

UNIVERSITY OF DELAWARE
DISASTER RESEARCH CENTER

PRELIMINARY PAPER #46

DELIVERY OF EMERGENCY MEDICAL
SERVICES IN DISASTERS*

E. L. Quarantelli
Verta A. Taylor
Kathleen J. Tierney

*This study was primarily supported by Public Health Service Grant
R0101781-01 and 02 from the National Center for Health Service Research,
Health Resources Administration, Department of Health, Education and
Welfare.

1977

Prior to the last decade, there was very little involvement by federal, state and local governmental agencies as regulators or providers of emergency medical care on a day-to-day basis and even less interest in developing and improving plans to provide emergency medical services (EMS) in disaster contexts. However, a change began in 1966 with the National Academy of Sciences report, Accidental Death and Disability: The Neglected Disease of Modern Society and the passage of the Highway Safety Act. These events, together with a Presidential decision to put health care dollars into fighting heart disease and strokes, spurred the passage in 1973 of the Emergency Medical Services System Act. By promoting and funding the development of comprehensive coordinated regional systems, the EMS Act offered a design to organize a community's health facilities and resources into a system aimed at insuring that essential emergency health services would be available to all persons in the system's service area and that unnecessary duplication would be avoided.

The 1973 Act mandates that one of the 15 functions to be performed by every EMS system is coordinated disaster planning. Implicit in the legislation is the assumption that everyday EMS systems will be the basis for the provision of EMS in extraordinary mass emergencies or, in the language of the act, during "mass casualties, natural disasters or national emergencies." Policy interpretations of the Act specified that the EMS system must have links to local, regional and state disaster plans and must participate in bi-annual disaster plan exercises. Thus, the newly established EMS systems have been faced with both planning for, as well as providing services in, large-scale disasters.

These recent trends in the EMS area converged with the post World War II everincreasing research and policy interest in social and behavioral aspects of disasters. The oldest and major organization in the United States involved in such research has been the Disaster Research Center (DRC). Since its formation in 1963, the Center has conducted over 350 field studies on the response of groups and organizations to community-wide emergencies; in particular, natural and technological disasters.

Although earlier DRC research focused on a variety of emergency groups, such as fire and police departments, civil defense offices and the Red Cross, hospitals and other EMS deliverers were also examined as a part of the overall community response. In 1970, the Center began to concentrate its research more directly on hospitals through a study of disaster preparations in 15 American communities known to be vulnerable to different kinds of natural catastrophes. A major finding from these earlier studies was that, in mass casualty situations, the internal workings of a hospital could not be fully understood without taking into account the larger social context which affected its response. At the same time that DRC was launching these hospital studies, a thorough survey of the medical area literature on EMS disasters and mass casualty situations was undertaken. Despite the fact that the providing of emergency medical care is an essential aspect of most major disasters, there had not been a single study of any EMS system response as a system in any disaster. Thus, despite a burgeoning EMS literature, there are no descriptive or analytical reports on how major providers of EMS respond collectively in disasters.

Research Objectives

Using its earlier work as an initial base for developing a research design, DRC in 1975 began a systematic and comparative study of the delivery of EMS in relatively large-scale, sudden mass casualty-producing situations in the United States, as well as more limited studies on pre-planned events with high mass casualty potentials and on the disaster EMS planning and everyday operations in some disaster-prone communities.

The research focused on three areas: (1) We examined the characteristics of disaster-related EMS delivery to discover the relevant features and patterns of the medical and supporting services delivered in mass emergencies. What, where, why, for whom and by whom are EMS provided in times of disasters? (2) We set out to

the kinds of pre-and post-disaster conditions which affected disaster EMS. Our aim was to identify the general factors or circumstances, internal and/or external to the EMS sector, which could account for what happened in planning for and providing disaster EMS. (3) We wanted to determine the consequences of involvement in mass emergencies for health systems' planning and operations.

Conceptual and Theoretical Framework

Since the overall task of providing EMS in disaster situations requires the coordinated work of many organizations, groups and individuals, our research initially assumed that the delivery of emergency medical care in mass casualty events could be viewed as the response of an open system. According to this perspective, all groups involved in the various phases of victim care in disasters are seen as interfacing and acting in a more or less integrated fashion to deliver EMS. System imagery was used, not only because it was congruent with thinking in the EMS area itself, but also because it was the most useful conceptual framework through which to analyze the overall structure and functioning of the EMS complex as a whole in disaster situations. The open system perspective was not used to generate specific hypotheses which could be empirically denied or supported, but rather served as a guide or framework to indicate what should be focused on in our data gathering to identify the conditional variables or dimensions which might be important in describing and explaining the observed characteristics of EMS planning and response in mass emergencies.

The key to the open systems approach lies in the specific types of concepts and processes it uses to describe and analyze the behavior of systems. An open system is set of social units performing tasks in a more or less integrated fashion.

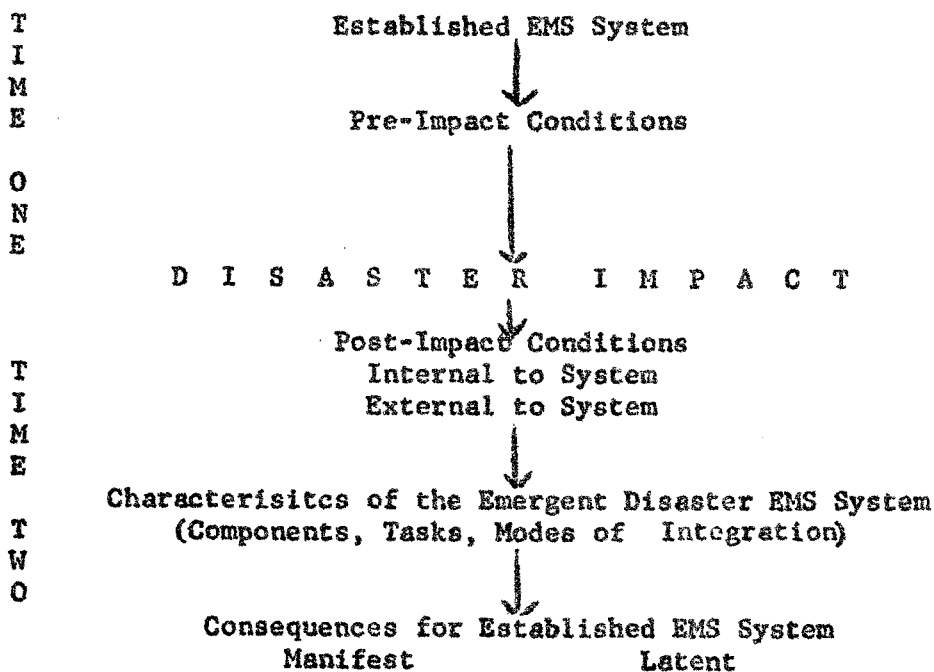
In employing this perspective to describe the characteristics of the social system which provided EMS care in the disasters studied, we used three concepts: components, task areas; and modes of integration. Components are the parts or sub-units involved in the delivery of EMS; that is, the organizations or groups comprising the system. Task areas specify what is done for whom. The delivery of EMS in disasters can be best understood as involving a number of separate but interrelated sub-tasks which together comprise the complex core of activities involved in rendering emergency medical care. These major sub-tasks are search and rescue, transportation and treatment. These activities can be performed by a number of organizations and groups which may or may not be formally designated components of the established or day-to-day (Time One) system for providing EMS. To describe the characteristics of the emergent or new (Time Two) social system which comes into being to respond to a particular mass casualty event means identifying the social units which carried out the major sub-tasks involved in the overall task of providing disaster EMS.

Modes of integration refers to the relationship between the component parts, the degrees of interdependence or coordination exercised by the set of system components interacting to provide emergency medical care. The control and communication structures of any social system may be informal or formal and they can vary to the extent to which they produce a centralized or decentralized response in the course of the system's carrying out its overall tasks. Thus, to describe the characteristics of the disaster EMS systems studied, we sought to determine the nature and extent of the integration established between the components comprising the responding EMS system. Earlier findings suggested that the EMS system which responds in times of disaster need not necessarily be the same system as the one which provides EMS care on a day-to-day basis. Thus, we hypothesized that an emergent system, i.e., a social system with new and different components interacting, would come into being to provide medical care to disaster victims. Therefore, establishing what set of components constituted the system that carried out the overall task of disaster EMS and how they were integrated with one another was an empirical problem examined in each disaster studied.

Use of the open system perspective entails the assumption that EMS systems are subject to influence by external as well as internal factors. As such, explanations of the functioning and dynamics of a system are sought primarily in the environment or social context in which the integrated group or organization operates. Since a disaster has the potential of significantly altering both internal system processes and the external environmental factors impinging on the system, the conditions or factors which account for the kind of EMS system which emerges in any mass casualty situation can be seen originating either from within or outside the boundaries of the normal everyday EMS system. The EMS system which evolves to provide disaster services can be viewed as being the result of both: 1) pre-impact internal conditions, i.e., factors which preceded the disaster, such as previous disaster experience, system resources, existing interorganizational relationships, etc; and 2) post-impact conditions which become operative as a direct result of the disaster event, such as the length of the warning period, adequacy of information about the nature and extent of casualties, the number of disaster sites, etc.

Finally, the consequences or the delivery of EMS in a mass casualty incident were examined to determine whether or not the established EMS system was in any way affected as a result of having experienced a disaster. More specifically, our study sought ascertain whether there were any: (1) manifest effects, i.e., consequences, directly related to the preparation for and response to other mass casualty events; or (2) latent effects, i.e., consequences for other system characteristics or processes not directly related to disaster preparation or response, such as changes in the relationships between system components.

To summarize, the conceptual framework which guided the data gathering and analysis can be graphically depicted as follows:



Data Gathering and Analysis

Since our research objective was to arrive at generalizations about EMS in disasters, we examined a large number and wide variety of cases, with some variability in both disaster agent and EMS system characteristics. Since almost every actual mass casualty incident involving more than several dozen victims was studied in a 22-month period, the difficulties inherent in sampling events were avoided. Of the 29 actual mass casualty events studied, 11 involved natural and 18 technological disasters.

In addition, there were five on-the-spot studies of potential high mass casualty pre-planned events, and information was also obtained on EMS disaster planning and normal EMS operations in six disaster prone communities. In all, field work was done in 44 communities spanning 17 states, Washington, D.C., and the Virgin Islands. Research covered localities from small towns to metropolitan areas, and caught communities in the full range of EMS development from those with only the most rudimentary capabilities to those with complex and well-established EMS systems.

Data was gathered by means of in-depth, semi-structured interviews with key personnel representing all groups involved in any aspect of disaster EMS planning and operations. Comparability of interview data was ensured by asking similar questions of certain job incumbents in every event studied and by using checklists to insure that the same documentary material and statistical information was obtained for disaster and normal EMS operations. Field work took place in about 200 hospitals and in at least an equal number of other groups. Approximately 600 formal tape-recorded interviews were conducted and perhaps twice as many informal contacts were made with personnel of emergency organizations. Extensive documentary data, such as disaster plans, afteraction reports, emergency department logs, medical statistics, etc. were obtained.

Since routine EMS record keeping is non-uniform and uneven in quality and since record keeping is typically neglected or suspended in disasters, little comparable reliable quantitative data exists. Therefore, observational data obtained on-site by DRC field workers became invaluable for obtaining primary data, for assessing the reliability and validity of data obtained by other means, and for gathering information about the reality as opposed to the ideal of EMS delivery in high demand situations. Hours were spent in direct field observations.

All of the various data collected were coded and then analyzed both qualitatively and quantitatively in terms of the basic theoretical dimensions of the study. The research findings set forth in the next section were derived from a highly systematic analysis of 24 of the actual disaster events. In addition, EMS delivery in disaster-prone communities and pre-planned high mass casualty events were analyzed comparatively to isolate what distinguishes EMS planning and response in these situations from that occurring in actual disaster events. Also examined were special topics such as the effects of the EMS law on disaster-related delivery systems, problems of needs assessment in EMS delivery systems, EMS disaster coordination associated with the distribution of victims, jurisdictional difficulties in providing disaster EMS, and the impact of different EMS configurations on disaster responses.

Findings

A. Characteristics of Emergent Disaster EMS Systems

In a majority of the events studied, the emergent disaster EMS system was not the same as the formally designated or established EMS system.

DISASTER TASKS: Search and Rescue. There is a widespread tendency for search and rescue (SR) activities to be performed by groups and individuals outside the everyday established EMS system. In 17 out of 27 separate disaster sites where SR activities were analyzed, fire personnel performed the majority of the SR. Police and volunteers were next most likely to carry out SR, with ambulance personnel participating in only three of the cases. In fewer than half of the cases studied did SR occur according to any pre-designated plan.

Transportation. Transporters are about equally likely to be notified of a disaster by police, by fire dispatchers, or by EMS dispatchers. The median response time for all disaster events studied was approximately 4.5 minutes, and response time did not appear to vary according to the source of official notification. In only about half of the instances studied did the transportation response occur according to any pre-designated formal plan or directive. Rather, both ambulance and other volunteer and

unofficial transporters converged on the scene often in an unsystematic and uncoordinated fashion. This frequently resulted in both serious problems in maintaining site security, as well as in the less seriously injured patients being transported before those who were more seriously injured. In addition, in only about one-third of the cases was patient distribution to hospitals done according to some overall plan or directive; rather, transporters were most likely to drop patients at the hospital closest to the event. Transporting agencies were only slightly more likely to be public rather than private agencies, with only about half of the public agencies using actual ambulances. In most events studied, transporters tended to be based within the local impacted community, but in large-scale events receiving considerable media coverage, there was a greater probability that both volunteer and formal transporters from other political jurisdictions outside the impacted community would become involved. These kinds of situations resulted in an even greater lack of coordination in the overall transportation response.

Treatment. There was a greater tendency to transport victims to hospital facilities immediately rather than to triage and stabilize them at the disaster site. Some form of on-site triage occurred in only about half the cases examined, with only half of these being done according to some pre-designated plan. Even then, it was extremely rare that medically trained personnel exercised authority over on-site triage, since site control, when it did occur, was most often carried on by either fire, police or sheriff department personnel in that order. The great majority of disaster victims were treated in hospitals, even though first-aid services were all that was required by most victims in some disasters studied. Transporting of these "walking wounded" frequently produced unnecessary demands on hospital facilities at the time they were attempting to treat injuries requiring more immediate attention. In only half of the events studied were actual first aid centers established, and these were more likely to emerge following diffuse natural disasters (as floods or tornadoes) and were as likely to be set up for shelter or public relations reasons as for medical use.

SYSTEM COMPONENTS INVOLVEMENT. Hospitals. Because in the great majority of disasters there was a marked underutilization of available hospitals from the established EMS system, fewer hospitals were part of the actual responding disaster EMS system than would be the case on an everyday basis. Underutilization of available system components was also associated with an unequal distribution of patients between those few system hospitals involved in the response; in the majority of these instances over half of the casualties ended up clustered in one hospital.

Others. New groups and organizations, not ordinarily a part of the established EMS system, became involved in responding to mass casualty events. About half of the first responders carrying out SR and transportation activities were not a part of the ongoing established EMS system. Likewise, coordinating components that assumed control over patient-related care and distribution at the site were more likely to be safety personnel than medically trained EMS groups or individuals.

These two general patterns in system components - i.e., involvement of new groups in disaster EMS and the lack of participation of established EMS components - produce system configurations in Time Two or disaster EMS systems which sharply differ from those of Time One or established EMS systems. The components are different.

MODES OF INTEGRATION. Centrally coordinated EMS responses, where all EMS subtasks are coordinated by some single unit, were rare in the mass emergencies studied. Such responses were especially unlikely to occur in large metropolitan communities, in instances where the disaster incident was quickly and widely focused on by the news media, and in localities where previous interorganizational expertise was scarce. Where a coordinated response was found, the more typical pattern was a network, rather than a system response. This mode of system integration is characterized by some degree of communication linkage between rescue units, transporters and treatment components and by some communication between components within the same EMS subtask area.

However, there is no control structure or unit which has the authority and responsibility to coordinate rescue, transportation and treatment organizations. In about half of the cases studied there was no evidence of any control or communication structure functioning to organize and coordinate the overall disaster EMS response. Not only was there typically no central component which coordinated the activities of the system components performing the major EMS subtasks, but there was little authority exercised to coordinate the activities of organizations performing the same subtasks. In one-half of the events examined, no authority was exercised at all at the disaster site, and in only about one-third of the events was there any overall coordination of the distribution of casualties. In fact, in half of the cases studied, there was very little evidence of the coordination of any organization by another organization.

The use of communication to achieve coordination was equally rare. There were no communities where transportation-based communications linkages were complete, even when all of the responding components were within the established EMS system, and there were only two communities where hospital communications were complete. But, irrespective of the established Time One EMS systems' communications capabilities, in only three of the events studied was the predesignated plan for disaster communications followed.

B. Conditions Associated with Disaster EMS

Interaction between: (1) pre and post-impact conditions; and (2) post-impact conditions which originated either from within or outside the boundaries of the established or everyday EMS system, gave rise to the emergence of the disaster EMS systems that responded in situations our research examined.

PRE-IMPACT CONDITIONS: System Resources. The size and complexity of the established EMS system's resource base - i.e., trained personnel, equipment, etc. - was found to affect the probability of a centralized response with, paradoxically, the presence of a larger number of resources making a centralized response less likely. Thus, where an abundance of transporting units were available, convergence of ambulances to the site often occurred. Also, in metropolitan areas having dozens of available hospitals, more often than not, the casualties ended up in one facility. Possibly systems which are richer in resources do not coordinate well during normal times, because it is not as crucial for adequate service delivery. Therefore, they are not able to effect a centrally coordinated response in mass casualty incidents. Conversely, as the complexity of the resource base decreased, a centralized response was more likely. Since scarcity of resources requires cooperation across a wide range of activities on an everyday basis, such systems are more likely to continue their cooperative relationships in disaster contexts.

System Relationships. Attempts to develop EMS disaster planning almost invariably exacerbate existing conflicts within and between the local health care area and other community sectors. Political considerations enter into all aspects of EMS planning and response, even in disasters. Self-interested organizational actions based on city/county, public sector/private sector, and other jurisdictional distinctions are common. EMS matters over which various interest groups differ include: participation by private hospitals in publicly controlled EMS systems; categorization of hospital emergency departments; the use of telemetry and the rendering of certain forms of treatment to victims by EMT's or paramedics on site or during transport as this relates to the possibility of later legal action, and the issue of patient accessibility to care. Also, even though there may be consensus about the need for funds, communities frequently divide on whether to accept or reject federal monies for the design and operation of EMS systems, since the issue of federal involvement in local affairs is a highly debatable one in many localities.

Disasters seldom occur neatly within politically convenient boundaries so organizations from a variety of EMS systems may respond to any mass casualty event. Yet in only about one-fourth of the localities studied was there any regional disaster planning. Unless pre-impact disagreements over jurisdictions have been settled by prior

planning, they may result in absence of coordination, confusion in EMS delivery, and less than satisfactory patient care. On the basis of the events studied, it is clear that long standing jurisdictional conflicts can rarely be effectively settled during a disaster; they require earlier planning.

All of the kinds of disputes discussed frequently result in a lack of interorganizational cooperation at times of disasters. Whatever the paper plans, the underlying antagonisms, frequently further magnified in the planning process itself, can have greater impact on a disaster response than the magnitude of the overall resources available to the health care system. Conflict can reduce the extent to which resources such as EMS expertise, communications equipment, and transportation vehicle are used effectively when required.

DISASTER SPECIFIC ACTIVITIES. Few community health care systems have undertaken realistic overall planning for handling large numbers of casualties. In over half the communities studied, it is generally assumed that everyday EMS can be extended in mass emergencies, i.e., that a system which functions adequately during normal time will also do so in disasters. But our research found that everyday and disaster EMS are not simply two points on the same continuum. Mass emergencies create demands that differ qualitatively, as well as quantitatively, from everyday EMS demands. Disasters can produce large numbers of "walking wounded" who, while not necessarily requiring the services of a hospital emergency room (ER), may, nevertheless, intensify demands by converging on hospitals. Indeed, convergence of press, relatives, medical personnel, etc. presents a major problem in disaster, as opposed to normal EMS delivery. Another distinction between everyday and disaster EMS is that the former is designed to function with great speed in meeting the specialized problems of sick and injured individuals, problems such as cardiac arrest and multiple trauma. In large scale disasters, the medical problems of casualties tend to involve different degrees of urgency, so the speed of the response may not be crucial to effective operations; instead, the overall coordination of the response--among hospitals, between first responders, hospitals, and transporters for example--becomes the essential task. Only realistic preplanning can assure such coordination.

In general, low priority is placed on planning for disaster EMS, although we found isolated officials and scattered EMS systems who had worked enthusiastically on EMS disaster planning. There are several reasons for this state of affairs. In over three-fourths of the localities studied, there was little resembling an EMS system for everyday purposes; consequently, it does not seem meaningful for officials to work on disaster EMS, especially if it is assumed it will be merely an extension of everyday EMS. Even in communities where systems do exist, there is often widespread ignorance about the overall EMS system, even on the part of subunits within the system itself. Lack of knowledge of other non-EMS emergency organizations and community disaster planning is similarly extensive in the EMS sector. There is also a prevailing misconception about the unreliable behavior of humans under extreme stress. This kind of ignorance, lack of knowledge, and misconception all contribute to a prevalent attitude in the EMS area of either faith or fatalism insofar as mass emergencies are concerned. Among some parts of the health care sector there is faith that necessary assistance will be forthcoming from somewhere in circumstances of extremely high EMS demands and that someone else has thought about the problem. There is a fatalistic notion among some EMS officials that all disasters are unique or that some disasters are of such a nature that there can be no effective community response. These attitudes do not lead local personnel to assign high priority to EMS disaster planning, but instead encourage a belief that ad hoc measures will be enough or are all that can be done in mass emergencies.

POST-IMPACT CONDITIONS. Internal to the System. The ways by which an established EMS system coordinates its everyday activities are good predictors of the ways coordination will be exhibited by the disaster response system. However, the occurrence of a major mass casualty disaster can affect the availability of normal means

coordination, if the necessary interorganizational expertise to coordinate the response is absent. For example, during "non-waking" hours, experienced organizational and system personnel are seldom immediately available. Senior organizational officials who carry major responsibilities for coordinating a medical response are more likely to be present during the day than in the evening. Indeed, centralized responses were as likely when mass casualty incidents occurred during the day shift, but centralized responses occurred only in a minority of instances when disasters happened during the evening shift, these included nearly half of the events we studied.

External to the System. Agent Generated Conditions. The time of day the event occurs is important. When disasters happen during non-waking hours, coordination of response is slow to develop because of the lack of availability of key personnel. If there is little probability of the convergence of non-EMS transporters, as might occur during an early Sunday morning, there is greater chance that the disaster response of the EMS system will follow a predesignated formal disaster plan. Also, when disasters strike during shift changes and there is a double staff on duty, high demands on the hospital do not present the same kind of problems they ordinarily would.

The location of the disaster site affects the disaster EMS system response. When there is more than one site, as there were in about a fourth of the cases we examined, a centralized response is less likely to occur. When the disaster site is in a densely populated area, the EMS response tends to display little coordination because of loss of control at the site. This condition almost always results in an unequal distribution of casualties among available system components.

Transmission of information about casualties is rather poor in most disasters. In the events studied, hospitals often failed to receive word of a disaster until the first victims arrived in the ER. Even when there was notification, messages were often vague. Ambulance-to-hospital/and hospital-to-hospital communication linkages were seldom utilized effectively. This rarely was due to a lack of communications equipment per se or to equipment failure. Rather, effectiveness was reduced by inexperience in using communications equipment, absence of trained communicators, confused or distorted messages, crucial communication gaps (e.g., site-to-hospital) and information overload. To function, EMS systems require adequate communication input. This is absent on a system-wide basis in many disasters. Because the flow of information between system components is a major method of achieving coordination, lack of communication between responding components is a major way in which established EMS components are excluded from the emergent disaster EMS system.

Response Generated Conditions. The EMS response is also influenced by conditions that arose from the social response itself to the disaster. The response generated condition with the greatest impact on the providing of EMS in the events examined involved the convergence of resources from outside the established EMS system into the system; e.g., a fair percentage of victims are typically transported to hospitals by means of private vehicles which are not linked to the EMS system. This pattern is common even in areas where sophisticated central dispatch systems exist. We found that this mode of transportation can result in the less severely injured patients arriving at hospitals prior to the more seriously injured victims.

Decisions about patient transport and distribution, when made by first responders who do not have medical training, have obvious consequences for the hospital phase of disaster care. Intrahospital activities are often adversely affected by the sudden and uncoordinated influx of large numbers of disaster victims. In the worst of cases, we found that regular hospital patients were neglected because of the attention given to disaster EMS, particularly since most hospital disaster plans fail to consider the important question of how they are to conduct regular patient care during precipitous mass casualty events.

In general, our data indicate that the unequal distribution of casualties among available hospitals found in almost every incident studied, is a result of these response generated factors: (1) the tendency for transportation to be the most salient response, rather than triage and stabilization; (2) the probability that the majority of first responders are not a part of the established ongoing EMS system; and (3) the fact that a similarity of decision making exists among transport personnel such that they tend to conclude independently that transportation to the most proximate health care facility is the most appropriate response.

C. Consequences of Disaster EMS

MANIFEST EFFECTS. Almost half of the locales studied instituted community-wide disaster drills, which constitutes a change from earlier patterns where drills tended to include only single system components or, at best, only a few components. Group critiques and after-action reports of the disaster response were carried out by about half of the communities studied. But apart from these mechanisms for learning from their own experiences, there are few formal or informal means whereby different communities can share information with one another in order to learn about useful innovations and operational problems experienced by other EMS systems.

LATENT EFFECTS. The establishment of disaster linkages among EMS components frequently led to an increase in cooperative interaction among system subunits during normal times. This was particularly evident in the preplanned events studied. New relationships, often involving new organizations, were operative in these settings, and these relationships extended into everyday EMS activities. Also, some decision-makers in a few systems recognized that accurate and systematic record keeping is not only crucial in times of disaster, but during day-to-day operations as well.

Implications and Recommendations

If, as stated in a National Academy of Sciences report, "emergency medical services is one of the weakest links in the delivery of health care in the nation," our research suggests that disaster related EMS planning and response is, similarly one of the less satisfactory aspects in the provision of EMS in general. The area is marked by lack of knowledge both of disasters and of EMS system operations, by inadequate and incorrect planning, and, especially, by poor response at times of mass emergencies. Response is characterized by inefficiency and ineffectiveness in both processes and outcomes; i.e., there are gaps, overlaps, conflicts, etc. among the groups involved, and the quality of disaster EMS is suspect at best.

Given two existing circumstances, major changes in EMS system disaster planning and response are not probable. (1) Disaster situations by their very nature preclude EMS system control over victims' entry into the system; this prevents total intra-system planning. (2) While, potentially, there could be drastic results in particular single cases of mass casualties, the problem as a whole, does not have, and probably will not have, priority over other ongoing EMS system problems. Nonetheless, this is not to say nothing can or should be done. The problem of mass casualties will not go away; there will be more and larger disasters in the future. The present state of affairs can not conscientiously be accepted as it is. More important, some worthwhile steps can be taken to improve disaster related EMS policy, planning, practice and research implementation.

1. For planning and operational purposes, HRA and other relevant agencies should explicitly recognize that there are qualitative differences between everyday EMS and disaster EMS. Such recognition is necessary to counterbalance the thinking and practice which sees disaster EMS as an extension of everyday EMS.
2. Disaster EMS should remain linked to everyday EMS as it is in current basic legislation, but efforts should be made to require consideration of EMS in other

disaster legislation and agency policies. Advantage should be taken of probable upcoming restructuring of national disaster policies so as to make disaster EMS more salient and linked to decision making in other disaster-relevant agencies.

3. Preplanned EMS events, instead of everyday EMS, should be taken as the prototype of disaster EMS. In such events usually there are explicit recognition of differences between disaster and everyday EMS, planning which involves community organizations outside of the local EMS system, and realistic preparations for likely operational demands.
4. Local disaster EMS planning must be closely linked to community wide and non-EMS disaster planning and not carried out solely as an EMS system activity or drill.
5. Plans should reinforce indirect positive aspects of disaster linkages within the EMS system and between EMS and other sectors. Such linkages increase cooperative interaction during normal times and serve as a corrective for conflictive relations that often exist in EMS systems, e.g., concerning hospital categorization.
6. Systematic EMS record keeping is needed for either retrospective or prospective planning. Evaluation of any program requires such information, so record keeping should not be but one of the 15 mandated EMS components, but should be made a mandatory higher priority.
7. Needs assessment, on-site triage and transportation of the injured, if possible, should be done by those appropriately trained regular emergency organization personnel, who are also likely to be first responders.
8. Convergence on disaster sites and on hospitals can not normally be stopped, so attempts should focus on channeling it along less disruptive lines (e.g., by selectively directing vehicular and pedestrian traffic to and within hospitals.)
9. Efforts during disasters primarily should be expended towards increasing good overall coordination, since that, rather than swiftness of response or utilization of highly specialized technology, results in effective EMS delivery.
10. Scientifically based knowledge about disasters and disaster related EMS should be diffused within the EMS sector via conferences, workshops, publications, talks, infusion into formal educational and in-service training courses, and written manuals and syllabi.
11. Current gaps in knowledge should be filled by more specifically directed studies: e.g., evaluative medical research on disaster related EMS; special disaster problems of very large metropolitan areas and widely dispersed rural EMS systems; and factors specifically facilitating emergent EMS systems.