

DISASTER-READINESS OF MEDICAL FACILITIES IN AICHI PREFECTURE

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ABSTRACT

One month following the Great Hanshin Earthquake of January 17, 1995, we conducted a survey of 173 hospitals in Aichi Prefecture to pinpoint problems related to their actual disaster-readiness and the medical backup systems in place to deal with such disasters. This study revealed that staff at 50% of the surveyed hospitals could reach the hospital within an hour, but that communication is almost entirely dependent on phone lines, suggesting that cordless/portable/mobile phones, radio systems, Internet, communications satellites and the like should be studied in the days to come for possible use as effective communication alternatives in times of disaster. Whereas 92% of the surveyed hospitals had manuals dealing with fire outbreaks, other areas were less well represented. For example, only 36.9% of surveyed hospitals had manuals for earthquakes, 31.7% had manuals for power outages and 14.2% had manuals to deal with flooding and water disasters. New manuals must be developed incorporating the key points garnered from experience (especially Hanshin) and be ready for use immediately. It is the time for each hospital to seriously rethink the measures it should take to deal with disasters.

Key Words: Great Hanshin Earthquake, Disaster-readiness, Disaster prevention drills, Internet

INTRODUCTION

The great Hanshin Earthquake¹⁾ of January 17, 1995, left in its wake 5,502 dead, 192,706 homes wholly or partially destroyed, 7,456 homes completely or partially burned out, and over 415,000 households suffering from some kind of damage. A number of problems emerged with the measures medical facilities used in response to this disaster. Some of the key issues included the importance especially of securing access to, and lifelines for hospitals to maintain their operational and communication functions, the operation of an information network for such emergencies, and the updating of disaster procedure manuals.

A closer look at the disaster measures and policies in place at hospitals throughout Aichi Prefecture reveals that the manuals dealing with disasters are not up-to-date, are outmoded even when available, are only geared to coping with fire disasters and are not capable of dealing with disasters of this kind. After the Great Hanshin Earthquake a year ago, there is a growing realization of the need for a manual of measures and means to deal with matters at the time of a disaster,²⁾ so we conducted a survey to pinpoint problems related to actual disaster-readiness in various hospitals and the associated medical backup systems to deal with such disaster.³⁾ Using this method, the survey information could be made available in conjunction with the production of a new manual.

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INSTITUTIONS SURVEYED

Out of a total of 474 hospitals in Aichi Prefecture, 173 were surveyed. This number included 76 hospitals with over 300 beds, and 97 randomly selected hospitals with fewer than 300 beds.

METHODS

A survey questionnaire was sent to the 173 hospitals identical to that shown in Table 1. It was mailed out in the name of the Chairman of the Department of Medical Information and Medical Records, Nagoya University Hospital, appended with a stamped return envelope. The mailing went out on February 14, 1995, and stipulated a return deadline of the end of February. The respondents were to remain anonymous. The general categories of questions were:

1. Type of medical facility (classification, size, no. patients transported in)
2. Present disaster measure status (disaster manual readiness, generators on the ready etc.)
3. Emergency medical backup system (no. patients facility can handle, etc.)
4. Projected effects if a Great Hanshin Earthquake class disaster were to occur (no. patients who must be sent to other hospitals, etc.)
5. General impression of Great Hanshin Earthquake (left to respondent to reply freely)

Table 1.

EMERGENCY SURVEY QUESTIONNAIRE

RESPONSE OF MEDICAL INSTITUTIONS TO LARGE SCALE DISASTERS

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(1) Regarding the nature of your medical facility.

1-1 Please indicate the type of medical facility.

1. General hospital	2. Other hospital	3. Mental hospital	4. Hospital for aged	5. Other ()
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1-2 Type

1. National	2. Public	3. Private	4. Other ()
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1-3 No. of beds (Permissible number)

()

 beds

1-4 No. of hospital staff (total)

()

 persons

1-5 No. of doctors

()

1-6 No. of nursing staff (exact/est. no.)

()

 persons

1-7 Intensive care facilities (ICU, CCU, NICU etc.) available?

1. No	2. Yes (Total no. beds)
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1-8 Any operating rooms? 1. No 2. Yes (Total no.:)

1-9 Total no. of outpatients/day on average Approx. ()

1-10 About what percentage of inpatients on average are non-ambulatory? Approx. ()

1-11 What is the mean percentage of inpatients who cannot walk unassisted, including stretcher borne patients?

Approx. ()%

(2) Regarding disaster-readiness at your facility.

2-1 About what percentage of your regular staff live less than an hour's walk from your hospital?

Approx. ()

2-2 If the phones are down, do you have means of communicating with the outside?

1. No. 2. Yes (Method:)

2-3 Do you have your own generator(s)? 1. Yes 2. No

2-4 Do you have an uninterruptible power supply (CVCF)? 1. Yes 2. No

2-5 Does your hospital hold disaster-readiness drills on an annual basis? 1. Yes 2. No

2-6 Do you have emergency food and water supplies on hand?

1. Nothing in particular 2. Yes (for days)

2-7 Do you have a special water supply for fire fighting? 1. No 2. Yes (tank: t)

2-8 Is there a helicopter landing pad at your hospital (and/or a heliport or sufficient space for emergency landings)? 1. Yes 2. No

2-9 Does your hospital have a manual for procedures to follow when an emergency arises?

1. No fixed set of procedures 2. A fixed set of procedures

2-10 Do you have a manual to deal with earthquakes?

1. No fixed set of procedures 2. A fixed set of procedures

2-11 Do you have a manual to deal with a fire?

1. No fixed set of procedures 2. A fixed set of procedures

2-12 Is there a manual available to deal with flooding?

1. No fixed set of procedure 2. Fixed set of procedures

2-13 Do you have a fixed set of procedures (manual) to deal with power outages? 1. Yes 2. No

2-14 Does your facility have an emergency network for use when a disaster occurs? 1. Yes 2. No

2-15 Are emergency exits clearly marked for escape in times of disaster?

1. Not clearly 2. For the most part 3. Yes

(3) Regarding your emergency medical supply system should a disaster on the scale of the Great Hanshin Earthquake occur.

3-1 Have you given serious thought to a system to assure medical supplies (for victims needing emergency treatment) should a large-scale disaster occur? 1. Yes 2. No.

3-2 How many patients besides your present patients could your facility accommodate in a disaster? (e.g., using corridors, waiting rooms) Approx. ()

3-3 Can your hospital provide surgical services in an emergency?

1. Virtually impossible 2. Mild case only 3. Yes

(4) Regarding damage inflicted should your facility be impacted by a disaster like the Great Hanshin Earthquake.

4-1 If a disaster like the Great Hanshin Earthquake occurred and your electricity, gas and water lifelines were cut off, about how many patients on the critical list would have to be immediately transported to another hospital?

Approx. ()

4-2 About how many patients in critical condition would have to be transported within 2 days (48 hrs) to some other hospital? Approx. ()

(5) We would appreciate your impressions of appropriate emergency services to be provided in the event of a disaster similar to the Great Hanshin Earthquake.

Kindly indicate the position/job of the individual who filled in this survey form.

Thank you for your generous cooperation with this survey and for the time spent filling out this questionnaire.

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RESULTS

A total of 84 replies (48.6% response rate) were received; 43 (56.6% response rate) from hospitals with over 300 beds, and 41 (42.3% response rate) from hospitals with fewer than 300 beds (Table 2).

1. Percentage of employees who can reach work within an hour

Some 52.0% of all surveyed hospitals could be reached within one hour by their regular employees. It became clear that half of the hospital employees lived within one hour's commute of their hospital. However, this percentage decreased as the size of the hospital facility increased. There were also 21 hospitals (25.6%) where only 30% of the employees could commute within one hour.

2. Availability/non-availability of means of other than phone communication with the outside

Overall, 85.5% of the respondents had no means of communication with the outside world other than the telephone, and virtually all of the private hospital respondents replied that they did not have other than phone communication. The respondents who said they had other forms of communication replied that their means of communication with the outside world was by way of "mobile phones."

3. Availability/non-availability of portable generator and UPS (uninterruptible power supply system)

Most hospitals had a backup generator (80.9%), but fewer private and other hospitals had them compared to national and public medical facilities; over half (51.8%) of the hospitals with less than 100 beds did not have them. Availability of UPS equipment was low at a mean 33.7%, and hardly any private hospitals or other facilities with less than 100 beds had such systems on hand.

4. Disaster prevention drills

Nearly all (96.3%) of the hospitals surveyed held routine disaster prevention drills, but 3 of the private and other hospitals (5% of 54 hospitals) failed to do so.

5. Presence/absence of fire fighting equipment

Some 54.8% of all the hospitals surveyed had fire fighting equipment (water pumping etc.) on hand, but only 33% of private hospitals with fewer than 100 beds and small hospitals had such equipment.

Table 2. The number of responses to the questionnaire

Type of Hospital	Number
National and public hospitals ≥ 300 beds	26
National and public hospitals < 300 beds	4
Private and other hospitals ≥ 300 beds	17
Private and other hospitals $300 \text{ beds} > \geq 100 \text{ beds}$	10
Private and other hospitals < 100 beds	27
Total	84

6. Helicopter landing pad or heliport availability

Only 14.1% of all hospitals surveyed had heliport facilities.

7. Manual for dealing with disasters in orderly fashion

Fig. 1 shows the availability of a manual covering the following disasters: (1) general disasters (so called an “overall disaster”); (2) an earthquake; (3) a fire; (4) flooding and/or water disasters and (5) a power failure. Up to 76.1% of the hospitals had measures to cope with an overall disaster, whereas the remaining 20–30% had none. In terms of the type of disaster, most hospitals (92.8%) had orderly measures in place for a fire, yet only 36.9% had them for an earthquake, 31.7% for power outages, and only 14.2% had steps to deal with flooding and water disasters. In sum, few hospitals had orderly measures to deal with disasters other than fire.

8. Emergency contact network for disasters

An emergency contact network is the most basic operational prerequisite when a disaster occurs, and 100% of the national and public hospitals, not to mention most of the other private hospitals, had networks. However, 11 of 37 private and other hospitals (29.7%) did not have a network, and the fact that some were hospitals with more than 300 beds deserves attention.

9. System for emergency medical treatment

During emergencies, besides inpatients accommodations, the survey evaluated the hospital's capacity to accommodate a larger number of patients associated with disasters. For example, waiting rooms and corridors can conceivably be used to accommodate an average (\pm S.D.) of $57.4 \pm (72.1)$ patients per hospital.

10. Availability/non-availability of surgical treatment in emergencies

Fewer hospitals than we thought replied “available,” and affirmative replies constituted only 40.9% of the whole. National and public hospitals with more than 300 beds indicated availability of surgical treatment in 69.2% of the cases.

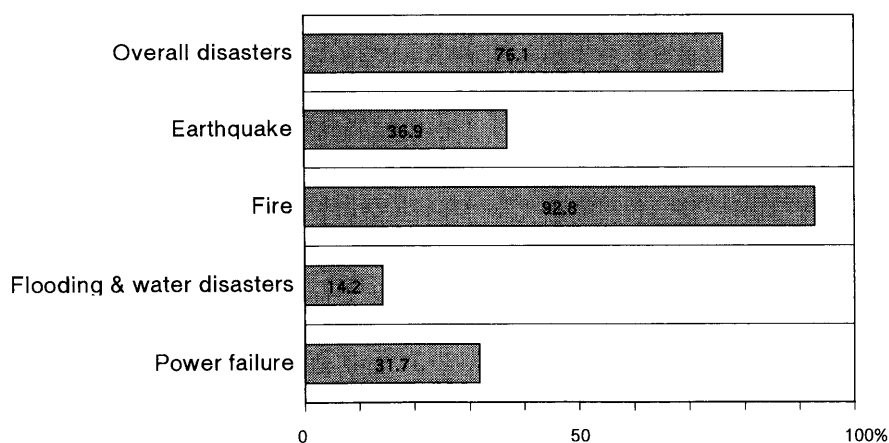


Fig. 1 The availability of manual information for dealing with various disasters.

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11. Number of severe cases requiring transfer to another hospital in an emergency and bed capacity ratio when no supply of water, electricity and/or gas (Lifeline)

The mean number of patients needing to be moved elsewhere in an emergency varied from 2.7% to 11% of a given number of beds at a general hospital, and those having to be moved out within two days ranged from 4.3% to 8.4%. As for the bed capacity ratio, the number of patients requiring transfer to another facility increased as the number of beds increased.

DISCUSSION

Although the overall response rate of 48.6% for the present survey was not high, some elements of the survey, such as poor readiness for disaster(s) may have been difficult to respond to. In light of this, we are grateful that nearly 50% of the hospitals surveyed responded because of the gravity and necessity involved. Nevertheless, if one factors in the non-response of hospitals which possibly do not have disaster measures in place, the results do not bode well for disaster preparation in Aichi Prefecture taken as a whole.

It is taken for granted that a hospital must be of sound construction in order to withstand a disaster and maintain its functions. But a system must also be in place to assure staff access to the hospital and Lifelines, along with an information system that can withstand the disaster and continue to function. The fact that staff at 50% of the hospitals surveyed could reach the hospital within an hour suggests that adequate staffing would be available to deal with an emergency situation from an overall hospital standpoint. However, it is apparent that when the dominant/sole means of communication are phone lines, communication will be a major problem when the system breaks down. Cordless/portable/mobile phones, radio systems, Internet,⁴⁾ communications satellites and the like must be evaluated as alternatives to phone lines to ensure effective communication in times of disaster. In addition, heliports are surely necessary at key hospitals.

Although an average 80.9% of the hospitals surveyed had generators available, only 48.1% of private and other hospitals with less than 100 beds had generators. This situation, one hopes, will be remedied in the near future, UPS equipment is essential for the stable operation of any information system, and at a time when more and more hospital information systems are coming on line, the lack of UPS deserves attention.

The issue of most interest in the present investigation was the availability of manuals competent to deal with disasters. Although the survey indicated that many hospitals (92.8%) had manuals with measures for fire outbreaks, no meaningful guidelines were available for earthquakes, floods or power failures. Yet even when disaster manuals are on hand, there is still a need to check them to both determine whether they are useful when a disaster occurs and to verify their easy implementation during regular disaster prevention drills. Oddly enough, the most carefully worked-out procedures end up being of no use sometimes. New manuals must be developed to incorporate the key points garnered from recent disaster experience (especially Hanshin) and be ready for use immediately.

Another kind of manual is important: It must set forth an organized system linking hospitals, doctors associations and so on, which, based on accurate disaster information, can provide a comprehensive support system to help mobilize and organize people, materials and functions effectively, with guidelines on clear decision-making procedures and with an information network capable of providing a flowchart needed to cope with disaster situations.

The present survey makes it clear that many Aichi hospitals are inadequately prepared to deal with large-scale disasters. Moreover, it appeared that private hospitals (rather than national and public hospitals), and small hospitals (as opposed to large ones), were insufficiently

equipped to deal with disasters. Of course, disaster measures must be undertaken at various levels; national and local governments have their respective roles to play in handling disasters, as do organizations of hospitals, doctors associations, and of course, the hospitals themselves. The calm of the present is the time for each hospital, organization and group to reexamine its current disaster preparedness, support systems and manuals, in order to incorporate the most recent information on disaster handling procedures, including the lessons of Hanshin, for the benefit of all.

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