coordination among

divers political and administrative jurisdictions within large geographical areas, is achievable and brought into being EMS systems whose achievements and experiences have gained recognition and prompted emulation throughout the country.

II. On the basis of its experience with this program, the Committee concludes:

A. That EMS is, and should be recognized as, an essential public service, as are the police and fire services.

B. That the configuration and characteristics of an EMS system are best determined locally, conditioned by local needs, resources, and constraints.

C. That a primary concern of EMS planners should be to ensure that the organization that is ultimately to be responsible for the operation of the system be professionally, politically, and financially strong.

D. That, with the basic EMS components of training, communications, and transportation, facilities categorization, and medical equipment relatively well established and standardized, increasing attention should be given at the state and national levels to the relatively undeveloped areas of evaluation, public education, management, and the economic and legal aspects of EMS.

E. That (notwithstanding the present shortage of rigorous scientific data from the 44 projects on the medical impact of EMS) EMS systems can and do effect significant reductions in accidental death and disability.

III. The Committee recommends:

A. That a national center for EMS information and public education be established, to collect and analyze data and disseminate studies on the impact of EMS systems and of public education in first aid and cardiopulmonary resuscitation on death and disability; to provide information and guidance for EMS system managers in the conduct of their public information programs; and to provide information to state and national legislatures responsive to their needs in framing EMS legislation.

B. That medical associations give high priority to developing methods of involving local medical communities in the support of EMS in their areas, and of ensuring prompt and professional emergency department response to medical emergencies.

C. That rural and wilderness areas be given priority in programs of federal and state assistance for EMS development.

D. That Health Systems Agencies (HSAs) be encouraged to bring personnel with EMS experience into their organizations.

E. That national sponsorship of the universal emegency telephone number, 911, be pushed more strongly, with financial incentives for establishment of consolidated dispatch centers serving police, fire, and EMS.

F. That the use of the 10 UHF MED-channels be strongly encouraged, while recognizing the present need in many areas to continue the use of VHF.

IV. The Committee feels that research priority should be given to the following subjects:

A. The cost-effectiveness of paramedic service, with and without telemetry, in urban and rural areas.

B. The effects of hospital categorization on emergency medical care.

C. The economics and financing of EMS, including the role of third party payments.

D. Issues of malpractice liability and personnel licensure in EMS.

E. The feasibility of training for and using various advanced life support measures in rural and wilderness areas.

F. The relationship of EMS system characteristics to system impact on death and disability, and to system efficiency.

G. Optimum CMED characteristics appropriate to various types of EMS systems.

H. The impact of regionalization on basic and advanced emergency medical care.

I. The feasibility of a cost-sharing approach to finance coordinated or consolidated telecommunicatons systems for community and regional EMS systems.

Introduction

On January 17, 1973, the Robert Wood Johnson Foundation through its President, David E. Rogers, inquired concerning the interest of the National Academy of Sciences in conducting with the Foundation a national competitive program for funding the initiation or improvement of regional emergency medical communications systems. This initiative of the Foundation was consistent with its general program goal of increasing the access to and quality of medical services for the citizens of the United States and was in response to a 1972 Academy study* which indicated that prehospital emergency medical care in the United States was a long-neglected, critical, and remediable area of medical care that needed to be addressed. It was the Foundation's hope that its "seed money" would have a catalytic effect in bringing together emergency medical services operated by different geographic and institutional jurisdictions within a region in some new and more effective regional administrative arrangements, in order to upgrade and systematize the delivery of emergency medical care.

On March 9, 1973, the Academy accepted the Foundation's proposal and on April 13th the Foundation and the Academy jointly announced the inauguration of a program whereby the Foundation would provide $15,000,000 for grants of up to $400,000 to public or nonprofit private organizations seeking to develop sound regional emergency medical systems.

A request for proposals (RFP) was prepared by a Foundation panel of emergency medical services consultants. The RFP is notable as representing the first nationally promulgated description of what a sound EMS system should be. Applicants were asked to provide evidence of ability and intent to meet stated "minimum requirements" (e.g., single access number and central

*Roles and Resources of Federal Agencies in Support of Emergency Medical Services. March 1972.

dispatch), and to comply with such further requirements as letters of support from cooperating agencies and letters of endorsement from governmental and professional organizations, and were encouraged to meet various stated priorities (Appendix A). Many of the provisions of that RFP were subsequently incorporated in federal requirements for EMS grants under the Emergency Medical Services Systems (EMSS) Act of 1973.

This report is intended to summarize the activities of the NAS-NRC Committee on Regional Emergency Medical Communications Systems since its formation in August 1973. In some ways, the report is a simple accounting, e.g., how many grants were reviewed, how many initial site visits were made, how many grants were awarded, and how many followup site visits were made. To the limited extent possible, the accounting will include quantification, e.g., numbers of areas where communications were improved between consumer and provider and amongst providers, and number of people trained. Outcomes in terms of patient care–the ultimate test of success or failure of this program and of EMS in general–such as fewer deaths from serious illness or trauma in the regions where Foundation funds were granted, are still difficult to quantify, and data based on controlled studies are rarely available. But where such data are available, they are cited.

The Committee, in addition, believes that the experiences gained by it over the last 5 years deserve explication beyond a simple accounting of activities listed. Because most of the 44 systems have been operational for only a short time and evaluation data are scarce, any general observations the Committee can make concerning the development and implementation and even the effectiveness of regional EMS systems must be based not on numbers but on observations and impressions, possibly biased and certainly limited by its work with the 44 funded projects.

Nevertheless, when fifteen persons of widely differing professional education, background and experience as represented on the Committee, through their experience as Committee members and site visitors, can agree on some general observations, and when these observations can be laid against some of the observations of the report to the Congress by the Controller General of the United States of July 13, 1976 ("Progress, But Problems in Developing Emergency Medical Services Systems"), then we believe there is value in recording such observations. Among the matters of concern on which the Committee has developed points of view are issues relating to regionalization and some of its impediments; the difficulty in judging the worth of a particular grant application on the basis of application review alone; the value of site visits in the grant selection process; the importance of, and in face necessity of, further site visits to assess progress, *vs.* reliance on written reports; the stimulative effect of site visits on progress within a region; the importance of technical consultation to local communities; and the need for flexibility and sensitivity to the wide variation in local community circumstances both

in the development of requests for proposals (RFPs) and the administration of grants. These perspectives may have some value to legislators, to federal, state, and local administrators, and to communities looking toward development or improvement of EMS systems. The Committee believes that any group, whether it be a foundation or a government, which is involved in making grants directly to communities for the improvement of complicated social-technical systems such as EMS, may profit from a study of the experiences reported here.

PART I

THE GRANT PROGRAM

Chapter 1

The Grants Process

During the spring of 1973, some 2500 informational packets, including recent EMS publications and the Foundation's RFP, were mailed to all state governors, state health officers, medical school deans, and ultimately to many others who had read the announcement of the program.

By June 1, 1973, some 550 groups concerned with developing regional EMS systems had submitted letters of intent to apply; and by the August 1 deadline 260 formal applications had been received.

In mid-August 1973, the Committee on Regional Emergency Medical Communications Systems, which had been called into being for the conduct of the program, began its review of the applications and specified criteria for the initial screening process by staff and consultants of the Academy. Following the initial evaluation of responsiveness to the RFP, teams of two Committee members reviewed each of the applications in greater detail together with the staff comments and provided their summary observations to the full Committee. Since these grants were intended to support operational activities, i.e., were intended to aid in the actual implementation of regional networks in emergency medical care, any application which was essentially a request for a planning grant was excluded. By mid-December 1973, a succession of screenings had yielded a list of 58 front-runners.

A relatively early decision of the Committee, reached after the first review of the applications, was that it would be impossible to select the approximately 40 or more applications finally to be awarded funds from the total of 260 applications without site visits. That is, the written responses to the RFP of the final 58 applicants were of apparently equal merit, and no further judgment could be made concerning the ability of one region *vs.* another to actually carry out the plans as outlined simply on the basis of those responses. Accordingly, the final 58 were site visited during February, March and April of 1974 by teams of Committee members and Academy staff. A resulting

list of 44 projects in 32 states and Puerto Rico was recommended by the Academy and accepted by the Foundation for funding. Announcement of the grants was made on May 23, 1974, by Dr. Rogers (Appendix B).

Chapter 2

Monitoring Programs

The Committee was charged not only with developing and implementing the process for selecting projects for grant awards but, also, with reporting to the Foundation on the progress of the funded projects and on the eventual impact of the program.

In the spring of 1975, a little less than a year after the original award of funds in 1974, a second round of site visits to the 44 projects was made. Each of the sites had earlier responded to a Committee request for a written progress report, and the site visits were concerned primarily with measuring progress against the original RFP and with the reality of the progress reported by the grantees themselves. The site visits, however, rapidly became more than project monitoring. Inevitably, the members of the site visit teams found themselves not only asking questions, but responding professionally to questions of the applicants, as well as identifying apparent project shortcomings and suggesting and urging remedial action. This expanded Committee role, although not foreseen, was recognized as necessary by both the Foundation and the Academy. The Committee's original recommendations to the Foundation for both initial and continued funding had included numerous "conditions" and "recommendations" applicable to specific projects, stipulating that acceptance of the grant would entail an obligation to take certain actions which the Committee felt were necessary for the particular project to succeed. Moreover, some of these site visits led to freezing of funds available to a grantee by the Foundation until certain specified conditions were met. In 13 instances, additional return visits were held within six months by joint Committee-Foundation teams to projects which the Committee had identified as needing particularly close attention. These activities unquestionably provided new impetus to several projects that had been floundering and enabled them to make important progress.

From September 1976 through February 1977 a final round of site visits was conducted.

It became evident to the Committee during the original site visits that all projects were in need of at least some advice and guidance beyond that which could be provided during site visits. The Committee conveyed this concern to the Foundation, which responded in a number of ways. Initially, the Foundation, in cooperation with the American Medical Association, sponsored a series of four technical assistance workshops for all program applicants on recent EMS developments. During August 1974 (in Omaha, New York, Atlanta, and Los Angeles) presentations were made and roundtables conducted on new Federal Communications Commission regulations, federal funding sources, evaluation, and other topics of immediate concern to EMS projects by Committee members, communications consultants, representatives of concerned federal agencies, the Foundation, and others.

To provide continuing assistance to EMS projects, the Foundation sponsored the formation of a consortium that included the Center for the Study of Emergency Medical Services, at the University of Pennsylvania, and the non-profit consultant organizations Public Technology, Inc. (PTI), and Kahl/Veneman Associates. The University of Pennsylvania group developed a series of information packages on various aspects of EMS systems. The two consultant organizations focused on EMS communications and management. PTI continues to publish a widely disseminated EMS newsletter. The Foundation also supported studies by the Leonard Davis Institute of the University of Pennsylvania on EMS costs and financing.

In June, 1975, after the first postgrant site visits, the Foundation, again at the Committee's suggestion, sponsored a 3-day workshop in Kansas City, where grantees who had made unusual progress in some aspect of EMS development shared their experiences with the other grantees. Also, at this workshop the Foundation staff reviewed the findings of the site visit teams with individual project directors and elicited strategies and commitments for dealing with identified shortcomings. In June 1977, a second grantee conference was held, both to exchange experiences and to see whether these experiences could lead to a consensus on various EMS issues.

Thus, what had been originally intended to be a series of site visits and other Committee activities to monitor progress, assess the final effectiveness of the grants, and make observations on specific issues relating to specific goals of the Foundation's grant program became as well an active process of continuing professional guidance, criticism and support.

Ultimate success or failure of an EMS system can be measured only in death and disability statistics. Lacking such data, which may not be available for several years, one can talk only about system implementation, achievement of goals, and continuing system viability. By these criteria, some of the 44 systems, inevitably, have enjoyed less success, or have encountered greater

problems, than others. There appear to be four principal reasons for these problems: 1) failure to involve concerned ambulance companies and hospitals in the system planning and design; 2) lack of dynamic project leadership; 3) the unsuitability of an applicant organization for actual system management; and 4) inadequate attention to public education, including use of the media and familiarization of political leaders with EMS and the proposed system.

These considerations suggest that in similar programs involving diverse political and institutional interests, it would be appropriate for those reviewing applications to allot sufficient time on their initial evaluative site visits to ascertain from the concerned providers the extent of their contribution to the system plan; from local political leaders the extent of their familiarity with and commitment to the proposed system; and from the applicant a clear picture of the nature, authority, and financial stability of the organization that would ultimately be responsible for managing the system. Finally, the site visit team should try to assess the quality of the project leadership in terms of its drive, dynamism, and ability to unite a diversity of conflicting interests.

Chapter 3

Program Goals

In addition to the general goal of stimulating effective regional EMS system development and management, the program had the following 4 objectives: 1) to improve and broaden access to emergency medical services by changing the structure of the emergency care response system; 2) to improve the links among the various components of EMS systems, (a form of regionalization); 3) to upgrade certain components, particularly communications and the training of key personnel; and 4) to develop a continuing and visible commitment to EMS on the part of the community through lasting institutions and resources.

Access

The key to the solution of the problem of inadequate citizen access to EMS was considered to lie in several actions to be taken within a region. The first of these was the provision of a single telephone number throughout a project area by which a citizen could reach informed and trained central medical dispatchers. In the eyes of the original group who prepared the RFP and of the Committee, the ideal system would include the use of the single emergency number 911; where this was not feasible, a 7-digit EMS number was considered acceptable. Moreover, it was agreed that the dialing of 911 from public telephones should be toll free.

Second, public education was essential. It was clear that without a successful effort to educate the public in terms of access to EMS, any such system would be useless.

Third, there was general agreement that access should be uniform throughout the EMS region: there should be no socio-economic barriers to EMS.

Fourth, wherever possible there should be extension of system coverage from existing systems into unserved adjacent areas.

Fifth, wherever possible there should be a training program for first responders, so that whoever responded first to a medical emergency could evaluate the situation and take some immediate remedial action.

Linkages

The second broad goal was to improve linkages among system components. This concept, narrowly conceived, relates solely to electronic systems of communication between central dispatch and ambulances, between ambulances, between ambulances and hospitals, and among hospitals–all to be coordinated appropriately with police and fire communication systems. Such linkages can lead directly to the development of information systems related to overall system performance: if within a region there is central medical dispatch of ambulance services and appropriate communication between squads and hospitals, then it is possible to monitor response time and determine the appropriateness of response by area and by type of emergency. To achieve these linkages, new administrative and institutional arrangements undoubtedly would have to be established among the various ambulance services, among police, fire and EMS systems, and among hospitals. Thus "linkages" implied regionalization of at least the out-of-hospital components of the system.

Training

It was agreed that not only was the training of ambulance personnel to the basic Emergency Medical Technician level required, but also training was required for paramedics, for dispatchers, and for first responders such as fire, police, and, where possible, for the general public. Moreover, retraining or continuing education in all of these areas is equally important, and a continuing commitment to training and retraining, beyond the stimulus of initial grant funds, is mandatory.

Continuity of Support

It was considered vital that the local governmental system should provide continued funding for those components of the EMS systems developed under the Foundation grant which in the long run would require continuous funding for operations and maintenance. This entails a political commitment throughout the region to EMS analogous to that which exists for fire and police services.

The key was the development within each region of an acceptable and lasting management structure for the Emergency Medical Services System. The original RFP and the Committee had no particular bias as to where this management structure should reside—e.g., in a governmental agency such as the state or local health department, or as a newly created agency within government, or as an agency sanctioned by and operating under the aegis of a council of governments in a multigovernmental region. Although the original RFP did ask for the establishment of an EMS council, it was recognized that whereas an EMS Council, made up of voluntary participating agencies and citizens, could be necessary in planning, guiding, and monitoring an EMS system, it would probably not be able to manage such a system.

Chapter 4

Concurrent EMS Developments

During the 5 years of the RWJF-NAS program, nationwide EMS development beyond the 44 projects, spurred by the RFP and by the EMSS Act of 1973, proceeded at an unprecedented pace. The Division of Emergency Medical Services in the Department of Health, Education and Welfare (DHEW/EMS) has designated some 300 contiguous EMS regions throughout the 50 states and to date has provided funding to approximately 230 of them. This federal program has affected the 44 Foundation-funded projects in at least three important ways: in funding, in system structure, and in geographic area of concern.

In funding, 18 of the 44 projects have received a total of over $10,000,000 from HEW/EMS, not counting grants to state health departments, (except where these were also Foundation grantees). Many of the federal grants were made possible through use of the Foundation grant as matching funds. Federal grants to Foundation projects ranged from $15,000 to Missoula, Montana, to over $4,000,000 to the State of Nebraska. In some instances, these grants have played a crucial role not only in enabling projects to further expand their services, but also in helping to tide them over the difficult transition from grant support to local funding.

In system structure, the federal emphasis on the "15 points"* has caused both federal grantees and EMS projects in general to focus attention on these 15 components. Those applying for "Section 1204" grants for advanced life support (ALS) systems have had to provide evidence that "medical control" of paramedics by physicians would be provided and would be centralized in a major resource hospital.

*The EMSS Act of 1973 required applicants for grants to demonstrate adequacy in the following areas: health personnel, training, communications, vehicles, medical facilities, specialized critical care units, use of other public safety personnel and equipment, public participation in policy making, service without prior determination of ability to pay, transfer agreements, standardized record keeping, public education, evaluation, disaster planning, and links to adjacent EMS systems.

The impact of the federal program on EMS service areas has been to cause many projects—such as those based in Missoula, Kansas City, Peoria, Cleveland, and Tallahassee—to become the principal agents for EMS development in areas much larger than those covered by the Foundation grant. For instance, the Kansas City project, originally for Jackson County, Missouri, and expanded under the Foundation program to include eight counties in Missouri and Kansas, is now responsible for EMS development in a 21-county area. In Florida, the 8-county Tallahassee-based project has become the focus and model for EMS development in an 18-county region.

It should be noted that many of the 44 projects have also received very substantial funds from the federal Department of Transportation for equipment and training; and some support from the Department of Labor and other agencies for training. Several have worked with police departments funded by the Law Enforcement Assistance Administration (LEAA) or with civil defense agencies to establish consolidated dispatched centers. Clearly, the Foundation and federal programs have had parallel interests and have been mutually supportive.

PART II

PROGRESS AND PROBLEMS IN MEETING PROGRAM GOALS

Chapter 5

System Design, Management and Operation

System Planning

As noted earlier, the Foundation's program prospectus constituted the first nationally promulgated definition of an EMS system, a definition delineated in more detail in the components of the federal program. However, neither program attempted to impose a universal template for EMS system design: both recognized that each individual system design would have to answer local needs, take advantage of local resources, and meet local geographic, political, and socioeconomic conditions. In the Foundation-Academy program, the Foundation and the Committee allowed considerable flexibility in local implementation of the "minimum requirments"; for instance, the requirement for "central control of communications with a single regional institution assigned responsibility for dispatch and coordination of emergency vehicles" was stretched to permit dispatch from a central office in each county in some multi-county system.

There are two distinct phases in EMS planning: 1) the overall EMS system planning, identifying regional emergency medical resources and needs and describing how these needs can best be met; and 2) the detailed planning of system components, in particular, of the communications subsystem. Among the 44 projects, the former was done by health planning organizations, by EMS Committees, by small groups of EMS promoters and, on occasion, by single individuals. These plans usually consisted of a general description of what the EMS system should do and of how it would meet the RFP's "minimum requirements" and "priorities." In contrast, the planning of system components can be highly technical. For instance, the design of the communications subsystem requires a degree of expertise not usually found in EMS committees; this planning was usually done by electronic engineering

consultants hired individually or from consulting firms or supplied by radio equipment vendors or by state EMS or communications offices.

Perhaps the most pervasive shortcoming in the general system planning was a lack of attention to the nature of the organization that would ultimately be responsible for the establishment and operation of the system. In the words of one Committee member:

> I believe that the major weakness suffered in common by most grantees was a failure to plan implementation strategy . . . to consider the factors and forces which can (and will) influence the implementation of their plans. The feasibility of implementation should be a factor included in the project planning process.

This shortcoming, in several projects, resulted in prolonged delays as organizations intrinsically unsuited to program management attempted to put their plans into effect. Thus in San Mateo County, California, an excellent EMS plan prepared by the County Comprehensive Health Planning (CHP) organization proved impossible to implement until project management (and grantee status) was transferred to the County Health Department; in New Haven, Connecticut, a year-long impasse between project management and private ambulance companies was resolved only after project management was transferred to the municipal government. Table 1 reflects shifts in grantee status and in the organization charged with implementing the system, during the grant period. Of thirteen such shifts, those in six urban or state systems were in the direction of providing a stronger organization for EMS management; those in six rural systems were in the direction of more local input to EMS management. One change resulted in stronger medical input.

A major fallacy frequently found in EMS system planning derives from the circumstance that such planning is often done by a small, dedicated group of EMS promoters. They feel that because an EMS system is obviously needed and would be widely beneficial, everyone who would be involved will join in. Subsequently, they are dismayed to find that various fire and police departments, volunteer and private ambulance companies, medical societies and hospitals, whose leaders have not participated in system planning, not only fail to understand what is proposed, but withhold support or actively oppose it. For instance, during the final days of this program's application review process, 9 months after the applications were submitted, two major city applications were withdrawn because the local fire departments would not cooperate; and another, which the Committee had decided to recommend for funding, was scratched when the city manager decided that his rescue squads should not go beyond their city limits. The alternative, of involving all concerned groups in the system planning, may seem hopelessly cumbersome, with a huge EMS committee and interminable jurisdictional arguments; but this method will produce a system design, if one can be produced, that is generally acceptable.

TABLE 1 Organizational Changes

A=Initial Grantee
B=Successor Grantee
1=Initial management organization
2=Successor management organization

	State Health Department	COG or COG-type	County Gov't	County Health Dept.	County Communic. Dept.	County CD	City Government	Hospital Association	Hosp. or Consortium	Health Org. Management	Health Planning Org.	University	EMS Corp.	EMS Cmte.	Private Ambulance Co.
Santa Clara			B2	A1											
Bluefield									A1						
Lafayette							A								1
Ponce	A							1							
Des Moines		1	A												
Grand Island		A1													
N. Mex. State	B1									A					
Missoula		1	A												
Lebanon					A1								2		
Santa Fe (PMS)									A1						
King County			A1												
Cody, Wyo.							A1						2		
Memphis						B2				A1					
Utah										A1	B		2		
Cleveland									A1			2			
Tallahassee								A1							
Philadelphia						1			A						
Mobile													A1		
Victoria						A1									
Indianapolis								A1							
Kitsap County					A1										
Suffolk County			A1												
Navajo Nation										A1					
Newark	A							1							
New Haven						B2		A1							
San Bernardino		A		1											
Hunterdon County		A1													
Atlanta	2									A1					
Troy		A1													
San Francisco			A1												
Menominee										A1			2		
Green Bay										A1			2		
San Mateo			B							A1					2
San Juan						A1									
Minneapolis		A1													
Peoria								A1							
Middleboro										A1			B2		
Redding		A1													
Kansas City		A1													
Idaho	A1														
East Lansing													A1		
Chapel Hill		1									A				
Hermiston								A1							
Charlottesville											A1				

If such a design cannot be devised, the time to find this out is at the planning stage, rather than later, after various expenditures and commitments have been made.

The experience, common among developing EMS systems, of encountering unanticipated opposition can lead to the judgmental fallacy of ascribing such opposition to narrow-minded and selfish provincialism. Among nongrantee applicants who responded to a questionnaire on their progress, provincialism was one of the most frequently cited obstacles to success. It is sometimes difficult for EMS people, a rare breed of idealists and altruists, to understand that the fears of ambulance companies that they may be put out of business, of hospitals that they may lose patients, of physicians that involvement with paramedics may lead to malpractice suits are legitimate concerns that must be anticipated in system planning, dealt with openly and flexibly, and answered convincingly; and that these concerns are simply a part of the free enterprise environment to which an EMS system must adapt, if it is to survive and flourish.

Communications Planning

The planning of the communications subsystem has usually followed either of two approaches: 1) preparation of a detailed, technical system design by an electronic communications expert, which results in specifications that precisely identify the equipment needed and where and how it is to be installed; or 2) a careful description of the functions which the communications equipment must serve, with a subsequent invitation to vendors to submit bids for equipment that would meet the functional specifications. Both approaches have advantages and disadvantages, and generalization is difficult. However, it can be noted that several projects which prepared functional specifications have been pleased with the results, inasmuch as the vendors were responsible for ensuring that the equipment performed as specified.

Management Patterns

Among the 44 projects, four general types of EMS management structure for operation of the dispatch and transportation subsystems can be distinguished, although the lines between them cannot be sharply drawn.

In some systems, dispatching and transportation are under the same authority. This may occur in a municipal system, as in Philadelphia where both are within the city fire department; a county system, as in San Mateo County, California, where a private ambulance company, under contract to and strictly regulated by the county health department, is dispatched by the county

central medical emergency dispatcher (CMED); or a private ambulance company, as in South-Central Louisiana, where the Acadian Ambulance company dispatches its own vehicles throughout a 10-parish area. In such systems, communication and management costs are absorbed as part of the overall costs—whether borne by taxation, fees, or subscriptions—and pose no special problems for continuing support.

Many systems have consolidated dispatch. In projects such as those in Peoria, Illinois; Kitsap County, Washington; Lebanon County, Pennsylvania; Hunterdon County, N.J.; and Grand Island, Nebraska, police, fire and EMS share a common dispatch center, and the dispatchers are usually trained to respond to any type of emergency. Here there is no question of continuance of the EMS dispatch function, because it is built into the overall emergency dispatch system. This arrangement does not, however, necessarily ensure support for continued medical direction of prehospital emergency medical care. In Peoria, such direction is ensured by strong EMS support of the principal hospital and trauma center, the St. Francis Hospital; in Kitsap, Hunterdon, and Lebanon Counties, EMS has the support of the county governments. In such systems, the EMS management must be alert to the danger that EMS can become unduly subordinated to the other emergency services.

In many rural EMS systems dispatch is dispersed among participating counties. In these systems, dispatch for each county is usually consolidated at the county sheriff's office—the only 24-hour answering post available—and is thus directly supported and assured of continuance by its county. In such systems, if a central EMS organization is to continue, it should be based in an independently strong organization, as in Tallahassee, Florida, where the Tallahassee Memorial Hospital was the applicant and prime mover; or have strong state backing as appears to be the case with the Green Bay, Wisconsin, EMS Committee; or as with the Redding, California, project, have binding commitments for support from the participating counties (this is extremely difficult, inasmuch as county commissioners and priorities change).

In some systems, the dispatching and transportation are under separate authorities. In these systems, dispatching is provided as a service to the ambulance companies, usually private or volunteer. In the 8-county, 110-community Kansas City system, the service is provided by Mid-America Regional Council-Emergency Rescue (MARC-ER), a nonprofit corporation subsidiary to the regional Council of Governments (MARC). In Atlanta, the service was, until recently, provided by the Metropolitan Emergency Medical Services (MEMS), a nonprofit corporation which spearheaded EMS development in the area. Of the four types, this one is inherently the least stable, since it has no intrinsic political strength or financial security, but must depend for both on voluntary agreements with participants.

Those designing an EMS system must be prepared to modify the management structure as the system develops. At the outset, strong leadership of one

dedicated person, or a few, working with a broad-based EMS committee is needed to develop a system plan that will be generally acceptable. An essential part of this plan is the identification of an organization with the resources and will to implement the plan (since planning and management require different skills and resources). Once the system is operational, further changes may be needed to ensure that system management has the political muscle, financial resources, and medical authority to stay in being, effect improvements, and demonstrate its value.

Medical Control and Hospital Categorization

Medical control—which has come to signify medical direction, by radio or protocol, of paramedic activity—has, itself, become an important factor in EMS design, inasmuch as HEW/EMS support for ALS and telemetry is made contingent on demonstration of medical control centralized in one hospital per area. This subject is closely related to another prominent in the federal EMS program and important for system design: hospital categorization. For EMS, categorization is a tool to facilitate the delivery of emergency patients to those hospitals best able to care for them. Over half the 44 projects are using paramedics under medical control and about half report that some form of categorization has been or is being implemented in their areas.

Among the 44 projects, medical control is exercised in a variety of ways. In Lansing, Michigan, telemetry transmissions go first to a central hospital; if another hospital is to receive the patient, the telemetry is then patched from the central to the receiving hospital. In Lansing, also, the paramedic certification, signed by the medical director, can be withdrawn if a paramedic's performance is not satisfactory. In Kansas City, telemetry and "doctor talk" (paramedic-physician radio communication) are received at the dispatch center and telephone-patched to the receiving hospital. But in San Bernardino County, 20,000 square miles of deserts and mountains pose enormous problems to the centralization of medical control among isolated rural hospitals; there, each hospital provides medical control for only local rescue squads. In Nebraska, where a major hospital may be 100 miles from the scene of an emergency, the dispatcher contacts a local physician, who provides the control. Many projects have standard paramedic protocols that specify and authorize advanced life support measures to be used if radio contact cannot be established.

Categorization of emergency departments—in effect, grading them by the level of service provided—although espoused by many national medical and hospital associations, is often unpopular among administrators of small hos-

pitals. In rural areas, where hospitals are widely dispersed, it is often felt that categorization would make little difference in patterns of patient delivery. In urban areas with several hospitals, some hospital administrators tend to see categorization as an economic threat. The fact that, to date, the local push for categorization has often come from EMS people has led many hospitals to avoid involvement in EMS system activities. It should be noted that planned categorization was one of the 12 RFP "priorities" but was not a major program goal.

Of the 25 projects that have, at this writing, reported on categorization in their areas, 14 indicated that it had been done, three that it is in progress, and eight that there was none. The account (paraphrased) of one midwestern project's experience with categorization is fairly typical:

> The nine emergency departments in the area range from some which provide less than basic life support to major trauma centers. Each was provided with the AMA categorization scheme and asked to categorize itself. Each facility gave itself a category I rating. Next, independent surveys of capabilities were conducted, under protest from the smaller facilities. The information was used by the EMS Council in EMT training programs to ensure that ambulance providers at least had a realistic idea of what type of care could be expected from a specific facility. This arrangement again evoked a negative response from the smaller institutions. Task forces were appointed to provide suggestions for improvement of care to the smaller facilities–suggestions which were disregarded for "economic reasons." To date, no significant resolution to the categorization problems has been found.

Similarly, a western state reports that one form of categorization–designating particular hospitals as trauma centers, cardiac centers, etc.–failed owing to opposition by hospital administrators; and that a subsequent attempt at categorization through self-profiling of hospitals by emergency and critical care facilities had not been accepted by the State Hospital Association, owing to fears of having hospitals locked in to particular categories and of medical-legal and reimbursement problems. They conclude, however, that "even though we have many scars (mostly mental) from categorization attempts, [we] still strongly believe in the merits of categorization, as a vital factor in any total EMS system."

Horizontal categorization (grading all hospitals in an area by level of service provided) is generally thought, among the projects, to be of little value but considerable trouble. Vertical categorization (of each hospital by specialties of care) is found to be somewhat useful in EMT and paramedic training and in preparation of transport protocols. Fortunately in practice, the EMTs and paramedics in a given area know which hospitals have 24-hour emergency departments with physicians, and which provide which kinds of special care, and act accordingly, whether or not there has been formal categorization.

Types of Ambulance Service

Most of the 44 projects contain some mixture of volunteer, private, and publicly-owned ambulance services, reflecting the fact that EMS planners are usually not free to design a system which they might consider ideal but must build on what is already in place. Two notable exceptions are the south central Louisiana project, in which a single private ambulance company, providing service by contract to ten parishes, is able to locate and shift its rescue squads as population and geography require; and San Mateo County, California, which has contracted with a private ambulance company to provide service in accordance with a detailed plan developed by the county.

In rural and wilderness areas, volunteer squads predominate. The Committee has found these people to be, without exception, extremely dedicated and eager to improve their skills and to take advantage of any technology which can improve their service. Two problems often found in systems based on volunteer squads relate to paramedic training and to central dispatch. Although in some areas of relatively high population density, such as Suffolk County, N.Y., and Cape Cod, Mass., volunteers have been successfuly trained as paramedics, the necessary skills are very difficult to introduce and to maintain in large rural or wilderness areas, where long transport times make these skills particularly important. This problem is discussed under Chapter 8 "Training" of this report. Secondly, volunteer squads, justifiably proud of their autonomy and local prestige, are often reluctant to join in a system with central dispatch. Project people must be prepared to respond to the fears of volunteers that a central EMS access number will cost them their local identity, or that participation in a system will reduce their local support. This reluctance can only be aggravated by presenting the squads with a system plan as a *fait accompli*. In one large rural project, volunteer squad participation was obtained only after the project personnel changed their approach from "This is our system" to "What can we do for you?" Ideally, representatives of the volunteers should have participated in system planning from the start. One project, that in Hunterdon County, N.J., which now has 911 and consolidated dispatch together with intercommunication among police, fire, and EMS vehicles, is notable in that the push for EMS system development originated with the volunteer squads.

In many urban and suburban areas EMS people have found that fire departments provide an excellent base for ambulance operations, inasmuch as fire fighters are likely to have the motivation, time, and, in paid systems, the funding for EMT and paramedic training. A development at some such projects, that could become of national significance, is that the ambulance stations are now also serving as neighborhood first aid stations. The most common problem associated with fire department-based ambulance service appears to relate to career advancement, which in many fire departments is possible

only for persons actually engaged in fire fighting. This is likely to result in the assigned rotation of unenthusiastic personnel to ambulance duty, with harm to morale and to quality of service. Projects which have established the ambulance service as a separate branch, with its own career program, within the fire department, have obviated this problem.

Private ambulance companies commonly fear that EMS system development will put them out of business, either by the competition from a publicly-owned service or by diverting business to other private or volunteer competitors. The perhaps limited observations of this Committee suggest, however, that when private companies have been forced out of business it was not because of EMS system development but because of their inability to comply with recently instituted state standards for equipment and training; those which have been able to meet these standards tend to become important and viable participants in the system.

It seems clear that no *a priori* prescription can be made for the nature or mix of ambulance services most appropriate to a particular EMS system. However, a detailed study of this subject would be extremely useful to EMS planners and developers.

Chapter 6

Improvement of Access

Access, taken narrowly, refers to the means, usually telephone or radio, by which people get into the prehospital emergency care system. Thus, a system which has adopted 911 or another single EMS number has resolved one access problem. Provision of telephone stickers identifying emergency numbers and arranging for coin-free emergency calling from public telephones carry this further. However, access does not end with a telephone call: central response coordination is required to ensure prompt dispatch of a rescue squad: if the call goes directly to a squad whose ambulance is out of service, or if, as in one city, the central medical emergency dispatch (CMED) turns calls for which a nearby rescue squad is not available over to the police department, the caller has still not gained effective access to emergency medical care.

In another dimension, access encompasses the training of the public in symptom recognition, in first aid and cardiopulmonary resuscitation (CPR), and in use of the EMS system. A third dimension of access relates to actual system expansion to populations which, for geographic or socio-economic reasons, were not previously served, or to expansion in the sense that further EMS development is spurred by the examples set by existing systems.

In areas where emergency care has not been systematized, the most common access problem is the multiplicity of phone numbers from which the often distraught caller must quickly choose. Other problems include non-availability of telephone or radio communications, lack of coin-free service for emergency calls from public telephones, refusal of ambulance services to cross service area boundaries, and refusal or delay of service for social or economic reasons.

There are basically two approaches used by EMS systems in resolving these problems. The first, less than ideal, approach, in which the system is adapted to the habits of the people served, permits people to continue to call whatever number–police, fire rescue squad, hospital, or telephone operator–they are

accustomed to call for emergency care, and so arranging communications and educating the responders that the caller immediately gets into the system. The second approach, in which the public communications are adapted to the EMS system, involves the establishment of a single EMS number, preferably 911, and requires an extensive public education campaign to get people to use it; this approach is often opposed by providers, who fear loss of identity, autonomy, and viability. Few systems are purely one or the other: even the most centralized single-number systems must provide for people who still call some other number; and the least centralized system must have a degree of central coordination.

Each approach has advantages and drawbacks. The main advantage of the first is its political acceptability: relatively few feathers are ruffled. Improving access in such a system can mean consolidating emergency response in a county sheriff's office and training his dispatchers to handle medical calls, or providing for push-button transfer of medical calls from police and fire departments to a CMED and arranging mutual aid agreements among EMS squads. Such systems commonly require ambulances, once dispatched locally, to check in with a central CMED for purposes of backup coordination and disaster control. The main advantages of the latter are the provision of a single, publicized number, optimally 911, which anyone in the area can use, and the centralization of response for greater efficiency in the management of emergency medical resources. One of the most highly centralized of the program's multicounty projects, the 10-parish system based in Lafayette, Louisiana, uses a toll-free WATS number, bilingual dispatchers, and central dispatch for ambulances based throughout the area. In this system, ambulances are frequently shifted temporarily to provide backup for others on call.

Data are spotty on public training in first aid and CPR, but the data available are impressive. Thirteen projects providing information as of September 1977 reported a total of 140,000 persons trained in first aid and 62,000 in CPR. Much of this training is done by local chapters of the American National Red Cross (ANRC) and the American Heart Association (AHA), but much of it is also done by project personnel and EMTs. Many projects strongly encourage their personnel to conduct such classes, both in schools and elsewhere, not only as a public service but also as a means of developing a constituency. Squads in Hermiston, Oregon, report that when they arrive at the scene of an emergency they usually find that the patient has already received appropriate first aid or, if needed, CPR from trained citizens. In Idaho, over 400 persons in remote communities have been trained and equipped as "Quick Response Units (QRUs)" to care for and stabilize emergency patients until an ambulance can arrive. Similar units are now being used in other wilderness areas, such as portions of San Bernardino County, California, and New Mexico. In the three-county Missoula, Montana, system, under project sponsorship the

Red Cross first aid course has been made a part of the fifth grade science curriculum; public school teachers have been given the ANRC or AHA instructor's course; and first aid and CPR training for the general public have been greatly expanded.

Extension of access through geographical expansion has resulted both from the Foundation's program itself and, as noted, from the impact of federal EMS programs. Within the Foundation program, eight of the projects are geographically larger than anticipated at the beginning of the program, and five are smaller, for a net increase of approximately 18 counties. Thus, the Louisiana project, originally for eight parishes, now includes 10; and the Kansas City project which at the time of application was only for Jackson County, Missouri, now includes eight counties in two states. On the other hand, the Newark, N.J., project, originally planned for four contiguous municipalities, now includes two. Expansion has occurred when areas adjacent to a project region have wished to share in an excellent service; contraction, when it was found that an EMS system could not be implemented for the entire area. This, of course, is related to the perennial EMS problem of defining "regionalization" satisfactorily: What is an EMS region? Should a region be defined by political boundaries, by hospital catchment areas, or by the availability of specialized medical services? The program's RFP designedly did not attempt to define "region," but allowed the applicants to define their own regions. The development of EMS at the 44 sites suggests that perhaps an EMS region should be defined simply as that area in which, at a given time, it is practical to systematize, upgrade and maintain emergency medical services.

It it difficult to judge to what extent the grant projects, serving as models, have stimulated further EMS development, but reportedly this is occurring in many states, such as Michigan, Wisconsin, Illinois, Alabama, North Carolina, and Pennsylvania. Certainly, a number of the projects which have made notable progress in resolving various EMS problems are attracting an increasing flow of visitors, from both their own and other states, who are eager to study and take back to their own areas knowledge of useful experiences and advanced techniques. In many projects–such as those in Lebanon, Pennsylvania; Hermiston, Oregon; and Tallahassee, Florida–another kind of expansion and role-modeling is taking place, with project personnel becoming leaders in the development of larger multi-county EMS organizations and systems.

In discussing the improvement of access, as with other system components, it must be remembered that starting points as well as goals differed widely among the 44 projects. For instance, regarding 911, Hermiston, Oregon, came into the program with 911, and it was being used in the principal population centers in the five-county Wyoming area. Florida and California had legislated future implementation of 911: in Florida the law seems to have acted as a stimulant and in California as a deterrent to local adoption of the universal emergency number. Rural areas commonly have numerous small telephone

companies, which lack the resources for upgrading their equipment to accommodate 911; this leads to the adoption of other expedients, such as a special EMS number, "dial Operator," the county sheriff's number, or a toll-free WATS number.

A simple measure of improvement in access among the 44 projects is the degree to which the public has been provided with a single number for EMS (see Table 2). At this writing a single number is available in 42 of the projects. This does not mean, necessarily, or even usually, that the other numbers have been eliminated, but only that the public is encouraged to use the EMS number for medical emergencies. Another measure might be the reduction in the number of numbers listed for ambulance service. One of the most dramatic changes is in the 21-county Nebraska project, where numbers for 5 dispatch centers have replaced the 184 among which callers previously had to choose. This consideration applies mainly to areas in which all emergency medical calls go directly to a CMED, with individual squad numbers perhaps retained for transport only; it would be irrelevant, for instance, to the New Mexico project in which the State has provided a backup communications system for ambulances throughout the State, without attempting to systematize local services.

New Mexico, however, has not neglected access, a singularly difficult problem in a state with vast desert and mountain areas and many small, remote communities which may not even have telephones. One approach has been to establish small first aid stations in remote settlements. Another has been to foster the development of a state-wide volunteer Citizens Band monitoring network, with maps provided to incoming tourists showing the locations, frequencies, and code names of the monitoring posts. A year's experience has shown, however, that the highway patrol, also equipped with CB as well as with equipment compatible with the statewide EMS communications net, is the most important source of access assistance for medical emergencies initially reported on CB. Most of the 44 projects now report that they are monitoring CB channel 9, reserved by the FCC for emergencies.

TABLE 2 Access Improvement

	1973	1977
Number of EMS numbers in project areas	1475	465*
Projects having a single EMS number	5	42
Projects served mainly by 911	2	18
Percent of total project population served by 911	0.1%	25%
EMS number plaques on telephones in project areas		
1) Percent of public phones	0	50%
2) Percent of private phones	0	43%

*Data are not available for New Mexico, but the figures for 1973 and 1977 are probably substantially the same. Other data are often approximate, but overall, a reduction of about 70% has occurred.

Another measure of improvement in EMS access would be the extent to which the single EMS number is used. This is more difficult to measure because only a few systems can provide reliable data, but indications are that the use of such numbers tends to grow steadily. For instance, at Peoria, Illinois, after 911 was instituted, there followed a month or so of heavy use, both because children were testing the system and because the public was using it for non-emergency calls. Subsequently, the total number of 911 calls fell off somewhat, whereas the total of calls for true emergencies increased. Peoria initially received about 1,200 911 calls per week, of which 12-14% were for true emergencies; they now receive about 800 calls per week, of which 80% are for true emergencies—a gain of about 300% in true emergency calls. Electronic devices at the dispatch center that permit immediate playback of a call to the number from which it came have proved very useful in reducing nuisance calls.

A third measure of improvement in access, impossible to measure with data now available, would be changes in the time between the emergency event and the call-in, and in system response time resulting from use of the central number. A fourth measure might be the extent to which persons with medical emergencies reach an emergency department via the system, in contrast to those who bring themselves to the ED.

Conclusions and Recommendations

State and local governments should be primarily responsible for defining EMS regions and ensuring the development of EMS systems capable of delivering acutely ill and injured patients to appropriate hospitals. This will necessarily entail information on hospital capabilities, as well as appropriate transport protocols and patient transfer agreements. Health agencies within a state should provide economic incentives for hospitals, in the form of service trade-offs, to offset the perceived economic threat, and resultant impediments to EMS system development, which often accompany categorization. The Committee cautions against the imposition of pre-set formulas or boundaries to define an EMS region.

The telephone has proved to be, in most areas, the most useful means of public access to the EMS system. The Committee concludes that sufficient experience has now been obtained to indicate that use of a single telephone access number, preferably 911, can be technically, operationally, and economically sound, not only for entry into any simple system, but as the best solution to the problem of nationwide system-to-system access for our increasingly mobile population. The Committee further recommends that the nation's telephone companies (especially the leading common carriers), the Federal Communications Commission and the state public utility regulatory

bodies now exert themselves to ease and hasten the attainment of this important national goal.

Recognizing that reaching this ultimate goal will require certain interregional obstacles to be overcome, the Committee recommends that for every system the minimal interim goal should be the establishment of telephone access through the use of a single, toll-free number accompanied by effective publication of this number throughout the system's region.

The education of the general public in CPR and first aid appears extremely effective. Such education appears to have provided significant numbers of "saves" in some locations and to compensate for delays in response time of EMTS. In addition public training and participation in the EMS system generates increased awareness, and an interest in supporting the system. The Committee strongly recommends extension of this education nationally. Within an EMS system, training has often been deficient in that personnel engaged in one aspect of an EMS system have not been oriented to the functions of the entire system. Understanding of the total system is crucial for optimal function of an EMS system and needs to be included in the education and training at all levels.

Well planned and conducted education programs through public school systems appear to be a particularly effective method of achieving the public education objectives of EMS.

Chapter 7

Improvement in Linkages among System Components

The emphasis on communications in this program stemmed from the initial judgment that many areas that had done the necessary planning and organizational work for a regional EMS system needed primarily the boost of initial financing for the expensive communications component to put their overall system plans into effect. Communications were seen as the catalyst which would tie together hitherto disparate elements of emergency care, improving access by bringing help more speedily to the victim.

Communications essentials, in addition to a means of access, include links among dispatchers, ambulance services, and hospitals. Links with police, fire, and public safety agencies are also needed because the public often calls these agencies for assistance in medical emergencies, because these agencies often originate such calls, and because emergency medical services often need their help. (Of course, with consolidated dispatch where police, fire, and EMS share a common dispatch center, these links are a part of everyday working arrangements.) Links with neighboring EMS systems are important for backup and disaster coordination.

At the beginning of the program, only one of the 44 projects, that in Santa Clara County, California, had most of the basic communication components in place;* others had fragments, or none. In Utah, for instance, Regional Medical Program (RMP) funds had supplied radios for most of the ambulances, but there was no central dispatch or coordination. Lebanon County, Pennsylvania, had central dispatch, but no ambulance-hospital communication. Hermiston, Oregon, had 911 and consolidated dispatch, but lacked other elements. Thus, in most of the 44 projects, progress in establishing various kinds of communications links and development of an integrated communications system is measured from a starting point of zero.

*Santa Clara had countywide central dispatch and ambulance hospital communication, with the dispatcher, on request from the squad, activating the hospital base station. Grant funds were to pay for encoders, to permit more direct ambulance-hospital communications, for telemetry equipment and training, for promoting 911, etc.

TABLE 3 Communications Links (44 Systems)

	1973	1977
Systems with ambulance-hospital communications for over 50% of the ambulances	11	40
Systems with ambulance-hospital communications for 100% of the ambulances	1	33
CMED linked with fire and police departments (including projects with consolidated dispatch)	0	38
CMED linked with other CMEDs (including systems with dispatch by counties)	0	27

In 1973 most EMS radio communications were within the very high frequency (VHF) portion of the radio spectrum, either in the high band (around 150 megahertz), usually used by police and fire departments and by the existing hospital radio nets, or in the low band (around 35 megahertz), used by other public service agencies. In 1974, the Federal Communications Commission (FCC) designated a 10-channel (20 frequency) ultra-high frequency (UHF) band for EMS only, intended to include all EMS radio communications–dispatch, ambulance-hospital voice transmissions, and telemetry. For those projects which elected to convert to UHF, this meant a complete rethinking of their communications plan, new equipment specifications, often new antenna locations, and new arrangements with equipment vendors–with resulting delays in system implementation.

Among the 44 projects, 19 now use VHF only, 4 use UHF only, and 21 use a combination of VHF and UHF.

Both financial and technical reasons have led many projects to continue to use VHF. Economically, they may not find it feasible to abandon their considerable investment in VHF in favor of the generally more expensive UHF equipment; technically, in some areas where there is little competition for frequencies, VHF is adequate for present EMS needs. And in densely populated areas, some feel that all the UHF channels should be reserved for telemetry alone, to prevent overcrowding of the UHF. Although VHF normally has greater range than the line-of-sight UHF, UHF range can be extended indefinitely through use of repeaters–which FCC regulations do not permit for VHF (except via microwave circuits).

Reasons for converting to UHF include the fact that the FCC, HEW, and Department of Transportation strongly encourage its use, this being considered the wave of the future* and technical advantages, such as less frequency congestion and often clearer signals. Also, UHF is the frequency band required by the FCC for biomedical telemetry. As noted, about half of the 44

*In FCC's words, the 10 UHF MED-channels, "would replace the present fragmented structure with a more unified and comprehensive radio service" and would encourage development of "areawide centrally-coordinated medical communications systems." (*Federal Register* Vol. 39, No. 137, July 16, 1974).

projects use both, usually with dispatching and ambulance-dispatcher communications on VHF and telemetry and doctor-talk of UHF. Those now using only VHF should plan for an eventual phase in to UHF.

Other forms of radio communication commonly used are microwave repeaters, two-way portable radios, and individual radio pagers. Mountaintop point-to-point microwave repeaters are used extensively in mountainous regions—in effect, as a substitute for telephone landlines. In New Mexico and Idaho, for instance, the major program thrust has been the establishment of statewide microwave EMS backbone nets, making possible ambulance-hospital communications anywhere in the state and bringing other services, such as forestry and highway patrol, into the EMS communications system. In the East, (e.g., as in the Lebanon, Pennsylvania, system) microwave has been used to upgrade dispatch and ambulance-hospital communications, and to link one EMS system with those in neighboring counties.

In many rural projects, where volunteer squads predominate, use of voice pagers to replace sirens or telephone calls as a means of assembling squad members has dramatically reduced response time. At one such project in western Wisconsin, where an unannounced test was conducted by visiting Committee members, all squad members were at their vehicle within 90 seconds of the call. Often, a paged EMT who happens to be near the scene of the emergency will go there directly and provide initial care until his colleagues arrive with the ambulance. In the four-county rural project based in Troy, North Carolina, pagers have halved the response time.

Hand-held two-way radios have many functions: they enable EMTs or paramedics who have left their vehicle to keep in touch with the dispatcher or with a hospital; they permit physicians, wherever they are in the area, to advise rescue squads or talk with hospital staff; and they free physicians from dependence on the telephone during on-call hours. This last is particularly appreciated by rural physicians, some of whom have credited it with making rural practice much more attractive.

TABLE 4 Use of Hand-Held Two-Way Radios and Pagers[a]

	Used Regularly	Used Sometimes	Not Used
Two-way hand-held radios			
1. By EMTs	21	10	11
2. By Paramedics	19	10	13
3. By Physicians	10	16	16
Pagers			
1. By EMTs	21	7	14
2. By Paramedics	19	9	14
3. By Physicians	10	22	10

[a]The tally here, and in some other tables, is 42 rather than 44 because at the time of writing the two Puerto Rican EMS communications systems were not yet in operation.

Of course, a prerequisite to electronic communication among system components is personal communication among people—people must be willing to talk to each other. A nagging problem in many EMS systems is that emergency department (ED) personnel, to reduce noise, turn their radio receiving equipment to too low a volume or off, and are thus unable to hear calls from ambulances; and some nurses and doctors feel that the radio equipment is too complicated for them to use. Many projects, such as those in Wyoming and in San Bernardino, California, have conducted courses at the hospitals designed to familiarize personnel with the equipment and develop an awareness of its importance. One effective answer to this problem is that used, for instance, in Kansas City and San Francisco, where all UHF ambulance communications go only to the CMED, who then patches the ambulance through by telephone to the appropriate hospital. This has the advantages of providing nothing more complicated than a telephone hand-set for the ED people to operate, of allowing frequency coordination by the CMED, and of obviating expensive base station equipment at the hospitals. Another solution often used is that of a tone-activated receiver in the ED, which receives signals only when it is activated by a signal from the CMED.

Another such problem is a reluctance of some physicians to provide advice by radio to EMTs or paramedics. This usually stems either from unfamiliarity with the paramedics and their capabilities or from fear of malpractice suits. A converse problem, sometimes reported, is of paramedics not requesting physician guidance. However, in systems where the ED physicians have participated in the EMT and paramedic training programs and where rescue squads help in the emergency departments these problems usually have not arisen.

In the Bluefield, West Virginia, project, where EMTs regularly accompany their patients into the emergency department and continue treatment until ED personnel can take over, the attitude of the doctors and nurses, as voiced by one head nurse, is "I don't know what we'd do without them." In Peoria, where a hospital consortium now owns the ambulance service, EMTs and paramedics work in (and are paid by) the hospitals when they are not out on call. A spinoff effect, reported at the Redding, California, project, of having paramedics stay in the ED after delivering patients is that the ED personnel, under paramedic observation, are being more careful.

However, the fear of liability is pervasive and is proving to be a major stumbling block to the development of some paramedic programs. In one project, for instance, a young physician who had spearheaded a drive for telemetry lost interest when his insurance agent told him that his premiums would quadruple if he were to provide radio advice to paramedics. One major city project has only basic EMT-level service for this reason. This problem needs to be addressed at the state and national levels, apparently by something stronger than good samaritan laws.

Dedicated telephone landlines, from the CMED to the ambulance stations

and hospital EDs remain a primary communications link. However, in areas where these distances are great, the cost of such lines may be very high. A solution, achieved through a state agency,* in the 21-county central Nebraska project, is to provide multiple-use lines, with first priority given to emergency medical calls. The hospitals are more willing to bear the cost of such lines than of EMS hot lines, which may be used only infrequently.

Telemetry, the transmission of electrocardiograms and vital signs from the patient at the scene or in transit to a hospital, is now used or being pilot tested in half the projects.

The addition of telemetry to an EMS system requires the use of UHF equipment, of paramedics, and of physicians to advise the paramedics. The federal EMS program stipulates that a single hospital in an area be designated to provide medical control for paramedics and telemetry. As might be expected, telemetry is commonly associated with urban centers and major hospitals, since such areas have a high cardiac case load, and can more easily bear the cost both of the equipment and of the training and salaries of paramedics and can also provide both the working experience needed for paramedic skill maintenance and the physicians on 24-hour ED duty. Thus, in New Mexico, telemetry is used chiefly in the Albuquerque area; and in the nine-county Florida project, telemetry is used only in Leon County, serving the Tallahassee Memorial Hospital. An exception is San Bernardino County, where several isolated, rural hospitals are now served by their own teams of paramedics with telemetry.

It should be noted that although telemetry requires paramedics, several systems use paramedics without telemetry—the paramedics report vital signs and electrocardiograph readings by voice or by telephone telemetry.** In fact, some projects with telemetry where physicians and paramedics work closely together, there is a tendency for physicians to rely increasingly on voice information.

The problems associated with the use of telemetry are less technologic than social, political, educational and economic. Rivalries among hospitals complicate the choice of one of them to assume responsibility for medical control—a problem sometimes handled by patching the telemetry from a central hospital or from the dispatcher to the receiving hospital. Often, doctors are leery of directing paramedics whom they know only slightly to perform advanced life support measures such as intravenous injections, intubation, or defibrillation. As noted earlier, the question of legal liability and malpractice, a major stumbling block in the establishment of medical control, is largely unresolved. Often, particularly in areas of low population density, it is felt that the considerable expenses entailed outweight the benefits.

*State intervention was necessary to encourage the telphone company to install such lines.

**At the time of the last site visits, paramedics in Mobile and Minneapolis were working in this mode, because their vendor had yet to supply telemetry equipment that functioned properly.

The main technologic problem associated with telemetry arises in large cities, where careful planning, use of directional antennas, and control by the CMED of frequency allocation are necessary to prevent congestion of the available UHF MED-channels. One approach toward a politically acceptable solution to this problem is being developed in the San Francisco Bay area counties in California: use of a computer to keep track of which UHF-MED channels are in use and to advise county dispatch centers of which channels are available.

The use of telemetry has received a big push from federal funding under Section 1204 of the EMS Act of 1973–funding for system expansion. Nine of the 44 projects are receiving funds under the 1977 1204 grants. Inasmuch as HEW/EMS has now designated 300 contiguous EMS regions covering the entire United States, grants for geographic expansion are not now available, and the money is being used for development of ALS systems, usually with telemetry. The ability of some areas to maintain paramedic/telemetry service, once grant monies run out, has been questioned.

The questions of the need for telemetry *vs.* voice transmission of vital data, and of where the use of paramedics and telemetry, rather than only basic life support (BLS), is economically and medically justified are being debated in EMS journals and conferences. Some EMS medical directors require the use of telemetry for severe trauma as well as for cardiac cases, because the former may develop the latter. Those planning new EMS systems, who may be tempted to opt immediately for telemetry, might consider the example of the Lebanon, Pennsylvania, EMS Committee, which although it has developed a communication system that can readily accept telemetry, has deferred its implementation pending training of paramedics and gaining fuller cooperation from the medical community. Whatever the merits of telemetry, itself, there is general agreement that it is usually useful as a magnet to interest physicians in EMS.

Conclusions and Recommendations

The advantages of a uniform, multichannel, regionally coordinated UHF radiocommunications system should be carefully considered by persons developing new EMS communications systems. Existing systems using VHF or a combination of VHF and UHF, should seek to develop emergency resource coordination centers at which all emergency frequencies and emergency telephone systems are interfaced. Federal, state, and local authorities should encourage the use of existing Disaster Emergency Operation Centers for this purpose.

The use of telemetry to support advanced life support (ALS) and cardiac arrhythmia management in EMS systems should be at the discretion of the local medical community.

Chapter 8

Training

Training—upgrading of the quality of care provided by ambulance attendants—is commonly the area of greatest initial progress among burgeoning EMS systems. As Tables 6 and 7 indicate, the 44 projects have, overall, increased their numbers of EMTs and paramedics by fourfold and ninefold, respectively, over these years. This rapid progress is understandable, in that this is the component of EMS for which outside resources, both financial (DOT, HEW, DOL, and private foundations) and professional (community colleges, concerned physicians, and state programs) are most readily available; it is appropriate, in that this is probably the area of greatest impact in upgrading pre-hospital care.

The Basic EMT course has been standardized in the DOT 81-hour course, and it appears that paramedic training will be standardized at the level prescribed by the recently completed DOT-HEW-DOL paramedic course. But local variations still flourish. Among the 50 states, standards vary from those which spell out the advanced life-support (ALS) measures which paramedics may or may not perform to those which require only that ambulance operators have driver's licenses. There appears to be a negative correlation between the political strength of volunteer and private ambulance companies in a given state and the comprehensiveness of its EMS legislation.

Conclusions on training reached at the June 1977 conference of Foundation grantees were 1) that training should be taken to the volunteer squads—squad members can seldom come to the city for it; 2) that volunteers need continuous in-service training; 3) that physicians should have a close working relationship with EMTs and paramedics, gained either through physician participation in training courses or through EMT and paramedic participation in the work of the emergency departments; and 4) that some compromise must be reached between the paramedic course requirements and rural needs and training possibilities.

TABLE 5 Aggregated Training Data[a]

	Population	Area in sq. mi.	No. of EMTs 1973	No. of EMTs 1977	Paramedics 1973	Paramedics 1977	1977 EMTs and Paramedics per 10,000 population	1977 EMTs and Paramedics per 100 sq. mi.	Area served by 10-man squad (sq. mi.)
urban projects (4)	3,708,100	264	154	1,195	49	200	3.7	528	2
urban-rural " (10)	9,572,100	8,369	3,442	11,730	101	1,117	13.4	154	6.5
rural-urban " (10)	4,374,500	21,491	1,016	4,603	2	388	11.4	23.7	43
rural " (12)	3,259,500	67,324	840	3,504	17	344	11.8	5.7	175
wilderness " (7)	2,109,500	311,400	498	4,708	71	202	23.3	1.6	635

[a]The project groupings, here and in Table 6, are based on the arbitrary population density divisions indicated in the following table. The urban projects are for single cities or metropolitan areas; the urban-rural projects are mostly for a single county, with a major urban center; the rural-urban are mostly medium-sized multicounty (average, 3.5 counties) projects; the rural (averaging 6.5 counties) are generally confederations of county projects, with communication links for backup and disaster; the wilderness, including two states and the Navajo Nation, are in areas of sparsely settled mountains and deserts. The total number of projects adds to 43, because the two New Mexico projects were considered as a single project. The last column is not intended to reflect actual conditions at any given project, but only to provide another basis for comparison of the five groups. In practice, rural volunteer squads may number 30-40 members, which would proportionately increase the area served per squad.

TABLE 6 Training at the RWJF Projects (in order of population density; data supplied by the projects)

Project	Population	No. of Counties	Area in sq. mi.	Pop. per sq. mi.	No. EMTs 1973	No. EMTs 1977	Paramedics 1973	Paramedics 1977	1977 EMTs and Paramedics per 10,000 population	1977 EMTs and Paramedics per 100 sq. miles	
Philadelphia, Pa.	1,948,000	1	125	15,584	60	733	20	110	4.33	674	URBAN
San Francisco, Cal.	665,000	1	47	14,149	52	210	29	78	4.33	613	
San Juan, P.R.	600,000	1	50	12,000	42	52	0	0	.867	104	
Newark, N.J.	495,100	2 cities	42	11,788	0	200	0	12	4.28	505	
Cleveland, Ohio	1,710,000	1	450	3,800	387	1,425	69	171	9.3	355	URBAN/RURAL
Indianapolis, Ind.	825,000	1	402	2,052	165	400	9	45	5.4	111	
Minneapolis, Minn.	960,100	1	600	1,600	0	675	0	55	7.6	122	
Suffolk Co., N.Y.	1,216,000	1	934	1,302	586	1,900	0	300	18.1	236	
New Haven, Conn.	400,000	10 towns	400	1,000	200	740	1	45	19.6	196	
San Mateo, Cal.	580,000	1	600	967	11	20	2	70	1.55	15	
Santa Clara, Cal.	1,200,000	1	1,300	923	67	332	0	37	3.08	28	
Ponce, P.R.	500,000	So. Hlth. Reg.	625	800	15	66	0	0	1.32	11	
Atlanta, Ga.	1,525,000	6	2,058	741	120	1,050	0	350	9.18	68	
King County, Wash.	656,000	½	1,000	656	1,900	5,122	20	44	78.75	517	
Kitsap County, Wash.	126,000	1	350	360	32	252	2	10	20.79	75	RURAL/URBAN
Kansas City, Mo.	1,327,300	8	3,800	349	0	400	0	150	4.14	14	
Memphis, Tenn.	974,000	6	3,478	280	80	459	0	78	5.5	15	
Lebanon, Pa.	100,000	1	400	250	0	60	0	0	6.0	15	
Cape Cod, Mass.	135,000	3	600	225	250	324	0	57	28.2	64	
East Lansing, Mich.	378,400	3	1,718	220	255	690	0	49	19.5	43	
Peoria, Ill.	350,000	3	2,000	175	108	718	0	22	21.1	37	
Hunterdon Co., N.J.	70,000	1	480	146	0	400	0	0	57	83	
Mobile, Ala.	411,600	3	3,790	109	100	700	0	22	17.5	19	
Des Moines, Iowa	502,200	8	4,875	103	191	600	0	0	11.9	12	

Chapel Hill, N.C.	111,000	2	1,325	84	0	351	0	53	36.4	30	RURAL
Green Bay, Wisc.	500,000	9	6,059	82	186	650	0	25	13.5	11	
Hermiston, Oregon	40,000	2	500	80	22	80	0	5	21.2	17	
Bluefield, W.Va.	164,100	5	2,200	75	70	210	0	21	14.1	10.5	
Lafayette, La.	603,600	10	8,600	70	38	133	2	18	2.5	1.76	
Victoria, Texas	62,000	1	900	69	0	3	0	18	3.4	2.3	
Troy, N.C.	128,200	4	2,058	62	8	300	0	0	23.4	14.6	
Tallahassee, Fla.	273,000	9	4,682	58	15	65	15	31	3.5	2.1	
Charlottesville, Va.	126,000	5	2,300	55	0	150	0	16	13.2	7.2	
Menominee, Wisc.	350,000	9	8,100	43	112	312	0	0	8.9	3.9	
San Bernardino, Calif.	684,700	1	20,160	34	64	350	0	132	7.0	2.4	
Grand Island, Neb.	217,000	21	10,440	21	325	900	0	25	42.6	8.9	
Missoula, Mont.	86,800	3	5,800	15	40	282	0	0	32.5	4.9	WILDERNESS
Redding, Cal.	336,800	9	39,930	8	88	1,085	0	40	33.4	2.8	
New Mexico (incl. PMS)	1,016,000	Statewide	121,666	8	170	500	49	102	5.9	0.49	
Navajo Nation	155,000	NA	25,000	6	0	90	0	0	5.8	0.36	
Idaho	400,000	Statewide	83,557	5	200	2,200	22	60	56	2.7	
Utah, Region IV	46,200	7	11,879	4	0	185	0	0	40	1.6	
Wyoming	68,600	5	23,568	3	0	366	0	0	53	1.6	

Taking the training to the volunteers can be and is being done for the basic EMT and refresher courses, but poses a serious problem with the much longer paramedic course. It is possible that the modular form of the new federal paramedic course will permit discrete segments of the course to be taken to the volunteer squads and will permit local regions to select those portions of the course that they most need.

A unique experiment, sponsored in part by the Robert Wood Johnson Foundation, in taking refresher training to volunteer squads was conducted in the spring of 1975, when the Public Service Satellite was used to relay an EMT refresher course to squads throughout the Rocky Mountain states. The arrangement allowed a two-way interchange between students and instructors, and was accounted notably successful by project personnel in this area.

A close working relationship between ED physicians and the EMTs and paramedics, essential for optimal patient care, develops over time, usually more rapidly in rural than in urban areas. Physicians who do not know at first hand the capabilities of the rescue squad members are understandably reluctant to accept advice proferred by nonphysicians or to delegate responsibility to them. In the projects where this close relationship does exist, there appears to be minimal concern with the question of legal liability.

Training does not end with EMTs and paramedics. Training of the public has been discussed in Chapter 6. Training is also in progress at many of the 44 projects for dispatchers, for nurses in emergency care, and for physician refresher training.

TABLE 7 Refresher Training

	Number trained per year	Number of projects reporting
Basic EMTs	3,400	39
Paramedics	475	15
Nurses	1,375	13
Physicians	160	7
Dispatchers	775	36

There has been considerable discussion, but little agreement in theory or practice, on the question of appropriate dispatcher training. EMT training, plus communications equipment familiarization, knowledge of FCC requirements, and techniques of telephone and radiotelephone communication are emphasized in course guides published by the Department of Transportation. The Foundation's RFP for its program envisioned the CMED as a person trained in EMT skills and communications; who would have current information on the status of rescue squads, hospitals, and roads; who would provide initial emergency care advice to distraught callers; who would allocate radio frequencies among rescue squads and hospitals; and who would direct ambulances to the most appropriate hospitals.

Indeed, some of the projects approach this ideal; and instances can be cited in which CMEDs have saved lives by timely advice to callers. In general practice, however, the duties and training of dispatchers vary widely from system to system. In one multicounty system that installed sophisticated computer-assisted dispatching, it was found that EMTs, whose skills didn't include spelling and typing, couldn't handle the computers properly; so they were sent back to the ambulances and a crew of young persons with secretarial skills was hired. In several multicounty rural systems, dispatching is done at the county sheriff's office, by the sheriff and his deputies. In the 10-parish Louisiana system, dispatchers are EMTs who have had several years of field experience, who can give ambulance crews detailed advice on local roads and who can respond to calls in either French or English. Systems based in fire departments often use disabled firemen as dispatchers. Many feel that special training for EMS dispatchers is less important than such character attributes as tact, good judgment, and emotional stability.

About one-fourth of the 44 systems report that dispatchers either provide medical advice to callers or patch calls through to physicians for such advice; and many systems patch calls to poison control centers or psychiatric centers for advice. In most of the systems, dispatcher screening of calls is limited to referral of obviously nonemergency calls to appropriate agencies. In general, if the caller feels that an emergency exists, the dispatcher provides an emergency response.

In practice, then, dispatchers usually do not provide medical advice, and are rarely involved in determining which hospital should receive an emergency patient. For most of them, EMT training appears beneficial mainly in enabling them to understand and respond intelligently to information received from ambulance or hospital personnel. The requirements for dispatcher training in a variety of EMS system circumstances and configurations deserve intensive investigation.

Continuing education, an essential for EMS, usually means refresher courses for EMTs and paramedics. For nurses and physicians, it means courses in emergency medicine or in some particular segment of emergency care.

Refresher training for EMTs and paramedics is most needed in those areas where it is most difficult to provide—rural systems served by volunteer squads. There, the time and money required for the training are hard to come by; but an individual squad member, who may be on call one evening a week, does not get enough practical experience to maintain his skills. Hence the conclusion of the 1977 Kansas City conference of grantees that such training must be taken to the squads. Alternative approaches to skill maintenance include occasional tours of duty in hospital emergency departments or with active urban squads.

In the recruitment of candidates for paramedic training, one problem is in the initial screening out of unqualified persons—completion of the basic EMT

course and field experience do not necessarily signify a high potential for success as a paramedic. In the San Bernardino project, where paramedics are used at a number of hospitals, candidates are rigorously screened by a panel of physicians and psychiatrists, with a resultant 100% rate of successful course completion. (However, now that the training program has become a part of the local college curriculum, there is beginning to be a problem of oversupply.)

A unique approach has been used in New Mexico for emergency medical training of nurses stationed at remote rural hospitals. Such training is urgently needed, because the nurse may well be the only person on duty to receive an emergency patient; but these hospitals lack the resources, in money or time, to send a nurse away for training. A program was developed whereby rural nurses were brought to Albuquerque for intensive training, one week a month for four months, being replaced during their absence by nurses from Albuquerque hospitals. Both the rural nurses and their replacements reportedly found this arrangement highly beneficial.*

Conclusions and Recommendations

EMS systems should provide for maximal face to face interaction among medical providers (MDs, RNs, EMTs) in such forums as training programs, routine case reviews, and refresher courses. Such interaction has been observed to increase system efficiency, quality of care, and esprit de corps.

Many problems in delegation of authority to EMTs and paramedics giving prehospital care arise from confusion about skills possessed. Further, the educational process itself is commonly described as the expenditure of a number of hours in training rather than as the acquisition of a set of skills and a body of knowledge. Orientation of the educational process itself in the latter forms not only may help to ensure quality of the product of the education but can provide medical advisors with a basis for confidence in the abilities of the field workers.

Exposure to patients requiring the use of special skills—e.g., tracheal intubation and intravenous therapy in the case of paramedics, and management of major trauma in the case of MDs in emergency departments—will vary greatly according to geography and often will not be sufficient to maintain competence gained previously. Every system needs to compensate for a progressive decay of skill by providing scheduled reeducation. Methods must accommodate to local problems such as the varied opportunities of volunteers

*Joan Baker, R.N., *Rural Critical Care Nurse Training Project*, New Mexico Regional Medical Program, University of New Mexico School of Medicine, Albuquerque, New Mexico, 1975.

to travel. In some cases, experience will dictate that a region not train EMTs to higher levels of practice, e.g., as paramedics.

Guidelines for EMS dispatcher training, which allow for the varied requirements of diverse operational circumstances, should be developed by a national body such as the Interagency Committee on Emergency Medical Services.

Chapter 9

Continuing Commitment

A major unanswered question in both the federal and the Foundation EMS programs is whether these projects will continue once grant funds are expended: will local funds–from taxes, fees for service, cost sharing among providers, voluntary contributions, or subscriptions–be adequate to maintain and develop what was begun? Here we are dealing with largely unquantifiable probabilities.

Of the 44 Foundation projects, 21 are based in state, county or city governments that contribute substantial support. One, in Louisiana, is based in a large and thriving private ambulance company. Two, in Peoria, Illinois, and Tallahassee, Florida, have strong hospital support. Two, in Kansas City, Missouri, and Troy, North Carolina, are based in strong councils of governments. These projects, in many of which police, fire, and EMS share a common communications center, seem likely to continue and to grow. The remaining 18 are, for the most part, multicounty rural projects in which the central EMS organization–an EMS council or health care provider organization–depends for financial support on yearly appropriations of county boards, and for authority on voluntary agreements with providers. For some of these, where the EMS council members are appointed representatives of the county commissioners (as in the Central Iowa, South Central Nebraska, and Northern California projects) or where, (as in the Northeast Wisconsin and South Alabama projects), the EMS council has state or city backing, prospects for continuing commitment, if perhaps on a reduced scale of operation, are relatively good. One EMS council, in West Central Wisconsin, unable to generate federal, state, or local support, has gone out of business. And at this writing the ambitious 6-county project centered in Atlanta, threatened by the withdrawal of some counties and private ambulance companies, is apparently being taken over by the State EMS Division. In general, however, prospects for continuance are good. As Table 8 indicates, those receiving the largest proportion of

federal aid for their 1977 budgets are the Western, wilderness projects. Apart from these, it may be noted that the two with the greatest percentages of federal support, Kansas City and Atlanta, are multicounty projects in which a

TABLE 8 1977 Funding for the RWJF Projects (37 reporting at the conclusion of the Foundation funding period)

	Percentages of funding (approximate)			
	Federal	Foundation	Local (incl. State support)	Data lacking
Philadelphia, PA	6	0	94	
San Francisco, CA	2	0	98	
San Juan, P.R.				X
Newark, N.J.	.75	4	95.25	
Cleveland, OH	0	2	98	
Indianapolis, IN	0	0	100	
Minneapolis, MN	0	0	100	
Suffolk County, N.Y.	6	1.5	92.5	
Kansas City, Mo.	40	0	60	
New Haven, Conn.				X
San Mateo, Calif.	20	23	57	
Santa Clara, Calif.	9	24	67	
Ponce, P.R.				X
Atlanta, GA	56.8	11.4	31.8	
King County, Wash.	0	7	93	
Kitsap County, Wash.	0	0	100	
Memphis, TN	1.6	9.3	89.1	
Lebanon, Pa.	0	0	100	
East Lansing, Mich.	0	10.7	89.3	
Cape Cod, MA				X
Peoria, Ill.	0	0	100	
Hunterdon Co., N.J.	0	0	100	
Des Moines, Iowa	0	93	7	
Bluefield, W.Va.	.04	21	78.96	
Mobile, Ala.				X
Green Bay, Wisc.	0	0	100	
Lafayette, La.	0	0	100	
Troy, N.C.	0	0	100	
Chapel Hill, N.C.	0	71	29	
Victoria, Texas	0	0	100	
Charlottesville, Va.	25	15.5	59.5	
Menominee, Wisc.	0	0	100	
Tallahassee, Fla.	16.5		83.5	
Hermiston, Oregon	14		86	
San Bernardino Co., CA	100?		(part of 3-county HEW grant)	X
Grand Island, NE		68	32	
Missoula, Montana	27.5	27.5	45	
Utah, Region VI	25	40	35	
New Mexico	0	32	68	
Idaho	43	2	55	
Redding, Calif.	46.8	0	53.2	
Navajo Nation (Ariz.)	12.8	5	82.2	
Wyoming, 5 counties	1.6	9	89.4	
Santa Fe (PMS) N.M.				X

separate incorporated body provides dispatching as a service to private and volunteer companies.

Even in the disbanded West Central Wisconsin 9-county project, each county continues to benefit from the use of a single emergency number that goes to a consolidated dispatch center at the county sheriff's office, a modern radio communication system, and a source of trained EMTs in the local vocational-technical colleges, which have picked up the training programs initiated under the Foundation grant. Thus, major program goals have been achieved in this area and will continue to be implemented. The discontinuance of the central EMS organization does mean, however, that further system improvements are unlikely.

Underlying the question of continuing commitment is a complex of problems anticipated in the program's statement of purpose:

> The major goal of the program is that the Foundation's seed money have a catalytic effect on bringing together the various aspects of emergency services operated by different geographic and institutional jurisdictions with new and more satisfactory administrative arrangements.

Thus, it was recognized at the outset that this was a program of institutional reform, of changing established institutions and institutional relationships. Because popular and political (and, therefore, financial) support for such changes does not come easily or quickly, the program prospectus (Appendix A) stipulated that applications should include letters of support from concerned agencies and jurisdictions. This was one of the criteria used in the initial screening of applications.

The new relationships needed involved the providers (private, municipal, or volunteer ambulance companies; police and fire departments; hospitals), the professionals (physicians, nurses, and their organizations); health and educational institutions; the political leaders (municipal, county, and state); and, finally, the public. Each sector needed to be convinced that its own interests would be better served by systematized and regionalized emergency medical care than by the fragmented and uncoordinated care previously provided.

That such new relationships have, indeed, developed is a tribute to the ability, dedication and perserverance of those promoting the systems. The fact that one-third of the projects have 911—the number for all emergencies—and consolidated dispatch testifies not only to the willingness of those police and fire departments, traditionally at odds with each other, to join with EMS in a common effort, but also to the willingness of rescue squads to give up the cherished autonomy symbolized by their separate telephone number. In several rural projects, multicounty EMS committees are reportedly the first institutionalized form of intercounty cooperation in their areas. This is not to say that opposition by volunteer rescue squads, private ambulance companies,

police and fire departments, and county commissioners has not often been a major impediment to EMS system development. But it does show that a strong EMS organization can overcome these impediments and that those less strong can achieve workable compromises.

In many of the projects, the development of sources of continuing funding for EMS systems has suffered from the prevalent initial assumption that local continuation funding would be inevitable, once the value of an operating EMS system, made possible by the grant, had been demonstrated–that local governments could not afford to allow the system to be discontinued. This assumption does not take into account the strong possibility that, for various reasons, system implementation may be delayed until the end of the initial funding period, or later; that local politicians, unless they have been involved in the EMS system planning and development, may be entirely unaware of what EMS is and is doing and for whom, or of the costs entailed; that county commissioners may themselves have to develop a new administrative arrangement, as well as new attitudes, if they are to expend funds for a service that is not based in their county, or which is but also serves other counties; or that a state government may impose a taxation ceiling on counties, precluding new kinds of expenditures. All these are among the problems that have been encountered among the 44 projects.

In the matter of continuation funding, the question of payment for the central dispatch service, for radio channel management to assure uninterrupted medical control, and for a central management organization is crucial. These costs are not now reimbursable by insurance and are not itemized on an ambulance bill. The ability of an EMS system to absorb these costs depends very much on the kind of management structure involved–systems in which dispatch is a separate service provided for private and volunteer ambulance companies are most vulnerable in this regard.

In the final analysis, EMS system continuance will depend on public acceptance and support. This presupposes a high quality of service; public awareness of the service and of how to use it; immediate and personal attention to all inquiries and complaints; complete openness of the operation to political, press, and public scrutiny; and a willingness to spend innumerable hours talking with rescue squads, county commissioners, civic clubs, hospital administrators, and physicians. Among the 44 projects, there appears to be a positive correlation between the time so spent and EMS system success.

Conclusions and Recommendations

EMS is an important (third) public safety service and should be accepted as a governmental responsibility as is the case with fire and police depart-

ments. Arrangements to ensure that adequate emergency medical care is made available to the public will vary from locality to locality.

Basic emergency medical systems that can provide prompt, appropriate emergency medical response should be available to all Americans on a 24-hour a day, 7 day a week basis. Such systems have been developed successfully throughout the country using a variety of organizational approaches and financing arrangements, based on local resources and needs. The Committee believes that it is the responsibility of local government to ensure that easily accessible and integrated dispatch networks are installed, although a variety of municipal, private and volunteer agencies may be used.

State and local governments have the responsibility to ensure a continuing commitment for adequate ongoing funding of EMS communications and response vehicles, to monitor the performance of the system, and to intervene when standards of performance are unacceptable.

Continued financial support is a serious concern, especially for those components of prehospital services whose development has been pivotal in the improvement of EMS services: dispatching, management, training, and continuing education.

Where emergency medical transportation is reimbursed by third party payers, the associated costs of dispatch, communication, and management should be allowable costs where not otherwise reimbursed.

Chapter 10

Impact

The major unanswered question concerning the whole concept of EMS is: To what extent does it save lives and reduce trauma? Every project provides anecdotal evidence of lives saved, and in Redding, California, the site visit team listened to the doctor-squad talk as a paramedic team resuscitated an 80-year-old cardiac victim on the third attempt at defibrillation. But hard data are still scarce. What follows, gathered on site visits and from the annual reports of the 44 projects, serves chiefly to document the scarcity of such information.

Among the 44 projects, the best impact data to date are from Newark, N.J. in Essex County. Newark now has 911 and central dispatch for hospital, municipal, and volunteer squad ambulances. The rest of Essex County, an area of comparable population size and somewhat higher socioeconomic level, served by 17 uncoordinated ambulance companies, was used as a control. Mortality data in both groups for 1967-1971 were compared with 1972-1977 data. As Graph 5 (p. 57), reproduced from their report, indicates, nontraffic-related accidental deaths, traffic deaths, and aggregate trauma deaths for Newark show significant declines not found in the control area; and the comparative figures for murders in Newark are significantly below those in the control area. This study also indicated that EMS reached 97% of all fatal traffic accidents in 1976-1977, compared with 82% in 1973; and that the interval between the reported time of fatal accidents and the time when an ambulance was assigned had been reduced by 3.8 minutes (over 50%) by 1977. Further details are available in the report, "The Measurable Effects of Improved EMS in Newark, N.J., Final Report, Robert Wood Johnson Foundation Grant #1400" (Office of Emergency Medical Services, New Jersey State Department of Health, Trenton, N.J., November 1977).

Data from Florida indicate that, statewide, deaths from coronary heart disease, per 100,000 of population from 1972 to 1975, dropped from 371 to

348.8, or 6%; in six counties of the Tallahassee project, the drop was from 198.8 to 154.4, or 22.3%. For cerebrovascular disease, the statewide decrease was from 124.7 to 106.5, or 14.6%; for the Tallahassee project, from 98 to 71.5, or 27%. The data also indicate that the death rates from these causes in Leon County, served by the Tallahassee Memorial Hospital and paramedics, were less than half those of the other five counties. In the absence of demographic and other data, it is impossible to ascribe any specific portion of the state and local declines in death rates to the development of EMS; nor, on the other hand, is there any other known factor responsible for the decline.

At the East Lansing project, which includes paramedics in the Ingham County Sheriff's department, in the year before the paramedic program was started, 38 of 42 cardiac victims were dead on arrival (DOA) at the emergency department; in the following year, 96 of 113 such patients were delivered alive to the ED.

In the King County, Washington, project, from April 1976 through March 1977, of 333 cardiac incidents brought to area hospitals, 13% were ultimately discharged.

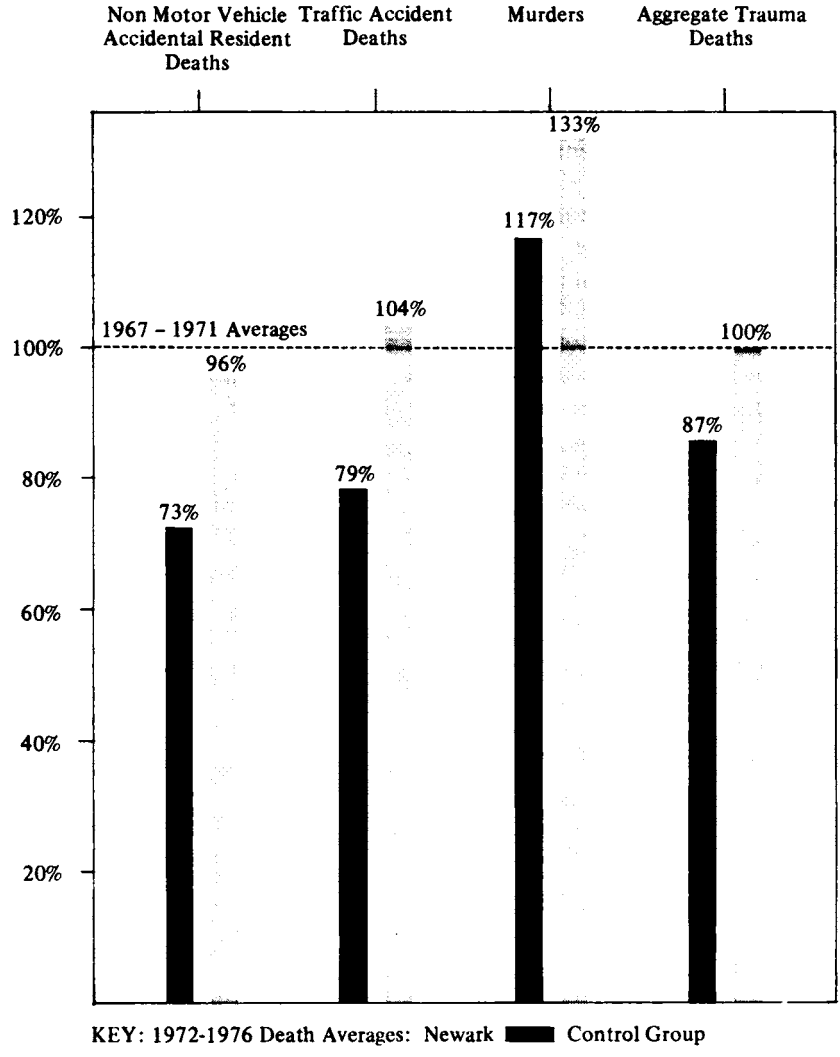
The efficacy of their public education program in CPR is suggested by data indicating that of patients for whom bystanders initiated CPR, 34% were admitted to a hospital and 25% were ultimately discharged; whereas of those for whom EMS personnel initiated CPR, 19% were admitted and 13% were discharged. This difference is accounted for by data comparing survival rate (21%) of patients for whom CPR was initiated within four minutes of onset (usually by bystanders) with the survival rate (8%) of those for whom the time was greater than four minutes. Two hospitals, Bellevue and Evergreen, served by paramedics under medical control averaged 25% discharge of cardiac cases, compared with 7.75% average for the four hospitals not so served. For Bellevue and Evergreen, 39% of the cardiac victims were delivered alive to the ED *vs.* 19% for the other four hospitals; in other words, the percentage of cardiac patients delivered alive to the hospitals served by paramedics was twice that for the other hospitals, and the discharge rate was over three times as great.*

In the first year of paramedic operation in Mobile, Alabama, of 274 persons reporting chest pains, 196 were delivered alive to the ED; of 53 persons with acute myocardial infarction, 31 (58%) were saved; of 11 persons with acute arrest, seven were delivered alive to the hospital coronary-care unit, and three were discharged.

In Victoria County, Texas, where, before the paramedic program there were no known cardiac saves, the number saved during the first year was 6 out of 26.

*Project Restart, Annual Report, April 1977. King County Department of Health.

Graph 5 1972-1976 Death Averages as Percentage of 1967-1971 Death Averages



KEY: 1972-1976 Death Averages: Newark ■ Control Group

Dr. Richard Crampton of the Charlottesville, Virginia, project, has published data showing a reduction of 15.3% in deaths per 1,000 persons from coronary artery disease after introduction of prehospital coronary care. * In Waynesboro, Virginia, about 25 miles from Charlottesville, the introduction of prehospital coronary care, with a registered nurse accompanying the EMTs on coronary runs, but without telemetry, is credited with reducing the mortality rate of patients with acute myocardial infarction and coronary thrombosis by 8%.**

The Peoria three-county project reports a decrease of 40% in deaths from severe injuries since the EMS system was instituted. Cape Cod reports that since the paramedic system was instituted, all persons with witnessed cardiac arrests have been saved.

As is evident, most of these data relate to paramedic treatment of coronary cases. The lack of conclusive impact data, particularly for nonparamedic EMS, is understandable: only a few projects have completely succeeded in standardizing ambulance forms, and, to the Committee's knowledge, only the Nebraska project has standardized both ambulance and emergency department forms for a large area; baseline data are usually unavailable; and projects have not yet reported feedback either from the state EMS offices, to which several projects send their ambulance forms for analysis, or from the Rand corporation, which has collected data at six projects. In general, project personnel, preoccupied with getting their systems into operation, have often felt that they had neither the time nor the expertise to do much with evaluation. This is unfortunate, in that data on the impact of EMS on mortality and morbidity can be crucial in convincing local and state officials of the need to provide financial support for EMS.

However, several of the projects, among which are those of the Navajo Nation, Kansas City, East Lansing, Idaho, Tallahassee, Philadelphia, and Charlottesville, now have incipient evaluation programs that should eventually provide useful data.

*Richard S. Crampton, M.D., *et al.*, Prehospital Coronary Care in Charlottesville and Albemarle County. Virginia Medical Monthly, Vol. 99, p. 1191-1196, November 1972.
**Thomas L. Gorsuch, M.D., *et al*, Mobile Prehospital Coronary Care in Waynesboro, Virginia. Virginia Medical Monthly, Vol. 101, pp. 121-125, February 1974.

Chapter 11

Epilogue

As is evident, this program has not produced, nor was it intended to produce, 44 perfect EMS systems. Progress in developing some EMS system components, particularly those somewhat peripheral to the daily provision of emergency care, has had to wait on operational implementation and is only now beginning to be made. Thus, only a few of the projects have made significant progress in evaluation or in categorization of hospital emergency facilities or have actualized the concept of the CMED as a highly trained resource management person. Progress toward improvement in hospital emergency department integration into an entire community EMS system is difficult to stimulate from outside the hospital environment. Only a few of the projects have been able to relocate rescue squads for optimal response or to achieve the operational economies that could result from such resource management.

But the remarkable fact is that, in the 3 years of program implementation, for approximately 11% of this country's population and area, the nonprofessional, fragmented ambulance service previously available has been replaced with professional, organized, and effective emergency medical care.

Moreover, access of the public to emergency care, promptness of response, quality of care at the scene and in transit, and the readiness of emergency departments to provide appropriate care, have all improved dramatically. What outcome data there are indicate a positive impact of EMS on morbidity and mortality in the project areas. The concept of the Foundation funding as seed money has been realized both in the augmentation of the $15,000,000 grant funds with over $10,000,000 in federal matching funds and in the stimulus provided for the generation of local support. Most of the projects have found solutions to particular EMS problems–solutions such as those described in the Foundation's *Special Report #2*–that are becoming known and emulated. And many projects have taken the lead in EMS development far beyond their immediate service areas. Regionalization of EMS, involving cooperation among a multiplicity of jurisdictions and providers, has been proved to be achievable.

In an age in which many have deplored the widening gap between technological progress and progress in social relationships, this Committee feels that this program has made an important contribution, in one sector of society, to narrowing this gap.

PART III

APPENDIXES

Appendix A

The Request for Proposals

The Robert Wood Johnson Foundation
National Competitive Program of Grants
for
Regional Emergency Medical Communications Systems
Administered in Cooperation with
The National Academy of Sciences
April 9, 1973

Background

Since it became a national philanthropy, The Robert Wood Johnson Foundation has placed a high priority on the improvement of access to front-line primary care in this country, particularly the form of care that has traditionally been rendered by the individual physician and his associates.

In its efforts to identify the barriers individuals encounter in obtaining access to medical care, the Foundation has pinpointed a particularly important problem—namely, the difficulty many individuals face in getting immediate, appropriate assistance in emergency medical situations. It has been demonstrated in a number of national studies that the difficulties in emergency medical services arise largely from the structure of the American health system. In the United States where great value is placed on pluralistic approaches to problems, the responsibility for emergency medical care is divided among a wide range of private institutions and governmental bodies. When individuals require emergency assistance, they are faced with a health system where many groups have partial responsibility but none has complete responsibility, thus creating uncertainty whether appropriate help will be readily available. In terms of health care performance, the United States falls desperately short in this critical area.

Today, most individuals have no central place to call when they need emergency medical assistance. Once a call is placed, the person receiving the call usually has little or no medical knowledge of how to deal with a request for emergency medical assistance. Throughout most of the country there is no direct communications capability between the emergency vehicle at the scene of the accident or illness and the hospital emergency room or a physician. Although we have the technological capacity, there are few regionally based communications systems that comprehensively deal with emergency incidents in a region. Most of the communications systems that do exist are fragmented along a variety of jurisdictional lines.

Reduction in the time from the onset of initial medical need until the provision of definitive medical care offers tremendous potential in saving lives and reducing disability and suffering. Although relatively little can be done to reduce ambulance travel time, communications techniques offer substantial benefits by: improving citizen entry into the response system, coordinating the dispatch of resources, ensuring that hospitals are alerted for arrival of patients, and providing professional medical advice and definitive intervention enroute or at the scene of need.

Each year 115,000 people die from accidents, and more than 50 million are injured. Of the more than 700,000 deaths from heart disease each year, the majority are due to acute myocardial infarction and more than half of these deaths occur before reaching the hospital. It is estimated that 90,000

lives could be saved each year by prompt medical treatment for heart attack victims and persons critically injured.

Providing standard nationwide citizen access to the response system is a widely recognized need, and efforts toward nationwide implementation of a universal emergency medical telephone number should be strongly supported. The communications dispatch center that efficiently coordinates and manages resources is a proven, practical concept. In addition to improved access, communications can reduce the number of deaths and injuries from highway crashes by providing the public with means for detection and location of accidents. A coordinated, integrated communications system which provides the telecommunication links between the dispatch centers, communications centers, hospitals, ambulances and rescue facilities is basic to an effective emergency medical services system. Proven technology is available to answer most of the system's needs. Impediments to implementation are primarily administrative and jurisdictional. The development of a comprehensive emergency medical services plan (which includes communications planning) is now being carried out in some states under the auspices of a variety of governmental and voluntary agencies.

The Proposed Program

As a result of its concern for this national emergency care problem, the Foundation is undertaking a nationwide program aimed at filling a generally recognized vacuum in emergency medical care planning. A major stimulus is needed to establish well-planned, compatible, regional emergency medical communications systems to coordinate emergency and disaster medical services through geographic areas. Consequently, the Foundation has decided to establish a competitive program, open to communities throughout the United States, aimed at providing basic support for the establishment of regional emergency communications systems. Such communications systems have been implemented successfully in a number of communities.

The Foundation anticipates a one-time expenditure of $15-million (over a two-year period) with an estimated $200,000 to $400,000 awarded per project. The Foundation expects to support approximately 50 regional projects, the number depending on the quality and cost of the proposals submitted. The major goal of the program is that the Foundation's seed money have a catalytic effect on bringing together various aspects of emergency health services operated by different geographic and institutional jurisdictions with new and more satisfactory operational and administrative arrangements.

The Foundation's funds will be utilized for the startup and development costs of organizing a new or improved system. Examples of such costs are: training professional emergency dispatchers and ambulance attendants,

communications hardware (such as mobile radio units and radio base stations), and educating citizens in the use of the system. The program is planned as a one-time national effort, with no commitment provided for any financial support on a continuing basis.

The Foundation anticipates applications from institutions that either will operate the emergency care system or have the concurrence of the institutions operating the system. This likely will include three kinds of organizations:

1 Regional nonprofit corporations (such as those with memberships from hospitals, local government agencies of participating communities, or emergency ambulance services). All private agencies must qualify as IRS Code 501(c)(3) "public charity" institutions.

2 Regional hospitals or hospital consortia with advice and support from surrounding communities,

3 The principal regional, county or city governments in the region of application.

The timetable for this national competitive program is:

April 9, 1973	Announcements and background materials sent to interested agencies and potential applicants.
June 1, 1973	Prospective applicants must notify the National Academy of Sciences in writing of the intent to submit a proposal. (See page 67)
August 1, 1973	Deadline for submission of six copies of completed applications to the National Academy of Sciences.*
August 1-31, 1973	Preliminary screening of applications by staff of the National Academy of Sciences.
September 1-November 15, 1973	Site visits by consultants to finalists.
November 15-30, 1973	Recommendations of the NAS professional advisory group to the Foundation.
December 15, 1973	Annoucement of awards by the Foundation.
December 31, 1973	Payment of two-year award.

During each of the two following years, each recipient of an award will submit a progress and a fiscal report and will receive a site visit from one or more consultants named by the National Academy of Sciences.

The Administration of the Program

The Foundation has requested the NAS to administer this program in conjunction with the Foundation over a two-year period. The NAS has been

*Fifteen copies of the form entitled "Resume of Application" should accompany the six copies of the full application.

involved in national emergency medical care planning for over a decade. The NAS has produced three major reports on the subject, including one which recommended that public and private groups undertake a national program of establishing regional emergency communications systems across the nation. Because of this work, the NAS has available a unique fund of medical and technical expertise and judgment on which to draw in the administration of the program.

As part of the administration of the program, the NAS will name an ad hoc advisory committee on emergency medical communications systems. The ad hoc advisory committee will review applications from regions for support of their emergency communications systems and, on the basis of the criteria and guidelines developed with the Foundation, make recommendations to the Foundation by December as to which proposals should be given support.

Under the guidelines the Foundation has established, the NAS staff has been given the authority to distribute information, to process applications, to review and evaluate preliminary proposals, to establish schedules for professional site visits, and to work with the ad hoc advisory committee on program procedures. For this reason the Foundation suggests that, to facilitate the orderly management of applications and grant awards, you direct any questions to Dr. David McConnaughey, The National Academy of Sciences, 2101 Constitution Avenue, Washington, D.C., 20418, (202) 961-1587.

Minimum Requirements for Eligibility

To be eligible, the program applicant must give evidence of capacity and intention of meeting the following minimum requirements within a one-year period of receiving a grant:

A *Central and immediate citizen access to the emergency medical system.* It is essential that the general public have access to all forms of emergency medical care through a single telephone number. Calling this number would put any person in contact with a central emergency medical dispatch agency. This should be accessible from all telephones, including pay phones where it is preferable that a coin *not* be required to reach the emergency number.

B *Central control of communications with a single regional institution assigned responsibility for dispatch and coordination of emergency medical vehicles and services and for collection of data necessary for effective internal management and monitoring of the system.* The proposal must specify the agency that would have overall *authority and responsibility* for the operation of the emergency medical dispatch system. The proposal must provide clear evidence of cooperation and agreement to participate from all appropriate agencies.

C *Prompt central medical dispatching of appropriate emergency care to the scene of the emergency and direction of patients to appropriate medical facilities.* This involves a trained central medical emergency dispatcher (CMED) who responds to notification of emergency situations via telephone or radio from private citizens, public agencies, or governmental institutions. It is expected that the CMED would:

1 Establish priorities and initiate appropriate response of the emergency medical system. If emergency medical assistance is needed, this response would include:

a dispatch of an ambulance with trained personnel and appropriate equipment,

b communication with those personnel en route to the scene,

c communication with related agencies when necessary,

d communication with the ambulance personnel after arrival at the scene to obtain such information as: the types and number of victims, the need for additional vehicles or equipment, and the need for ancillary and backup medical facilities.

2 Where appropriate and feasible, facilitate patient-related clinical communication between personnel at (or en route to and from) the scene and physicians or other medical professionals.

3 Based on information received from the scene and from the relevant medical facilities, direct the transport of the patient or patients to appropriate facilities.

The CMED agency would assume two additional vital functions:

4 Continuous and current assessment of the areawide emergency vehicle status and other relevant medical facilities.

5 Initial and backup response to other agencies involved in disaster situations.

The CMED agency would necessarily require functional integration with the daily activities of police departments, fire departments, civil defense, rescue units, utility companies, and other involved agencies. It would include the cooperative arrangements needed for integrating these emergency services into an effective emergency preparedness and response system. It would also identify the functional requirements for communications among the relevant agencies in the emergency system and establish procedures for routine interagency information exchange.

D *Adequately trained dispatch, ambulance and other health personnel.*

1 All central medical emergency dispatchers must complete the Department of Transportation Emergency Medical Dispatcher course or its equivalent before assuming this role (see enclosed booklet). As soon as feasible, all CMEDs should complete the 81-hour Department of Transportation Emergency Medical Technician/Ambulance course or its equivalent.

2 The great majority of ambulance personnel shall have completed the 81-hour DOT EMT/Ambulance course or its equivalent by the end of the two-year funding period.

3 As soon as feasible, advanced emergency medical training should be made available to emergency medical technicians, nurses, and physicians.

E *Prompt and appropriate emergency system capacity*. This would include:

1 Twenty-four hour availability of properly designed and equipped vehicles staffed by trained emergency medical technicians.

2 Adequately staffed and equipped 24-hour hospital or clinic emergency department capability, with substantive progress toward regionalization and categorization.

3 Adequate communications equipment for transmission of voice information between hospitals, ambulances and the CMED agency.

4 Hospital specialized care capabilities (e.g., burn units, coronary care units, trauma unit, poison control centers).

F *Access to adequate radio channels and telephone lines for a comprehensive emergency medical services system.*

G *Assurance that after the two years of support, the program would become self-sufficient, with its subsequent operational expenditures becoming part of the budgets of the applicant or other agencies.*

Priorities

Among proposals meeting all of the minimum requirements for eligibility stated above, priority will be given to those including the following characteristics (not ranked in the order presented):

A Those which offer greatest potential impact in reducing mortality and disability.

B Those which provide the most effective use of other public and private resources (including maximal use of existing communications equipment, existing community planning mechanisms, and existing training programs) which, as a result, are able to apply for reduced funding levels below the maximum of $400,000.

C Those which demonstrate strong linkages and coordination with other emergency services and planning agencies, such as police and fire departments, hospitals, comprehensive health planning agencies, regional emergency services planning councils, and civil defense agencies.

D Those which demonstrate consistency with state, local or regional emergency medical services plans if they exist.

E Those which would serve regions which encompass a large geographic (e.g., multi-county) area or large population (e.g., metropolitan) size.

F Those which would serve regions that can provide evidence of hospital commitment to develop and implement a plan of categorization of hospital emergency capabilities by the end of the two-year funding period.

G Those which would serve regions which can demonstrate the commitment to provide, within the two-year funding period, identification plaques on telephones to aid the caller to reach the CMED when emergency assistance is needed and to provide coin-free pay telephones for dialing the central medical emergency dispatch number (such as 911).

H Those which provide training in emergency medical services for physicians, nurses, and other involved health personnel.

I Those which provide a plan to inform and educate the public in the region of the proper use of the emergency medical system and citizen responsibility in emergency care.

J Those which make appropriate provision for three levels of function: routine transport of non-emergency patients, care and transport of patients needing basic emergency medical assistance, and care and transport of patients requiring advanced medical assistance.

K Those giving evidence that, when new ambulances or equipment are purchased, they are in accord with National Academy of Sciences guidelines and Department of Transportation standards.

L Those which demonstrate the development and operation of such a system with the greatest cost effectiveness.

Permissable Use of Funds

Funds will be granted for a two-year period starting January 1, 1974, and terminating December 31, 1975. Support is limited to a maximum of $400,000 for each two-year project. Funds will be granted for:

A Planning and development of the central emergency medical dispatch center for the region, including: administrative, organizational, consultant, and start-up costs; legal fees; rental of space; printing and reproduction of printed materials (including materials designed to educate the public); and office equipment and supplies.

B Training.

1 Central medical emergency dispatchers and other personnel who would perform the functions outlined in Part IV.

2 Ambulance personnel through the DOT 81-hour EMT/Ambulance course or its equivalent. DOT refresher training courses (or their equivalent) are included.

3 More advanced training for emergency medical technicians, physicians, nurses and other involved health personnel.

4 Training of citizens in basic medical emergency techniques and in effective use of the emergency medical response system.

C Salaries.

1 For central medical emergency dispatchers and other health personnel and communications center core staff (who are involved in emergency medical services). Salaries of ambulance personnel will not be reimbursed.

2 For personnel responsible for communications equipment operation and maintenance, especially where shared capability leads to increased efficiency and lower cost.

D Equipment purchase, installation and minor facility alteration, when immediately related to the development of the emergency medical communications system. All equipment and facility requests must be documented and justified. Ambulance purchases are not included in this program.

E Initial cost and maintenance of communications hardware and equipment including:

1 Mobile, portable and fixed radio units with multiple frequency capability.

2 Central telephone facilities.

F Related domestic travel of staff, faculty and trainees.

G Collection of data for purposes of areawide planning and *internal* evaluation of the system's operation.

H Development of systematic collection and analysis systems on the nature and causes of medical emergencies that can be used in the development of future preventive programs.

Supplies that are expended to provide patient care may not be replaced through the use of grant funds. Indirect costs may be reimbursed only in very unusual circumstances.

The Applicant's Proposal

A *Scope of the Project.* The applicant's proposal should contain a *short clear presentation* of the current and planned future course of the emergency patient from first notification of the system to comprehensive treatment at the appropriate emergency facility. This would include a description of the existing methods of delivery of emergency medical services in the region and how requested funds would alter them. Specifically, the proposal should address itself to each of the minimum requirements described on pages 67, 68, and 69, and as appropriate, to the priorities described on page 69 and 70.

B *Qualifications of the Applicant.* The proposal should specify:

1 The names, titles, curricula vitae and job descriptions (when available) of the project director and senior program personnel.

2 The personnel, facilities, equipment, radio frequencies, telephone systems, locations and space already available for the project.

3 The role and relationship of the applicant to existing emergency medical organizations and communications systems.

C *Cooperating and Supporting Agencies*

1 The proposal shall contain letters of firm agreement to participate from appropriate cooperating agencies, including police, fire, civil defense, ambulance services, and hospitals. The letters shall specify detailed statements of affiliation and cooperation. They should include a description of the type of cooperation and the qualifications of each agency.

2 The proposal shall indicate public support for the system and shall contain letters of endorsement from supporting agencies, including municipal governments, medical societies, health departments, Red Cross, Governor's Highway Safety Representatives, community groups, and areawide comprehensive health planning agencies. Where possible, actual commitments to cooperate should be included.

D *Budget.* The proposal shall include a detailed two-year line-item budget which describes the allocation of funds according to the components described on pages 11 and 12.

E *Tax Status.* Evidence of the applicant's Internal Revenue tax status should be included. Ordinarily this will be in the form of a "501(c)(3) certificate" and a "form 0714" issued to the applicant by the Internal Revenue Service.

F *Foundation Conditions of Participation.* The Foundation Conditions of Participation contained on pages 16 and 17 should be reviewed, approved, and signed by the project director of the application. After such signature and approval, pages 16 and 17 must be returned to the National Academy of Sciences as part of the applicant's proposal.

Foundation Conditions of Participation

The Tax Reform Act of 1969 imposed a series of new restrictions upon the activities and grants of private foundations. One provision of the legislation requires grants to be made subject to a written agreement between the grantor and grantee establishing limitations on the use of the grant funds. To comply with the statutory standards, the applicant must agree to the conditions set forth herein.

Your acceptance of this agreement should be indicated at the bottom by the signature of the officer or officers who are, under your by-laws, and the

law governing you, authorized to execute contracts on your behalf. Please return the executed original of this form to the National Academy of Sciences.

WILLIAM R. WALSH, JR.
Treasurer
The Robert Wood Johnson Foundation

Foundation Conditions of Participation (continued)

A Specific conditions.

1 In applying for this grant, it is expressly understood by the applicant that the Foundation has no obligation to provide continuing support for the grantee beyond the expiration of the two-year award.

2 In applying for this grant, the applicant agrees to participate in any program of external research and evaluation sponsored and supported by the Foundation for the purpose of measuring the effectiveness of the national program.

B General conditions.

1 *Purpose.* The grant is to be used exclusively for the purposes specified in the applicant's request for project support.

2 *Budget.* The grantee shall make no substantial changes in the proposal budget without first obtaining the written approval of the NAS.

3 *Accounting and Audit.* A systematic record on a fund-accounting basis, shall be kept by the grantee of the disbursement of funds and expenditures incurred under the terms of this grant, and the substantiating documents such as bills, invoices, cancelled checks, receipts, etc., shall be retained in the grantee's files for a period of not less than four years after expiration of the grant period. Further, the grantee agrees to furnish the Foundation with copies of such documents when and if requested; and to return any unexpended funds at the completion of the project or at the expiration of the stated support period.

The Foundation reserves the right to require a certified audit of the records of the grantee insofar as they relate to the disposition of the funds granted by the Foundation and the grantee shall make available to the Foundation its books and records.

4 *Reports.* Narrative and financial reports must be furnished to the NAS for each budget period of the grant, and upon expiration of the grant period. The narrative reports should contain an account of the manner in which funds have been spent, and the progress made in achieving the purposes of the grant. The financial report shall be in the form prescribed by the NAS.

5 *Publicity.* The Foundation will refer to this grant in its next annual report and in other published material. It may also issue a press release on the

grant, in which case a copy shall be sent to the grantee in advance for comments. The grantee may issue its own press announcement, but shall consult with the NAS before doing so.

In all public statements concerning the Foundation—press releases, annual reports, or other announcements—grantees are specifically requested to refer to the Foundation by its full name: The Robert Wood Johnson Foundation.

6 *Tax exemption.* The grantee represents that it is a public instrumentality or a nonprofit, tax-exempt organization within the provisions of Section 501(c)(3) of the Internal Revenue Code of 1954, as amended, which is not a private foundation under IRS Section 509(a). The grantee agrees that, if this tax exemption status is revoked or otherwise withdrawn during the period of this grant, it will notify the NAS immediately. It is expressly agreed that any change in the grantee's tax status will terminate any obligation of the Foundation to make further payments under this grant.

7 *Breach of condition.* The Foundation reserves the right, in the event that the grantee breaches any of the foregoing conditions, to withhold any further payments of the grant and to require the grantee to repay to the Foundation any funds expended in contravention of such conditions.

Accepted on behalf of _____,
this _____ day of _____, 197 __.

By: _____
(Title)

_____
(Address)

_____
(City and State)

_____
(Telephone Number)

Supplementary Materials

The enclosed materials are provided for additional information concerning emergency medical services and communications systems:

1 "Roles and Resources of Federal Agencies in Support of Comprehensive Emergency Medical Services," National Academy of Sciences-National Research Council, March, 1972.

2 "Emergency Medical Services Communications Systems," U.S. Department of HEW, August, 1972.

3 "Communications-Guidelines for Emergency Medical Services," U.S. Department of Transportation, September, 1972.

4 "Emergency Medical Services Training-Dispatchers," U.S. Department of Transportation, 1972.

5 Directory of Designated State Emergency Medical Services Coordinators, U.S. Department of Transportation, 1973.

Also included is a brief brochure on The Robert Wood Johnson Foundation.

Appendix B

Announcement of Grants

The Forrestal Center–P.O. Box 2316
Princeton, New Jersey 08540
Phone: (609) 452-8701
John W. Murphy

The National Academy of Sciences
2101 Constitution Avenue, Northwest
Washington, D.C. 20418
Phone: (202) 389-6587
David A. McConnaughey

For Release Thursday, May 23, 1974

The Robert Wood Johnson Foundation and the National Academy of Sciences announced today 44 grants totally $15 million for multi-community emergency medical networks which will provide citizens central telephone numbers to call in the event of accident, heart attack, or other medical emergencies. The grants are going to urban and rural regions in 32 states and Puerto Rico.*

The grants are provided by the Foundation under its program to improve primary, front-line medical care. The objective is to demonstrate the advantages of a centralized communications system in the rapid dispatch of ambulances by trained professionals serving large geographic regions.

The program is being administered by the National Academy of Sciences, Washington, D.C., which has been involved in emergency medical planning for a decade.

*Note to editors. A list of grant recipients is attached. For further details on a local project, editors should contact the person whose name is listed with the grant recipient.

In announcing the grants, Dr. David E. Rogers, president of the Foundation, said that in this program the Foundation will be helping to provide care which could save many lives by prompt and appropriate treatment in emergencies.

"The technology and knowledge exists to do the job. It is a complex one, however. People in an emergency need a central place to call. Once a call has been placed, they need a person at the other end who has the medical knowledge to deal with the problem. This program will put in place a capability to meet the problem," Dr. Rogers said.

"All too often," he said, "the emergency vehicle at the scene of accident or illness has no direct way of contact with the hospital emergency room or doctor, which can mean that victims of a serious highway accident, for example, may arrive at a hospital without warning, or a seriously burned patient may be taken to a hospital without the needed sophisticated burn unit."

The regional systems to be supported by the Foundation use common telephone numbers, such as 911; medically controlled dispatch of ambulances, and transport of patients to previously alerted facilities; and area-wide coordination among hospital emergency rooms, ambulance services, emergency cardiac units, and burn and poison centers.

The geographic areas involved often cross jurisdictional and governmental boundaries. Three of the 44 programs are statewide in scope—Idaho, New Mexico, and Utah; four of the programs involve counties in two states; seven of the programs are metropolitan area programs for the cities of San Francisco, Indianapolis, Minneapolis, Cleveland, Philadelphia, Atlanta, and Seattle; 22 are multi-county; 14 are single county. Nearly two-thirds of the regions receiving grants are rural in character. Sponsors of the programs include state and local health departments, hospital consortiums, county and city governments, regional health councils, and other health care organizations.

The grants will be used for the organization and startup of new regional programs, or the extension of existing programs. Funds may be used to train emergency medical communications dispatchers and emergency medical technicians, to secure communications equipment, and to inform citizens in the use of the system in their areas. The two-year funding will start July 1, 1974.

The Academy's 15-member Committee on Regional Emergency Communications Systems, headed by Dr. Robert M. Heyssel, executive vice president of the Johns Hopkins University, Baltimore, Maryland, reviewed the grant applications for the Foundation, and recommended the 44 regional programs from among 252 applications.

Commenting on the applications, Dr. Heyssel said the NAS Committee was impressed by both the number and high quality of the proposals received. "We had to make some difficult choices," he said, "and while we regret that the Foundation could not fund many more, we are pleased that out of the planning process required to develop the application to the Foundation

community interest was stimulated to the degree that several regions are seeking ways to move forward even though Foundation support is not available."

According to studies made by NAS and other organizations, an estimated 115,000 persons die in this country from accidents each year, and more than 50 million are injured. Of the more than 700,000 heart disease fatalities, more than half the victims die before reaching a hospital.

The Foundation has commissioned the Rand Corporation, Santa Monica, California, to assess the overall impact of the program on improving emergency medical care and saving lives. The Foundation is also sponsoring a series of four two-day workshops in regional emergency medical response systems. These workshops will be available on a priority basis to those organizations which applied for support under the Foundation's program.

The Robert Wood Johnson Foundation, Princeton, New Jersey, was established in 1936 by General Robert Wood Johnson who died in 1968. His bequest, received in December, 1971, and the appointment of Dr. Rogers as President in January, 1972, marked the beginning of the Foundation's transition from a local philanthropy active primarily in New Brunswick, New Jersey, to a national philanthropy interested in improving health in the United States.

The National Academy of Sciences is a private organization officially chartered by the U.S. government to provide advice on problems in science and technology.

Recipients of The Robert Wood Johnson Foundation Grants for Regional Emergency Medical Response Systems

The list of grant recipients arranged alphabetically by states follows. The name of the individual to be contacted for information about each program follows the name of the grant recipient and the geographic area included in the program.

Alabama

1. Mobile County Emergency Medical Services Council, Mobile, Alabama; for Mobile, Baldwin, and Escambia counties.

Phillip A. Snodgrass, M.D., Chairman, Mobile County Emergency Medical Services Council, 171 Louiselle Street, Mobile, Alabama 36601

Arizona

2. The Navajo Health Authority, Window Rock, Arizona; for the Navajo Nation.

Irvine Hendryson, M.D., Director, Emergency Medical Services, Navajo Health Authority, Window Rock, Arizona 86515

California

3. Northern California Emergency Medical Care Council, Redding, California; for Siskiyou, Shasta, Lassen, Modoc, Plumas, Tehama, and Trinity counties.

David G. Daehler, M.D., President, Northern California Emergency Medical Care Council, Redding, California 96001

4. Board of Supervisors, San Bernardino County, California; for San Bernardino County.

Ms. Nancy E. Smith, Chairman, Board of Supervisors, San Bernardino County, San Bernardino, California 92401

5. San Francisco Department of Public Health and Community Emergency Care, Inc.; for San Francisco, California.

Francis J. Curry, M.D., Director, Department of Public Health, 101 Grove Street, San Francisco, California 94102

6. Office of Emergency Services, Santa Clara County, California; for Santa Clara County.

Mr. Ralph H. Mehrkens, Chairman, Board of Supervisors, County of Santa Clara, San Jose, California 95110

7. Comprehensive Health Planning Council of San Mateo County, Inc.; for San Mateo County, California.

R. J. Marshall, Executive Director, Comprehensive Health Planning Council of San Mateo County, Inc., 1015 East Hillsdale Boulevard, Room 206, Foster City, California 94404

Connecticut

8. The Yale-New Haven Hospital and The Hospital of St. Raphael; for a 400-square-mile-area around New Haven, Connecticut.

Mr. Herbert Paris, Associate Director, Yale-New Haven Hospital, New Haven, Connecticut 06504

Florida

9. The Tallahassee Memorial Hospital, for Madison, Gadsden, Jefferson, Leon, Taylor, and Wakulla counties in Florida; and Thomas County in Georgia.

Mr. M. T. Mustian, Executive Director, Tallahassee Memorial Hospital, Tallahassee, Florida 32303

Georgia

10. The Atlanta Regional Commission, Atlanta, Georgia; for Fulton, DeKalb, Cobb, Clayton, Gwinett, Douglas, and Rockdale counties.

Raphael B. Levine, Ph.D., Director, Health and Social Services Planning Department–Project Director, EMS, Atlanta Regional Commission, 910 Equitable Building, 200 Peachtree Street, Atlanta, Georgia 30303

Idaho

11. Department of Environmental and Community Services, Idaho Emergency Health Services Program; for the State of Idaho.

James A. Bax, M.D., Administrator DECS, Idaho Department of Environmental and Community Services, Statehouse, Boise, Idaho 83720

Illinois

12. The St. Francis Hospital, Peoria, Illinois; for Tazewell, Woodford, and Peoria counties.

Edward T. McGrath, Administrator, St. Francis Hospital, Peoria, Illinois 61603

Indiana

13. The Health and Hospital Corporation of Marion County, General Hospital, Indianapolis, Indiana; for Marion County.

Arvine G. Popplewell, M.D., Director of Hospitals, Marion County General Hospital, 960 Locke Street, Indianapolis, Indiana 46202

Iowa

14. Polk County Board of Supervisors, Des Moines, Iowa; for Boone, Dallas, Jasper, Madison, Marion, Polk, Story, and Warren counties.

Mr. Richard Brannan, Chairman, Polk County Board of Supervisors, Polk County Court House, Des Moines, Iowa 50309

Louisiana

15. Louisiana Hospital Association, New Orleans, Louisiana; for Lafayette, Acadia, St. Mary, Vermilion, St. Martin, Evangeline, Iberia, and St. Landry parishes.

Mr. Robert Merkel, Executive Director, Louisiana Hospital Association Research & Education Foundation, 2026 St. Charles Avenue, Suite 701, New Orleans, Louisiana 70130

Massachusetts

16. Region VII Comprehensive Health Planning, Inc., Middleboro, Massachusetts; for Cape Cod, Martha's Vineyard, and Nantucket.

Donald J. Haughton, Executive Director, Region VII Comprehensive Health Planning, Inc., Middleboro, Massachusetts 02346

Michigan

17. Tri-County Emergency Medical Services Council, East Lansing, Michigan; for Clinton, Eaton, and Ingham counties.

John G. Wiegenstein, M.D., Chairman, Tri-County Emergency Medical Services Council, East Lansing, Michigan 48823

Minnesota

18. Hennepin County Criminal Justice Council, Minneapolis, Minnesota; for Hennepin County and adjacent areas.

Stanley R. Cowle, County Administrator, Hennepin County Criminal Justice Council, Room 136, Courthouse, Minneapolis, Minnesota 55415

Missouri

19. Mid-America Regional Council, Kansas City, Missouri; for Jackson County.

Richard F. Davis, Executive Director, Mid-America Regional Council, Kansas City, Missouri 64105

Montana

20. Missoula Emergency Systems for Health (MESH) Council, Missoula, Montana; for Missoula, Mineral, and Ravalli counties.

Kit G. Johnson, M.D., Chairman, Missoula Emergency Systems for Health (MESH) Council, Missoula City-County Health Department, Courthouse Annex, Missoula, Montana 59801

Nebraska

21. Nebraska State Health Department, Lincoln, Nebraska; for "Area 2" including Blaine, Loup, Garfield, Wheeler, Custer, Valley, Greeley, Sherman, Howard, Buffalo, Hall, Merrick, Hamilton, Phelps, Kearney, Adams, Clay, Furnas, Harlan, Franklin, Webster, and Nuckolls counties.

Kenneth Kimball, M.D., Chairman, State Executive Committee EMS, Nine West 31st Street, Kearney, Nebraska 58847

Henry Smith, M.D., Director, State Health Department, 1003 "O" Street, Lincoln, Nebraska 68508

New Jersey

22. Hunterdon County Board of Chosen Freeholders, Flemington, New Jersey; for Hunterdon County.

Mr. William W. Winter, Freeholder Director, Hunterdon County Board of Chosen Freeholders, Administration Building, Flemington, New Jersey 08822

23. New Jersey State Department of Health, Trenton, New Jersey; for the cities of Newark, Jersey City, Elizabeth, and East Orange, including Newark International Airport.

Marie A. Sena, M.D., Director, Office of EMS, New Jersey State Department of Health, Health–Agriculture Building, Trenton, New Jersey 08625

New Mexico

24. New Mexico State Health Agency of the Health and Social Services Department, Santa Fe, New Mexico; for the State of New Mexico Crisis Center in Albuquerque.

Victor Zalma, M.D., Director, State Health Agency, Health and Social Services Department, State of New Mexico, Santa Fe, New Mexico 87501

Richard A. Walsh, M.D., Director, Emergency Health Services, New Mexico Regional Medical Program, The University of New Mexico School of Medicine, Albuquerque, New Mexico 87131

25. Presbyterian Medical Services, Santa Fe, New Mexico; for Rio Arriba, Taos, Sandoval, Santa Fe, Mora, San Miguel, Guadalupe counties, in New Mexico; and portions of Conejos and Costilla counties, in Colorado.

Mr. Daniel M. Smith, III, Vice President & Treasurer, Presbyterian Medical Services, Santa Fe, New Mexico 87501

New York

26. Office of the County Executive, Suffolk County, New York; for Suffolk County.

Mr. John V. Klein, County Executive, Suffolk County, County Center Hauppauge, Hauppauge, New York 11787

North Carolina

27. The North Carolina Memorial Hospital, Chapel Hill, North Carolina; for Orange and Chatham counties.

Dennis R. Barry, Administrative Director, The North Carolina Memorial Hospital, Chapel Hill, North Carolina 27514

28. The Pee Dee (Region H) Council of Governments, Troy, North Carolina; for Anson, Montgomery, Moore, and Richmond counties.

Mr. N. Worth Chesson, Executive Director, The Pee Dee (Region H) Council of Governments, 227 North Main Street, Troy, North Carolina 27371

Ohio

29. The Metropolitan Health Planning Corporation, Cleveland, Ohio; for Cuyahoga County.

Mr. Vernon R. Burt, President, Metropolitan Health Planning Corporation, 908 Standard Building, Cleveland, Ohio 44113

Oregon

30. City of Hermiston, Oregon; for a 500-square-mile area.

L. T. Harper, City Manager, The City of Hermiston, Hermiston, Oregon 97838

Pennsylvania

31. Lebanon County Office of Civil Defense, Lebanon, Pennsylvania; for Lebanon County and adjacent areas.

Mr. Walter W. Francis, Civil Defense Director, Lebanon County Civil Defense, Room No. 14, Municipal Building, Lebanon, Pennsylvania 17042

32. Philadelphia Health Management Corporation, Philadelphia, Pennsylvania; for the metropolitan Philadelphia area.

Mr. John C. McMeekin, Executive Director, Philadelphia Health Management Corporation, 530 Walnut Street, 13th Floor, Philadelphia, Pennsylvania 19106

Puerto Rico

33. Department of Health of Puerto Rico, for the Southern Health Region; a 625-square-mile-area around Ponce.

José A. Alvarez de Choudens, M.D., Secretary, Department of Health, Ponce de Léon Avenue, No. 1306, Santurce, Puerto Rico 00908

34. Emergency Health Service of the San Juan Health Department, San Juan, Puerto Rico; for the City of San Juan.

Eduardo Sotomayor, Jr., Administrator, San Juan Emergency Health Service, San Juan Municipality, Rio Piedras, Puerto Rico

Tennessee

35. Health Systems Management, Inc., Memphis, Tennessee, for Crittenden County, Arkansas; DeSoto County, Mississippi; and Fayette, Lauderdale, Shelby, and Tipton counties, Tennessee.

Mr. Walter W. Diggs, Executive Director, Health Systems Management, Inc., 1303 Medical Center Towers Building, 969 Madison Avenue, Memphis, Tennessee 38104

Texas

36. City of Victoria, Texas; for Victoria County.

Mr. John F. Lee, City Manager, City of Victoria, Victoria, Texas 77901

Virginia

37. Division of Biomedical Engineering, University of Virginia, Charlottesville, Virginia; for Albemarle, Louisa, Green, Fluvana, and Nelson counties.

E. O. Attinger, M.D., Biomedical Engineering Department, University of Virginia Medical Center, Charlottesville, Virginia 22901

Utah

38. Intermountain Regional Medical Program, Salt Lake City, Utah; for the State of Utah.

Mr. W. S. Partridge, Vice President for Research, Intermountain Regional Medical Program, 50 North Medical Drive, Salt Lake City, Utah 84132

Washington

39. Kitsap County Board of County Commissioners, Bremerton, Washington; for Kitsap County.

Mr. Gene Lobe, Chairman, Kitsap Board of County Commissioners, 614 Division Street, Port Orchard, Washington, 98366

40. King County Board of County Commissioners, Seattle, Washington; for King County.

Mr. John D. Spellman, County Executive, King County, King County Court House, Seattle, Washington, 98104

Mr. Jerry Montgomery, Emergency Medical Services Division, Public Safety Building, Seattle, Washington 98104

West Virginia

41. Southern West Virginia Regional Health Council, Inc., Bluefield, West Virginia; for Mingo, Logan, Wyoming, McDowell, Raleigh, Fayette, Summers, Mercer, and Monroe counties.

Mr. Calvin Belcher, Jr., Director, Southern West Virginia Regional Health Council, Inc., Bluefield, West Virginia 24701

Wisconsin

42. West Central Wisconsin Health Planning Council, Inc., Menomonie, Wisconsin; for Polk, Barron, Rusk, St. Croix, Pierce, Dunn, Pepin, Chippewa, Eau Claire, and Clark counties.

Richard L. Dahlby, Executive Director, West Central Wisconsin Health Planning Council, Inc., 103 First Avenue, West, Menomonie, Wisconsin 54751

43. The Northeastern Wisconsin Health Planning Council, Inc., Green Bay, Wisconsin; for Menominee, Oconto, Shawano, Marinette, Door, Kewaunee, Brown, Manitowoc, and Sheboygan counties.

George R. Curry, Executive Director, Northeast Wisconsin Health Planning Council, Inc. 828 Cherry Street, Green Bay, Wisconsin 54301

Wyoming

44. Wyoming Hospital Research and Educational Foundation, Cheyenne, Wyoming; for Park, Big Horn, Washakie, Hot Springs, and Fremont counties.

Mr. Albert B. McDonald, Executive Director, Wyoming Hospital Research and Education Foundation, Cheyenne, Wyoming 82001