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#6

SOME PRELIMINARY OBSERVATIONS ON A HOSPITAL
RESPONSE TO THE JACKSON, MISSISSIPPI TORNADO
OF MARCH 3, 1966

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On March 3, 1966, a tornado cut a path of about 100 miles across the state of Mississippi. At approximately 4:30 p. m. that day the tornado, moving generally in a northeasterly direction, struck the capital of the state, Jackson. It missed the center of the city of about 200,000 people but completely destroyed a moderate size factory complex a short distance east of the city as well as a shopping center (Candlestick Park) on the southwest edge of the town. About 300 of the nearly 500 injured in the whole state were from the Jackson area. Out of the 53 persons who died, 20 were killed in the metropolitan area.

A severe weather bulletin for the general Mississippi area, issued from the U. S. Weather Bureau was broadcast by a local radio and TV station at 3:33 p. m. However, the tornado itself did not appear on the Weather Bureau radar and there was no prior warning about the tornado by any agency in Jackson. At a local radio and TV station an employee saw the funnel of the tornado as it was striking the southwest edge of the city. Thus, the first broadcast concerning the tornado occurred after the tornado had already hit the town.

Even though there had been no tornado warning as such, some direct response to the threatening weather had occurred. For instance, almost all of the workers in the factory complex that was destroyed had been released from work earlier than usual because of the severe weather bulletin. However, the shopping center of 12 stores was quite crowded at the time of impact and it was there that the largest number of casualties (approximately 225 persons) occurred in the immediate Jackson area.

A three man DRC team (plus two attached OSU engineers) arrived in Jackson

on Friday, March 4. The team made a reconnaissance survey conducting several dozen informal interviews with officials in the police department, civil defense, the Red Cross, several hospitals and other community organizations. The initial field observations suggested that while there had not been a major community disaster, some organizational responses in the city might warrant a more intensive examination. Subsequently, a DRC team returned to Jackson and conducted a partial "in-depth"¹ study of the hospital which was closest to the shopping center and that had received the first large influx of casualties. In about a week's time the second DRC team interviewed approximately 35 persons connected with the hospital including physicians, nurses, administrators, paramedical and other staff personnel. The usual complete cooperation was extended, the standard DRC field procedures being followed in both the initial and later visit.

This paper reports some preliminary observations on the activities of the hospital most involved in the community disaster response. The focus is on organizational rather than medical aspects. Since a more systematic analysis of the data will be presented only in a later research report, all statements herein are to be taken as tentative rather than definitive.

While almost exclusive attention is given to one hospital, three others are mentioned. When necessary to avoid confusion the hospital studied most thoroughly is designated as hospital A. The other three are called B, C, and D. The emergency activities of other community groups and organizations are not generally discussed except in passing and to the extent such information provides a better understanding of the situation at hospital A.

The rest of the report is divided as follows:

- A. General Hospital Response
- B. The Response of Hospital A
 - 1. Staff, Facilities and Plans for Disaster
 - 2. Sequence of Events in the Emergency Period
 - 3. Problems: Control
Communication
Coordination
- C. Analysis of Response of Hospital A

A. General Hospital Response

There are five major hospitals in the city of Jackson and another nearby in an adjacent town. Three of them in central Jackson are old, established hospitals with disaster plans. All three were prepared to receive casualties within a short period. Hospital D, furthest away from the southwestern impact point of the tornado had staff waiting for patients that never came. Not more than half a dozen patients were examined. Hospital C probably prepared most quickly of all, in part because a patient saw the tornado out of his window and notified his doctor who thereupon set the hospital disaster plan in operation. This hospital, having house physicians which also facilitated rapid mobilization, received and treated some 27 patients. Hospital B, the second largest in the city, received close to the same number of patients (about 85) as did the hospital closest to Candlestick Park although many of them were not as seriously injured. However, victims arrived later at hospital B than at A partly because of the greater distance from the shopping center. Because of cramped physical facilities in the emergency area there were some problems in handling patients at hospital B.

At least several dozens of the patients arriving at this hospital came from hospital A. Some were sent because of special types of injuries (e. g., orthopedic problems), others less seriously injured were sent to make room at hospital A.

Hospital C, the third largest in the city, received far fewer patients than A or B for apparently two reasons. One, ambulance drivers do not usually like to take patients to this hospital because certain emergency room procedures make for a very slow turn-around time. Secondly, the road to hospital C from the Candlestick Park area goes by hospital B. Several persons were directing traffic on this road and diverted some ambulance runs into hospital B. No one seems to know for certain who these persons were although there is some evidence that they were off-duty policemen. Whoever they were, there were some occasions when an ambulance leaving hospital A or the scene of the disaster with instructions to go to hospital C, brought its load to hospital B.

B. The Response of Hospital A

1. Staff, Facilities, and Plans for Disaster.

The hospital is a community, non-teaching institution. Thus, there is no resident staff and no doctor is on duty at the hospital as a house physician. However, about 175 physicians are connected in some way with it. The daily routines are carried out by approximately 85 registered nurses and some 40 licensed practical nurses. In addition, there is a supporting staff, which includes nurses aides, maintenance personnel, office workers, etc., of 197 other persons.

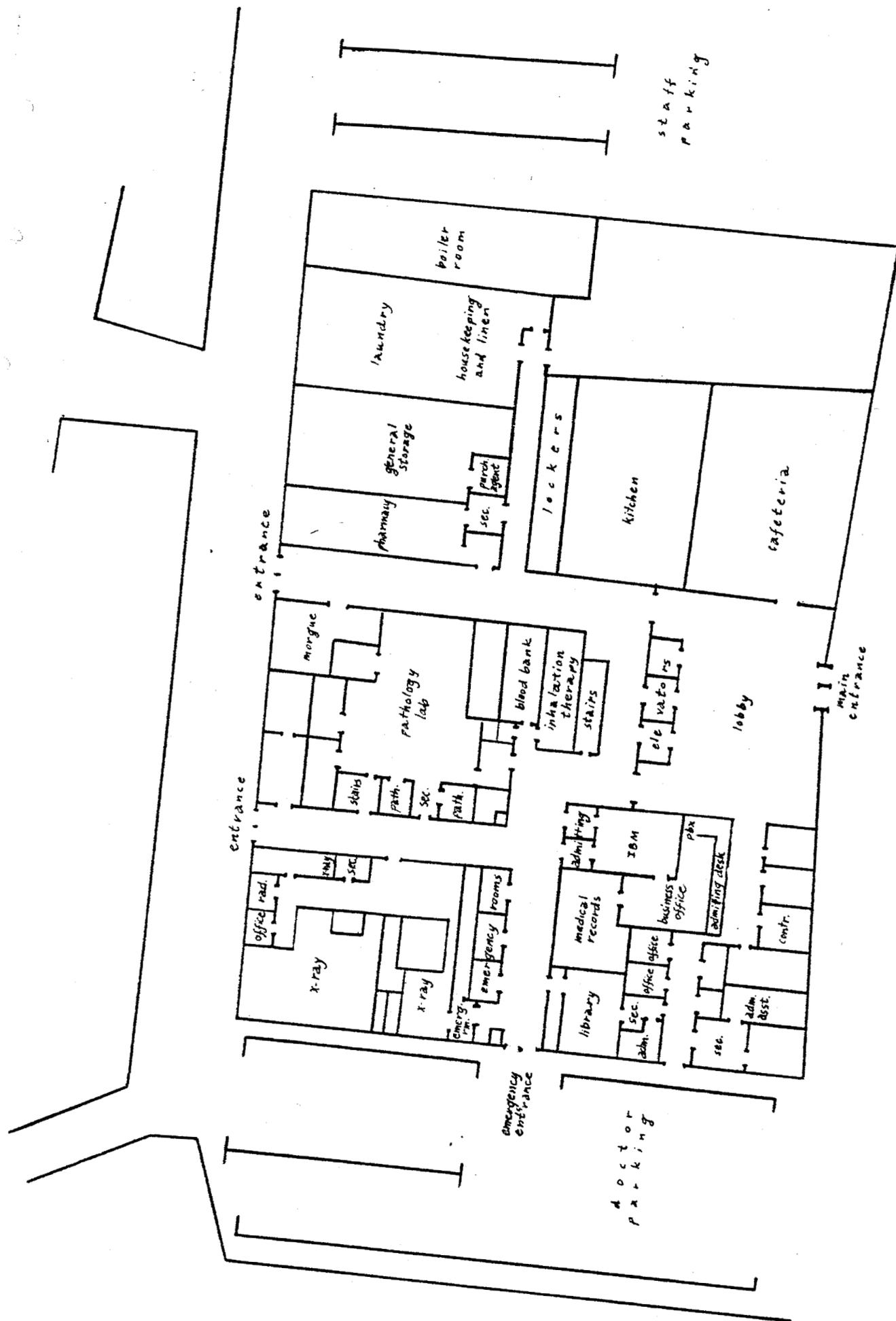
The hospital does not have a security force. There are several reasons for

this. Mentioned by respondents were the hospital's size, its newness, economic considerations, and a general feeling about the honesty and trustworthiness of the population in the community. Such passing thought as had been given to security had focused on the protection of parked cars. The use or need of a security force in the event of a disaster had not been anticipated.

Since the hospital had been open only for five months, it was still defining operating procedures for itself and its personnel. One of the more significant aspects of the hospital's newness at the time of the tornado was that the institution had not yet developed a functioning disaster plan. In addition, the Jackson Area Medical Association had not yet changed its emergency plans to take into account the new medical unit in the city. According to the area medical plan, each physician in the vicinity knows which hospital to report to in the event of an emergency. However, since the plan had not yet been changed, there were no doctors assigned to hospital A.

A medical emergency committee had been formed at the hospital. As will be indicated later, the physicians on this committee were among the first to be informed of the disaster, and its head (the chief surgeon) was responsible for much of the organizing of treatment that was done. Only in this sense had there been any formal preparation. Overall, however, there was neither an internal nor external disaster plan designating staff personnel for institutional activities in cases of large-scale emergencies.

At the time of the tornado the hospital had a 142 bed capacity (including nine intensive care beds) with a projected one of 210. An unusual feature of the



staff parking

visitor parking

doctor parking

hospital was that a full floor had not yet been opened because of a lack of personnel to man it. However, the floor was completely furnished and ready for occupancy. Hence in terms of strictly physical facilities, the hospital's capacity at the time of the disaster was over 200 beds, making it the fourth largest in the city.

From a physical or structural viewpoint there is nothing unusual about the four story building occupied by the hospital, although one spatial aspect should be noted. On the ground floor in the rear of the hospital are four emergency rooms with a lobby area, three x-ray rooms, the pathology laboratory, blood bank, and the inhalation therapy room. However, as can be seen in the following diagram, the emergency lobby area combined with the layout of the hallways allows for more floor space than one might expect from knowing merely the number of emergency rooms.

Likewise, it is important for an understanding of hospital activities to have some picture or image of the possibility of physical movement into and out of certain parts of the building. The emergency area, for instance, is easily reached from a number of points inside and outside the building. Thus, the rear of the hospital on the side where the emergency area is located, is accessible through three different entrances: the emergency room entrance which leads directly to the emergency desk and emergency rooms, a rear door opening into a corridor which leads past the x-ray department and down to the emergency area, and another rear door several yards away from the other one and which opens into a hallway leading past the hospital laboratory and into the emergency

lobby area. All three of these doors are on the same driveway. In addition, there is the front hospital entrance which leads directly into the main lobby. There are two doorways on either side of the elevators which connect the back emergency area of the hospital with the front lobby area. Three automatic elevators open into the emergency lobby and front lobby area.

2. Sequence of Events in the Emergency Period

The following time table roughly indicates major sequences of events. It should be remembered that it was difficult for participants in the emergency activities to recall specific times as they were very busy with non-time related tasks. Some persons interviewed noted that what they had thought to have been 30 minutes, for example, turned out to be more like ten minutes when they were actually able to obtain time references.

4:45 - 5:00	First victim arrives in a private automobile. Two doctors in hospital at time. Call goes out to nursing staff and telephone operators are asked by administrative assistant to call doctors' exchange.
5:00 - 5:30	Telephone communication with outside becomes a problem.
By 5:15	Several doctors arrive at hospital. Many more victims arriving. Start of triage system.
By 5:30 - 5:45	Doctors, nurses, and other staff from other shifts and volunteer nurses not working at hospital arrive.
5:45 - 6:00	Adequate staffing, situation under control in regard to procedures. Majority of patients have arrived, visitors increasing.
6:00 - 8:00	Sending patients to other hospitals when possible.

9:00 - 10:00 Situation well in hand. No new victims coming in. Minor injuries being attended to, major cases being double checked.

By 11:00 Hospital areas cleaned up and extra staff remain in case new casualties are found. Patients in hospital admitted by disaster committee of hospital.

3. Problems: Control

There were a few control problems during the emergency period. Several of these occurred outside of the hospital and seemingly had relatively minor effects on the organizational response. The several control problems inside the hospital were of greater magnitude, and may have had some major negative consequences for organizational activities.

a. City police went to the shopping center with instructions that they were to take orders from the local sheriff department since the area is outside of the formal jurisdiction of the Jackson Police Department. Whether because of this somewhat ambiguous legal position, or for other reasons, no strict traffic control was imposed around the Candlestick Park area. Apart from evoking the typical convergence of persons to a disaster site,² the tornado had also struck just at the start of the normal evening rush hour traffic. Further compounding traffic congestion was the fact that a bridge on the approaches to the shopping center was closed because it was undergoing repairs. For all these reasons, movement was slow on certain thoroughfares and some ambulances had difficulty quickly getting into and out of the impact area.

However, as has been frequently noted in other similar situations, victims were not left waiting for ambulances to arrive at the disaster site.³ Persons

at or near the shopping center and other impacted sites took it upon themselves, using private cars, trucks, and buses to take injured to hospitals. Thus, there was little delay in casualties getting to hospitals. At hospital A, the staff estimated that some 50% of those treated arrived in the first half hour.

Leaving aside the question of the medical wisdom of rushing undiagnosed and untreated victims to the hospital, the informal influx did create some organizational difficulties. The emergency area, for instance, was faced with processing a large number of patients in a very short period of time. At one point, some 30 casualties arrived at the hospital in a bus. However, while the uneven influx of victims proved troublesome, it did not really create a major organizational problem in itself. It simply contributed to initial coordination problems discussed later.

b. Traffic was not too well controlled on the roads just around and into the hospital grounds. In fact, there was no traffic control in the parking lot outside the building until some Boy Scouts appeared and were assigned to park cars and to prevent the hospital entrances from being blocked. They acted in the place of a non-existent security force. This action, however, did not even start until more than an hour after the onset of emergency activities. Nevertheless, while the lack of control in the parking lot and the nearby streets proved irksome to some persons coming to the hospital, overall it had no major effects on organizational mobilization and operations.

c. There was considerable congestion inside the building, especially in and around the emergency area, because victims and visitors flowed in before control

of their movement could be instituted. Casualties as well as other persons coming to the hospital flocked in through all three of the rear doors. A few came in through the front entrance as well.

An effort - largely unsuccessful - was made to stem the uncontrolled influx. Several persons were assigned to doors to prevent people from entering the hospital. This did not work out well for several reasons. First, at least a half hour had passed by the time guards were assigned to the doors, so many persons had already entered. Secondly, the instructions given to the men on the doors were quite vague as to whom they should allow to enter. Since the hospital was trying to identify several victims, the guards allowed persons to enter who said they had injured relatives inside. Furthermore, and in line with the informal atmosphere of the whole operation, guards were reluctant to keep persons waiting outside in the rain.

The men at the doors were also handicapped by the fact that they were not in uniform. At least one of them was a deputy sheriff who happened to be visiting the hospital at the time when the victims started arriving, but he was in plain clothes. The other persons assigned to guard duty were from the maintenance staff of the hospital. None of them were trained for such duty and they had no visible symbol of authority (a crucial factor as other studies of disasters have shown).⁴

Efforts to reduce the congestion were not much more successful than the attempt to control the influx. The medical director and the administrator of the hospital several times took to the public paging system to call all persons who

had no vital function to leave. Few heeded the appeals.

The result was a very congested first floor in the building. The lobby was full of victims usually with minor injuries waiting to be treated. More serious cases generally were in the four regular emergency rooms as well as in the rear corridors which had been turned into temporary emergency treatment areas. Intermixed with the casualties on stretchers and those on the floor on mattresses were relatives of victims, as well as persons seeking to find out if family members had been brought to the hospital. Possibly too, there were other persons wanting to be helpful since some people volunteered their services. Since their services were not needed, their offers were rejected by hospital personnel. The congestion clearly added to the confusion and slowed hospital activity.

d. There was little control also over the influx of medical and nursing personnel to the hospital. An unascertainable number of the staff reported in because they were contacted by the phone from the hospital or by phone relays initiated by the institution. Physicians on the hospital medical committees, absent heads of departments and some nurses came to the hospital because of these calls. Other doctors and nurses came however, because of hearing a call on radio and TV for hospital personnel. Still others proceeded to the hospital because they heard that a tornado had hit the Candlestick Park area and assumed the institution would receive many casualties because of its proximity.

Physicians other than those connected with the hospital also appeared at the hospital. Although for reasons indicated earlier no physicians had been assigned to this particular institution by the Jackson Area Medical Association. Many

doctors assigned to other hospitals nevertheless decided this would be the most appropriate place for them to go. They seemed to take into account that hospital A was the closest to the scene, and that two of the other hospitals in the city had a resident staff and physicians in attendance.

The peak number of the staff (as well as other medical personnel) at the hospital during the immediate emergency period could not be ascertained. The tornado struck after the regular 7 a.m. - 3 p.m. nursing shift had gone off duty, but while several nursing supervisors and all clerical personnel were still at work. Only two physicians happened to be present in the hospital at the time of the disaster. Of course, as just indicated, after impact many physicians and off-duty personnel flocked to the hospital. Whatever the total, there clearly was no shortage of manpower, either for general or for specific institutionally related tasks.

However, the absence of control over incoming personnel did contribute to coordination problems. As will be discussed later, the influx did not help in the hospital's effort to organize its response in the first hour or so. (A separate and unstudied question involved in this, quite apart from the DRC focus on hospital A, is whether from an overall community as well as medical viewpoint, some of the personnel not needed at the hospital might not have been more useful if they had initially gone to the major disaster sites. Only one physician, who happened to have his office in the shopping center, apparently was at the major disaster site in the post-impact period.)

Communication:

There were some communication problems during the emergency period. Two of them had less consequences for organizational activity than a first glance might suggest. Several other communication problems however, clearly affected the carrying out of some organizational tasks or contributed to other group difficulties.

a. Information that there was a large-scale emergency started being disseminated within the hospital when the first two casualties arrived unannounced at approximately 4:45 p. m. The emergency room staff nurse immediately paged her supervisor with a call of "stat." (This is the hospital term meaning urgent.) The call brought to the emergency room her supervisor, a physician who happened to be in the building seeing a patient, and the hospital pathologist.

When the supervisor arrived and learned from the nurse and the casualties that a tornado had struck and that more victims were coming, she telephoned the administrative assistant's office and told his secretary of the situation. (The hospital administrator was at home ill that day.) The secretary informed the administrative assistant. He went to the emergency room (which is just a short distance from his office) to evaluate the situation. He then told the administrator's secretary to call the administrator at home and apprise him of the disaster. The assistant instructed his own secretary to phone and inform all the department heads. It was about 4:50 at this time when he proceeded to the hospital switchboard which is at the admissions desk. He told the operators about the situation and instructed them to contact all physicians connected with

the hospital, starting with the chief medical officer, then the members of the emergency committee of the hospital, all other affiliated doctors, and then to call staff nurses that were on other shifts, starting first with supervisors.

When phoned, some of the people contacted offered to save time for the hospital operators by calling other staff personnel that they knew. This relay or branching out of alerting calls had not been preplanned but spontaneously emerged.

Standing by the admissions desk, the assistant administrator saw the hospital pharmacist in the coffee shop. He went in and informed him of developments. A period of perhaps 15 to 20 minutes passed during which time he talked to the administrator at home, endeavored to organize activities and arranged for things that might be needed. The medical records librarian was also assigned to help with a tagging and identification system. However, a nurse with experience in large scale emergencies had already brought label tape out of the supply room and was using it for tags.

It is clear that even though there was no initial warning of a disaster or communication about the impending influx of patients, the hospital was able to mobilize rather quickly. Even the coupling of no forewarning with the absence of a disaster plan did not prevent rapid alerting of much of the staff. The initiative of different staff personnel provided enough impetus to overcome the initial lack of communication about the disaster and the potential work load for the hospital. Once the chain reaction was started, different staff members played their expected roles as might be anticipated. It seems doubtful if the hospital had been warned ten minutes prior to the arrival of the first patients, whether

the organizational response really would have been markedly different. The communication problem here had only minor organizational consequences.

b. Much more disturbing was the lack of any information from the major disaster site about two miles distant. The hospital was not connected to any organizational radio network (unlike hospital B) and no direct contact was ever established with any agency who had personnel at the shopping center. The hospital staff did receive some information from ambulance drivers and others who arrived from the scene. The news communicated usually consisted of estimates of the number of casualties that would be found under the debris. These estimates turned out to be extremely high (e. g., statements were made that as many as another 100 persons would be found in the wreckage at the shopping center).

The lack of feedback from the disaster site, a phenomena noted in other disasters,⁵ meant that the hospital had no idea of how many cases to expect or when they might arrive. Staff members reported that the uncertainty, fed by indirect reports of a possible still larger influx of victims, created some pressure to process cases as quickly as possible. That is, there was a feeling among some of the medical personnel that if many more casualties were to arrive, it would be best to handle the injured already at the hospital as fast as possible even if quality of medical care might necessarily have to be sacrificed to a degree. Thus, the lack of communication from the disaster scene, did have some consequences on the prime task activity of certain organizational personnel.

c. About 5:15 p. m. the assistant administrator was reached by a local TV station. They asked if there was anything that they could do to help the hospital. In reply, he made two requests. One, was that the station ask all staff personnel to report in person to the hospital. (As indicated earlier, this contributed to the influx of medical personnel to the institution.) Second, the assistant administrator requested that the station ask less seriously injured persons to go to one of the other hospitals in the city.

This second request was somehow misunderstood. An announcement was broadcast saying the hospital was full, could handle no more patients, and that no more victims should be brought to it for treatment. This story spread widely. The evening papers in the city reported that the hospitals had been completely filled and had had to send casualties to other hospitals. Some out-of-town newspapers carried the story that all the hospitals in the city were full. (The case, of course, was that no hospital filled to capacity, but this is an interesting example of how incorrect information spreads and becomes part of the public record.)

Did the incorrect announcement on radio and TV have any direct effect on the work load of different hospitals? It is difficult to say. Certainly in this situation, after the announcements, there was no immediate slackening in the steady flow of casualties to hospital A. Injured persons and those helping them, of course, are not too likely to be attending to the mass media in the first place. On the other hand, a higher proportion of the less seriously injured persons showed up at hospital B than at hospital A. It is conceivable that a very minor

part of that particular convergence of casualties was related to the announcements made.

d. Starting around 5 p. m., and for about an hour thereafter, phone communication into and out of the hospital was very difficult. Telephone lines were jammed not only because of the calls at the hospital but also as a result of the large increase in calls in the Jackson metropolitan area. This kind of communication jam has been reported in almost all disasters studied.⁶

However, in this situation the consequence was difficulties rather than problems. Thus, hospital A was able to reach other hospitals and to make arrangements to send patients to them, when and if necessary. Instead of blocking communication, the jam probably tended to discourage attempts to complete calls in some instances. At least from an organizational viewpoint, there is no evidence that important information or inquiries failed to get through.

It is of interest that while there was a delay in making contacts with some outside physicians, a few calls managed to get through to localities of usually limited phone access within the hospital. For example, medical personnel working in the emergency area received telephone requests from concerned relatives looking for someone. Apparently some calls made to the hospital were improperly screened.

Coordination:

There were problems and difficulties in coordination of activities during the emergency period. Both organizational and medical responses clearly were affected by these. Already indicated difficulties in control and communication

contributed to the coordination problems.

a. The lack of coordination was most conspicuous in the very early stages of the emergency period. The initial incoming victims were not separated according to types of injuries. The greatest and quickest attention was generally paid to the seemingly most seriously wounded cases but these were not segregated spatially for particular types of treatment. Overtly less serious injuries were sometime treated but no systematic effort was made at first to check possible deterioration in conditions of such persons.

Neither was there separation of treatment function in terms of physicians' specialties. For example, all kinds of specialists (including the pathologist) did suturing and gave first aid to the patients laying around in the corridors and emergency rooms. There were no teams of specialists set up working in different rooms of the hospital as is sometime called for in some mass care disaster plans.

Within the first hour after cases started to arrive a rough kind of sorting system evolved. It appeared to have developed in large part as the result of the actions of a physician present who had experience in triage work in the Air Force. It was given further impetus when the director of nursing and the administrative assistant suggested to one of the arriving doctors that he sort the less severely injured cases into the lobby and away from the rest of the emergency area.

No room was utilized for shock, orthopedics, etc. The blood bank room was used as a morgue. Crowded conditions and physical massing of persons

characterized the first floor.

Considerable more order and system was instituted when the chief medical officer and the hospital administrator arrived and conferred. Between 5:30 and 5:45 p. m. the obstetrics ward on the third floor was prepared to receive casualties and four of the five delivery rooms were used for purposes of minor surgery. The unused fourth floor was also opened up around 6:15 p. m. and when beds were made patients were sent there. Intravenous fluids were given and suturing was done in this area also.

The more critical cases continued to be initially treated in one of the emergency rooms of corridors. The regular surgical rooms on the second floor of the hospital of course had started taking some patients earlier. When the upper floors were opened, the less critical cases were sent upstairs. (While there are three automatic elevators near the emergency area, they were run manually that evening and night at various times by a drug salesman as well as maintenance and housekeeping staff members. Some hospital personnel felt that the elevators moved too slow but this was because of mechanical reasons, not because of congestion.) However, the sending of patients to the newly opened areas appeared to be less of a separation of functions in terms of different areas, but more a method to relieve some of the heavy congestion in the ground floor hallways.

Eventually too the less severely injured were directed to the hospital lobby to await treatment. With the arrival of more personnel, several physicians made rounds of the lobby systematically checking these victims.

Needed supplies were generally available and adequate. However, there was a large demand for suturing sets because of the great number of cases of lacerations. That some doctors did not always obtain the precise size needle they would have preferred, was no real problem. But because of a shortage of sets (and also because of pressure to help patients as quickly as possible), normal standards had to be sometimes changed. For example, there was such a demand on suturing sets that a different sterility procedure was used because of the time it would have taken to autoclave the instruments as is usually done. The instruments instead were soaked in a disinfectant (PhisoHex) and then used. One physician mentioned that he used the same suturing set on several persons and did not change until he ran out of thread. It was said that, to compensate in part for alteration of procedures or standards, all victims were given antibiotics.

The lack of early coordination along the lines indicated above, while understandable and probably unavoidable given the existing circumstances, was not conducive to efficiency, if not effectiveness of organizational operations. Physicians were handicapped in their efforts to give the best quality medical treatment. Administrators and supervisors in turn had trouble in getting a clear picture of what was or was not being done, and trying to ascertain developing and potential difficulties in organizational activities.

b. The x-ray department, which was in the middle of the congestion, had its own particular problems. Normally, the activities of this subunit within the hospital are highly coordinated with the rest of the organization. Its difficulties therefore affected the whole hospital's functioning.

The radiologist got to the hospital some 15 or 20 minutes after being called at 5:15 p. m. His technicians had all arrived by that time. Thus, there was ample staff to man the equipment within an hour; in fact, there was enough staff present for adequate operations within the first half hour.

The department has three non-portable and one portable x-ray machines, the latter usually being used in the emergency room. After the tornado, the portable machine was utilized in the normal manner until the fourth floor was open. It was then taken to that floor and used with patients being treated there. This meant that all other x-rays had to be taken by the non-portable machines.

The department not only had a quantitatively greater number of x-rays to handle, but there were also some qualitative differences in the processing compared with normal operations. A number of patients could not cooperate because they were unconscious. There was also concern that some of the tornado victims possibly had spinal fractures, making for a much slower processing than usual. Potential skull fractures also required special handling.

Furthermore, the processing had to be undertaken in the middle of very congested hallway conditions. When the radiologist arrived, for example, he found patients were still on the floor in the corridors. For some time afterwards the space outside the x-ray room was filled with people being treated for lacerations, physicians with patients waiting to get x-rayed or awaiting x-ray photographs, relatives, volunteers of different kinds and apparently a few sightseers. The crowded conditions, besides adding to the confusion and noise, made it difficult to wheel patients in and out for x-rays.

For this and other reasons, x-rays were taken on a first come, first served basis with no priority given to possibly critical cases. Also, at the beginning there developed some confusion regarding which films belonged to what patients. (A system was soon worked out whereby a patient was assigned a number, this number then being placed on his tag and on the film.) Many of the films were not as of good a quality as usual because of the necessity of rushing their development. All these things created some obvious problems insofar as overall patient care was concerned.

On the other hand, the x-ray department did process 30 patients in three to three and a half hours. This is about half the time that is normally taken to handle that many x-rays. This of course was done under extremely difficult conditions, almost all of them outside any real control of the x-ray department.

c. Some of the supervisory personnel among the nurses got involved in direct patient care when their services might have been more profitably utilized in coordinating activity. In view of their professional training and orientation towards helping patients, this is not surprising. However, this kind of behavior was not always their choice. For example, one doctor asked the supervisor of nurses to go with him to the front lobby to check the less severe cases. Because of her subordinate status, the nurse did not feel she could refuse although realizing that she was needed to coordinate certain other activities. The doctor evidently concerned with immediate patient care, asked the first nurse he saw to help him without considering what other important tasks or duties she may have had. One supervisory nurse on another occasion during the emergency

period did tell a physician that it would be better if she did not aid him as requested because she had other important responsibilities. The physician involved did not seem to be aware of the dilemma he created for her. At least in the early stages of the emergency period, if some of the supervisory nursing personnel could have worked more fully at coordinating and organizing certain activities, the overall confusion might have been considerably less.

d. The hospital, used to admitting relatively few people at any given time, had a little difficulty coordinating the formal processing and record keeping needed to treat and admit a large bloc of persons within a short period of time. It appears some 75 per cent of the victims arrived in the first hour. Hospital records indicate that 85 persons were treated but staff members believe that the actual figure receiving more than superficial treatment was over one hundred. Some patients were known to have walked out before records were made on them.

In all 34 patients were admitted. (An additional four died at the hospital.) Initially casualties were admitted to the hospital informally, that is, they were simply treated and then put to bed. Only much later in the evening were the patients already bedded down, formally admitted and under the name of the hospital disaster committee. Records were made out on these patients at that time. Such other information as could be found was also written down. Most of the basic information was on the tag of each patient although in some cases physicians on the committee making a further diagnosis, added additional information. Of course, that it took five or six hours for the hospital to process formally the patients that it had, made no difference at all to the medical

treatment they received. From an organizational viewpoint, however, the procedure followed and information obtained were necessary in the long run for efficient operations.

e. The hospital received a number of offers of aid from other organizations, and coordinated some of its emergency period activity with a few of them. Civil Defense called asking if anything would be needed. The Red Cross among other things sent some people who helped out with clerical duties, the information desk, and also assisted the medical records librarian. The Red Cross also offered blood as well as blood replacement, neither of which the hospital accepted. Upon request, the National Guard after being contacted brought in some cots, although apparently when they arrived proved not needed. Two or three hours after the tornado struck some National Guard personnel helped direct traffic at the road into the hospital. Members of the Boy Scouts, Sheriff's department and other public and private organizations assisted with various tasks at different times during the emergency period.

The greatest coordination was with the other hospitals in the city. Hospitals B, C, and D all made direct offers of whatever help they could give. The transfer of patients from hospital A to B, as indicated earlier, was a definitely coordinated action.

C. Analysis of Response of Hospital A

The following discussion, although often using concrete examples from the situation studied, is somewhat more abstract than what has been presented so far. The intention is analysis rather than description. The hope is to suggest

some dimensions along which comparisons can be made not only of other hospitals in different disasters, but of other organizations as well.

During normal times the organizational goals of a hospital may be seen as two-fold: the primary one of patient care and the other, if not of making money, of at least maintaining a financial situation which allows it to stay open. The latter necessitates an accounting of supplies and services dispensed to patients. Without such information, long-run organizational survival is jeopardized, and with that the impossibility of attaining any other possible goal, even one that may be more primary.

When a disaster strikes there often is not enough time to carry out the routine bureaucratic procedures of a complex organization. Most disaster plans include instructions on different methods for handling paper work and administrative processes that may temporarily be ignored during an emergency. Such modifications may involve a change in the individuals responsible for the work or shortened forms or both. But plan or not, the immediate primary goal is patient care. Thus, standard admissions procedures and some other types of paper work are often set aside in an emergency situation. Requisitions for supplies, keeping records of narcotics and other things routinely done may be dispensed with.

In general, this is what happened in the hospital studied. During the emergency period the requirement of requisitions for supplies was dropped. The manager of central supply, who is a nurse, made things available literally by hand. The items that she thought would be most in demand were set out by her. People working in the hospital came by and merely picked them up. The change

to an informal supply system extended even outside the hospital. Drug supply and other institutional supply salesmen came out to the hospital or contacted it to ask if there was anything that the organization needed. Many such persons brought materials on their own. Both the internal and external process of allocation of supplies moved from a bureaucratic form of submitting an order and waiting to receive the item, to an informal, usually face-to-face system of receiving supplies on one's word that they were needed.

The internal dispensing of drugs also took on an informal aspect with the individual responsible for supplying drugs through the hospital, the pharmacist, making himself available in the corridors where much of the medical activity was taking place. He took periodic tours through the building to see if anything was needed. Before starting out on these tours he filled his pockets with the types of drugs that he thought would be most in demand and distributed them to doctors and nurses who needed them. As part of the change in the process of drug distribution there was no writing up of doctor's orders. During normal times a nurse will administer only those drugs that are ordered in writing by physicians (or which will later be put in writing). During the emergency, verbal orders for drugs were all that were used. During normal times, a nurse usually has some discretion as to when to give certain pain relieving drugs after they have been ordered for the patient by the doctor. During the emergency some nurses' discretion went so far as whether or not to administer pain relieving drugs and to start intravenous fluids. In general, this occurred before many physicians had arrived at the hospital.

Disasters may not only force a setting aside of certain routine procedures but may generate administrative actions or processes not required in normal times. Or if required in non-emergency situations, administrative actions or processes may be handled in a different way.

This also occurred in the hospital studied. For example, the usual admission procedures were not and could not have been initially followed in the emergency period. However, it is through such a procedure that a patient is normally identified and his medical history obtained. In this disaster and with the number of casualties involved, therefore, hospital personnel were not totally certain who was or had been present. With concerned relatives making inquiries, the organization was faced with a new demand for an information center. This led to the medical records librarian keeping lists which were given to an information "office" eventually set up at the admissions desk. The whole system involving several persons had to be put into effect to take care of a demand that in normal times is taken care of "automatically" by the standard admissions record keeping procedures.

Likewise, a record of drugs and other treatment administered must be available so that when further treatment is given the physician will have adequate knowledge of the patient's condition. This information is ordinarily on the medical record form of the patient at the time of admission which in this emergency, could not be filled out given the pressure of time. An attempt was made to deal with this problem of both medical information and identification through a system of tags placed on patients. While this solved part of the medical information

problem, it was an inadequate solution in that the tags did not have carbons which would allow copies to be sent to the admission office for information regarding identification and general condition.

During the emergency, the organization temporarily operated with informal procedures in handling supplies, etc., and inadequate records regarding admissions. Thus, estimates of costs for patients examined and treated the night of the tornado were made on the basis of counts before and after the disaster period, but the exact cost as would be demanded during normal times was unavailable for the emergency period. This expense was accepted as part of the cost of the disaster. The change in conception of what is proper procedure for an emergency in regard to administrative processes corresponded to the exigencies of the situation which placed total emphasis on the primary goal of patient welfare. This is not to say that hospital personnel do not usually place patient welfare first; rather it is said in relation to a possible shift in balance between primary and secondary objectives of organizations during an emergency.

The overall hospital activities on the night of the tornado can best be described as a series of informal organizational adjustments. For example, in coordinating activities, the administrative assistant and the director of nursing needed to contact each other during the most hectic period at the hospital. There were several occasions when they had difficulty finding each other. They finally agreed on using the hospital library, which is adjacent to the emergency area, as a place to which they would periodically go. Thus, since there was no prior setting up of a meeting place by plan, one was worked out on the spot. Other such

informal agreements and understandings were developed to cope with specific situations as they arose. This is in contrast to routine organizational procedure. In the latter, situations are anticipated (insofar as is possible) and explicit mechanisms instituted to deal with them.

Informal adjustments of the kind just illustrated leaves some outcomes up to chance. The effective and efficient functioning of the organization may well depend on a few people almost fortuitously making appropriate decisions at the right time. Yet if a situation demands action and it is not taken, the consequences can be very disruptive of the organization's ongoing activities and hinder attainment of goals.

Types of disasters vary in terms of the extent to which an organization has a period of time to allow for preparation. In the present case, the onset of a high demand upon the organization was sudden, and allowed little if any "stepping back" to organize activities. In such situations, breaches in the official chain of command result most frequently because there is no central command post. Immediate superiors may not be readily available and without the structuring of a plan there is a tendency for personnel to act in terms of the needs of the situation which are the most salient in their perception at the time. This usually involves undertaking palpable tasks such as rescuing or treating people rather than more abstract activities such as coordination. This was partly illustrated in the x-ray room when the taking of the picture itself was the object and thoughts of complications that might arise outside of the picture taking did not come until some difficulties were noticed, and then a system of identification worked out.

In an emergency situation where an organization is operating under a disaster plan, personnel will know their roles and the general types of activities they should engage in under the new conditions. However, in an emergency where there is no prior plan an individual's behavior may be rather crucial. The person may be involved in more than one area of activity and these areas may be different from his usual one. Since no area of activity is definitely assigned, there is a tendency to act in any area in which a need is perceived particularly since there is no way of knowing that the task will be carried out by anyone else. This leads not only to an overdependence on fortuitous individual initiative but also, of course, to problems involving coordination and efficient decision making on the part of officially defined decision makers.

The problem of coordinating activities is increased when administrators do not receive information about activities initiated by lower level personnel on their own. For example, in the situation studied, several nurses thought of things that might be needed and called directly for them. In normal circumstances they would have gone through their superior. On one occasion, a harried nurse working in the emergency area received a call from another hospital offering to send doctors. Without consulting anyone else or telling anybody of the call until later, she told them to come. It turned out that this action had no negative consequences. However, the doctors were not really needed. The most important aspect of such actions is that if information does not get to decision makers, their opportunity to utilize potential and present resources is limited. Another example was a department head who, upon hearing of the disaster, immediately called another

organization and asked them to send cots. It turned out that very few of the cots were used. When the cots arrived no one seemed to know from where they came or where to put them. Attention paid to dealing with this difficulty took time from other activities. It was apparently sometime the next day or so until anyone else, including the administrators, learned how the delivery of the cots had originated.

There can also be other difficulties because of a lack of upward channels of information flow. An organizational member may see a need, not know if action will be taken by anyone else, feel that things are disorganized and that someone has to do something, not be able to find his superior to ask about it, and subsequently initiate an action. His superior thus has no information concerning the action taken. If he himself later perceives the need he may also undertake the same task making for duplication of effort as well as negating the possibility of good planning based on knowledge of present and potential resources.

As indicated earlier, the hospital studied had no formal disaster plan. Yet it functioned on balance relatively well in the emergency. There were several reasons for this.

The majority of injuries were relatively minor -- lacerations or contusions. If there had been a large number of major surgery cases or even a handful of burn cases the situation might have been much more critical. The disaster also struck at a time of the day when most of the supervisors and department heads were still at the hospital. If the same tornado had struck at night when a much smaller staff would have been present, the organization of activities might have

been considerably delayed. In addition, many of the medical and hospital personnel in the city know each other on a personal basis, which made alerting and mobilization easier because of persons calling one another before the hospital contacted them. Furthermore, the phones did not fail completely and traffic delayed but did not block arriving personnel.

Most important of all, the hospital as an organization is highly specialized in terms of its functions. Therefore, there was no vagueness in regard to priorities of goals. To treat the patient was the overriding concern. The staff of the hospital, moreover, is highly differentiated with a professional orientation to their work. (This is clearly indicated by the fact that many of the staff and volunteer physicians reported to the hospital without receiving any request to do so.) The disaster called on the staff to do work that was within the range of their usual duties so that there was generally little question concerning what a person should do.

Experience of a kind nevertheless seemed to be a factor. Almost all medical and nursing personnel have been trained in terms of patient care first. Not all, however, have experience in positions of command in a complex organization. Most of the physicians at the hospital, for example, are accustomed to working as private practitioners, involved in immediate patient care. Therefore, they are usually not very aware of activities not immediately related to the patient they are treating. In this emergency, it was the exception when a doctor tried to coordinate activity. A number of activities only got organized when physicians whose official position lent itself to coordination arrived. An example of this

would be the actions of the chief medical officer during the emergency.

Nurses also are accustomed to following doctors' orders and giving primary attention to patient care. The nurses who functioned well in terms of coordinating activities during the emergency were either in very high official positions of command with considerable experience in such positions or had very long experience in nursing. Several of the nurses who did not do as well in this regard had high official positions but had been in them for a short period of time.

There seldom or never was a problem in command in the sense of someone not doing a specific task. Rather, any command problems that arose were in the realm of large scale integrative activities. The greatest problems in terms of coordination or command functioning were largely in the assigning of workers from other shifts and volunteers, and the setting up of some kind of triage system.

Some potential organizational problems or difficulties did not develop because of the initiative of staff personnel. Actions of this kind on the part of physicians and administrators were earlier noted. However, initiative was not confined only to high status or high echelon personnel. For example, since even a gross triage system was not started until some time had passed, there was the possibility that a seriously injured victim amidst the confusion on the first floor of the hospital might not receive relatively quick treatment. This apparently did not happen. Part of the reason was that at least a few nurses on their own looked for more serious cases and called the attention of physicians to them.⁷ To be sure, as indicated earlier, organizational dependence on individual initiative is likely to create coordination problems, but in this particular emergency personal

initiative in a few cases did help the hospital in dealing with some other potential difficulties.

For example, when first informed of the disaster the administrative assistant and the director of nursing decided that since it appeared as though there were going to be many casualties, patients in the hospital who were able should be released to make room for victims of the tornado. (The hospital census at noon on the day of the disaster listed 135 patients, only seven short of the day to day bed capacity.) Patients waiting for elective surgery as well as others normally nearing the end of their hospital stay were chosen for discharge. Where possible doctors were contacted to obtain their verbal agreement to a release; normally a physician's signature is required. The director of nurses handled most of the details, after consultation with the administrative assistant and also after checking with her floor supervisors as to the conditions of particular patients. In all, 18 patients were released. Thus, as the result of the initiative of a few key persons looking beyond the immediate situation, the hospital was quickly able to increase its capability to handle the increased demands it was soon to face.

Some of the problems that developed in this emergency were entirely because the hospital was new and all its organizational procedures had not yet been established. A few difficulties stemmed from lack of prior individual and group experience with large scale and sudden emergencies. As for the lack of a disaster plan, it was probably most crucial in the following respect. Personnel who did not undertake as much coordinating work as would have been desirable, might have been much more attuned to this need had they been assigned such a function

in a disaster plan. Even if details are forgotten, periodic drills of a plan create a sensitizing attitude towards potential difficulties and problems.

On balance and given the existing circumstances, this hospital as an organization responded well in the emergency. The focus in the prior discussion on problems and difficulties should not obscure this fact. (The DRC of course did not study another important technical question, going beyond its present interest and competence, that of the quality of medical care and treatment in the hospital after the disaster.) It is primarily by examining troublesome areas for a given organization in a past disaster, that important lessons can be drawn for the planning and operations of other groups in different emergencies in the future. The hope is that this report contributes something in that direction.

FOOTNOTES

1. An in-depth study involves an intensive examination of the disaster-related operations of a particular organization. It is primarily conducted by undertaking a series of systematic interviews with all or a pre-determined sample of organizational personnel. A more limited in-depth study was conducted in this situation than is usually the case, because of factors not directly related to the study.
2. The convergence pattern in disasters is discussed in detail in Charles E. Fritz, "Disaster" in Robert K. Merton and Robert A. Nisbet (eds.), Contemporary Social Problems (New York: Harcourt and World, 1961), pp. 651-694.
3. The initiative of disaster victims in many disasters is noted by Enrico L. Quarantelli in his article, "Images of Withdrawal Behavior in Disasters: Some Basic Misconceptions," Social Problems, 8 (Summer, 1960), pp. 68-79.
4. Other examples of this are discussed in Thomas E. Drabek, Disaster in Aisle 13: A Case Study of the Coliseum Explosion at the Indiana State Fairgrounds, October 31, 1963, to be published in late 1966 as part of the DRC Monograph Series.
5. Ibid.
6. See Fritz, op. cit.
7. Nurses often had a better picture of emergency activities than did physicians and administrators. This resulted from several factors: the discussed lack of coordination, the generally greater physical mobility of nurses within the building, and the obvious fact that higher echelon personnel simply cannot think of and be aware of all details. The DRC team found on several occasions that while some administrators knew of certain events in general, they did not know what specifically occurred and who had been involved. The information could frequently be obtained from a nurse who had answered a phone and responded according to how she saw the situation at the time. Likewise a nurse who had worked with several physicians could give a much better idea than doctors of the problems involved in obtaining items the doctors needed and other such aspects of patient care.