(76%) were transferred from affected hospitals to back-up hospitals, while 549 patients (24%) were evacuated directly to the back-up hospitals. The peak in transports came during the first four days. The family car was the most frequently utilized means of transport; ambulances were used in only 26% of cases, and the helicopters were utilized minimally.

Conclusion: In the initial 15-day period following the earthquake, there was an unprecedented number of patients suffering from trauma, and they converged upon the *affected* hospitals. Subsequently, an increased incidence of illness was observed. The existing emergency medical services system was not adequate for this urban earthquake. From our vantagepoint, we are keenly aware of the need for improved communications between hospitals, a well-equipped patient transport system, and a well-coordinated disaster response mechanism.

Keywords: ambulances; automobiles; crush syndrome; disaster; demography; distribution of patients; emergency medical services (EMS); Hanshin-Awaji earthquake; helicopters; hospitals; illnesses; injuries; morbidity; mortality; transfers; trauma

PN2-2
Complex Systems in Crisis: The Great Hanshin Earthquake, 17 January, 1995

Louise K. Comfort
University of Pittsburgh, Pittsburgh, Pennsylvania USA

Sudden disaster creates an enormous disruption for the interdependent systems of services — communications, transportation, electrical, water, gas distribution, and sewage disposal — essential to response operations in a technically advanced society. Disaster environments are dynamic, and require a different mode of organization, information processing, and leadership skills than are the traditional forms of management and control. The problem is how to increase the capacity of interdependent organizations to anticipate risk and demonstrate resilience in response to threat.

This problem intensifies for public organizations that interact with private and non-profit organizations to protect a community at risk from natural or technological disaster. Organizational performance repeatedly declines in environments of increasing complexity, and previous efforts to address this problem have considered it essentially insoluble. Increases in organized complexity require significant increases in information flow, communication, and coordination in order to integrate multiple levels of operation and diverse requirements for decision into a coherent program of action. Yet, human decision makers have limited cognitive capacity. In rapidly changing environments, they often are unable to process the amount and range of information required to make timely, informed decisions essential for adequate coordination among the multiple components of the response system. Accordingly, organized performance in complex environments has been viewed as necessarily limited by human information processing capacity.

Advances in information technology and telecommunications allow means to overcome the long-observed decrease in organizational performance in complex environments. Technical capacity to order, store, retrieve, analyze, and disseminate information to multiple users simultaneously creates the potential for innovative approaches to collective learning and self organization. These means extend information processing capacity beyond the limits of single individuals, and provide decision support to multiple managers addressing the same problem at different locations at the same time. Linking organizational capacity for mobilizing the resources of a community to appropriate uses of information technology creates a "sociotechnical system" in which technical capacity to exchange timely, accurate information among multiple participants increases organizational capacity to solve shared problems that require action at local, regional, and national levels.

This paper will present the concept of self organization in the mitigation of risk and mobilization of response to disaster. This concept depends upon the design and implementation of a socio-technical system that integrates the technical capacity of information technology with organizational design and communication processes among major actors in a community response system. This paper will present findings from a field study of the Great Hanshin Earthquake of 17 January 1995 that shows the consequences of a major earthquake in a metropolitan area of 6 million people. Such an event disrupts the performance of the basic response systems of the community, including the capacity for medical response. This paper will identify possible ways to improve inter-organizational and inter-jurisdictional performance in risk reduction and response to disaster, focusing on medical response, through the appropriate design and application of information technology.

Keywords: earthquake; Great Hanshin earthquake; information systems; mitigation, risk, systems; technology

PN2-3
Disaster Preparedness in Osaka: A Role and Relationship of the Core Medical Institutes in a Disaster

Toshiharu Yoshioka; Shigeru Yamayoshi; Hisashi Ikeuchi; Atsushi Iwai; Akira Nakamura; Kikushi Katsurada
Department of Emergency Medicine, Osaka Prefectural General Hospital, Osaka City, Japan

When a great earthquake strikes Osaka Prefecture, the number of injured and deceased will be several times those that occurred in the Great Hanshin-Awaji Earthquake because Osaka is one of the most overpopulated areas in Japan.

Medical actions should be divided into two categories: 1) those in the affected area; and 2) those in the non-affected areas. Both those injured victims triaged as well as those needing treatment for mild injuries must receive care at the core medical institutes with in the damaged area. However, it is most important for the core disaster hospital to take care of the "red-tagged"