L1-5
Psychological Effects of Disaster in Children

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1) Stress reactions in children
   a) Acute phase
   b) Restabilization phase
2) Children's experiences in a disaster
   a) Destruction
   b) Detachment
   c) Bereavement
   d) Confusion
3) Interventions
   a) Children survivors
   b) Family
   c) Nurses and teachers
4) Expectations of mental health services

Keywords: children; disaster; effects; expectations; experiences; interventions; mental health; psychological; stress reactions

L1-6
Management for Alcohol-Related Problems After a Natural Disaster: In the Case of The Great Hanshin-Awaji Earthquake

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Soon after the Great Hanshin-Awaji Earthquake, the concept of the post-traumatic stress disorder (PTSD) was introduced into Japan and immediately became popular. We believe the reason is that it is easy for people to understand PTSD as a very sympathetic mental illness that every person could affect all persons who suffer from traumatic events.

However, it actually was difficult for psychiatric staffs to manage the adjustment behavior of mentally ill patients at the shelters. Of special concern was alcoholism, as some alcoholics could drink with right reason because victims were likely to have the use of liquor recommended as a method for manage their stress. In the Japanese culture, people are permitted to drink for coping with sadness or pleasure on "hare"(unordinary days including feast and mourning days). After the earthquake, many bottles of liquor as material supports were sent to shelters. As it is estimated that almost 2% of Japanese are alcoholics, many treated and untreated alcoholics must have evacuated to shelters. It was very risky. The longer time after the earthquake, the more alcohol-related problems seemed to appear. Therefore, management for alcoholics gradually has become an important issue. Moreover, we worried about relapse of ex-alcoholics. Alcohol abstinence, self-help groups such as Danshukai and AA had come to have few meetings because every place where meetings could be held had become shelters.

Since victims had moved to temporary evacuation dwellings, it has begun to be recognized that many of the solitary deaths of living in single residences were associated with alcohol. Thus, after the earthquake, alcohol-related problems have been continuous and serious.

This presentation will include: 1) Preventive strategy for alcohol-related problems; and 2) Method for supporting alcoholics at shelters and temporary evacuation dwellings.

Keywords: alcohol; alcoholism; culture; disasters; Great Hanshin-Awaji Earthquake; management; mental illness; post-traumatic stress disorder (PTSD); psychiatry; self-help; shelters; support

General Session XIII
Disaster Epidemiology
Tuesday, 11 May, 8:30–9:45 hours
Chair: *M. Wayne Greene, Hiroshi Henmi*

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The Risk Factors of Crush Syndrome Patients for Renal Failure, Hemodialysis, and Death

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Introduction: Although numerous reports have described crush syndrome patients after a large earthquake, risk factors for severe complication and a deleterious outcome never have been established because of scarcity of epidemiological and quantitative analysis. In this study, we clarify the risk factors and the effectiveness of fluid resuscitation for crush syndrome.

Methods: We used data from 372 crush syndrome patients reported by Oda *et al.* Three outcomes were employed: 1) renal failure (RF) defined as serum creatinine (Cr) >2.5 mg/dl; 2) induced hemodialysis (HD); and 3) death. A total of 21 risk factors were grouped into seven domains: 1) patients characteristics; 2) physical examination and laboratory data without specific device; 3) laboratory data using specific devices; 4) life-saving effort; 5) severity of crush syndrome; 6) therapeutic approach; and 7) the site of injury. Logistic regression models were used to control for confounding variables and to assess interaction between variables after a univariate analysis for all 21 variables. The Mantel-Haenstzel test was used to assess the effects of volume resuscitation therapy stratified by severity of crush syndrome. In all tests, a p-value of 0.05 or less was considered to be statistically significant.

Results: The final logistic regression models included peak CK and macroscopic abnormal urine finding for RE; peak CK, macroscopic abnormal urine finding, tachycardia, and delay of rescue response for HD; and peak CK and presence of body injury for death. The patients whose peak CK was >100,000, always had HD or death. Although the outcomes of patients with severe crush syndrome (peak CK >75,000) were not severe (RE) if they had received massive volume resuscitation (>160m1/kg/day), the Mantel-Haenszel test showed no significant relationship between the amount fluid administered and outcome ($p = 0.63$).

Conclusions: We found several risk factors for each outcome following crush syndrome that are pathophysiologically reasonable. The peak CK was a strong prognostic factor for all three outcomes. Because only 3% of patients received massive fluid resuscitation, the beneficial effects of fluid resuscitation did not show statistical significance. However, it may be useful for crush syndrome except for extremely severe patients (peak CPK >100,000).

Keywords: crush syndrome; death; earthquake; fluid resuscitation; hemodialysis; risk factors; volume

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Cost-Effectiveness Analysis of Volume Resuscitation Therapy for Crush Syndrome Patients following a Large Earthquake

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Introduction: Several articles have reported the effectiveness of fluid resuscitation therapy following crush injury, but the number of patients in these studies is small. In our previous report on the Hanshin-Awaji Earthquake, fluid resuscitation therapy did not show a statistically significant effect because few patients received massive fluid resuscitation. In this study, we performed meta-analysis to integrate all clinical studies of traumatic crush syndrome, and conducted a cost-effectiveness analysis of fluid resuscitation therapy to prevent fatal and/or severe complication of crush syndrome.

Methods: A simple decision-tree model was used to compare massive fluid resuscitation (>160ml/kg/day) strategy (MF) and less fluid infusion therapy (LF) over a short time period. Outcomes were defined in terms of expected utility (EU). Transition probabilities were obtained from our previous report and the published literature, and integrated with meta-analysis. Utilities were elicited from expert panels, and reported as quality-adjusted expected survival (QAES). Cost data were estimated based on the current insurance system in Japan. Tornado diagram analysis was performed on all probability and utility values to clarify the influence of each factor, and further one-way sensitivity analysis was done in order to explore the threshold of each variable. Monte-Carlo probabilistic sensitivity analysis was undertaken to simulate the uncertain clinical situation.

Results: Expected Utility analysis demonstrated a QAES of 0.759 with MF, and a QAES of 0.665 with LF. A tornado diagram analysis showed that salvage rate at three hours after earthquake, and the complication rate of renal failure and mortality in the MF group have the greatest influence on the decision. Monte-Carlo sensitivity analysis of 10,000 samples revealed that the MF strategy had greater QAES in 98.2% of cases. Cost-effectiveness analysis indificated that about $17,000/QAES for the MF strategy versus $40,000/QAES for the LF strategy. Cost of in-patient care and quality of life for uncomplicated patients and renal failure morbidity for MF patients are significant factors in cost-effectiveness analysis.

Conclusions: MF strategy is a cheaper and more effective therapy for crush syndrome patients, compared to LF. Effort should be directed to improve patients' outcomes according to the factors reported that influence the treatment decisions in the current study. Further study of medical preparedness for MF is needed to provide international guidelines for medical response planning for crush syndrome patients.

Keywords: cost-effectiveness; crush syndrome; fluid resuscitation; Great Hanshin-Awaji Earthquake; renal failure; treatment

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Estimation and Reduction of Casualties in Buildings During Earthquakes

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The aim of this study is to examine the use of Loss Estimation Techniques (LETs).

Most of the well-known applied LETs are aimed at understanding the probable human fatalities and property damage. Medical parameters of disasters such as the number of wounded people and the classification by the types of injuries seldom are considered by the modern LETs. At the same time, these parameters are very important for the development of preventive medical preparedness for a forthcoming disaster.

A sad experience in the last earthquakes was classification of different types of buildings from a point of view of the inhabitants' vulnerability. Moreover, even non-destructive earthquakes have caused human victims