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

Noriaki Aoki MD;[1,2] Shizuko Nagata, MD;[2]
J. Robert Beck, MD;[1] Ernesto A. Pretto, MD;[3]
Katsuhiko Sugimoto, MD;[4] Jun Oda, MD;[2]
Hiroshi Tanaka, MD;[2] Toshiharu Yoshioka, MD; [2]
Tsuguya Fukui, MD[2]

1. Information Technology Program, Baylor College of Medicine, USA
2. Department of General Medicine and Clinical Epidemiology, Kyoto University Hospital, Kyoto, Japan
3. Safar Center for Resuscitation Research, University of Pittsburgh, Pittsburgh, Pennsylvania USA
4. Department of Emergency and Critical Care Medicine, Showa University Hospital, Tokyo, Japan
5. Department of Traumatology and Emergency Medicine, Osaka University Medical School, Osaka, Japan

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

Mark Klyachko, PhD; Tatyana Markacheva
Centre on EQE & NDR, (CENDR), Gosstroy of Russia, Kamchatka, Russia

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