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RADIATION DISASTERS: SIMILARITIES TO AND DIFFERENCES FROM OTHER DISASTERS

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In this paper we present five themes.

First, we note that most researchers see disasters as being qualitatively as well as quantatively different from everyday accidents. In this framework therefore the preparations for and responses to radiation disaster occasions have to be different in important ways from those that can be used in routine radiation emergencies.

Second, since all disasters have many aspects in common this means that from the study of any disaster we can learn for other disaster occasions. We therefore point out several across-the-board generalizations about individual human behavior in all disasters that also apply in the radiation disaster area.

Third, disasters do differ in terms of certain characteristics such as those which allow warning and those that do not. For our purposes here we will therefore discuss four distinctive although not unique features of radiation disasters and will note they are mostly primarily of risk perception rather than so-called objective reality.

Fourth, we then indicate the implications of these observations for community planning and responding to radiation disasters. In particular the problems of crisis management of emergency oriented organizations in such disastrous occasions will be noted.

Fifth, we conclude by noting that the problems of preparing for and reacting to radiation disasters are rooted in human and group behavior. Dealing with such problems therefore require social rather than technological examinations and solutions.

Disasters Are Different From Emergencies

In what ways are the responses to disasters quantatively and qualitatively different from everyday accidents and emergencies? In what ways is a Three Mile Island or Chernobyl disaster occasion different from a minor radiation leak in a laboratory? Research (1-2) shows that there is a difference of kind not just degree compared to what behaviorally goes on in an accident or minor emergency. There is not only a quantitative difference which is obvious but also a qualitative one which is not as obvious. A disaster involves not just more, but something which is qualitatively different. An accident cannot be perceived as a little disaster, nor can a disaster be viewed as a big accident.

The reasons are that in a sudden community disaster, the responding organizations are faced with a new set of circumstances with which they must cope that are different from those involved in accidents or minor emergencies. In all or in part, they have to:

(1) quickly relate to far more and different groups than they have to on an everyday basis (e.g., business concerns with government units, local agencies with state and national organizations that they were not even aware existed before the disaster). A disaster generates a "mass group assault" from within and outside the affected community upon the problem. Accidents do not.

(2) adjust to losing a part of their usual autonomy and independence (e.g. personnel, operations, resources and locations become partly monitored and managed by certain public authorities). Everyone and all groups in a disaster impacted area become more directly dependent upon others, unlike in accident situations.

(3) develop new norms regarding what is acceptable and non-acceptable at the height of the emergency period and apply different performance standards (e.g. instead of speed of response, reallocation of resources can become the higher priority norm). Emergent new norms and standards are rare in accidents, almost inevitable in disasters.

(4) operate within a closer public and private sector interface than is the case in normal times (e.g., boundaries between public and private personnel, goods and services become blurred). Legal boundaries and group domains are seldom crossed over massively in accidents.

(5) respond to being directly impacted themselves (e.g. there can be direct and indirect loss of personnel, resources, equipment and facilities). In everyday accidents almost all responding will be regular members of involved groups which will have lost little if any of their operative capabilities.

These changes in behaviors and circumstances do not happen in accidents or minor emergencies. A minor radiation exposure in a laboratory does not generate these happenings as did a Three Mile Island or a Chernobyl disaster occasion. Thus, prior disaster preparedness planning which does not recognize the qualitative as well as quantative differences cannot be good. Managing the response of necessity too will be different in sudden disaster occasions than in accidents.

All Disasters Are Somewhat Similar

All disasters have much in common. To set this in the proper context we should note that radiation disasters are more similar than they are different from disasters generated by other kinds of agents. Persons and groups concerned with a certain kind of threat--be these floods, hazardous chemicals, earthquakes or dangerous radiation occasions--sometime tend to overlook this.

Their concern with a particular threat leads them therefore to ignore what they could learn from other similar situations.

Let us note here what social science research (3-4) has established about individual behavior in preparing for and responding which cuts across almost all disaster situations.

Disaster Preparedness.

On an everyday basis, the vast bulk of citizens are oriented to the "here and now." As such, the idea of a possible disaster in the future in their community is seen as so remote, unlikely and uncertain that the threat does not enter into consciousness, or if it does, is quickly dismissed. This is not irrational behavior. The need of almost all of us to deal with other everyday and important problems of daily living necessarily leads to a very low priority being given to attending to the actual very low probability of such rare events as sudden community disasters. From a statistical point of view, the ordinary citizen clearly is betting on the right odds.

Even when in certain localities there is a recognition and awareness of a potential threat (e.g. near an earthquake fault or a nuclear plant), citizens see disaster planning as primarily a governmental responsibility. This obligation of the state is seen more in moral than legal terms. People do assume planning is something which can and should be done. However, the passive attitude and expectation that public agencies ought to be taking the lead is indicated by the fact that extremely few persons undertake any kind of specific disaster preparedness in their households or, on their own, at places of work.

The overall point of these observations is that under usual circumstances, few human beings will take steps to prepare for a very low probability event which may or may not happen and be personally dangerous.

There is little reason to think that individual or household preparations for radiation disasters will show a different pattern. In fact, even less preparing is likely because while people may think they know how to prepare for an earthquake or a fire, they think they have less knowledge on how to prepare for disasters involving hazardous radiation.

Disaster Response.

According to research studies (3), one of the most notable overall characteristic of persons caught in disasters is that they actively seek relevant information. The threat of a disaster soon to happen or its immediate impact does not paralyze those affected. It is true that initial indications or warnings of dangers are usually downplayed or assimilated to the normal.

Physical cues that something may be amiss are frequently initially interpreted in everyday non-threatening terms---what has been called the normalcy bias. People also tend to seize upon any vagueness, ambiguity or incompatibility in warning messages to interpret them in the most optimistic ways possible. Disbelief, rather than acceptance, is typically the first response to signs or statements of an ongoing threat. Psychologically this is a very appropriate reaction for otherwise everyday behavior would become totally paralyzed. But once it is believed something negative is likely to happen, people will react.

A prevailing image is that human beings do not behave too well in stressful situations that occur suddenly. The belief that such disasters generate a great amount of personal pathology and deviance is very widespread and deeply rooted in the public at large, community officials, and to some extent even among personnel of emergency organizations and disaster victims themselves. It is generally assumed that individuals are likely to panic and act irrationally, will be stunned and unable to take care of themselves, act in anti-social ways, be emotionally traumatized or psychologically incapacitated, and react selfishly and in self centered ways during and immediately after a disaster threat and impact. However, research studies (5-6) indicate that the picture is an almost totally incorrect one in every respect. The popular image is a compound of myths and misunderstandings about how human being actually behave in the emergency time period of disasters. People do not panic or act irrationally, they are active and prosocial, and they do not become traumatized nor are they self centered. In many ways, sudden disaster victims rise to the occasion and behave much better than is believed.

This does not mean that everyone responds in the same way. When danger is recognized as imminent and personal, people seek safety or escape. Research (7) shows that if evacuation occurs, the great majority of those affected will leave, but some will never evacuate even if officially ordered. Given enough of a time period for movement, there will frequently be evacuees who will leave before any evacuation is suggested or ordered. Overwhelmingly evacuation is not by solo individuals but by group members, usually family units. Typically too threatened persons will delay evacuating as long as possible from home locations until other family members arrive or there is knowledge that they are safe elsewhere. The point of these observations is that response behavior will take different forms and is quite understandable if viewed from the perspective of the actors in the situation.

Is there reason to think that individual behavior in a radiation disaster will differ from what has been observed in other kinds of disasters? In general terms, probably not. But

there are certain distinctive although not unique features of nuclear disasters that might lead to some modifications in the general behavioral patterns. We turn to looking at these now.

Four Distinctive Characteristics

While disasters do share many aspects in common, there are nonetheless differences between different categories of disasters. We do not have in mind the distinction often made between disasters that have natural and those that have technological (or human) generated sources (8); studies have not found many behavioral differences between the two. Instead cutting across this distinction is that some disasters have important characteristics which they do not share with others. For example, some allow warning whereas others do not; some will be focused in impact but others will be diffuse. Now of all the varied dimensions along which differences could be noted, we discuss four. While these are not peculiar or unique to radiation disasters, they are nonetheless very characteristics of such occasions and are rather important in both individual and organizational responses. They are:

1. The unfamiliarity of the threat. High unfamiliarity with a disaster occasion is psychologically disturbing. While people have different images of various kinds of threats they are clearly most concerned with and afraid of those that are most unfamiliar, such as threats associated with nuclear power plants and hazardous chemicals. Obviously this depends very much on the sociocultural setting for what is familiar to one population could be very unfamiliar to another (e.g., tourists could be quite unfamiliar with volcanic eruptions that might be very known by the local population while workers in the nuclear power industry will be familiar with radiation threats). In all cases familiarity is a matter of learning and prior experiences.

Now the knowledge that people have of many natural disaster threats may actually be little better than their knowledge of other threats. But there is little doubt that among people generally some threats are perceived as more unfamiliar and therefore more worrisome. The threat from radiation clearly falls into such a category for the average citizen.

2. The predictability of the threat. Sometime it is possible to predict or forecast that one will be exposed to a threat; in other cases, the ensuing disasters are totally unexpected. Such evidence as exists indicates the unexpected is much more psychologically disturbing than the expected. The importance of being unexpected is that there is an inability to quickly bring to bear the normal routines and coping mechanisms people have for dealing with expected threats.

Furthermore, if one can predict involvement in a dangerous

situation, culpability for the involvement is more likely to be attributed to self. If predictability is very low--as seemed to be the case in the Mt. St. Helens volcanic eruption and Three Mile Island--others are more likely to be held culpable. Also, if predictability is high--as in the instances of populations living near chemical and nuclear plants--there is greater sensitivity to danger cues, willingness to act upon them, and less trauma in evacuation as studies (9) of residents around hazardous chemical complexes have found.

In general, radiation disasters lack predictability as to time, place and magnitude. If the appearance is particularly unpredictable, as was the case in the Goiania radiation incident in Brazil, the negative effect is especially magnified. Such occasions contrast sharply with people who know they live in flood plains or near earthquake faults.

3. The duration of the threat. Studies (2) suggest that there is almost certainly some relationship between length of a threat and psychological effects. However it is doubtful that the relationship is a linear one. For example, the longer people are involved with a threat, the more likely they make an adjustment to the threat, including a possible desensitization process. On the other hand, it could be argued that there could be some accumulative negative effects, the longer the threat.

Perhaps the intervening factor is whether some of the threat is manifestly realized or not. Thus, some researchers have suggested that the 1979 nuclear plant accident at Three Mile Island has not yet impacted for certain population segments in the area, that the threat is still in being. This is different from where there can be a continuing impact as in exposure to certain hazardous waste sites or to a very active volcano.

Generally, radiation disasters are seen as having long duration. That is, reinforced by mass media accounts, many actual and potential victims of radiation hazards, know that there is not likely to be an immediate, obvious manifestation of physical damage to self or loved ones in most cases. Whether it be Love Canal or Chernobyl, once the immediate crisis is recognized and adjusted to, concern turns to an uncertain and unclear future, usually measured in years. This does allow time and effort for planning and managing even projected very negative consequences.

4. The rapidity of the threat. In some disaster occasions, victims become slowly involved in the situation. Generally, populations adjust better to such occasions and there might not even be much of a crisis. On the other hand, there may be very rapid involvement in a disaster; adjustment seems to be much more difficult in such cases. Most riverain floods and flash floods are almost ideal polar type examples of the differences in these

two kinds of occasions.

Rapidity, which is not to be confused with speed of onset of a disaster, refers to what happens in the response pattern and is viewed from the perspective of those involved. Thus, it may or may correspond to what others, such as experts, deem as the actual time available for action. Psychological effects stem not from how long in some chronological sense people have available to react, but rather from whether they perceive themselves as having to hurry to save threatened values. In general, most people apparently do not see radiation threats as requiring a rapid response (e.g., like in a fire).

Our point here is that the slowness of the perceived threat actually affords time to help people to adjust to such situations. Victims of such occasions are faced with a different psychological situation than persons who know a tornado is going to hit in their locality in the next few minutes or that a hurricane will impact their community in the next several hours. Put another way, not all of the distinctive characteristics of a radiation disaster are necessarily tilted towards the negative, relative to other disaster agents.

Of course these features of radiation disasters--unfamiliarity, unpredictability, duration and rapidity--are primarily matters of risk perception and not of so-called objective reality. It should be noted that this is a controversial issue among researchers.

There are at least two ideal-type concept of risk used in the scientific literature. There is the concept of risk as: (a) "as a physically given attribute, an objective property of hazardous technologies" and (b) "as a socially constructed attribute rather than a physical entity" (10). We think the second position is by far the more useful one. From our perspective what is often called objective reality is just the specialized or technical perception of experts. That perception is valid only within that perspective, and when all is said and done is merely the consensus among a number of individuals, the so-called experts. It is no more real for behavioral purposes than what others might perceive. To understand human and group behavior requires understanding how they perceive a situation or as a sociological maxim states: if people define a situation as real it is real insofar as consequences are concerned. This observation explains much of the differences in perception of risk and ensuing behavior between technical experts and other people. To some extent it also accounts for organizational behaviors and problems in disasters, to which we now turn.

The Situation of Emergency Organizations

Social science research (11-13) has uncovered three major

organizational problems at the emergency time periods of disasters.

In all major disasters, organizations typically have a series of problems with information flow within, and to-and-from the organization to others. For example, it is rare that the initial flow of reports and rumors to an organization make clear the extent and scope of a disaster and what might be required to be done in the emergency time period. Often too, different sectors and levels of the organization will have widely varying amount of knowledge about what the group is doing; not infrequently, top echelon officials are not receiving the regular flow of information from below, and often the communication going down through the system is uneven, unclear and irrelevant to lower level personnel. Here again, because much of what is important to communicate in radiation disasters is of a technical nature, the information flow in such occasions will be further compounded and confounded.

Studies (14) also suggest that overall control by any group or agency is impossible in any major community disaster: a degree of coordination is the best that can be achieved. Just the multiplicity and variety of organizations, public and private, operating out of various jurisdictions preclude that orders or commands from one group would be accepted by all. This is true in any disaster but it is further complicated in the nuclear radiation area in that its usual connection with the military leads many of the organizations responding to think in terms of "command and control" of a crisis situation. This is unfortunate. Research (5) has consistently shown that a "command and control" model of organizational response is not only very difficult in practice but also not a very efficient or effective way of proceeding.

Finally, research (13) has indicated that the effectiveness and efficiency of organizational managing in a disaster stems from: communication which results in correct information collection and distribution; a fully functioning emergency operating center; appropriate procurement and allocation of human and material resources; proper task delegation and coordination; a legitimated authority structure; integrated and cooperative relationships among and between local and extra community groups; harmonious relationships with mass media organizations; and response activities based upon real and not mythical needs. All this in principle can be preplanned but seldom is. Moreover, in a radiation disaster, some of the features noted will be inherently more difficult to achieve because of the reasons stated earlier.

Now it might be thought that preparedness planning would eliminate or at least reduce the indicated problems in managing a disaster. However, this is not the case because for the

following reasons.

First--and this is not peculiar to the nuclear area--there is a tendency to equate planning with the only one end product of that process, mainly a formal disaster plan. However, the production of such a document--while sometimes legally required--is not necessary for good planning, and there are many other aspects of the planning process which can be of greater importance. These include undertaking public educational activities; establishing informal linkages between key groups; assessing, monitoring and communicating information about local risks; developing techniques for training, knowledge transfer and assessments; convening meetings for the purpose of sharing information; holding disaster drills, rehearsals and simulations; involving citizens, business and industrial organizations, non-emergency public agencies and relevant non-local groups in the planning process; updating strategies, resources and laws necessary; checking that relevant local regulations and ordinances are in place and kept up to date, etc.

Second, there often is a failure to understand that planning is not managing and that managing is not planning. The military draws a clear distinction between strategies and tactics. The former refers to the general approach to the situation as a whole, the latter to the specifics that have to be used to deal with situational contingencies. The principles of disaster planning refer to the general strategy, whereas the principles of emergency management have reference to the particular tactics which need to be considered in specific disasters. But this useful distinction is frequently badly confused in the particulars of plans and planning.

Third, such disaster preparedness planning for emergency time response as is in place, often is independent of other efforts and groups in the local community relevant to preventing and mitigating disasters or recovering from them. Thus, local groups that are involved in such matters as building codes and inspections, land use regulations, supervision of utilities, as well as the local community development and planning agencies, only rarely have contact or much knowledge of the responsibilities and activities of area organizations such as police and fire departments, which prepare for and respond at emergency times. One consequence is a sharp separation between possible disaster prevention and mitigation measures, laws and rules and those that deal with emergency time preparedness and response.

Frequently too there may also be even more separate preparedness planning that revolves around the risks posed by radiation threats. In some societies, including the United States and Great Britain, there are often independent agencies, different organizational responsibilities and separate plans for

nuclear disasters than those in place for natural disasters or even hazardous chemical disasters. This is not a good arrangement. It almost insures serious problems of group conflicts and operational gaps in disaster occasions because there will be concurrent responses by all with any interest in disasters. Separate planning worlds are also cost inefficient and can lead to competing for always scarce community and societal resources.

The Social Sources of Problems

In conclusion, we have tried to underline the general point that the source of most major problems in radiation disasters are primarily in the social and not technical area.

This is very well illustrated by the Three Mile Island nuclear disaster in the United States. The President's Commission (15) which studied the event concluded that the major factors involved in the accident were "people problems". These problems stemmed not just from what the plant crew did in the control room, but from how personnel were originally trained, how construction decisions were or were not made, how emergency planning was developed, etc. These were the sources of the potential catastrophe (the same seems to have been true in the Chernobyl nuclear plant disaster in the Soviet Union). The technology itself functioned reasonably ell. The various mechanical safety devices operated within reason. It took human errors, bad judgments, knowledge gaps, inadequate training procedures, poor preparedness planning measures, confusion over responsibilities, failures to recognize consequences of decisions long before the accident, etc. to turn an initial relatively minor technical mishap into a major disaster (certainly from an economic and political viewpoint) and a potential catastrophe. As they are in all disasters, human and group behaviors were the ultimate source of problems.

Put another way, preparing for and managing radiation disasters requires the knowledge and understanding that the social sciences including psychology can provide. Technical information will not be enough. We have tried to illustrate this general idea in our paper.

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