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NEEDED INNOVATION IN THE DELIVERY
OF EMERGENCY MEDICAL SERVICES:
PRESENT AND FUTURE*

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INTRODUCTION

Let us start out with a partial description of a recent disaster in the United States. A 12-car passenger train carrying 579 passengers (and 12 crew members) was hit by the engines of another train. The ensuing wreck killed 16 persons and injured about 200 others. A total of 178 injured were taken to 11 different hospitals and three temporary shelters.

There were a number of problems in the provision of emergency medical services (EMS) in this large mass casualty situation.

For example, there was a very bad overestimation of the number of injured in the first reports from the scene and what was communicated to waiting hospitals, with one institution alone being told to expect 800 casualties. This resulted in a massive mobilization of resources which proved unnecessary. Of twenty alerted hospitals nine received no patients.

Another hospital was told to expect several dozen victims, which turned out to be relatively accurate. After treatment of the victims, the hospital personnel who had been mobilized for the disaster were sent home. A short time later, the hospital, being advised that it would receive another wave of victims, recalled staff members; however, no more victims ever arrived.

The closest hospital to the crash site, less than two and a half miles away, did not get its first patient until 80 minutes after the wreck had occurred.

One EMS team, because police perimeter guards were unaware of its identity, was refused initial entry to the site, although permission was soon granted.

Another EMS team, sent to the site by helicopter, landed about two miles away and had great difficulty in working their way through the heavy traffic in the area.

In fact, there was massive convergence of people and vehicles on to the crash site, which soon resulted in a massive traffic gridlock, delaying EMS personnel from getting into and out of the site.

Verification of the injured was difficult with names ending up on different lists being put together by different agencies and, in some cases, on no list at all for a very long time.

There was a major mix-up on the numbering in the initial field triage tagging, and some retriaging had to be done.

Initially, the portable radio communication channels were not enough.

Physicians not part of the regular EMS system started to participate in providing services and generated a question of how they could be used.

After the incident commander had arrived on the scene, it still took more than a half hour before he received a report of the EMS situation.

These and other difficulties and problems occurred in a disaster situation where there were several aspects favorable for providing EMS services. There were considerable resources available; the fire/EMS personnel on the scene numbered 510-570, and they had at least 143 pieces of equipment available, including 10 helicopters. The heart of the crash site was, literally, physically concentrated in less than a one block area; this would contrast with a tornado or earthquake situation where casualties might be scattered over dozens of miles in all directions. Finally, the state EMS system has a reputation for being in the forefront of EMS planning for mass emergencies, and, therefore, the area was not one where such planning had been given relatively little attention.

Of course it might be argued that the indicated difficulties probably had no important negative consequences insofar as the medical handling of the victims was concerned. Is such a criteria the only one to use? (If so, we think there is a question whether in the majority of disasters any reasonable improvement in the EMS system could substantially reduce loss of life or aggravation of injuries in the majority of disasters, but that is the theme for another paper.)

None of the above mentioned problems are surprising to disaster researchers who have looked at the delivery of emergency medical services (EMS) in disasters. They are the kinds of problems that have been observed fairly consistently in the United States since the early days of disaster studies, going as far back as the Texas City explosion in 1947 which resulted in over 4,000 injured. In that sense the difficulties noted are not new. In the last decade or so the researchers have increasingly sought the sources of the problems and how present day disaster EMS could be improved in the future.

Basic Themes

We want first to talk about what we currently know of the delivery of EMS in disasters. Our remarks are derived from field studies of the Disaster Research Center (DRC) on the delivery of EMS in large mass casualty situations in the United States (see Taylor, 1977; Quarantelli, 1983), and to a limited degree some observations on EMS delivery in a few other disasters around the world, but they are intended to be applicable to all societies.

What do these studies--of what is, rather than of what should be--tell us?

Our basic themes will be three:

1. Present day planning for the delivery of EMS in large mass casualty situations is often based on an incorrect model of what supposedly is involved. It is frequently assumed that the delivery of such services in disasters differs only in degree from the delivery of services in everyday emergencies. This false assumption has serious consequences when emergency services have to be provided in major disasters, for the difference is often one of kind rather than degree.

2. A different prototype for disaster EMS has to be used. There are some non-everyday events involving potential large mass casualty situations which provide a better prototype. These are real and not hypothetical events from which we can learn much.

3. Any attempt to bring about changes in disaster EMS planning will be very difficult. The problems range from the practical to the political. The difficulties range from those inherent in maintaining any EMS system to additional ones involved in planning for a standby disaster EMS system.

We then want to say something about what will face us in the coming decades. We will use the current time to project into the future. We want to avoid a common major mistake in disaster planning which is to look backward, not forward. What can we visualize as the problematical aspects in the delivery of EMS in the disasters in the rest of this century, and especially the 21st century.

Our basic themes again will be three:

1. The future will be worse than the present in this area. There is every reason to think we will have both quantitatively and qualitatively more difficult disasters in the decades to come. There is also the paradox that continuing improvements in medical technologies will increasingly not lend themselves well to use in future disasters.

2. There is need to be innovative, at least along two lines. First, the use of new technological possibilities have to be explored in the medical area. Second, social scientists need to indicate what different kinds of institutional arrangements for providing disaster EMS can be involved.

3. Whatever the future will bring, it will not be a homogeneous world. We need to keep in mind both cross-societal differences in technological innovations and uses, and in

vulnerabilities to disasters. A major goal, therefore, is the development of alternative models of EMS systems which can be used to handle the more numerous and different disasters of the future.

The Present Situation

Let us elaborate on the three themes we mentioned earlier about the present day delivery of EMS.

1. Difference in kind, not degree.

Planning can be no better than the assumptions upon which it is based. Unfortunately, almost all current day planning for the delivery of EMS in disasters is based on an incorrect model. The model rests on the view that there is only a difference of degree between everyday delivery of EMS and EMS delivery in large mass casualty situations. However, research, both in the United States and elsewhere, indicates that the difference is one of kind, rather than just degree.

It is a major mistake to view EMS in disaster situations as only quantitatively different from everyday EMS operations. It is an error in planning and response to think that the provision of disaster EMS is only larger in magnitude than the provision of daily emergency treatment. Instead, the difference in delivery of EMS in disasters differs in kind, as well as degree, from the delivery of routine emergency medical services.

For example:

(1) The EMS system in disaster situations usually loses control of the input into the system. In everyday emergencies the situation generally is different. For instance, an ambulance goes to the traffic accident site and brings the injured person to a specific hospital. In contrast, in a disaster, many victims frequently arrive, often as the result of decisions and actions by non-medical personnel, at hospitals not designated in disaster plans as the locale for treatment. Walking wounded often leave the disaster scene and choose their own sources for medical treatment (e.g., their own private physicians). Put another way, the transport of victims and where they get taken for treatment is determined outside of the community EMS system. There is, in fact, no way that the EMS system can absolutely control influx into the system in most mass casualty situations (or even that the injured will enter the system), although, as we will indicate later, planning of a certain kind can bring about a better situation than we typically and currently have.

(2) Disasters require medical organizations to coordinate, or at least interact, with unfamiliar agencies and groups with which they do not interact on an everyday basis. During routine times, organizational interactions tend to be mostly with a limited number

of known others and familiar groups, almost all, if not all, from the community setting. At a time of a disaster there are more unknown organizational actors from both within and outside the local medical sector. In fact, the larger the disaster, the more likely there will be on-the-scene groups and agencies from afar, representing different community, state, regional, and even national level entities. In many cases, the local EMS system is dealing with organizations and systems that were, prior to the disaster, even unknown to exist, rather than just unfamiliar. At a minimum, interaction becomes very complex and difficult, and any coordination of effort usually has to go far beyond previous planning. (This becomes very obvious in some large mass casualty disasters in some developing countries. The local EMS system often cannot cope well with the everyday emergency load. Also, in such disasters, because of considerable convergence of outside medical assistance, there are many unfamiliar groups interacting. In such cases there is no question that disasters involve a difference of kind and not degree situation. Sometimes practitioners and researchers in the United States do not recognize the limits of generalizing out to the whole world from their own particular circumstances of a relatively resource rich society.)

(3) Unlike everyday accidents or smaller multiple casualty emergencies, major disasters trigger a massive convergence of people, things, and communications at hospitals. The mass assault on medical institutions is typically threefold. There is a convergence of the personnel from other time shifts of the institution, other volunteering medical care personnel, mass media representatives, public safety officers and officials, donors of various kinds, politicians, and the curious from the general public, not to mention victims, their family members and relatives. Except in atypical situations, these persons usually arrive in cars or trucks alongside ambulances and other emergency vehicles. The medical organizations are subjected to inquiries, demands, requests, questions, etc. by persons on the scene, and almost always the phone system becomes jammed as a result of calls from the outside. The convergence often spills into areas that are supposed to be private, locations and spaces supposedly secure, and facilities that plans sometimes suppose as being restricted only to regular hospital personnel.

(4) Also, criteria that are operative in disasters frequently differ from those used in everyday emergencies. For example, in the latter situations, often key criteria are swiftness of transportation of patients, quick response, and priority of attention to more serious problems. In disasters, both for individual hospitals and the EMS system as a whole, matters are frequently handled on a different basis. The less seriously injured often arrive or are taken to hospitals before the more seriously injured, as anyone thought to require treatment is taken into the EMS system, since the notion of triage is frequently ignored. Almost always, there is a great unevenness of distribution

of victims to hospitals with more familiar institutions often receiving the largest number of casualties. Facilities other than hospitals are sometimes used to treat victims and locations in hospitals not normally used for EMS are, at times, put into service for emergency treatment. Medical and non-medical personnel who usually might not even come close to an everyday patient will be involved and make decisions about disaster casualties.

(5) EMS systems have daily experiences of providing ordinary EMS so the whole procedure becomes quite routine. However, a large mass casualty situation may occur only once in the lifetime of most EMS system members. Thus, there usually is very little direct learning from an initial disaster experience that can be applied to a second disaster situation.

In disasters, compared with everyday situations, there are usually major differences in the control of patient influx into the EMS system, in the interacting organizations involved, in the traffic and convergence patterns, in who makes the crucial decisions, the criteria that are used to handle patients, and in the earlier direct learning experiences which can be applied. While these are typical differences, there can still be other differences. There may be, for instance, the loss or disruption of lifeline systems, such as any of the utilities. There may be damage or destruction of hospital facilities or equipment. It is possible hospital personnel may be killed, injured, or unable to get to the institution. Medical personnel may not know the nature of the hazard involved that is creating the health problems, as is sometimes true in the case of toxic chemical disasters.

We believe we have indicated enough to illustrate that major community disasters can be, and often are, qualitatively different situations for EMS purposes than everyday routine EMS situations. If what we say is valid, then it follows that it is dubious to attempt to extrapolate from everyday EMS situations to major disasters. The community disaster is not simply the other end of a continuum represented at the other extreme by a traffic accident involving casualties.

The ability to recognize this problem, and to acknowledge it, is further complicated these days by the fact that some medical groups have a vested interest in maintaining the incorrect model. For example, some such organizations have spent considerable time, energy and resources in planning the EMS disaster response and have assumed that there will be only a difference of degree between everyday EMS problems and disaster EMS problems. It is understandable why they would find it difficult to reconsider the matter--police and fire departments have the same problem in accepting research findings which are contrary to their deeply held beliefs. As researchers, fortunately, we have an advantage. We can let the research data dictate for us what model seems most valid; in fact, we started our own EMS research at DRC making the

assumption that disaster EMS would only differ in degree from everyday EMS. However, the empirical data forced us to recognize that our initial assumption was simply incorrect. Since we had no vested interest one way or another on the degree or kind issue regarding EMS, it was relatively easy for us to change our position.

2. A different prototype

For current purposes, a different prototype has to be used in planning for mass casualty situations. We are fortunate in that there are some non-everyday situations which could be employed to plan for the delivery of disaster EMS. These non-everyday situations, while they might have the potential for generating a large number of casualties, are not disaster situations as such.

We have in mind such events and settings in the United States as the Kentucky Derby, the Indianapolis 500 Speedway race, the Mardi Gras celebration in New Orleans, New Year's Eve in Times Square in New York City, and similar regularly scheduled gatherings of huge numbers of people. On a somewhat more irregular basis, and usually involving relatively smaller numbers of participants, would be many rock music concerts (for a description of the medical preparation and care at a three-day outdoor rock musical festival, see Qunanian, et al., 1985), the gatherings of youth at spring or vacation time resort areas, football games in the larger stadiums, and other crowd and audience like settings. Other recent examples would be the Olympics in Los Angeles, the Pope's visit to certain American cities, various celebrations in Washington, D.C., the Live Aid concert in Philadelphia, and the major political conventions. (For description of medical care at 15 large public gatherings such as a rodeo, a golf tournament and a state fair, see Sanders, et al., 1985.)

What is characteristic of these events and settings is that large numbers of individuals are assembled in a relatively confined space and where physical movement is considerably restricted and slow. As such, they are situations where it would be very difficult to provide ordinary EMS services. Furthermore, all have the potential of being situations where there could be a massive number of casualties.

A few years ago, DRC studied a number of these situations in the field. In many of these cases, the planning for EMS not only differed significantly from everyday EMS, but also showed certain common elements. The latter was not the result of following any explicit planning model, but stemmed from a recognition that in such situations large scale emergency services could not possibly be provided in the usual or routine ways. Organizational and operational innovations were necessary, and, in a great number of cases, they were, or are, a part of the prior medical and EMS planning for the event. There was a more or less conscious

abandonment of many features of the everyday EMS system, and the temporary institution of a somewhat different kind of disaster potential EMS system.

In the context of our presentation here, we cannot detail all the new features, but the major ones can be enumerated. Almost all the planning assumed that:

(1) It was necessary to move out of the hospital and to set up operations out in the field or on-site. Instead of waiting for victims to be brought or to come to the hospital, it was thought necessary to move some of the operations out of the hospital and nearer the potential mass casualty location. Somewhat overstated, as one of our respondents in an interview said, "We brought the hospital to the victims instead of bringing the victims to the hospital."

(2) Instead of operating reactively, it was assumed a proactive orientation was necessary. Thus, much of the planning stressed that it was necessary to have a continual field monitoring for victims, if not an actual search for them. Small roving teams of personnel literally hunting for victims was a common feature of the planning.

(3) There was an assumption that the field operations did not require the use of physicians except in the standby triage system we shall next mention. In fact, much of the planning assumed that the setting up of the field operations and the hunting for victims did not necessarily require trained medical personnel as such, but only people who had been trained enough to initially adequately handle whatever casualties were encountered.

(4) A standby triage system at some central location in the field was also assumed in much of the planning. When the victims were brought in, it was felt that a medical decision had to be made at that point.

(5) All the planning made the assumption that communication networks and transportation equipment had to be developed in ways different than in everyday operations. More communication among out-in-the-field personnel and from them to the base location was visualized as crucial. Means for transporting the more seriously injured had to be strategically preplanned both as to allow the vehicles to be relatively accessible to the victims at the base location and to be relatively easily movable to get to hospitals.

We should note three things about this kind of planning for handling large mass casualty situations. First, it obviously provides a different prototype for disaster EMS than using the everyday EMS system. We think it is a much more realistic one and one that should be given serious consideration. Second, of course, what we have discussed is primarily the planning process, not the

actual implementation. In those cases where we saw the potential large mass casualty system in operation, it seemed to work well, but we had no occasion to examine a situation where there were massive numbers of injured. From other research in the disaster area we know there is always something of a gap between whatever is planned, no matter how good, and what, in an actual setting, with all sorts of contingencies possible, is implemented. Finally, the use of the potential large mass casualty system as a prototype model for disaster EMS planning might seem to violate one of the consistent findings of disaster research--it is very unwise to ask people and organizations at times of crises to deviate too much from their everyday behavior--the results are usually very bad. However, in most of the situations studied, the temporary EMS system had become a historically well-rooted part of the special occasion for which it was activated, or considerable time, effort and resources had been given to training personnel and organizations to operating with the new system. Thus, in that sense, there was not that much deviation from the expected for the special occasion, but this does suggest that if the prototype is to be used for disaster EMS delivery, it has to be institutionalized in some way long before its actual use.

Some of the ideas we have discussed are slowly being developed in EMS training and practice. For example, citing some of the DRC research, Butman (1982) has produced a guide for EMS personnel which incorporates some of this approach. Coming at the problem from a more direct experience basis, the Boston EMS system has also implemented in its planning a non-traditional approach (see Jacobs, Goody and Sinclair, 1983). Medical groups providing emergency medical services in major and long-lasting brush fires in California have, likewise, instituted procedures to bring some of the hospital operations out into the field and nearer the disaster site.

3. Difficulties in EMS disaster planning

While we do believe planning for disaster EMS should move in the indicated direction, we recognize the difficulties of bringing this about at the local community level. Anyone familiar with the area knows the problems there have been in instituting and maintaining everyday EMS systems in the typical community. On top of those difficulties, there would be others in attempting to put into place what essentially would be a standby disaster EMS system.

Let us note four problem areas that exist, at least in the United States, although we suspect they are present elsewhere also. (See Tierney, 1985 for a more detailed discussion.)

(1) The high status of medicine and medical institutions make them usually reluctant to give up any control over the system. This is usually phrased in terms of the necessity of maintaining "medical control." A disaster EMS system of the kind we have

suggested would mean that the major share of the management of the first phase of disaster EMS would be in the hands of non-physicians, i.e., police, fire, and other public safety personnel, paid and volunteer ambulance workers, emergency medical technicians, paramedics, nurses, and other emergency service providers. We, personally, see no problem with this, for the planning and management required do not necessitate or require control by medical personnel, although their understanding and cooperation would be necessary for the planned system to be implemented.

(2) On an everyday basis, there are very complicated relations among the organizations in the health care sector, especially in larger communities in the United States. There are high and low status hospitals. The former are often attached to medical schools and usually have a core of teaching and research elites. They are reluctant to do anything which would affect their control over their usually selective admission policies. In addition, there is the well recognized division or split between public and private health care institutions. This, as well as the status differences, means that anything involving the relations between the institutions involved is very political in the broad sense of the term. In turn, this means that the development of a disaster EMS system of the kind we suggested would have to escape the political pitfalls that surface in any kind of overall community disaster planning that, of necessity, would require common planning and agreements among and between all the medical care institutions in a given community.

(3) As a general rule, the more organizations there are and the different levels of organization involved, the more difficult it is to initiate, carry through, and implement any kind of planning, as well as actual coordination over anything. This is true outside of disaster planning and even more true within. Outside of the complexity of the relationships of medical care institutions mentioned in the point above, there would be problems just from the sheer numbers and different levels of jurisdictions that are additionally involved. Furthermore, developing EMS preparedness for disasters is even more complex than planning everyday EMS because the former usually involves, in the United States, more local, regional, state, and federal agencies. Even if the planning process could pretend to ignore these factors, the mass assault of organizations upon a disaster, when it occurs, will insure that these factors will surface.

(4) Finally, there is another unfortunate characteristic of disaster planning in the health/hospital area. In American society, occasional exceptions to the contrary, research has consistently found that the medical sector planning tends to be isolated from the rest of the disaster planning efforts in the community. For example, hospital planning generally ignores complementary or support services, such as law enforcement

agencies. Thus, there may be direct contradictions in the planning of evacuation routes or the roads to be given traffic priorities at times of disasters. Typically, hospitals frequently have limited knowledge of community wide disaster planning. Organizations that would need to coordinate closely with medical institutions in an actual disaster may, likewise, have little awareness of medical/hospital sector planning. There are reasons for the separation and the mutual ignorance of the sectors involved, many having little to do with disaster planning per se. Our point here is that development of disaster EMS, whether along the line we have suggested, or along any other line, is not going to proceed too well unless there is a prior coming together and a mutual awareness of who is attempting to do what.

In calling attention to these problems, we think we are being primarily realistic, not pessimistic. There are difficulties, but, in principle, many of them can be solved in the disaster EMS area as well as other areas of disaster planning. A necessary first step, however, is to recognize what the situation actually is and what conditions are operative.

The Future

4. Future disasters

Nonetheless, in the context of what we are addressing in this session today, even if everything was currently perfect in the planning and the response of disaster EMS systems, we would still have to be concerned. This is because there are reasons to think the situations we will be faced with in the future, with respect to disaster EMS delivery, will be worse than those at present. These are related to the almost certainty of worse disasters in the future, and, paradoxically, to the continuing development of sophisticated and complex medical technologies which do not lend themselves well for use in disaster situations.

It may seem odd, but despite all the mitigation and preparedness measures we can take, disasters in the future will occur more often and be worse in their impact. Why? For two basic reasons:

(1) There is now and, increasingly, will be more population in vulnerable geographic areas than ever before. The 1811 and 1812 New Madrid earthquakes in the center of America for example, occurred in an almost uninhabited area; the same equivalent earthquakes today would affect St. Louis, Memphis and hundreds of cities, towns and villages. It does not take much imagination to see what disaster EMS might be required in a present or future day eventuality.

(2) We have, in the main, created a new category of

disasters, the so-called technological disasters generated by toxic chemicals, dangerous nuclear substances, electric and lifeline system breakdowns, fire and explosions in high rise buildings, hazardous waste sites, etc. The gas explosion in Mexico City in November of 1984 that probably killed several thousand people and injured at least 7,000, the even more famous Bhopal, India, poisoning, and the more recent Chernoble nuclear accident, are harbingers of what the future will bring. To so-called "natural" disasters, we have now added those directly created by human actions and products. They also have the potential to injure people in ways different than can be done by natural disaster agents (e.g., by quick asphyxiation or slow generation of cancer).

Apart from the probability of more and worse disasters, the delivery of EMS in future disasters will possibly be even more difficult because of an interesting paradox: the better medical technologies we have and will develop are more and more less applicable in disaster situations. For emphasis, we are somewhat overstating the point. In developing very sophisticated and complex medical technologies which are very good for everyday use (in medical diagnosis and treatments), we are almost assuring that most of these technologies are too costly, unwieldy, require such specialized knowledge and personnel, etc., to be quickly and efficiently used at times of massive casualties. Again, let us overstate, for emphasis, a parallel. All physicians in the past were general practitioners and could provide EMS at times of disasters; many specialist physicians today, the longer they have been out of medical school, are close to being useless from an emergency medical care perspective at times of disasters.

The situation, of course, is more complex than we have stated. It could be argued that we have far more personnel now than in the past who can help in providing certain aspects of emergency medical care--apart from nurses, there are various paramedical specialists, for instance. It might also be argued that some of the newer kinds of available drugs might partly balance off an inability to use the new technologies at times of disasters. However, speaking generally, we do believe a case can be made that certain advances in medicine, especially in its technologies, have been of the kind that are increasingly less quickly usable or available at times of mass casualties, and that, on balance, there has not been an equivalent gain for the disaster EMS area.

5. The need for innovation

There is a need to be innovative in making use of technological innovations and to work out better institutional and organizational arrangements in preparing for delivering disaster EMS. Persons in the medical area need to be involved, but they must be those who understand that new technologies are means, not ends. Social and behavioral scientists who recognize the real, rather than the ideal, of disaster situations must also be

involved.

Undoubtedly, the newer medical technologies can be adapted or new medical technologies can be developed which can be useful for field use in large scale disasters. The specifics of these have to be left to people in the medical health sector. However, we can argue that if there are going to be any disaster related consequences, the innovations must be created by those who are interested in actual field use, not simply a more advanced technology. Head-imaging devices, for example, be they improved CAT scanners, M.R.I. units, or PET and BEAM machines, can, undoubtedly, be developed, but what is needed for use in the field in disasters are probably not bigger and more complex devices (although with imagination it is possible to visualize field computers linked to fixed hospital equipment that might be usable and useful). If the intent is to improve diagnoses and treatments, somehow, the new technologies have to be of the kind into which information is fed into them in the field, assuming that the disaster EMS system model moves in the direction discussed earlier--out from the hospital in the initial stages.

Developing a disaster EMS system is not just a matter of technological innovation or adoption, or even solely of medical knowledge. It is a question of how resources can be organized, of how planning can be instituted, and of how response can be made more adequate. These are matters to which social and behavioral scientists, especially disaster researchers, can contribute. Much disaster hospital planning in the United States, for example, often conjures up an ideal situation of how the hospital could operate in a mass emergency. Unfortunately, this ideal situation is one that will seldom appear in an actual disaster. There will, for instance, often be unexpected convergences upon the hospital and absence of crucial information which will not have been visualized in the planning, but which research has shown are typical realities in such cases. Elsewhere, we have detailed the realities of the delivery of EMS in disasters so we will not pursue this point any further here except to stress again that good disaster EMS can be no better than the assumptions which are made about organizational behavior (such as of hospitals) at such times. Working together, social science disaster researchers and medical and technological experts can assure that the assumptions will be valid ones.

6. Cross-societal difference

Finally, and especially important to note in the context of this international meeting, we need to remember that the disasters of the future and the development and use of medical technologies are not all going to be the same everywhere around the world. There are now, and possibly increasingly so, cross-societal

differences. One implication of this is that we will probably need somewhat different types of models of disaster EMS delivery for such different situations.

Most disaster research clearly suggests that generic planning, rather than agent specific or country specific planning, is the best route to follow. Nonetheless, there are some differences that have to be taken into account. For example, not all societies are equally subjected to disaster risks, whether natural and/or technological. Of course, in the long run, even here there may be more of an equalization of threats, as, for example, practically all societies come to be vulnerable to toxic chemical threats. However, differential vulnerabilities of societies is probably a fact-of-life for a long time to come. Clearly social systems subject to more and worse kinds of disaster agents will have to have better disaster EMS planning.

It is in the medical technology area that societal differences will be most marked. Even at present there are huge gaps between medically and technologically rich societies and poorer societies. This gap probably will widen even further in the future. To compound the problem, many of the more disaster vulnerable countries in the world are also those low on a medical/technology scale. In fact, we can categorize societies as falling into one of four types when they are characterized according to their high-low disaster vulnerability and their rich-poor medical/technology status, as depicted in the following:

STATUS OF MEDICAL TECHNOLOGY			
		<u>RICH</u>	<u>POOR</u>
DISASTER VULNERABILITY	<u>HIGH</u>	++	+-
	<u>LOW</u>	-+	--

The point of drawing this chart is to highlight the obvious: that societies that fall in the second quadrant (+-) must plan and prepare for disaster EMS in somewhat different ways than societies that fall in the first (++) or the third (-+) quadrant. In fact, some recent DRC studies found that the handling of massive burn cases in some disasters in developing countries were handled at a lower quality level than they are handled in richer societies--the principles of treatment may be universalistic, but the practice of treatment reflects the capabilities of the societies involved. This is simply another way of saying we cannot expect to develop only one model of disaster EMS. There has to be the development of alternative models of EMS which reflect not only the disaster vulnerabilities but the resources which can be brought to bear.

A Concluding Remark

In conclusion, we should recognize that no solution is ever final or perfect. Even now we can project different kinds of EMS needs and problems in the near and far future. There are also usually different options available for attaining efficiency and effectiveness in service delivery. It is important that at present we look in the past to see how and where we can improve so we will do better in the future. Past experiences, however, should not be our sole guide, they can only serve as starting points. We tried to provide, in the first part of our remarks, some ideas from past research which might be used. We also need to plan for the future which we can be certain will be different from the past. Imagination is needed for that kind of projection. We tried our hand at that in the second part of the paper.

Put another way, research can tell us just so much and usually only of what has already happened. We have indicated what studies have told us up to now about disaster EMS. We must also visualize what possibly might happen. Our efforts in that direction may not eventually prove correct, but we hope to have at least provided some clues.

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