

Regionalization & Health Policy

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Foreword

This volume grew out of a conversation I had with Dr. Kenneth M. Endicott in 1973. Dr. Endicott was the Administrator of the Health Resources Administration, Public Health Service, in the U.S. Department of Health, Education, and Welfare. We were talking about the need for reform of the American health delivery system, when the conversation turned to the desirability of focusing more attention upon regionalization as part of that effort at reform. I noted that the Conservation of Human Resources Project at Columbia University had recently been given a grant from The Robert Wood Johnson Foundation and that we would very probably initiate some studies on regionalization with the aid of that grant. Dr. Endicott said that his agency, HRA, might want to be part of a much broader approach to the issue of regionalization.

Towards the end of 1974 this topic was reopened with Dr. Martin Cummings, Director of the National Library of Medicine, NIH. We decided then to gather a series of in-depth papers which would illuminate the principal facets of regionalization in health, with primary emphasis on the (albeit limited) experience of the United States. We felt this could help clarify the options our country faces in deciding how to strengthen its health delivery system.

Our objective initially was to prepare such a volume for publication during our Bicentennial Year to underscore the linkage between past accomplishments (and failures) and opportunities for the future. The passage of the National Health Planning and Resources Development Act in December 1974 gave us a sense of further urgency.

Drs. Endicott and Cummings asked me to prepare a plan by which such an authoritative volume might be produced. It was immediately clear that the success of the undertaking would depend on my ability to obtain the collaboration of an outstanding group of experts who would be willing not only to contribute but to adjust their working schedules to meet our schedule.

The draft of the manuscript was in hand in the Spring of 1976. Editing by the Health Resources Administration took some time to assure a uniform style and to enhance readability. With a few exceptions for which I assume the responsibility, the edited chapters were reviewed by the

authors and approved by them. While it is regrettable that so much time has passed between the initial draft and final publication, I am satisfied that the book is now easier to read and that no violence has been done to the authors' ideas even though their style has been to some degree altered.

Those who are acquainted with the ways of academicians and research investigators will be surprised to learn that, of the original men and women invited to participate, all accepted. Later, only two had to be replaced: one on the ground of health; the second, because of his having been drafted into an important governmental assignment. I would like to acknowledge my indebtedness to my collaborators who not only graciously agreed to transform this effort from idea to reality but also tolerated with good humor the pressures, cajolery, critiques, deadlines, and reminders that are the armamentarium of an editor.

This project also received the assistance of a group of experts who had earlier played leading roles in programs directed at regionalization. This is particularly pertinent for two chapters: "Regional Medical Programs" and "Voluntary Regional Planning." The fact that we were able to obtain the participation in the same meeting of all the national directors of the Regional Medical Program from its inception indicates our good fortune. We were also able to profit from an extended discussion with the principal participants in the regionalization efforts carried out in New York City, Pittsburgh, and Rochester, New York. In addition, we received valuable assistance from others whose names appear at the end of the book.

Through the courtesy of Dr. Ernest Seward, I had the opportunity to participate in a symposium at the University of Rochester on the Regionalization of Personal Health Services in February 1975; those *Proceedings* were later published by the Milbank Memorial Fund. The Rochester Symposium highlighted some of the troublesome issues, particularly where health, values, and politics collide.

Potential contributors were identified through exploratory discussions with Dr. Robert Blendon and Professors Rashi Fein and Herbert Klarman. Dr. Harold Margulies, Deputy Administrator of HRA, HEW, was a constant

source of support in helping us identify and contact current and former members of the Federal bureaucracy who could be helpful.

My colleagues on the Conservation staff and I were responsible for the preparation of six chapters. Ms. Miriam Ostow assisted me in coping with many of the details of the project. Dr. Charles Brecher helped with editorial revision. Ms. Anna Dutka played a constructive role in the preparation of the final manuscript.

No reader of this book should expect to learn exactly what the United States should do to strengthen its health delivery system through regionalization. In fact the authors do not agree among themselves. Nevertheless, I believe the book meets Dr. Endicott's expectation that a critical assessment of the Nation's modest early efforts in the area of regionalization can help identify some useful directions for the future. I also believe that this volume will contribute to the process of further clarification and action.

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9. Emergency Medical Services: Regionalizing Intents and Localizing Effects

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Introduction

Emergency Medical Services (EMS) provides a good opportunity and illuminating arena to examine the theory, practice, and mythology of regionalization. As a relatively new area, EMS has neither the disadvantage of a shibboleth-strewn past nor the advantage of tradition or long program experience. It offers a comparatively pristine case-study in which the normal issues generic to regionalization and health care become exaggerated. Such issues as local access vs. regional specialization, and the cost, time, and quality implication of local vs. regional care all have a special life-determining importance in emergency medicine. Whether a patient with chest pains, multiple trauma, or severe burns should be sent to local or a regional treatment facility is, in the short-term, a more life or death decision than in other types of health care delivery. This extreme time dependency in EMS, as well as the relative independence of EMS planning from the past and present mainstream of health care in this country makes it especially attractive as a case-study for regionalization. It is, perhaps, the "Eliza Doolittle" of health care: it has a neglected and undistinguished past, it easily falls victim to current health care fads and foibles in becoming more perfect than those born to it, and yet it often remains slightly tawdry in the end.

The general argument of this chapter is that, despite the enormous zeal for the regionalization of EMS, the current strategies in the public and private sectors disguise rather than change its structure.

The Comptroller-General of the U.S. reported to Congress in 1976, "So far, regional systems have not been able to gain the control and coordination necessary to achieve economic, effective, and efficient emergency medical services delivery called for by the Emergency Medical Services Systems Act of 1973 . . . the regional concept is being

compromised by virtue of the independence and differing priorities of local governments and providers." In fact, after \$210 million worth of technology and resources over three years to change a pluralistic, competitive non-system into a structured and regulated regional system, the impact has had exactly the opposite effect. By making resources available at the local level, rather than through regional authorities, the attempts at EMS regionalization have actually had localizing effects. Ironically, the movement towards EMS regionalization was progressing tolerably well with low public expenditures and "benign neglect" until this country self-consciously and mistakenly tried to buy faster progress. The attempt to plan for and buy regionalization reversed the program's direction and made it apparent that the lost legacy of unregulated pluralism and competition was a better way of achieving regionalization than planned, expensive regional strategies. Ironically, regionalization may well have had no impact on patient mortality and morbidity rates, albeit at enormous political and economic costs. Indeed, the possibility exists that in the one Federal demonstration EMS system (where before-and-after data are available) mortality rates may even have worsened subsequent to regionalization.

There is, then, no evidence that regionalization either saves lives or reduces disability. A massively expensive regionalization program was and continues to be carried out in the U.S. with insufficient evidence then and now to suggest that it would or could achieve the mortality and morbidity reduction Congress wants. Whether regionalization can save lives and reduce disability in the future remains an open question. The alleged life-saving advantages of regionalized emergency medical care probably cannot be realized in the U.S. without regional governmental authorities replacing the current fragmentation of local jurisdictions, each with separate priorities, political controls, and funding sources. And since the U.S. values pluralism and local independence, it is not likely that regional govern-

ment will replace the fragmented local jurisdictions in the foreseeable future.

Since 1973, the major organizational theme in the development of emergency medical services (EMS) in the U.S. has been regionalization of resources, service areas, patient flow patterns, and facilities. While there is little evidence that regionalization results in better patient health outcomes and much to indicate that it results in added system and patient costs and abrasive resistance at local levels, regionalization is being aggressively pursued by national agencies. It is important to note that regionalization is not being merely encouraged, it is required by governmental and non-governmental agencies as a basic condition for funding. This requirement includes substantive EMS services (communications, ambulances, hospital emergency departments, and critical care units) which must be grafted onto the organizational skeleton of regionalization.

The major national agencies presently funding EMS system development are the U.S. Department of Health, Education, and Welfare under the Emergency Medical Services Systems (EMSS) Act of 1973 (PL 93-154) and the Robert Wood Johnson Foundation through its grant program for Regional Emergency Medical Communication Systems.

DHEW and the Emergency Medical Systems Act of 1973

The EMSS Act was passed by Congress in November 1973 over the veto of President Nixon. It made up to \$185 million available over a three-year period for feasibility studies and planning (Section 1202), establishment and initial operations (Section 1203), and expansion and improvement (Section 1204) of regionalized EMS systems. Unlike previous funding initiatives by the U.S. Department of Transportation under the National Highway Safety Act of 1966, the 1973 EMSS Act makes funds available not only to States but also to units of general local government and, indeed, any public entity or non-profit private entity. The Act also makes available monies for EMS research and evaluation and for training during 1973-1974. The Act is built around 15 mandatory program requirements to which grantees must either comply or commit themselves to achieving compliance in order to receive funding.

In DHEW's *Program Guidelines*, the 15 requirements are preceded by the following passage on "Regionalization of Emergency Medical Services":

"A regional EMS system is one that is geographically described by the existing natural patient care flow patterns. It must be large enough in size and population to provide definitive care services to the majority of general, emergent and critical patients. Where care deficiencies of a highly sophisticated nature exist within a region, arrangements must be made for obtaining these patient care services in an adjoining region. Various counties and cities will need to be grouped and the

region may have to be larger than the boundaries of an Areawide Comprehensive Health Planning Agency. It is the definition of the EMS regional delivery system with its patient distribution patterns that is the essential issue.

"The regional operational organizations must attempt to pull together the EMS services within these medical-geographic arrangements. The planning and evaluation process must be based upon sound clinical considerations and with State and inter-regional relationships being maintained. In these EMS regions the provider elements within the geographic area will need to work together to solve mutual problems. The EMS Council must be developed with advisory input into these regional EMS programs and their relationships to regional or State health authorities.

"The EMS region must be contiguous with the adjoining region. Regional planners should recognize that populations in the fringe areas of a region may need to develop dual plans and allow for inter-communications with adjoining regional EMS plans and operations. A coordination mechanism should be developed between intra-state regions and inter-state regions.

"The EMS systems must be integrated through an appropriate regional organization so that the total resources can be effectively utilized to meet the needs of the geographical area. The financial resources of the area must be sufficient and mobilized to develop and sustain the EMS system operation. The EMS system must be interfaced with the total health care delivery system for the region. The EMS system resources must be linked to local disaster organizations in order to respond to sporadic high intensity needs such as a natural disaster within the regional service area and adjoining service areas.

"The role for the health professionals, hospital associations, and EMS councils is to consider the critical professional services required to establish community wide and regional care programs, to recruit the EMS professionals, to affirm the economic base, and to provide community access to these emergency care resources when needed."¹

While this broad program statement contains inconsistencies, ambiguities, little awareness of the difficulties in implementing regionalization within EMS, and no pragmatic justification for regionalization, it represents the overwhelmingly accepted position within EMS planning. It is also a backdrop for the 15 mandatory program requirements for EMS grantees. These requirements represent Congress' definition of an "ideal" EMS system and the way to achieve the ideal through Federal programming. The 15 points are discussed below:

1. Manpower

"An adequate number of health professionals, allied health professionals, and other health professionals, in-

cluding ambulance personnel, with appropriate training and experience."

Under this *Guideline* there must be enough of all types of personnel to provide "EMS on a 24-hour a day basis, 7 days a week within the service area of the system." It further specifies these major manpower elements: first responders (fire, police, and other public safety elements), communicators (EMS resource dispatchers), Emergency Medical Technicians (ambulance attendants/paramedics), registered nurses and physicians (emergency departments and critical care units), and EMS System Directors and Coordinators. But the guidelines fail to address several issues of substantial importance in implementing regionalization at the EMS system level. They fail to indicate how many of what kind of manpower would be sufficient at each facility. Thus, EMS systems have frequently assumed by default a "deregionalizing" posture since they often assume that each individual facility must have its own full complement of manpower rather than the aggregate system possessing a full complement. As a result, the manpower problem is frequently and inaccurately seen as under-supply rather than over-supply. For example, most hospitals within a service area see themselves as needing more physicians and nurses with a higher level of EMS training in their emergency departments and critical care units and do not accept the proposition that such resources should (and probably already do) exist for the system rather than for each facility within it.

2. Training

"The provision for appropriate training (including clinical training) and continuing education programs which 1) are coordinated with other programs in the system's service area which provide similar training and education and 2) emphasize recruitment and necessary training of veterans of the Armed Forces with military training and experience in health care fields and of appropriate public safety personnel in such areas."

As with previous requirements, this training standard has not helped achieve regionalization although the way that systems implement it has important implications for regionalization.

It is ironic that regionalization is *least* needed but most easily achieved when scarce resources are concentrated at regional centers; it is *most* needed and *least* easily achieved when new resources are made available (through the EMSS Act) to local provider-dominated mechanisms. Thus, the pressure towards regionalization was much greater when EMS resources were scarce and limited to existing regional and specialty centers: community hospitals could not afford neuro-surgical coverage in their emergency departments, nor even specially trained physicians to staff them; local ambulance services could not afford the technology and special personnel trained for advanced life support, and the training level of nurses and physicians at community hospitals was so low that the clinical decisions to transfer patients to

regional centers were made more in ignorance than in understanding.

3. Communications

"Provisions for linking the personnel, facilities, and equipment of the systems by a central communications facility which 1) utilizes emergency telephonic screening, 2) utilizes or will utilize the universal telephone number 911, and 3) will have direct communication connections and inter-connections with the personnel, facilities, and equipment of the system and with other appropriate emergency medical services systems."

Communication is a major means for achieving regionalization in emergency medical care. Specifically, the convenience of a uniform number (911) to be called by a citizen asking for emergency help anywhere in the service area can increase the probability of an ambulance actually arriving on the scene in time. This contrasts with the traditional situation where a region may have up to 100 separate ambulance companies (hospital-based, commercial, volunteer squads, police, fire, etc.) with separate telephone numbers covering small, over-lapping service areas within the region.

Finally, a regional communication system also has direct radio links between central dispatcher, hospital emergency departments, specialty care centers, and ambulance personnel so that clinical consultation is available at the scene or en route to the hospital and hospitals are forewarned of a patient arrival. The program assumption here is clearly that ambulance attendants will treat patients differently and better because of verbal contact with a specialty physician and that a forewarned hospital will activate its resources promptly and thus render more effective treatment.

The Johnson Foundation's Experience: A Digression

In 1973, the Robert Wood Johnson Foundation National Competitive Program of Grants published program guidelines for regional emergency medical communications systems. They are a most eloquent statement about the role of communications in regionalized emergency care and the most explicit outline of the relationship between regionalization and better care.

The Foundation (in cooperation with the National Academy of Sciences) chose 44 not-for-profit entities (ranging from county and city governments and hospital consortia to regional governmental units), each to receive approximately \$400,000 over two years to establish regional emergency medical communications systems. The Foundation saw communications as a way of regionalizing *despite* the current pluralistic structure rather than *through* it. This seems to be a key assumption: that a skeleton of technology and operating procedures can be grafted on to

an existing fragmented and competitive health non-system which structurally is resistant to regionalization and, without radically altering the local governmental structure, induce local facilities to act regionally without, in fact, becoming a region.

It is true that the Foundation's guidelines say, "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." Indeed, jurisdictions were "brought together" and new "arrangements" developed but these have been *coordination* and *liaison* arrangements, not new regional management authorities. Existing jurisdictions have cooperated to varying degrees; few, if any, new regional authorities have been created.

The Robert Wood Johnson Foundation places high importance on increasing access to health care. This led to their belief that regionalization could improve access and that such improvement was greatly needed in emergency medical care:

"In its effort 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.

"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."²

After such a ringing rationale for regionalization via communications, it must seem churlish (albeit necessary)

to inquire whether a communication system can really produce all these benefits. If the Foundation is correct in its belief that "the difficulties in emergency medical services arise largely from the structure of the American health system," can a communication system super-imposed upon that fragmented pluralism remove those "difficulties"? It seems more reasonable to believe that the independent impact of a communication system is likely to be negligible.

If regionalization, as encouraged by both DHEW and the Robert Wood Johnson Foundation, consists of fewer and more specialized facilities controlled at the regional level, it is not likely to increase the local availability of a resource but merely its appropriateness or rather its level of complexity. The choice may very well be between the present pluralistic and available help (which for some patients may be inappropriately basic) and regionalized, less available help (which for most patients may be inappropriate and expensively over-specialized). Today, the practical choice in many rural areas is between a high availability of just basic services and a future regionalized low availability of all kinds of service (a choice mandated by the present geographic distribution of emergency services for which communications is largely irrelevant). It is hard to see how regional communications would change the picture.

Indeed, with these considerations it is quite curious and inconsistent that the Robert Wood Johnson Foundation should be attracted to EMS regionalization as a vehicle to improve access to front-line primary care. (Front-line primary care commonly refers to non-urgent care or primary health care.) One function that present non-regionalized hospital emergency departments perform well is the provision of wide-open local access for front-line primary health care:

- They are open 24 hours a day
- Unlike most other delivery sites, emergency departments do not have the option of denying or delaying access
- They are often the only delivery site in many poverty areas
- Financial barriers are not imposed at the time of service
- It is a convenient walk-in facility

This primary care access provided by pluralistic fragmentation and unregulated competition is eloquently attested to by utilization figures. At present, there are 65 million emergency department visits per year, of which 50 million are for non-urgent primary care. This utilization has increased more than five-fold over the last 15 years—a greater increase than any other single indicator of health care productivity. Approximately one-half of all physician visits by black and poverty level citizens take place in an emergency department. Whether or not one may approve of emergency departments delivering front-line primary care (presumably of an acceptable quality), it is beyond dispute that hospital emergency departments are doing very nicely in providing access, albeit without regionalization.

Efforts at EMS regionalization, in fact, could actually reduce access to front-line primary health care via emer-

gency departments. Already the number of hospitals with emergency departments is declining by 5 percent per year, largely as a result of regionalism-inspired changes in State Hospital Licensing Codes to remove the provision of an emergency service as a condition for hospital licensure.

Further regionalization, (*i.e.*, more resources to regional critical care centers and the rerouting of emergency patients from local (under-utilized) hospitals to regional centers) will certainly produce overwhelming financial pressure on community hospitals to close out their emergency departments. Patients seeking "front-line primary care" at their local emergency department may have to be turned away. National health insurance, if enacted, will likely reduce financial barriers and increase demand but will not increase the capacity of the total health care system to respond to that demand; hence, local emergency departments (because they, uniquely, have no other option) will have to absorb the increased demand for primary health care. To seriously suggest EMS regionalization as a means of increasing access to primary health care is an exercise in either the bizarre or the irresponsible.

4. Transportation

Among the 15 mandatory program requirements of the Emergency Medical Services System Act of 1973, one with clear regionalizing implications is that dealing with ambulance services:

"This component shall include an adequate number of necessary ground, air, and water vehicles and other transportation facilities properly equipped to meet the transportation and EMS characteristics of the system area . . . Such vehicles and facilities must meet appropriate standards relating to location, design, performance and equipment; and the operators and other personnel for such vehicles and facilities must meet appropriate training and experience requirements."

Present ambulance services are characterized by multiple providers, small but over-lapping service areas, separate dispatching and communication systems, and very few runs per vehicle. Many hospitals run their own ambulance service and, while they will transfer patients from the base hospital to a regional facility, most patients are evacuated from the accident scene to the base hospital, whether or not it is clinically the most appropriate. Municipal ambulance services organized through the fire or police departments are usually restricted to city or county boundaries. Being a public service, they are sensitive to local political influences, and often feel compelled to evacuate patients to the *nearest* hospital or at least to observe some informal "quota" system among hospitals if no protocol designating receiving hospitals has been developed. Commercial (for-profit) ambulance firms and volunteer ambulance squads (either free-standing or associated with volunteer fire departments) are also most likely to evacuate to the nearest hospital or to the one requested by the patient or the

patient's family. In sparsely populated areas there are, of course, additional problems of infrequent runs, vast distances, and remote areas without ambulance coverage at all.

Several strategies to improve EMS service include a single access number, central dispatching of vehicles, and communications links among vehicles, dispatch points, and hospitals. In addition, the Emergency Medical Services Systems Act emphasized—and provided money for—ambulance vehicles to meet design and equipment criteria established by the American College of Surgeons, technicians to be given 81-hour emergency medical training, and vehicle locations to permit "(for 95 percent of all calls) a maximum of 10 minutes response time in metropolitan areas (and of 30 minutes . . . in rural areas.)"¹ Beyond these basic ambulance requirements, there are certain specialized technologies which can only be provided, or are best provided, at the regional level: helicopter ambulances, fixed wing ambulance units (for responses beyond a 150-mile radius), water-based and snowmobile units, and certain specialized ambulances for high-risk infants and cardiac patients.

5. Hospital Emergency Facilities and 6. Critical Care Units

Hospital EMS subsystems are being pursued most aggressively under regionalization. Two EMSS program requirements deal with them:

Facilities: "This component shall include an adequate number of easily accessible emergency medical service facilities which are collectively capable of providing services on a continuous (24 hours a day, 7 days a week) basis, which have appropriate standards relating to capacity, location, personnel, and equipment, and which are coordinated with other health care facilities of the system."

Critical Care Facilities: "This component requires providing access (including appropriate transportation) to specialized critical medical care units. These units should be in the number and variety necessary to meet the demands of the service area. If there are no such units in the EMS region, then the system will provide access to units in neighboring areas if feasible in terms of time and distance. Specialized critical medical care units should include trauma intensive care units, burn centers, spinal cord centers, and detoxification centers, coronary care units, high risk infant units, drug overdose and psychiatric centers and others as appropriate. Appropriate transportation means a vehicle equipped and staffed with at least two EMT's or more highly trained personnel to administer to the patient's in-transit needs."

These requirements reflect a concern with three general themes. *First*, hospitals vary greatly in their ability to render high quality emergency care; *second*, many patients are treated in woefully deficient hospital emergency depart-

ments; and *third*, any patients treated in hospital emergency departments for non-urgent conditions should be treated in outpatient clinics.

Thus, a major defect of the present hospital emergency subsystem is inappropriate utilization. The strategy for the future would reduce the current mismatch between resources available and resources clinically needed by re-routing emergency department patients to the most appropriate treatment facility.³ Ambulance systems have been criticized for taking patients not to the most appropriate hospital but to the nearest facility where they may wait up to 30 minutes for the physician on call.⁴ Highly specialized trauma centers at large teaching hospitals are often under-utilized because trauma patients are taken to small, ill-equipped community hospitals instead. Well-staffed and well-equipped large emergency departments often treat fewer critically ill patients than smaller, less adequate emergency rooms.⁵

Generally speaking, these examples fall under two widely accepted generalizations about hospital emergency department utilization: (1) many emergency patients should have been treated at another more appropriate emergency room within the EMS system, (2) while other patients treated in an emergency department should have been treated at a more appropriate facility outside the EMS system altogether.

Regionalization through Categorization: A Further Digression

There are a number of approaches to this matter of inappropriate utilization (24-hour "convenience" clinics, triage systems, designated receiving hospitals, etc.); however, current policy (as expressed in EMS program requirements) stresses "categorization" of hospital emergency capabilities. This approach was first recommended by the American Medical Association as follows:

"Categorization is based on the capabilities to provide effective emergency medical care for those individuals in-house or brought to the hospital with severe or critical injuries or illnesses. The basic purpose of categorization is to identify the readiness and capabilities of the hospital and its entire staff to receive and treat, correctly and expeditiously, emergency patients. Ambulance personnel, law enforcement officers, and other citizens of the area, having advanced knowledge of the designated categories of emergency capabilities of the various hospitals in an area, may thus select the proper institution to which emergent patients should be taken. A dividend of categorization will be achieved by the efforts of the whole community in improvement of the emergency medical services for the citizens of that particular community. A total categorization of hospital capabilities may evolve so that selected hospitals might close emergency departments thus conserving resources and money, and other selected hospitals might expand their capabilities

resulting in total improvement of the area-wide capability for the care of the acute and non-acute patients."⁶

The AMA publication, *Categorization of Hospital Emergency Capabilities*, describes the four categories of hospital emergency services as follows:

Comprehensive Emergency Service: The hospital shall be fully equipped, prepared, and staffed to provide prompt, complete, and advanced medical care for all emergencies including those requiring the most complex and specialized services for adults, infants, and children, including newborn infants. It shall have a capacity adequate to accommodate the direct and referred patient loads of the region served and be capable of providing consultative support to professional personnel of other hospitals and health facilities in the same region.

Major Emergency Service: The hospital shall be equipped, prepared, and staffed in all medical and surgical specialties to render resuscitation and life-support for adults, children and infants, including newborns. It shall also supply definitive care for all such patients except for the occasional patient who requires follow-through care in very specialized units. Transfer may be necessary and shall be under prior agreement with other hospitals.

General Emergency Service: The hospital shall be equipped, prepared, and staffed in the medical and surgical specialties necessary to render resuscitation and life-support care of persons critically ill or injured of all ages. The availability of supplementary specialty services shall be prearranged with non-staff specialists. Transfer of patients for specialty care shall be by prior agreement with other hospitals.

Basic Emergency Service: The hospital shall be equipped, prepared, and adequately staffed to render emergency resuscitation and life-support medical services for patients of all ages. Transfer when necessary shall be under prior agreement with other hospitals.

Given these four categories and the associated criteria and definition of resources necessary for allocating a hospital to a particular category, the AMA and HEW recommended that communities or hospitals themselves should survey and categorize their emergency services. The heroic assumption is that by doing this and announcing the results, inappropriate utilization will be ended. This categorization strategy and methodology is overwhelmingly accepted in this country. Hospital licensing laws in several States have been changed to encourage its adoption. The Joint Commission on Accreditation of Hospitals and the American College of Surgeons are among the many professional associations that have accepted the principle of categorization. Such agencies of the Federal Government as the Department of Transportation and HEW's Bureau of Health Resources Planning and Development and the

Division of EMS are committed to categorization; they either require or financially reward its implementation at the State, county, and community level. EMS health planning activities throughout the Nation are predominantly based on the categorization, both as a strategy for change and as a method for assessing the adequacy of the present EMS system.

Nevertheless, the strategy of categorization suffers from severe planning, conceptual, and methodologic deficiencies. It can no longer be regarded as a reasonable means of either assessing present emergency medical services or changing them for the better. No evidence exists that a single community has changed utilization patterns of hospital emergency departments as a result of categorization.

7. Public Safety Agencies

Returning to the congressionally dictated parameters of EMS systems as outlined in the HEW mandatory program requirements, the one on public safety agencies has only minimal implications for regionalization:

“Provisions must be made for effective utilization of appropriate personnel, facilities, and equipment of each public safety agency in the area. Effective utilization means the integration of public safety agencies into standard EMS and disaster operating procedures of the areawide system.”

8. Consumer Participation

“The EMS system must make provisions in its system management that persons residing in the area and having no professional training or experience may participate in the policy making for the system.”

The several regionalization issues involved here have led to a disparity between regional advisory structures and local operating units (which have responded more to provider than consumer interests).

First, the advisory structure needs to be different from the management authority during the developmental and planning stages of an EMS system.

Second, advisory structures have been independent of local units responsible for planning and delivering health care and, while they have served well in initially reviewing existing fragmented or inadequate services and developing EMS plans, they have frequently been unable to maintain a satisfactory advisory relationship with the governmental unit responsible for the EMS system once it is underway. Indeed, it is not at all clear how compatible local government requirements for administering EMS are with the needs of a strong consumer advisory structure.

Third, consumer advisory structures have been, for the most part, categorically concerned only with EMS and have been much more successful in developing a regional base than have the EMS administrative units they seek to influence. This has created difficulties in integrating EMS

with other health functions and in creating a regional system that moves resources and patients across city and county lines.

Fourth, there has been little agreement as to the balance between consumers and local legislators, voluntary providers (hospital administrators and commercial and volunteer ambulance managers), public sector representatives (county and city hospitals, health departments, police and fire department ambulance personnel), and voluntary organization delegates (American College of Emergency Physicians, American College of Surgeons, Emergency Department Nurses Association, American Red Cross, Civil Defense, American Hospital Association, CHP representatives, and others). They all have varying degrees of commitment to regionalization. There has also been the generic problem as to the appropriate balance between consumer and provider, and layman and expert in planning an EMS system.

9. Accessibility to Care

“The EMS system must provide necessary emergency services to all patients without prior inquiry as to the ability of the patient to pay.”

While this standard may seem self-evident, and already required under the civil rights, Hill-Burton, and hospital licensing regulations, dollar access is not equal across all parts of all EMS systems. Thus, quite apart from the blatant, albeit infrequent, case of commercial ambulances refusing to transport and emergency departments refusing to treat patients who have neither cash nor insurance coverage, financial access has had a profound impact on patient flow patterns, with concurrent regionalizing *and* localizing consequences. Certain volunteer ambulance companies, dependent on membership subscriptions for funding, are sometimes reluctant to transport non-subscribers; but even if their reluctance is overcome, they tend to evacuate a non-subscriber to the nearest hospital rather than that most appropriate. Certain patients requiring intensive or expensive resources (such as burn patients) are likely to be referred to public, county, or city hospitals. That such hospitals are most likely to have a burn unit should be regarded as a clinical coincidence, accidentally produced by fiscal influence rather than good medical practice. Conversely, publicly funded hospitals are increasingly reluctant to be regional referral points for medically indigent out-of-county residents. This is a reaction to fiscally induced prior regionalization. It is ironic that financial barriers probably have a net regionalizing effect, albeit one that will dissipate into more localized and clinically inappropriate patient flow with the advent of national health insurance and equal financial access to emergency care. It is not overly cynical to suggest that, since present “accidental” fiscal regionalization and future localization will primarily affect the medically indigent, there will be little public concern for the issue.

10. Transfer of Patients

"The EMS system shall provide for transfer of patients to facilities and programs which offer such follow-up care and rehabilitation as is necessary to effect the maximum recovery of the patient."

Under the National Highway Safety Act of 1966 the definition of EMS ended at the front door of the hospital emergency department. Subsequently, the definition was broadened to encompass the emergency department itself and inpatient critical care facilities. The current EMS standard includes follow-up and rehabilitation care. But many EMS systems do not provide this continuum of care within the region because the necessary facilities are not present or because patient flow patterns are so localized that appropriate and existing resources are not used.

11. Standardized Patient Recordkeeping

"Each EMS regional system shall provide for a standardized patient recordkeeping system which shall cover the treatment of the patient from initial entry into the system through his discharge from it, and shall be consistent with patient records used in follow-up care and rehabilitation of the patient."

While of importance, this standard by itself does not have major implications for regionalization.

12. Public Information and Education

"The EMS system shall provide programs of public education and information for all people in the area so they know about the system, how to access it, and how to use it properly."

The previous mandatory program requirements imply that regionalization is the pattern of patient flow produced by the structure of the EMS system itself. Yet, much of the present localization is apparently patient-generated; regionalization requires *changes* in patient attitudes as well as in the system. Thus, ambulances often take patients to the hospital specified by the *patient* rather than to the regional center. Referrals and direct admissions to regional centers are often resisted by the patient and his or her family because they are confused about the function of the regional facility. Emergency department patients not arriving by ambulance (this includes non-urgent patients as well as significant proportions of critically ill or injured patients) are, of course, beyond the influence of regional transportation agreements and can be influenced only by public education.

13. Independent Review and Evaluation

"Each EMS system must provide for 1) periodic, comprehensive, and independent review and evaluation

of the extent and quality of the emergency health care services provided in the system service area and 2) submission to the Secretary of the reports of each such review and evaluation."

While this standard calls for descriptions and impact evaluations, the literature assessing regionalization is quite sparse.

14. Disaster Linkage

"The EMS system must have a plan to assure that the system will be capable of providing emergency medical services in the system service area during mass casualties, natural disasters, or national emergencies."

An EMS system is not expected to take over disaster organization from the Red Cross, Civil Defense, or other public safety agencies, but is mandated to provide a medical evacuation and treatment plan with regional transportation to designated emergency facilities.

15. Mutual Aid Agreements

"Each EMS system must provide for the establishment of appropriate arrangements with EMS systems or similar entities serving neighboring areas for the provision of emergency medical services on a reciprocal basis where access to such services would be more appropriate and effective in terms of the services available, time, and distance."

While previous requirements (5, 6, and 9) refer to access by patients to appropriate specialized facilities within a given EMS system service area, this standard primarily calls attention to the need for links with facilities outside an EMS system. Examples are such highly specialized facilities as Spinal Cord Rehabilitation Centers, High-Risk Infant Centers, and Cancer Rehabilitation Centers. These clearly are not found in all or most EMS systems; indeed, many rural systems lack even a trauma or burn center. In such regions, patients have frequently been denied access to external resources due to a long tradition of inter-system patient flow patterns, understandable fears for lowered occupancy rates and face-losing posed by out-of-system transfers, and a lack of appropriate intra-system transportation facilities.

Regionalization Experiences In EMS

To this point, we have painted a broad canvas of localized, fragmented ambulance and hospital facilities as the setting for the regional program requirements of the Emergency Medical Services System Act of 1973. Nothing has been mentioned whether the experiences with regionalization to date provide any basis for a belief in either the

viability or end-results of regionalization. Relevant experiences are available from five Federal EMS Demonstration sites (State of Illinois, State of Arkansas, seven Florida counties, three California counties, and seven Ohio counties) that received \$15 million from DHEW for a three year period, beginning in the summer of 1972, to develop and implement regional EMS strategies. The varying experiences and results from the five sites provide an instructive assessment of regional theory and practice.⁷

State of Arkansas

In Arkansas, the grantee was the Arkansas Health System Foundation, a demonstration and coordinating agency without direct governmental links. A statewide system with inter-regional links was proposed, based on eight EMS districts (coterminous with the eight Economic Development Districts and Comprehensive Health Planning areas). The eight districts were to be administered by AHSF until the Division of Emergency Health Services of the Arkansas State Health Department assumed ongoing responsibility. At the beginning of the demonstration, Arkansas had a very low level of EMS resources. Ambulance services were uncoordinated and dominated by funeral homes and by commercial ambulances with several volunteer units. The State had not developed minimum ambulance equipment or training standards; attendants were frequently untrained, only 10 percent of its vehicles had essential equipment and only 6 percent were connected by radio to hospitals. There were 101 general hospitals in the State, but only 11 had more than 200 beds. Emergency room capability was low: University Hospital in Little Rock was the only Category 1 emergency facility, most of the others were in Category 3 or Category 4. Each of the eight planning districts did have at least one well equipped community hospital with most specialties available. There was also a severe shortage of hospital-based physicians, nurses, and trained EMT's. The demonstration priorities of AHSF were to improve ambulance equipment and staff, complete a radio communications network, and upgrade local hospital emergency facilities. AHSF attempted to do this through a decentralized regional management structure using performance sub-contracts with existing EMS providers. AHSF did not provide direct services but played an administrative managerial role coordinating EMS providers within each of the eight districts to which it gave technical assistance.

To summarize the Arkansas experience, \$3 million over a three-year period, although intended to create a regional EMS system, did not in fact significantly affect regionalization. Ambulances were bought, EMT's trained, and an optional central dispatch system with a single statewide access number was put into place, but these developments had no known effect on where patients were treated and the quality of care they received. Ambulance response time was lowered and perhaps pre-hospital care was more intensive (though not necessarily better). Even though EMS regional councils met regularly, employed full-time project

directors, and dispensed contract money to providers, these councils were unable and unwilling to create a coherent inter-regional system, much less an intra-regional one. The State Health Department, at the conclusion of the Federally-funded demonstration, was financially unwilling and unable to take over responsibility for the entire system. The reasons for this disappointing experience include:

. . . the impoverished environment with regard to EMS resources and trained EMS personnel and the absence of State legislation or regulations for minimum EMS standards;

. . . the fact that a non-State agency (AHSF) developed and implemented the statewide system with little or no input from the State government, CHP, and RMP agencies;

. . . an overly complex internal management process suffered from turnover in leadership;

. . . the AHSF was separated from local EMS providers by eight regional EMS councils.

San Diego

The Federal demonstration activity in southern California consisted of a tri-county (San Diego, Imperial, and Riverside) regionalized EMS system developed by the Health Care Agency of the County of San Diego. Prior to Federal funding, San Diego had already completed significant EMS activities: city policemen were trained to staff the police department city ambulance service, descriptive categorization of hospital emergency capability had taken place, uniform data collection for police ambulances was underway, certain inter-hospital coordination and communication links were in place, and a full-time EMS coordinator and two other professional staff had been hired by the county health department. Imperial and Riverside counties had not developed any regional EMS plan. They also suffered from a sparse population base and a dearth of existing health care resources. The tri-county project proposed to develop certain regional centers (poison control and burn treatment at University Hospital in San Diego) to implement perinatal intensive care transport units, to complete the radio communication system linking the 81 ambulances to hospitals, and to implement advanced EMT training for police officers. However, project goals for Imperial and Riverside counties contained no more detail than the employment of county coordinators through the respective sub-contracting county health departments to develop an EMS plan.

In summary, the San Diego project was relatively successful in completing a radio communication system, in training ambulance and hospital emergency room personnel, in adding resources (particularly specialized transport facilities) to existing regional facilities for burns, poison control, and trauma, and in making ambulance services more locally accessible. Burn and trauma patients, who previously had been referred from Riverside north to San Bernardino, are

now more likely to come south to San Diego. Critically ill patients within the tri-county area probably also are more likely to be referred to San Diego, although the upgrading of some rural hospitals may well have inappropriately localized the previous regionalized flow patterns. By and large, EMS system implementation in Imperial and Riverside counties was much less impressive, partly a reflection of the uneasy subcontractual relationship with San Diego.

Despite initial internal management difficulties and high turnover among senior project staff, the probability is high that the three counties will maintain the system after Federal funding ends and do so out of general revenue funds, but at a much lower level of expenditure. It is uncertain whether the tri-county system or three separate county systems will be retained. However, some system will be retained and this is due to the fact that local governmental units were the grantees.

Southeast Ohio

The Federal grantee in Southeast Ohio was the Ohio Valley Health Services Foundation (OVHSF), the CHP "b" agency for seven rural counties. The seven counties are hilly and economically depressed. Five of the counties have one hospital each, one has none, and the remaining county has two. The situation prior to Federal funding was marked with severe deficiencies. Ambulances were, in the main, operated by funeral directors; none had radio communications or met Federal design or equipment standards. Only 5 percent of ambulance attendants had received even basic training.

Recent State legislation setting minimum ambulance standards had caused 32 funeral services (80 percent of all area ambulances) to decide to discontinue operations. This precipitous gap in ambulance services was seized enthusiastically by OVHSF as an opportunity to organize ambulances *de nouveau* on a regional basis. Thus, the acquisition of 32 ambulances and the training of 450 EMT's was proposed.

In addition, the area suffered from a severe physician shortage and OVHSF proposed to subsidize local hospitals so that 15 physicians and para-professionals could be employed to provide 24-hour hospital emergency department coverage. The remaining ingredient of the regional system proposed by OVHSF was an advanced communication system to link consumers with a central dispatch center and educational services for providers and consumers.

The Southeast Ohio system created a complex and expensive communications system, purchased and operated several ambulances, trained ambulance attendants, and subsidized some hospitals to employ additional physicians. Thus, an independent corporation, without governmental links, directly provided ambulance services. This put it into a competitive stance with the remaining volunteer and commercial ambulances who reacted bitterly at what they saw as publicly subsidized competition. The political con-

sequences of this have made it extremely unlikely that the local county governments will be willing to maintain the system after Federal funding has ended. In any event, OVHSF was not able to achieve financial self-sufficiency for its ambulance system while the seven county governments were financially unable (even if they had been willing) to support the system. This attempt at regionalization through the direct provision of ambulance services in response to a sudden drop in existing services had, in fact, no known impact either on patient utilization patterns or on mortality or morbidity outcomes.

Jacksonville, Florida

The demonstration project in Florida was developed by the Office of the Mayor, Jacksonville. The proposal was to extend an already well-advanced EMS (and particularly pre-hospital) system in the Jacksonville/Duval County area to the adjacent seven-county rural area. The aim was to expand a centralized metropolitan system centered around a major medical complex and a county-wide ambulance monopoly run by the fire department into the economically depressed surrounding rural counties. Although each contiguous county had one community hospital, they were not staffed on a 24-hour basis, no single ambulance service met training, design, or equipment standards, and they lacked a uniform communications system. The project goal was to coordinate the rural areas with the Jacksonville system by improving local patient access, providing effective stabilization at the accident scene, offering better emergency care at the community hospital level, and evacuating patients to the Jacksonville major medical center where appropriate definitive care was available. Thus, the objectives focused on better rural ambulance care, training of rural ambulance attendants, a uniform communications system, and transfer protocols from the rural areas to Jacksonville. A highly centralized project management team—with little CHP, RMP, or other external input—would work through local county management committees but (unlike Arkansas and San Diego) not by means of reimbursable sub-contractual relationships.

In summary, the Jacksonville system used a strong centralized leadership, operating from a firm local and regional political base; they upgraded rural ambulances, hospital, and communications capacity to implement an impressive regional system. Strong public and political support throughout the region has enabled local (Jacksonville) money to replace the Federal demonstration grant.

Illinois

The Illinois EMS system is widely regarded as the most successful regionalized structure currently in operation. The Federally funded demonstration activity was supposed to expand an existing statewide system of regional trauma centers into a comprehensive EMS system. The demonstra-

tion plan was prepared by the Division of Emergency Medical Services of the Illinois Department of Public Health with strong support of the Governor and the CHP "a" agency. The Illinois Trauma Care Plan was initiated in 1971, by a special message on health care by Governor, Richard B. Ogilvie. It should be noted that the Illinois regional EMS system was funded not only by the Federal demonstration contract but also by grants from the U.S. Department of Transportation. The demonstration activities centered upon plans for categorized hospital and trauma centers, integrated communications, improved and coordinated transportation, and continuing training for health personnel.

Hospitals and Trauma Centers: Forty areawide trauma planning regions were designated; in the main, they corresponded to CHP "b" agency areas. For each, an EMS Council was established of EMS providers and community leaders, and subcommittees for categorization, communications, transportation, training, public education, and evaluation. Each council was responsible for the planning and coordination of all EMS activities within its area. The designation of a hospital, within each of the regions, as a trauma center was a decision the Illinois Department of Public Health Division of Emergency Medical Services left to the local CHP "b" agency. That agency, in turn, consulted extensively with the medical societies, medical and administrative staffs of local hospitals, public officials, and local specialty organizations. In general, the concept and particular designation of a trauma center was initially and subsequently well accepted since (unlike other emergency diagnoses) the critically injured trauma victim is easily identified and has clinical needs manifestly beyond the fiscal and medical capacity of the average local hospital.

The trauma centers themselves are placed into one of three categories. *Local trauma centers* carry on basic resuscitation and life support. There is always a nurse on duty in the emergency room and an emergency physician at all times within the hospital. Highly specialized services are not available and the emphasis is upon resuscitation and stabilization prior to evacuation (mainly by helicopter and fixed wing aircraft) to a more advanced center. There are 19 local trauma centers, mainly in rural areas, each covering an area with a 50-mile radius. *Areawide trauma centers* have 24-hour staffing in the emergency department and associated critical care facilities by highly specialized personnel performing resuscitation and definitive care for all injured patients. Such centers maintain operating rooms, intensive care units, laboratory services, blood banks, resuscitation equipment, and x-ray facilities (including arteriography). A trauma director is present at each center, usually a practicing general surgeon experienced and skilled in initial care and triage. Specialty consultants are available (or on call) at all times. Ten areawide trauma centers are based in general community hospitals, each with about 500 beds and located in communities with populations over 50,000. *Regional trauma centers* are based in university-affiliated medical complexes. They provide highly special-

ized care, educational support, and coordination for the statewide system. They are the focal points for professional and para-professional training, regional transportation networks, communication systems, data controls, and clinical and epidemiological investigations. Within the 10 regional centers there are three special statewide regional centers: the Midwest Regional Spinal Cord Injury Center, the Children's Memorial Hospital Trauma Center (both at Northwestern University), and the Central Nervous System Trauma Study Center (at the University of Chicago). It is important to note that patients are retained at the local center unless the primary physician at the local center determines the need for—and authorizes and initiates transfer to—an areawide or regional center.

Communications: Even though most hospitals and ambulances have a radio communications capability, Illinois does not have a standardized statewide system. Nearly 600 radio sets were purchased or modified using DHEW demonstration funds and U.S. Department of Transportation (DOT) grants. Most of the State is covered either by telephone reporting or two-way radios. Several areas have a 911 system, but the multiplicity of independent (non-Bell) telephone companies and the alleged high cost (to the Bell system) in equipment modification has prevented its implementation in other areas. In Chicago, despite the \$3 million demonstration grant between 1972-1975 and a further \$1.5 million under Section 1204 of the Emergency Medical Services Systems Act for the period 1975-1976 (both of which were contingent upon the introduction of a single access number and central dispatching) agreement has not been reached among the fire, police, and health departments of the same jurisdiction on the acceptability of a 911 system. Even in the down-state areas, the seven newly established regional communication centers with radio and phone-patch linkages with hospitals and ambulances are coordinating rather than command and control centers. They monitor and facilitate ambulance calls and hospital transfers initiated by local centers and do not themselves determine patient flow patterns.

It appears that in Illinois, the hospital facilities subsystem itself has changed such utilization patterns. In Illinois, and other demonstration sites, the independent impact of the communications subsystem in regionalizing flow patterns appears to be negligible. Indeed, without the regionalizing influence of the hospital subsystem, it seems likely (and this seems to have happened at the remaining four demonstration sites) that the communications system, by making regional medical consultation available by radio to local levels, would have had a deregionalizing impact on flow patterns by strengthening local use. This would have been (and in the other sites it was) even further reinforced by other subsystems making substantial resources available at the local level.

Transportation: Similarly, the Illinois transportation approach supports regional utilization by hospital facilities and trauma centers. Indeed, the local trauma coordinator

directs both subsystems (transportation and facilities) at the area level. This coordinator is responsible for both the local (primary response) ambulance system and the regional (secondary response) system.

Soon after the trauma centers had been designated, trauma coordinators worked with the political and medical authorities within their region to evaluate existing ambulance services, to determine needed improvements, and even to help write DOT grant applications for new ambulances. This resulted in more adequate ambulances on the local level and, more important, medical-political acceptance of the regional trauma system and of its local coordinator as a locally responsive representative.

The secondary ambulance response system was developed to facilitate patient transfers from local to regional trauma centers and to make available intensive care and stabilization enroute. Thus, six Overland Critical Care Vans were purchased and equipped to render specialized intensive care for trauma, cardiac, and high-risk neonate patients en route to more sophisticated centers. The vans will be stationed at the regional trauma centers; the first one has been leased to the Children's Hospital in Chicago.

The major ingredient in regional transfers, however, is air evacuation. Helicopter evacuation by the Chicago Fire Department and Illinois State Police units average 200 missions each year in transferring patients from local hospitals to regional trauma centers, each of which has a heliport. Fixed-wing evacuation (for distances over 200 miles) is provided by cooperative arrangements with the Illinois National Guard and Federal military installations. Each year, for instance, about 50 fixed-wing evacuations take place from southern Illinois to the special regional spinal cord injury and pediatric trauma centers in Chicago. This secondary response system is coordinated at the area level by the trauma coordinator who activates the system only after the local physician has spoken with the regional center physician and both physicians agree that the transfer is indicated.

Training: Illinois has not only provided a high level of training for ambulance personnel, physicians, and nurses but has also been innovative in developing and demonstrating new EMS manpower roles. Between 1972 and 1974, some 6,500 ambulance attendants were trained to the EMT advanced level through the 81-hour DOT curriculum; 5,000 nurses have been trained in 2-day specialty seminars and 358 nurses graduated from 4-week courses in trauma and critical care. The Trauma Nurse Specialist has been developed as an expanded role in trauma both in patient care and clinical assessment and in training emergency department nurses in their local areas. The Trauma Coordinators were selected from among persons with administrative, teaching, and clinical training and experience with the Armed Forces Medical Corps, with particular skills in management, evacuation, and follow-up care with the military wounded. Each Trauma Coordinator is based at a regional trauma center and works under the direct supervision of the center's staff trauma surgeon.

Residency programs in emergency medicine have been established at three of the regional trauma centers.

Public Information and Evaluation: The Division of Emergency Medical Services has carried on important legislative lobbying, regional publicity seminars, and other public relations activities to support areawide planning. Each EMS area council had a public education committee with corresponding duties. Southern Illinois University, under contract to the Division, conducted a household survey of EMS expectations, knowledge, experience, and satisfaction. Continuing media campaigns will address EMS deficiencies.

Management: Standard evaluation data forms were designed for dispatchers, ambulances, emergency departments, and mobile intensive care units. These were very successful in trauma centers and hospitals and related transportation facilities, but met with little success outside the EMS system. "Death tracer" studies were conducted, transportation models were developed to measure ambulance response times, and a trauma registry recorded demographic, epidemiologic, clinical, and health care delivery data on the ambulance, emergency department, and definitive care phases of treatment for each trauma patient. This registry is two-way, operational, and on-line at trauma centers.

The Illinois EMS system was aggressively and well managed out of the Division of Emergency Medical Services. The State EMS Director was a charismatic surgeon with personal and political support from the Governor. His frenetic and, at times, abrasive zeal was impressively backed by a central and regional staff with a high level of political, program, and administrative sophistication. These personal characteristics of the EMS Director are mentioned because, in a very large measure, the creation and initial operation of the Illinois system is attributable to his enthusiasm and charisma. Since his departure to head up the Federal implementation of the EMSS Act and the departure of his senior staff, it has become apparent that the management structure and personnel needed to create an EMS system are different from that required to routinize and institutionalize EMS as an on-going program within the health department without massive Federal funding.

REGIONALIZATION AND EMS IMPACTS

Did the \$200 million spent by DHEW between 1972 and 1976, and the \$15 million spent by the Robert Wood Johnson Foundation to regionalize EMS make a difference in where and how patients are treated and in mortality or morbidity outcomes? No published studies describe the impact of regionalization upon how and where patients are treated or compare pre and post-regionalization situations. Boyd *et al* report on an 18-month pre-regionalization and a two-year post-regionalization period in Central Illinois.⁸ This region contains 14 counties and 17 general hospitals, four of which were designated as trauma centers:

Lincoln, Jacksonville, and Litchfield (local trauma centers) and St. Johns Hospital in Springfield (a regional trauma center). Table 1 presents the data of the original article, which compared the January-June 1971 (pre-regionalization) and January-June 1973 (full regionalization) periods and reported a 29 percent decrease in vehicular deaths, a 17 percent increase in the number of accidents, a 1 percent decrease in the number of persons injured, and a 28 percent decrease in the death/injury ratio. The article characterizes these changes as "significant and remarkable," on the basis of which "it appears that significant decreases in deaths from vehicular causes have occurred in (the) region . . . over the first 2-year period of the Illinois trauma program. These . . . indicate that a significant impact may result from a trauma center approach due to a redirection of relatively small numbers of the most critically injured patients within a region to designated trauma hospitals."

The data in Table 1 shows that the periods chosen arbitrarily in the original article may give a serious overestimate of the impact of the trauma system. Thus, if we compare the entire 18-month pre-intervention period with the entire 18-month *post*-intervention period, deaths decreased by 17 percent (*vs.* 29 percent in the original arti-

cle), accidents increased by 9 percent (*vs.* 17 percent), injuries decreased by 5 percent (*vs.* 1 percent), and there was a 12 percent decrease in the injury-to-death ratio (*vs.* 68 percent). In addition, the time series seems to be unstable, not to have a linear trend, and to show that the mortality reduction began before the intervention and perhaps was independent of it.

The same article⁸ also presents interesting cross-sectional data on differences observed for 1,132 abdominal injury patients treated July 1971-July 1973 at the regional, area-wide, and local trauma centers (excluding Cook County Hospital Trauma Unit). These are summarized in Table 2.

Most patients were treated at local centers but most *transfer* patients were treated at regional centers. Care at regional centers was much more expensive, intensive, and lengthier than at other hospitals. Survival rates were lower at regional centers than elsewhere. The original article sees this as a measure of the severity of patient injury and not of center effectiveness. Since there are no measures of severity, the survival rates are probably a mixture of input and output in unknown proportions. The Illinois data suggests that: (1) the introduction of regionalization of trauma care may have been associated with a 17 percent mortality reduction; (2) regional care is costlier and lengthier than non-regional care; and (3) fewer patients survive their encounter with regional than with non-regional care.

The Jacksonville, Florida EMS system has similar data on highway deaths and deaths-to-injuries ratios for periods before and after the 1972 regionalization effort and for the entire State as a control group and the entire demonstration site as the experimental group. *Table 3* presents the relevant data for the demonstration site (broken out between the seven rural counties and Duval/Jacksonville county) and for the State of Florida for 1968 *vs.* 1971 (pre-regionalization) and 1971 *vs.* 1973 (post-regionalization).^{9, 10} Deaths increased between 1971 and 1973 by 22 percent in the entire 8-county area (16 percent in the seven rural counties *vs.* 26 percent in Duval), compared with an increase of only 12 percent for the State as a whole. Deaths per 100 injuries (the ratio that Illinois and Florida considered the most sensitive⁹ measure of improved outcomes attributable to regionalized EMS) had a combined 20 percent *increase*—from 1.62 in 1971 to 1.94 in 1973 for the demonstration site.

During the same time period, the ratio of deaths per 100 injuries *declined* by 1 percent for the entire State. Although some of these data were originally published by Waters and Wells under the title, "The Effects of a Modern Emergency Medical Care System in Reducing (*sic*) Automobile Crash Deaths," they appear to indicate a 22 percent *increase* in automobile crash deaths and a 22 percent *increase* in the death-to-injury ratio in the regionalized county EMS systems in 1972, in contrast to a mere 12 percent increase in deaths and an actual 1 percent decrease in the death-to-injury ratio over the same 1971-1973 period for the rest of the State (which did *not* undergo regionalization).¹⁰ Although comparable data are not

Table 1. Highway Accidents, Deaths, Injuries, and Deaths per 100 Injuries, January 1970 - June 1973, Central Illinois

	Total Highway Accidents	Deaths	Injuries	Deaths per 100 Injuries
<i>Pre-Regionalization:</i>				
Jan-June 1970	6,800*	76	3,454	2.2
July-Dec 1970	7,374	117	4,030	2.9
Jan-June 1971	6,085	73	2,922	2.5
<i>Beginning of Regionalization:</i>				
July-Dec 1971	7,500	101	4,040	2.5
<i>Full Regionalization:</i>				
Jan-June 1972	7,400	69	3,450	2.0
July-Dec 1972	7,611	101	3,483	2.9
Jan-June 1973	7,115	52	2,959	1.8

* estimated from bar chart in Ref: 8

Table 2. Admissions, Transfers, Survival, Hospital Charges, and Length of Stay for 1,132 Abdominal Injury Patients Treated at Illinois Regional, Areawide, and Local Trauma Centers* July 1971 - June 1973

	Trauma Center		
	Regional	Areawide	Local
Direct admissions	298	342	393
Transfer admissions	51	22	7
Percent of direct admissions surviving ...	93.3	97.1	97.2
Percent of transfer admissions surviving .	78.4	86.4	100.0
Average hospital charges** per day	\$153.68	\$142.34	\$103.42
Average length of stay in days	14.8	9.8	7.0

* Excluding Cook County Hospital Trauma Unit

** Excluding Physician Charges

Table 3. Highway Accidents, Deaths, Injuries, and Deaths per 100 Injuries for Florida Federal Demonstration Counties and the State of Florida 1968-1973

	Federal Demonstration Counties		
	7 Counties	Duval	State of Florida
Pre-Regionalization:			
1968			
Highway Accidents	2,841	15,846	n/a
Deaths	85	131	2,169
Injuries	1,741	8,669	115,372
Deaths per 100 Injuries	4.88	1.51	1.88
1971			
Highway Accidents	3,710	19,776	n/a
Deaths	88	120	2,394
Injuries	2,266	10,532	145,091
Deaths per 100 Injuries	3.88	1.14	1.65
Post-Regionalization:			
1973			
Highway Accidents	5,211	22,674	n/a
Deaths	102	151	2,683
Injuries	2,812	10,219	164,601
Deaths per 100 Injuries	3.63	1.48	1.63
1971/1973 Percent Change:			
Highway Accidents	40%	15%	n/a
Deaths	16%	26%	12%
Injuries	24%	-3%	13%
Deaths per 100 Injuries	-6%	30%	-1%

Source: References 9, 10

available for the seven rural counties and the State, the 1974 data for Duval/Jacksonville shows a continuing increase in the death-to-injury ratio: in 1974 there were 1.61 deaths (compared with 1.48 in 1973 and 1.14 in 1971) per 100 injuries. (It will be recalled that the Illinois data for one region showed a 17 percent decrease in deaths and a 12 percent decrease in the deaths-to-injuries ratio over the same period, although no comparisons were possible with the entire State as a control group.) The expenditure of over \$3 million in the 8-county Florida regionalization demonstration appears to be associated with an increase of 7 highway deaths each year and a 20 percent increase in the probability of deaths for the injured, as compared with what would have happened (on the basis of statewide Florida trends) without such expenditures and regionalization. While there can be disagreements about cash values to be assigned to deaths,

Table 4. Selected Pre- and Post-Regionalization Characteristics, Duval County, Florida, 1971 and 1973

	Pre-Regionalization 1971	Post-Regionalization 1973	% Change
Highway Deaths	120	151	26
Deaths per 100 Injuries	1.14	1.48	30
Mean number of minutes between highway accident and ambulance dispatched	9.4	8.0	-15
Mean number of minutes between ambulance dispatched and arrival at scene	7.4	7.3	- 1

\$142,857 per year increased death seems excessive even by Department of Defense standards, let alone those of DHEW. Table 4 shows that these expenditures do, however, seem to have enabled ambulances to get to the scene of the highway accident sooner and presumably at a higher rate of speed (an average 1/10 of a second sooner).

Regionalization of EMS does not seem to have had a well documented capacity to reduce mortality. Indeed, perhaps the major lesson of the Federal demonstration activities (\$15 million) under the EMSS Act (\$185 million) and of the Robert Wood Johnson Foundation EMS initiative (\$15 million) is that regionalization is rather different from (and more difficult than) buying more ambulances and radios and training personnel. Regionalization depends upon a centralized political structure and a rigid governmental style that is—one would hope—still alien and unacceptable to the American ideals of competition and heterogeneity. But without such a structure and style, regionalization remains unattainable. More ambulances at higher speeds and more electronic gadgetry do not seem basic to attaining EMS regionalization. On the whole, \$215 million seems a somewhat excessive price to have paid to learn that lesson.

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