Benchmarking for Hospital Evacuation: A Critical Data Collection Tool

Carl H. Schultz, MD, FACEP;[1] Kristi L. Koenig, MD, FACEP;[1,2]
Erik Auf der Heide, MD, MPH, FACEP;[3] Robert Olson[4]

1. Department of Emergency Medicine, University of California-Irvine Medical Center, Orange, California USA
2. Professor of Emergency Medicine, University of California-Irvine College of Medicine, Irvine, California USA
3. Medical Officer, Agency for Toxic Substances and Disease Registry, US Department of Health and Human Services, Atlanta, Georgia USA
4. Principal, Robert Olson Associates, Folsom, California USA

Correspondence:
Carl H. Schultz, MD, FACEP
Department of Emergency Medicine
Route #128
UCI Medical Center
101 City Drive
Orange, California 92668 USA
E-mail: schultzc@uci.edu

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Abstract
In events such as earthquakes or terrorist attacks, hospitals may be victims of disasters. They may need to transfer patients to outside facilities rather than continue to provide on-site care. Following the Northridge earthquake, eight hospitals in the damaged area were the foci of a United States National Science Foundation study that examined the status of the hospitals' pre-event planning, post-event evacuation decision-making, and internal and external evacuation processes. Building on this experience, this paper offers a standardized data collection tool, which will enable researchers to record hospital evacuation information in a systematic manner so that comparable data can be accumulated, evacuation research methods can be improved, and consensus on methods can be reached. The study's principal subjects include: (1) hospital demographics; (2) description of existing disaster response plans; (3) an event's impacts on hospital operations; (4) decision-making and incident command; (5) movement of patients within the facility; (6) movement of patients to off-site institutions; and (7) hospital recovery.

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Introduction

In the traditional approach used in disaster studies, hospitals are viewed as sources of medical care for victims. However, these institutions also are vulnerable to disasters and the concept of the "hospital as a victim" is generating considerable interest. In the United States (US), the Standards of the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) require that hospitals have a plan to evacuate their facilities as part of their overall emergency management strategy.[1] Currently, little guidance exists as to what issues should be addressed in a hospital evacuation plan.

Similar problems occur when researchers attempt to study events during which hospitals evacuated patients.[2] Since no standardized data collection tool exists, investigators are left to review reports of previous evacuations, and then create a tool that seemingly best captures the most important information. This can be problematic, as each report differs in the size and number of hospitals involved, the reasons for evacuation, the motivation for the study, and the knowledge and experience of the research team.[2]

A solution to this problem is the creation of a standardized data collection tool that will enable researchers to record hospital evacuation data in a systematized fashion that will improve research in this field. Each event would provide the same data elements, facilitating the identification and comparison of effective and failed strategies. Ultimately, these data can be used to create a standardized set of recommendations that identify the key issues for hospital evacuation. Institutions will be able to compare their individual plans to benchmarks, thus ensuring that they have not omitted critical areas.

While no universally recognized hospital evacuation data collection template currently exists, there is a data tool that investigators studying the

Northridge earthquake used to capture information about hospital evacuations.[3,4] The tool was developed and implemented in research that represents the largest number of studied hospitals evacuated after a single event, and therefore it is a reasonable template for beginning the process of creating a standardized hospital evacuation tool.[4] Although it was created to study hospital evacuations after an earthquake, most data fields in this tool could apply to any crisis necessitating the transport of hospitalized patients off-site. Currently, researchers can use this tool as an initial benchmark until consensus on a standardized instrument is reached. The following article describes the Northridge Earthquake Hospital Evacuation Data Collection Tool.

Methods

The data collection tool is comprised of questions that investigators posed to hospital personnel involved in the evacuation process in real-time, following the Northridge earthquake. The hospital staff who were interviewed included administrators, nurses, physicians, and maintenance personnel. The investigative team wrote sample questions after a thorough review of the hospital evacuation literature.[5–17] Investigators identified articles using MEDLINE, searched bibliographies of previously reviewed articles, and incorporated the suggestions of colleagues. The fact that some information was published by organizations or as proceedings of meetings necessitated the use of this last strategy, since these publications were not listed in any electronic database.

After investigators wrote a draft form of the tool, a consultant with expertise in survey writing reviewed the draft. The Consultant made substantive suggestions that were both conceptual and specific in nature. Several revisions of the questionnaire were required before the research team agreed on a final version of the instrument. It contained 63 questions that utilized several formats: (1) yes/no; (2) information inquiry (year hospital built, in-patient census at time of evacuation); (3) scaled scoring (rank the hospital's preparedness on a scale of 1–5); and (4) open-ended (identify most significant reasons for evacuating patients). These questions comprised seven data categories that described the evacuation event. Subsequent review of more recent publications reinforces the types of questions selected for this instrument.[2,18–20]

Discussion

The tool is directed at obtaining information about seven areas: (I) hospital demographics; (II) description of the hospital's disaster plan; (III) impact on hospital operations; (IV) decision-making and incident command; (V) movement of patients within the facility; (VI) movement of patients to an off-site facility; and (VII) recovery (Appendix). Each of these areas is described below.

I. Hospital Demographics

Queries regarding hospital demographics comprise the first section of the questionnaire and are intended to identify the physical characteristics of the hospital and its role in the community. Data were obtained on total bed capacity, actual number of in-patients at the time of the disaster, year of construction, number of floors within the structure, and the types of specialized care units contained inside the building. The number, type, and capacity of the specialized units (burn unit, adult intensive care unit, pediatric intensive care unit, etc.) provided a more accurate picture of the care burden a particular hospital faced than did the more general descriptions. Identification of the year of construction of the facility has implications for seismic safety as well as for issues relating to fire suppression.

Researchers also identified the facilities by their respective role in the community. Hospital descriptions included such terms as "private community", "Veterans Affairs", "pediatric", "psychiatric", "university", "trauma center", and "county". The role of each institution impacted its overall patient mix, spectrum of diseases encountered, medical acuity of the patients, and governance structure. Each of these factors potentially can impact which individual made critical decisions regarding hospital evacuation, the financial implications of patients being transferred, and the ability of a hospital to find another facility with the expertise to care for its patients. Because a community may have only one pediatric hospital, if this facility required evacuation, it might be difficult to find sufficient capacity within the community to absorb these patients.

A few areas targeted for data collection did not seem to produce any meaningful insight into the evacuation event. These included the number of stairwells and elevators. Of the eight hospitals that participated in the Northridge earthquake evacuation project, no institution made comments regarding the lack of sufficient stairwells or elevators. While this may be more of an issue when evaluating hospital evacuations in developing nations, it would not seem prudent to include this information when examining hospital evacuations in industrialized countries.

II. Description of Disaster Plan

The second section of the Tool was used to characterize the institution's disaster plan, focusing on critical components that address patient evacuation. Investigators established whether institutions had a comprehensive emergency management strategy or a more traditional hospital-centric focus. Those hospitals with a more comprehensive approach considered the hospital as both a responder and as a victim. The hospital plans addressed issues related to both contingencies and emphasized community-wide planning as now is required by the JCAHO. As such, the plans contained some provisions for patient evacuation and an evacuation drill was performed at least once during the three years. However, for most, the strategies were not evaluated using real persons—tabletop exercises were used instead. In addition, most hospitals did not have plans for evacuation to off-site facilities. The strategies were limited to horizontal and vertical movements of patients within the facility. Therefore, written, mutual-aid agreements with other institutions to accept patients from their hospital did not exist, although some hospital administrators claimed that verbal agreements were in place.

Investigators identified several other issues of importance. These included the hours of training on disaster response provided to staff each year, input from community agencies (fire department, regional government, police, public health) into the hospital's disaster management plan, whether the institution's plan addressed all hazards, and the staff's overall assessment of their preparedness to evacuate patients to an off-site facility. When examining facilities with a more traditional emergency management strategy in which the hospital was viewed only as a provider of care, many of these components were present either in limited amounts or were completely absent. The management of these institutions also believed their plans were proprietary in nature and specific to their situation. Therefore, it did not perceive the need to integrate its plans with the emergency management strategies within the community.

III. Impact on Hospital Operations

The next series of questions was used to assess the immediate impact of the earthquake on the hospital's structure and function. Multiple types of damage were listed in the questionnaire and the interviewers asked whether such damages had occurred. Examples included loss of structural integrity of the building, loss of power, flooding, and the status of the elevators. If such damage did occur, its extent was characterized further. If the hospital lost communication capability, was it complete or partial? If partial, what modalities remained functional (fax, e-mail)?

Besides the structural and non-structural physical damage to the institutions, additional questions were used to examine how these losses impacted function. Urban hospitals usually have several intensive care units, and their functions may be compromised to various extents by physical damage. Whether these units remained functional was explored. In addition, the data tool was used to record the impressions of hospital staff with respect to the level of hospital compromise. This permitted association of types and severity of physical damage with the perceptions of staff regarding the hospital's ability to provide patient care.

Arrival of earthquake victims from the field and unexpected transfers from outside hospitals potentially complicate hospital evacuation. The questionnaire was used specifically to explore the extent of this problem and to identify whether institutions accepted incoming patients during the evacuation process. The impact of arriving victims on the movement and departure of in-patients was not specifically addressed. Requests for this type of information should be included in future revisions of the tool.

As a measure of the earthquake's impact, investigators also characterized the general movement of patients within the hospital and transfers to outside facilities. The questions were used to explore the number of patients evacuated, whether their movement was limited to a single floor (horizontal evacuation) or multiple floors (vertical evacuation), whether patients were moved more than once within the institution, and whether off-site transfers occurred.

Although the tool was used to explore the disaster's impact on staffing, it was used only to explore those issues related to staff arrivals and departures. Hospitals were queried regarding staff reductions encountered after the earthquake that were related to transportation problems (freeways/roads damaged) that prevented employees from reaching the hospital, individuals who refused to leave families, or those who left at the end of their shifts without personnel arriving to replace them. Investigators posed no questions addressing the departure of staff immediately after the earthquake before the end of their shifts to check on families or on the impact of staff who were killed or injured. While no hospital experienced loss of staff due to injury or death as a result of the earthquake, it would be best to specifically include such questions in a generic, standardized tool.

IV. Decision-Making and Incident Command

The data on the evacuation decision-making process were the most difficult to obtain. Staff members were reluctant to identify an individual as responsible for actions that may be associated with significant liability. In addition, some of the evacuation decisions (or lack thereof in cases of delayed evacuations) may have been influenced by political and financial considerations. Nonetheless, the use of some of the questions highlighted the relevant components of the process.

With respect to plan activation, the investigators used the tool to ask who was authorized to activate the disaster plan, who actually made the decision to implement the plan, and at what time activation of the plan occurred. Further questions were used to examine whether criteria for activation were specified in the plan or if the decision was left to the Incident Commander. Lastly, interviewees were asked whether the decision to implement the disaster plan was justified. Although many hospitals have adopted some type of incident command system, the effectiveness of its implementation has not been well-studied. This first set of questions was used to explore the initial performance of such systems.

Since the potential for damage to hospital structures after the earthquake was significant, investigators explored the role of damage assessments in the decision-making process. Participants were asked to identify the individuals who made the damage assessments and comment on their qualifications. The questions used included whether they were hospital employees, consultants, or from other agencies. Often times, respondents stated that several inspections occurred, and that they provided information during each one. Investigators recorded the time of each inspection and the participants offered a qualitative assessment of the impact on the final evacuation decision provided by this damage information.

The last series of questions in this section were used to examine the evacuation decision. Investigators asked when the evacuation decision was made, who made it, and if that person actually was authorized to take this action. Participants then listed the types of damage that they believed resulted in the decision to evacuate patients to off-site facilities rather than to other areas within the facility. Interrogatories also explored how many, if any, of these fac-

tors were listed as criteria for evacuation in the disaster plan. Investigators identified potential problems or delays in obtaining relevant information that could influence the decision to move patients.

V. Movement of Patients within the Facility

Next, researchers used the tool to explore how patient evacuation transpired. Inquiries focused on the triage strategy. Which patients did the hospital staff move first and which ones last? Did such factors as acuity, location within the facility, or perception of immediate danger play a role? If so, to what extent?

After the order of patient movement was established, investigators asked who actually moved the patients. Was it only hospital staff or did volunteers and members of other city services, such as fire or police, participate? What devices did these individuals use to effect the evacuation? Were these devices specifically designed to move patients during an emergency (stair chairs, evacuation slides, infant carriers) or did staff improvise and use items routinely available, such as backboards, mattresses, blankets, and gurneys? Participants identified which sections of the hospital were evacuated (what floors and what units), what impediments they encountered during the process of moving patients, and any resultant morbidity or mortality.

The investigators also used questions to address the evacuation route. They inquired whether staff spontaneously chose a path through the facility or if they used specific evacuation routes pre-designated by the disaster plan. Respondents discussed the functional status of hospital elevators, if any were used during evacuation, or if all movements of patients utilized the stairwells.

VI. Moving Patients Off-Site

This section of the questionnaire was used to examine the movement of patients from the damaged hospitals to other facilities. The questions used related to the selection of receiving institutions and included how the receiving facilities were chosen, if they were contacted before patients were transfered or if patients arrived at the receiving facilities unannounced, and what would be the impact on patient movement if better information on the status of neighboring hospitals was available. Interestingly, telephone communication played a large role in both locating facilities to accept patients and in coordinating their movement. There were no questions in this hospital evacuation tool that could be used specifically to address the communication issue with respect to patient transfers to off-site facilities. In future examinations of hospital evacuations, investigators should obtain data on how hospitals would address these problems if communications are completely disrupted.

To identify the specifics of how patient transfers occurred, participants answered questions related to the types of vehicles used, how they were obtained, to what extent police, fire, and ambulance services provided assistance, who coordinated the movements of patients, whether medical records/medications/equipment accompanied the patients, whether patients were transported in groups or individually, and to what extent hospital personnel escorted patients or had them transported unsupervised. Researchers asked if hospital staff considered the implications of the Consolidated Omnibus Budget Reconciliation Act (COBRA) regulations (legislation passed by the US Congress that regulated patient transfers between hospitals), and if so, to what extent they attempted to comply with COBRA. Respondents described problems they faced during the transport of patients to other facilities and estimated the percent of the total disaster response they were forced to improvise as compared to the percent directed by the disaster plan.

VII. Hospital Recovery

The final series of questions was used by the investigators to explore how the institutions evaluated their experiences post-event and what changes resulted from this self-examination. Respondents identified the types of meetings held after the earthquake and what issues they discussed. Investigators asked them to rate the extent to which their written disaster plans addressed the contingencies faced during the event and to identify situations that were not anticipated in the plan. Examples included problems related to patient tracking, availability of information on hospital damage, communications with other hospitals, and the functional status of other local, patient-care facilities.

Next, participants discussed the changes in the written disaster plans resulting from the meetings and performance evaluations. Changes such as creation of better mutual-aid agreements between hospitals, improved redundancy in communication modalities, better strategies for acquiring vehicles for patient transport, and contingency plans for staff supplementation were explored. Investigators asked what mitigation or prevention measures the institutions had implemented since the event, including mitigation of non-structural hazards (e.g., bracing of cabinets and heavy equipment), improved staff training, and better storage of medical supplies.

Conclusion

Hospitals also may be victims of disasters, and may need to transfer patients to outside facilities rather than continue to provide care on-site. No currently accepted, validated survey tool exists that assesses the hospital evacuation process. Researchers developed and implemented a survey instrument for evaluation of hospital evacuation after the Northridge, California earthquake. The seven major assessment categories are: (1) hospital demographics; (2) disaster plan description; (3) impact on hospital operations; (4) decision-making and incident management; (5) movement of patients within the facility; (6) movement of patients off-site; and (7) recovery. This tool provides a good starting point for benchmarking preparedness for hospital evacuation and a standardized measure of evacuation success after an event.

References

1. Joint Commission on the Accreditation of Healthcare Organizations: *Accreditation Manual for Hospitals*, Oak Brook:Terrace, Ill, 2005, Joint Commission.
2. Sternberg E, Lee GC, Huard D: Counting crises: US hospital evacuations, 1971–1999. *Prehosp Disast Med* 2004;19(2):150–157.
3. Robert Olson Associates: *Tough Decisions: Hospital Evacuation in the Northridge Earthquake*, Folsom, CA, 25 January 1998.
4. Schultz CH, Koenig KL, Lewis RJ: Implications of Hospital Evacuation after the Northridge, California Earthquake. *N Engl J Med* 2003:348; 1349–1355.
5. Blaser MJ, Ellison RT, III: Rapid nighttime evacuation of a veteran's hospital. *J Emerg Med* 1985;3:387–394.
6. Fisher HL: Emergency evacuation of the Denver Veteran's Administration Medical Center. *Mil Med* 1986;151:154–161.
7. Chavez CS, Binder B: A hospital as victim and responder: The Sepulveda VA Medical Center and the Northridge earthquake. *J Emerg Med* 1996; 14:445–454.
8. De Lorenzo RA, Augustine JJ: Lessons in emergency evacuation from the Miamisburg train derailment. *Prehosp Disast Med* 1996;11:270–275.
9. Tanaka H, Iwai A, Oda J, *et al*: Overview of evacuation and transport of patients following the 1995 Hanshin-Awaji earthquake. *J Emerg Med* 1998; 3:439–444.
10. Bell JR: 200 patients evacuated in hospital fire. *Fire Journal* 1985;Jul:55–95.
11. Blumhagen DW: Evacuation of patients during a fire at a general hospital. *Ann Emerg Med* 1987;16(2):209–214.
12. Burton I, Victor P, Whyte A: *The Mississauga Evacuation: Final Report to the Ontario Ministry of the Solicitor General*. Toronto: Institute for Environmental Studies, University of Toronto; 1981.
13. Henry S: Mississauga Hospital: Largest evacuation in Canada's History. *CMAJ* 1980;122:582–586.
14. Vogt BM: *Evacuation of Institutionalized and Specialized Populations*. Oak Ridge (Tennessee): Oak Ridge National Laboratory; 1990. ORNL/SUB-7685/1 & T23.
15. Maxwell C: Hospital organizational response to the nuclear accident at Three Mile Island: Implications for future-oriented disaster planning. *Am J Public Health* 1982;72(3):275–279.
16. Quarantelli EL: *Social Psychological Aspects of Evacuating or Sheltering Healthcare Facilities in the Event of a Nuclear Power Plant Accident*. Newark (Delaware): University of Delaware, Disaster Research Center; 1992. p 248.
17. Sporty L, Breslin L, Lizza P: The emergency evacuation of a psychiatric hospital. *Journal of Social Psychology* 1978;107(1):117–123.
18. Vasudevan P, Wade K: Total facility evacuation at Helena Regional Medical Center. *Journal of the Arkansas Medical Society* 1997;94(2):76–77.
19. McCaughrin WC: Perfect storm: Organizational management of patient care under natural disaster conditions. *Journal of Healthcare Management* 2003;48(5):295–310.
20. Nates JL: Combined external and internal hospital disaster: Impact and response in a Houston trauma center intensive care unit. *Crit Care Med* 2004;32(3):686–690.

Appendix—Northridge Earthquake Questionnaire (ICU = intensive care unit; CCU = cardiac care unit; PICU = pediatric intensive care unit; JCAHO = Joint Commission on Accreditation of Healthcare Organizations; Mgt = Management; NA = not applicable; COBRA = Consolidated Omnibus Budget Reconciliation Act; HEAR = Hospital Emergency Administrative Radio; REDDINET= Rapid Emergency Digital Data Information Network)

I. HOSPITAL DEMOGRAPHIC INFORMATION

1. How many licensed beds did your hospital have at the time of the earthquake? _____
   How many patients were in the hospital at that time? _____
2. How many stories tall is your hospital? _____
3. How many elevators does your hospital have? _____
4. How many staircases does your hospital have? _____
5. What types of special care units does your facility have (ICU, CCU, PICU, etc)? _____
   What are the units' capacities and how many patients were in these units at the time of the earthquake? _____
   _____
6. What year was construction completed on the hospital? _____
7. What role does the hospital fill in the community (trauma center, pediatric, university, etc)? _____

II. DISASTER PLAN CHARACTERISTICS

8. At the time of the earthquake, what was the status of your hospital's written disaster plan?

   _____ A comprehensive plan addressing the hospital as both a provider of assistance and a victim in need of assistance.
   _____ Focused exclusively on delivering assistance, without addressing the hospital as a victim.

9. Is the plan community-based or specific to your institution?

   _____ Community-based (county?) _____ Institution-specific

10. Does the plan explicitly include written agreements for mutual aid with other hospitals?

    _____ Yes. Does this cover:
    _____ exchange of equipment?
    _____ exchange of staff?
    _____ movement of patients (to/from)?
    _____ No

continued

11. Does your disaster plan address horizontal and vertical evacuation within your hospital?

_____ Yes, this is covered in the plan.
_____ No, but this is written up as a procedure separate from the plan.
_____ No, the issue isn't addressed.

12. Does your disaster plan address patient evacuation out from your hospital?

_____ Yes, this is covered in the plan.
_____ No, but this is written up as a procedure separate from the plan.
_____ No, the issue isn't addressed.

13. Is the evacuation plan generic ("all-hazards") or is it specific to a particular threat?

_____ Generic. Covers evacuation decisions & procedures that should be used any time evacuation is needed.
_____ Specific to a particular internal event (fire or hazardous materials contamination), but could be used for any reason.
_____ Specific to particular internal threat, not easily generalized.
_____ Specific to an earthquake.
_____ Includes contingencies for evacuation when buildings might be damaged.
_____ Anticipates the loss of electricity.
_____ Includes contingencies that might arise from chemical spills caused by ground motion.
_____ The evacuation plan does not mention earthquakes and doesn't talk about specific contingencies; it assumes staff will improvise.

14. Approximately how many hours of training in disaster procedures (on average) are given to hospital staff each year?

_____ Nurses _____ Administration _____ Physicians _____ Maintenance

How much on evacuation?

_____ Nurses _____ Administration _____ Physicians _____ Maintenance

15. Overall, how prepared was your hospital to evacuate patients out of the facility before the earthquake? Each member of the group should record the number that reflects their view and list their job title next to their response.

1	2	3	4	5
Unprepared		Somewhat prepared		Very prepared

16. During JCAHO-mandated disaster drills in the three years preceding the earthquake, was evacuation tested?

_____ Yes, evacuation within the hospital in connection with an earthquake.
_____ Yes, evacuation to other hospitals in an earthquake.
_____ Yes, evacuation within the hospital, not earthquake-related.
_____ Yes, evacuation to other hospitals, not earthquake-related.
_____ No, drills did not involve evacuation.
_____ No, but evacuation was tested in a non-JCAHO drill.

17. With respect to the development of your disaster (evacuation) plan or critiques of your plan, which other agencies have been involved?

_____ Fire Department _____ County Emergency Management Office _____ Red Cross

_____ Police _____ City Emergency Management Office _____ Other

III. IMPACT OF THE NORTHRIDGE EARTHQUAKE

18. Please indicate specific earthquake consequences for your hospital.

_____ Loss of electric power?
Approximately how many hours? _____
Were backup generators available? _____

_____ Reduction of regular staffing because employees couldn't reach the hospital or would not leave their families?
Approximately what percent of normal staffing levels existed in the first 24 hours following the earthquake (consider just your employees, not volunteers)? _____%

_____ Structural damage to hospital?

_____ Non-structural damage to hospital?

_____ Hazardous chemical incidents?

continued

_____ Loss of water?

_____ Natural gas leaks without fires?

_____ Loss of medical gases (oxygen, etc)?

_____ Equipment, supplies, or records inaccessible?

_____ Loss of telephone or other communication capacity?

_____ Broken windows, fallen shelves?

_____ Other (specify): _____

19. Overall, taking into account all types of damage, how would you rate the impact of the earthquake on the hospital's ability to function? Each member of the group should record the number which reflects their view and list their job title next to their response.

1	2	3	4	5
No impact		Some impact		Major impact

20. Were patient evacuations:

_____ within the hospital to safe areas? How many? _____
_____ to other acute care hospitals? How many? _____
_____ discharge to home? How many? _____
_____ to other facilities (Nursing homes)? How many? _____

21. Were multiple evacuations or movements needed?

_____ Yes, some patients moved once inside the hospital were moved again due to changes in building safety, equipment availability, staff availability, aftershocks, medical concerns, or other reasons.
_____ Yes, same patients moved inside the hospital had to be subsequently relocated to another hospital or facility, or discharged
_____ Yes, different areas were evacuated at different times, so different patients were moved at different times
_____ No, a single area was targeted and evacuated and no other movements of the same or different patients was needed

22. Were any patients transferred to your hospital while you were evacuating patients?

_____ No. _____ Yes.
Approximately how many? _____
From where? _____
Was this under a mutual aid agreement? _____

23. Did your emergency facility continue to accept and treat patients while you were evacuating (ambulance patients, walk-in patients, etc)?

_____ Yes.
_____ Yes, but with some restrictions.
_____ No.

IV. HOSPITAL DECISION-MAKING AND INCIDENT COMMAND

24. After the earthquake, approximately when was your hospital's written disaster plan officially activated?

_____ No official activation _____ <15 minutes _____ <1 hour _____ <6 hours

_____ <24 hours _____ >24 hours

25. Who is authorized by the disaster plan to activate it?
TITLE:_____

Who actually activated the plan?
TITLE:_____

Is a person specified as an ALTERNATE in the plan to activate it? _____

continued

26. Does the written plan, itself, specify criteria on which to base the decision to activate the disaster plan?

_____ Yes, the principle criteria are:
  _____ city, county or state emergency declaration
  _____ environmental conditions
  _____ hospital conditions
  _____ other: _____
_____ Yes, but criteria are not precise; the assessment is left to the decision-maker.
_____ No criteria are written into the plan (skip to Question #28).

27. At the time the plan was activated, do you believe conditions actually justified its activation in terms of the written criteria?

_____ Yes.
_____ No, activation was based on incomplete information.
_____ No, activation was based on faulty damage assessment.
_____ No, official activated the plan as a precautionary measure.
_____ No. Specify other _____

28. Was a damage assessment conducted at your hospital after the earthquake?

_____ Yes, by hospital staff.
  How many hours after disaster plan activation did this occur? _____
_____ Yes, by city or county inspectors.
  How many hours after disaster plan activation did this occur? _____
_____ Yes, by a private inspector paid by hospital.
  How many hours after disaster plan activation did this occur? _____
_____ No, staff handled obvious problems to return functionality.
_____ No, no assessment was needed.

29. Approximately how many hours passed before the evacuation decision was made? _____

30. Was damage assessment information used in making a decision to evacuate patients? _____

31. Who made the final decision to evacuate patients?
TITLE_____

32. Is this the same person assigned that responsibility in your written plan?

_____ Yes.
_____ No, it was a person specified as an alternate.
_____ No, it was a person not mentioned in the plan.
_____ No, evacuation is mentioned in the plan but no person is assigned the responsibility.
_____ No, evacuation is not addressed in the plan.

33. On what criteria were decisions to evacuate patients based?

_____ Structural damage to patient areas?
_____ Loss of electricity/insufficient power?
_____ Medical care delivery adequacy (loss of supplies, oxygen, staff shortages, etc.)?
_____ Medical condition of patients?
_____ Loss of water supply?
_____ Natural gas leak or other hazardous chemical incident?
_____ Possible future damage from aftershocks?
_____ Other: _____

34. Are criteria for the decision to evacuate patients specifically covered in the written disaster plan?

_____ Yes, and they were the same as those on which the decision was made.
_____ Yes, but the evacuation decision was also based on things not mentioned in the plan.
  What?_____
_____ No, the evacuation decision was based on: _____

35. Were any problems or delays encountered in obtaining the information needed to make the evacuation decision? If yes, what were the difficulties?

_____ No.
_____ Yes, the extent of building damage was not clear.
_____ Yes, communication systems did not function adequately.
_____ Yes, accurate time estimates for restoration of power, water, etc were difficult to obtain.
_____ Yes:_____

continued

36. Overall, what factors governed the decision to evacuate patients to another medical facility rather than move them within your own?

_____ Medical condition of the patient.
_____ Loss of or reduced medical service capacity (unavailability of equipment, medicines, medical gasses, etc.).
_____ Shortage of staff to deliver care.
_____ Loss of electricity/water/sewer capacity.
_____ Structural damage to critical areas of the hospital.
_____ Non-structural damage to critical areas of the hospital.
_____ Concern with further structural or other damage in aftershocks.
_____ Hospital was at capacity so moving patients elsewhere was the only option.
_____ Other: _____

V. MOVEMENT OF PATIENTS WITHIN THE FACILITY

37. With regard to any evacuation efforts, what triage strategy was used to determine movement priority?

_____ Standard medical concerns.
_____ Patient location in area of structural danger.
_____ Patient location in area without electricity/water.
_____ Some combination of the above.
What?_____
_____ Other: _____

38. Any patients triaged as unsalvageable? _____

39. Were any of the following units evacuated? If so, how many patients were moved? Describe any problems.

ICU: _____ N/A-no unit; _____ not affected; _____ affected/# patients evacuated? _____
CCU: _____ N/A-no unit; _____ not affected; _____ affected/# patients evacuated? _____
PICU: _____ N/A-no unit; _____ not affected; _____ affected/# patients evacuated? _____
____: _____ N/A-no unit; _____ not affected; _____ affected/# patients evacuated? _____

40. Did you identify any morbidity or mortality associated with the evacuation process?

_____

41. With regard to physical movement of patients, how was this accomplished? Indicate all that apply.

_____ Nurses _____ Physicians _____ Orderlies _____ Other staff _____ Volunteers

_____ Other: _____

42. Was movement accomplished by:

_____ walking patient to destination?
_____ moving patient in bed?
_____ moving patient in wheelchair?
_____ moving patient on gurney?
_____ carried?
_____ evacuation slide?
_____ Other: _____

43. Were evacuation routes posted or otherwise part of evacuation planning?

_____ Yes, and none were blocked.
_____ Yes, but some blocked (or too dark, etc) so rerouting was needed.
_____ No, routes not established in advance, but no movement problems arose.
_____ No, routes not established in advance and this resulted in some delay of movement.

44. Did evacuations involve the use of stairways and elevators?

_____ Yes, both used.
_____ Yes, stairways were used exclusively because elevators not working.
_____ Yes, stairways used exclusively because it was deemed not prudent (too risky) to use elevators, even though they worked.
_____ No, movements were confined to a single level (horizontal).

continued

45. Overall, were any special impediments to movement encountered in the process of moving patients within your hospital?

_____ Yes, shortage of personnel to move patients.
_____ Yes, elevators didn't function or could not be used safely.
_____ Yes, stairways were blocked, damaged, dark, or otherwise Impassable.
_____ Yes, not enough stairways to move patients quickly.
_____ Yes, not enough elevators to move patients quickly.
_____ Yes, hallways, doorways impassable because of fallen ceilings, cabinets, shelves, broken glass, etc.
_____ Yes, shortage of equipment on (in) which to move patients.
_____ Yes, equipment, medical records, medications moved with patients slowed the process down.
_____ Yes, tracking patients moved within the hospital was difficult.
_____ Yes, other: _____

46. What changes in procedure, equipment, or hospital layout could make future movements of patients within the hospital go more smoothly and quickly?

_____
_____

VI. MOVEMENT OF PATIENTS TO OTHER FACILITIES

47. Once the need to move patients to other medical facilities was determined, how were alternate facilities chosen?

_____ Through the use of HEAR radios or the REDDINET.
_____ Facilities where mutual aid agreements were in place.
_____ Facilities that were geographically closest.
_____ Facilities known to have specialized equipment or capacity.
_____ Facilities thought to have space to take patients.
_____ Contacts were made with facilities thought to be outside the impact area.
_____ Other: _____

48. Were they contacted before transfer? ____ Was this discussed in the disaster plan? _____

49. Would additional concurrent information about the status of surrounding hospitals have been helpful? _____

50. When patients were transferred to other medical facilities, how were they actually moved? Indicate all that apply.

_____ Ambulances _____ Public safety vehicles (police, fire) _____ Public buses

_____ Hospital-owned vehicles (non-emergency) _____ Personal vehicles

_____ Buses obtained privately _____ Helicopters

_____ Other. What? _____

51. How was transportation arranged?

_____ Prearranged in the disaster plan.
_____ Not prearranged in disaster plan.
_____ Hospital staff was aided by outside agency. Who? _____
_____ Transportation arranged by agency designated in disaster plan.
_____ Transportation arranged by agency not designated in disaster plan.

52. Were medical records, equipment and/or medications moved with patients transferred to other medical facilities?

_____ Yes, as required in our disaster plan.
_____ Yes, but isn't required in our disaster plan.
_____ No, but it is required in our disaster plan.
_____ No, but it is not required in our disaster plan.

53. How were COBRA regulations addressed during patient transfers?

_____ Rules suspended in emergency to follow-up later.
_____ Consent & forms filled out while patients waited or in transit.
_____ Other: _____

54. Were any special problems encountered in patients evacuated to another medical facility?

_____ Long delays were involved while patients waited for transport.
_____ Extra personnel were needed to oversee patients waiting for transport.
_____ Medical supervision was needed for patients awaiting transport and during transport.
_____ Movement of equipment, medical records and/or medications with patients slowed the process down.

continued

_____ Processing of COBRA requirements for each patient moved slowed the process down.
_____ Shortage of equipment on (in) which to move patients.
_____ Shortage of vehicles for transport slowed process down.
_____ Hospital liability insurance considerations slowed the process.
_____ Problems in tracking patients who were relocated off site.
_____ Other: _____

55. Overall, what changes in procedure, equipment, or hospital layout would make future evacuations of patients to other medical facilities go more smoothly and quickly?

_____
_____

56. Emergency procedures and strategies are almost always described in written disaster plans, but almost always some portion of the actual response must be improvised by staff. Please estimate the proportion of your response to the earthquake event that had to be improvised by staff. Each member of the group should record the number which reflects their view and list their job title next to their response.

1	2	3	4	5
Almost everything improvised		50% was improvised		Almost everything covered in plan

VII. HOSPITAL RECOVERY (LESSONS LEARNED)

57. Since the earthquake, has your hospital held meetings to critique the overall response?

_____ Yes.
_____ Yes, and we have begun making specific changes to adapt the disaster plan to our experiences.
Specify which changes: _____
_____ No, but these are planned.
_____ No.

58. Overall, please rate the extent to which you believe that your written disaster plan adequately handled the contingencies you faced in the earthquake event.Each member of the group should record the number which reflects their view and list their job title next to their response.

1	2	3	4	5
Most issues not addressed in plan		Some issues not address in plan		Covered virtually everything

59. Please indicate any special problems or issues that arose in the earthquake response that WERE NOT anticipated in your written plan.

_____ Reduced communications capacity with entities outside the hospital.
_____ Reduced communications capacity within the hospital.
_____ Patient tracking issues.
_____ Management of volunteers (medical/non-medical).
_____ Availability of hospital physicians and staff.
_____ Emergency credentialing of volunteers.
_____ Availability of information on hospital damage assessment.
_____ Availability/accuracy of information on the demand for hospital service within your community.
_____ Accuracy of information disseminated by the media.
_____ Unclear/undefined responsibility for decisions regarding hospital or patient management during the disaster.
_____ Hospital personnel/decision-makers not clear on disaster procedures specified in written plan.
_____ Inadequate availability of equipment, supplies, and medications.
_____ Building/structural damage to hospital itself.
_____ Limitations due to structural/other damage at hospitals in area.
_____ Limitations due to unavailability of internal evacuation routes (routes blocked for structural reasons, loss of power).
_____ Limitations due to influx of emergency patients.
_____ Hazardous chemical spills.
_____ Lack of access to architectural drawings of the facility.
_____ Other _____

60. Please indicate the single most important UNANTICIPATED PROBLEM that could have had negative consequences for either patient care or movement.

_____

61. Please indicate what CHANGES have been made in your written disaster plan as a function of the earthquake.

_____ Disaster drills focusing on earthquake events.
_____ Rapid structural damage assessment of the hospital structures.
_____ Multiple alternate modes of communications (cellular phones, radio, message relay through other agencies).
_____ Emergency staffing supplementation.
_____ On-site clean-up of hazardous chemical spills.

continued

_____ New/modified mutual aid agreements with other medical facilities covering patients, equipment, etc.
_____ Acquiring medical transport rapidly in the event external patient evacuation is needed.
_____ Modification of patient tracking systems.
_____ Clarify lines of hospital management authority.
_____ Clarify responsibility for medical decisions impacting patients.
_____ Other: _____

62. Since the earthquake, has the hospital instituted any specific mitigation or prevention measures?

_____ Structural bracing or improvements are in progress or completed.
_____ Cabinets, shelves, other equipment have been secured.
_____ Specific training programs for staff have been implemented.
_____ Alternate storage practices for equipment, medical supplies, records, hazardous chemicals have been devised.
_____ Bracing installed to prevent movement of patient beds during an earthquake.
_____ Mutual aid agreements.
_____ Other: _____

63. Since the earthquake, you have had time to reflect on the experience and your hospital's performance. In light of all this, could you please tell us what you believe is the SINGLE MOST IMPORTANT LESSON YOU LEARNED?

_____
_____