

### S1 Countermeasures against the Pandemic Influenza H1N1 at Saitama City Hospital

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**Introduction:** Influenza H1N1 which emerged in 2009 caused social anxiety in Japan because of its unknown pathogenicity. At Saitama City Hospital, a plan of action for the epidemic was established based on the Action Plan formulated by the local government.

**Medical services:** Patients with a high fever (over 38.0 degrees) and symptoms common to influenza were examined mainly by emergency physicians and pediatricians in the flu clinic where zoning was planned according to patient flow lines. The medical staff in the flu clinic was instructed to follow the CDC's guidelines for infection control and to wear appropriate PPE. Serious cases were admitted to negative-pressure rooms to isolate them. Virus subtype identification by RT-PCR was discontinued in July because subtypes other than H1N1 were extremely limited in number.

**Results:** As of March, 2010, 1818 patients had been examined in the flu clinic, and 776 were diagnosed with H1N1. Although there were no fatal cases, 66 patients required admission to the hospital for quarantine and treatment of pneumonia and encephalopathy.

**Commentary:** Primary care of influenza H1N1 requires special skills to prevent healthcare staff from becoming infected. Thus, we believed it less efficient to examine sporadic influenza patients in general outpatient clinics. Patient care by emergency physicians accustomed to emergency cases can minimize disruption of medical services in other sections of the hospital.

Influenza H1N1 in 2009 provided a good opportunity to establish countermeasures against highly pathogenic avian influenza which is considered likely to emerge in the near future.

### S2 Clinical characteristics of pneumonia in hospitalized patients with novel influenza A (H1N1) in Korea

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Since March 2009, a novel influenza H1N1 virus (2009 H1N1) emerged and spread worldwide. We describe the clinical course of pneumonia in hospitalized patients with 2009 H1N1 in Korea from August to mid-October 2009. A total of 17 cases of pneumonia were admitted to an acute care unit among 351 patients who were confirmed 2009 H1N1 infection. More than half of the patients were between 7 and 23 years of age, and only 2 patients were 65 years of age or older. Only 6 patients (35.3%) had underlying medical conditions. For 10 of the 17 patients, the chest radiographs on admission had findings pneumonia with bilateral infiltrates. Despite intensive resuscitative efforts, one adult patient with severe hypoxemia at emergency department visit was died 3 weeks later. However, most of patients could be discharged without any other complication in five days. A 2009 H1N1 in Korea can cause pneumonia with mild hypoxemia at admission in previously healthy school-aged persons.

### S3 H1N1 influenza; how to manage the pandemic in the emergency medicine setting

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Kawasaki Municipal Hospital is a large general hospital, with 733 beds, and is located 20 km from the center of Tokyo. This hospital has an emergency medical center, and annually accepts 35,000 patients (7,500 transported by ambulance transports) with all severities of emergency conditions. It also functions as a pediatric emergency center. Ambulance-transported patients are accepted by the emergency department, and pediatric patients by the pediatrics department, while adult walk-in patients are seen by general physicians. The doctors cooperate with each other.

H1N1 influenza patients are accepted in this emergency system. On the other hand, serious patients transferred from other hospitals are managed by emergency physicians and internal medicine physicians in the ER, but are managed by the infectious-disease department during hospitalization. As a general rule, patients with H1N1 influenza are placed in general private rooms, while the use of special isolation rooms (there are 12 such infectious-diseases special rooms in this hospital) is not permitted. To date, we have hospitalized 13 H1N1 influenza patients (11 pediatric patients) whose infections were associated with pneumonia or encephalitis. Furthermore, we transferred one (child) to specialized facilities for children with infectious diseases.

We are dealing with a very serious matter in terms of emergency medicine. Although there are many new reports on H1N1 influenza, this news may confuse doctors. In other words, doctors fear H1N1 influenza, and may even misdiagnose other serious diseases as H1N1 influenza. In Japan on September 18, when staying with a patient who has influenza including those with signs of influenza despite being negative by the quick test kit for the H1N1 influenza virus, it became permissible to prescribe Tamiflu. However, a pre-existing bias might still lead to misdiagnosis. We will report a misdiagnosed patient with group A streptococcal necrotizing fasciitis with toxic shock-like syndrome, who died.

### S4 Status of emergency physician in Japan; who are emergency physicians and what are they doing?

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The Japanese emergency medical service system was established in the 1970's. This system is composed of primary, secondary and tertiary emergency medical care facilities. Primary emergency medical facilities handle outpatients who do not require hospitalization. Secondary care includes community hospitals where seriously ill patients cannot be hospitalized. Tertiary care centers are authorized as "emergency medical service centers".

The practice of emergency medicine in Japan has been unique in that emergency doctors are engaged in critical care medicine and traumatology mostly at emergency medical service centers. However, with the recent increase in the number of emergency patients, some hospitals have adopted US-style emergency medicine, where emergency physicians take care of all patients presenting to the emergency department. Emergency physicians have expertise in some aspects of all medical specialties enabling them to recognize, evaluate, treat and stabilize patients with a wide variety of illnesses and injuries.

In November 2007, the status of implementation of US-style emergency medicine in accredited training institutions for Fellowship of the Japanese Association for Acute Medicine (JAAM) was investigated. Questionnaires were sent to 408 accredited training institutions, and valid responses obtained from 248 facilities were analyzed (88%). US-style emergency medicine was provided in 150 facilities (60% of 248 facilities), either in full time (24 hours a day, seven days each week; 82 facilities) or in

part time (less than 24 hours a day; 68 facilities). Sixty-eight facilities provide a residency training program, and another 36 institutions plan to build it up. US-style emergency medicine operates in some accredited training institutions for Fellowship of the JAAM; however, its staffing is inadequate. The national strategy to provide emergency doctors/physicians is seemingly essential.

#### S5 Characteristics and Epidemiology of 2009 Influenza A (H1N1): An observational Study at a Tertiary Emergency Department

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**Purpose:** 2009 Influenza A (H1N1) was pandemic in Korea. This study aimed to describe the epidemiologic characteristics of influenza A (H1N1).

**Methods:** A prospective surveillance from September 1 through November 30, 2009 in one urban academic emergency department (ED) was conducted. Demographics, diagnostic, and therapeutic variables were recorded and follow-up telephone survey for final outcome was conducted at 1 week after ED visit.

**Results:** A total 5,317 patients visited influenza care center in ED. 1,472 patients (27.7%) were confirmed as influenza A by RT-PCR method. Among RT-PCR positive patients, 90 patients and 7 patients admitted to ward and intensive care unit respectively. Five patients needed mechanical ventilation and one patient was diagnosed as acute respiratory distress syndrome (ARDS) but fully recovered. There was no mortality caused by H1N1. The median age of confirmed patients was 9 years (range, 1 month - 81 years), 825 patients (56.1%) were male gender, and 223 (15.3%) had risk factors for seasonal influenza complication. Common symptoms were fever (92.8%), cough (84.1%), and rhinorrhea (44.0%) by incident rate. The 40.3% (593/1472) patients were pre-school age (range, 1 month - 7 years, median 4 years). In young patients, 97.5% (578/593) complained fever and 81.3% (482/593) had cough. The 7.8% (46/593) were admitted and three patients required admitting to intensive care unit and mechanical ventilation.

**Conclusion:** Surveillance of H1N1 virus shows that the majority of those infected have a mild illness. The 2009 H1N1 virus common with pre-school ages and few severe illnesses occurred in young individuals.

**Keyword:** influenza A, emergency department, epidemiology

#### S6 Residency and Career Satisfaction Among Emergency Medicine Residents in Japan

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**Background:** Despite the critical importance of quality of residency training, no studies have examined Japanese emergency medicine residents' satisfaction in their training. This study investigated their residency and career satisfaction, and factors associated with high and low satisfaction.

**Methods:** We developed a cross-sectional survey to measure residents' satisfaction and its associated factors. Data were collected in February 2010 from all emergency medicine residents from 10 institutions and residents who participated in the EM Alliance Meeting. The survey consisted of 16 questions on demographics; 3 questions on well-being; 8 questions on training; 6 questions on professional interests; 11 questions on professional experience; and 4 questions about overall satisfaction. Questions relating to satisfaction were scored with a 5-point Likert-like scale, and

further dichotomized to high and low levels. Data were analyzed with factor analysis and multivariable analysis was performed with a logistic regression model.

**Results:** Of questionnaires distributed, 100% (n=67) were returned. Overall, 50.1% and 67.2% of residents reported high residency and career satisfaction, respectively. Training system factors (well-developed curriculum and emergency system at institution, subspecialty support, and role model) were positively associated with residency satisfaction (p=0.03). Stress factors (various stresses and fatigue) were negatively associated with career satisfaction (p=0.02).

**Conclusion:** Although more than half of emergency medicine residents reported high level of satisfaction, interventions on these training system factors and stress factors may increase residents' satisfaction. This study can serve as a basis of future resource application, research and advocacy for improvement of residency training and securement of future emergency physicians.

#### S7 Therapeutic Hypothermia Attenuates Post-resuscitation Myocardial Injury in Swine Cardiac Arrest Model

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**Purpose:** Therapeutic hypothermia during post-resuscitation care has been recommended because of its neuroprotective effects. However, a few studies have reported the effects of therapeutic hypothermia on heart. The aim of this study was to determine whether therapeutic hypothermia attenuates post-resuscitation myocardial injury in swine cardiac arrest model.

**Methods:** After the induction of ventricular fibrillation and subsequent 6-min no flow time, we provided cardiopulmonary resuscitation to pigs (35 - 40 kg of body weight) and acquired restoration of spontaneous circulation (ROSC). Then the subjects were randomly allocated to normothermia group (NT group, n=5) or hypothermia group (HT group, n=5). In HT group, therapeutic hypothermia with 32 - 34°C of core temperature was maintained for 24 hrs and rewarming was performed over 8 hrs. In NT group, core temperature was maintained to 37°C throughout experiments. After 60-hr post ROSC, myocardial tissues were harvested. We compared between the two groups with respect to hemodynamic parameters, myocardial ATP contents, apoptosis-related protein expressions, and histological damages.

**Results:** Hemodynamic parameters were not different between the two groups. Myocardial ATP contents in the HT group were higher than those in the NT group. Immunohistochemistry for apoptosis-related protein showed that survivin and cleaved caspase-3 expressions in the HT group were higher, and XAF1 expression in the HT group was lower than those in the NT group. Myocardial histological damages were also attenuated in the HT group.

**Conclusion:** Therapeutic hypothermia preserved ATP, reduced development of apoptosis, and attenuated histological damages in myocardium during post-resuscitation care.

**Keywords:** cardiac arrest, myocardial injury, therapeutic hypothermia, apoptosis, ATP

**S8 Evaluation of a New Model for Emergency Departments and Implications for Future Residency Programs**

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**Introduction:** A United States (US)-style Emergency Room (ER) model has recently been introduced and is continuing to gain popularity in Japan. A new Emergency Department (ED) which combines a US-style ER and a traditional Japan-style ED was established in Teikyo University Hospital on May 7th 2009. The purpose of this study is to review the eleven month experience and to consider whether the patient volume was acceptable for US residency programs.

**Methods:** A retrospective review of the Teikyo-ED registry was carried out between May 2009 and March 2010.

**Results:** Twenty five thousand two hundred fifty-four cases were treated in the ED. One thousand and three hundred thirteen cases were brought to the Trauma and Resuscitation Center, which functions as a tertiary ED. There were 6393 ambulance transports to the ER as a secondary triage category. There were 1180 admissions or 4.7% of total volume in emergency intensive care unit.

**Conclusions:** This ED has taken all responsibility not only for trauma, medical emergencies, intoxication and critical care that have been acknowledged in our professional discipline for more than forty years, but also for walk-in medical and surgical emergencies. The estimated number of ED visits and the critical admissions in a year will achieve the minimum requirement in US. Therefore the new combined residency program in Teikyo University is ideal for maintaining the identity of the Japanese Association of Acute Medicine and it is thus considered to be a good model ED for modern day Japan.

**O1 Successful Treatment by Extracorporeal Membrane Oxygenation of a Child Suffering from Severe Respiratory Failure Complicating the Novel Influenza A (H1N1) Virus Infection**

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This paper reports the successful treatment by Extracorporeal Membrane Oxygenation (ECMO) of an 11-year-old girl with life-threatening acute respiratory failure complicating the novel influenza A (H1N1) virus infection during the influenza outbreak of 2009. Admitted with wheezing and fever (37.8°C), the child's respiratory condition deteriorated rapidly and she was transferred to our unit. Her SpO<sub>2</sub> remained between 80-85% with oxygen supplementation at 10 L/minute, and aggressive mechanical ventilation did not improve her condition. X-rays revealed evidence of atelectasis of the right upper-middle lobes and of the left lower lobe of the lung with pneumomediastinum. As the respiratory acidosis was quickly worsening, we commenced ECMO. The child exhibited rapid improvement in response to veno-venous ECMO, and her cardiopulmonary condition stabilized. Oseltamivir (450mg/day) was administered through a naso-duodenal tube. Aggressive pulmonary treatment was also undertaken, with administration of a surfactant and thorough bronchial toilet. No complications of ECMO were observed, and the child's pulmonary condition improved rapidly. After 73 hours, the child was successfully weaned from the ECMO, and she could be extubated soon after with no recurrence of dyspnea. Thus, ECMO was life-saving in our patient, and we recommend that ECMO be introduced immediately upon failure of mechanical ventilation in children with severe respiratory failure complicating the novel influenza A (H1N1) virus infection.

**O2 Simple survival prediction of blunt trauma for emergency physicians**

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**Introduction:** For real-time assessment of probability of survival (Ps) for blunt trauma victims at emergency department, this study aimed to establish regression models for estimating Ps that used simplified coefficients and could be used even when some variable is missing.

**Methods:** Data (10,210) including necessary data for Ps calculation by the TRISS method and including binary data of survival were collected from blunt trauma patients (17,564) registered in the Japan Trauma Data Bank (JTDB, 2004-2007), and half (5,113) of the data was allocated to a training data set, with the remaining half (5,097) allocated to a validation data set. For logistic regression analysis, age, injury severity score (ISS), Glasgow coma scale (GCS) score, systolic blood pressure (BP), respiratory rate (RR), and their coded values (cAGE: 0~1, cISS: 0~4, cBP: 0~4, cGCS: 0~4, cRR: 0~4) were used as explanatory variables. For validations, areas under curves of receiver-operating characteristic curves (AUROCs) were compared.

**Results:** The model with age, cISS, cBP, cGCS, and cRR shows the lowest in Akaike's information criterion. For easier calculation, we made a similar model with simplified coefficients (logit (Ps) = -α + cISS - cAGE + cBP + cGCS + cRR/2), which showed an AUROC of 0.9635 in derivation and 0.9639 in validation. Modifications of this model without one or two of those explanatory variables can maintain AUROCs greater than 0.94.

**Discussion:** If calculated value of the simplified equations is more than 0, then Ps is

more than 0.5. These equations allow real time assessments of survival from easy mental calculation by physicians, and can be utilized for critical decision making at emergency departments.

**O3 The predictive factors of traumatic cardiac arrest patients**

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**Background:** Traumatic cardiac arrest patients have very poor prognosis. We sought to determine predictive factors for mortality in trauma patients who were received cardiopulmonary resuscitation.

**Methods:** We conducted a retrospective study of 560 patients with traumatic cardiac arrest (male 392 [70%], mean age 48±21 years) who visited our ED from January 1997 to April 2010. We divided patients according to survival more than 24 hours.

**Results:** 212 patients (38%) recovered their spontaneous circulation. 62 patients (11% of total study patients) survived more than 24 hours. The patients who discharged alive were 12 patients (2% of total study patients). About the immediate cause of cardiac arrest, hypovolemia were most frequent (255 patients [46%]), CNS injuries were 198 patients (35%), tension pneumothorax 34 patients (6%), and so on. The odds ratio of the recovery of spontaneous ventilation were 23.036 (95% confidence interval [CI] = 5.452-97.336). Ratio of hypovolemia (>24h-survival group, 38% (24/62); <24h-survival group, 60% (91/150) [p=0.015]), Head and neck trauma (>24h-survival group, 39% (24/62); <24h-survival group, 29% (44/150) [p=0.017]) and Chest trauma (>24h-survival group, 15% (9/62); <24h-survival group, 37% (56/150) [p=0.007]) were different significantly between groups.

**Conclusion:** Among >24h-survival patients with traumatic cardiac arrest, they had more head and neck trauma, less chest trauma and less hypovolemia. The recovery of spontaneous ventilation were predictive factors of survival according to our study.

**O4 The ATOM course in Japan**

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**Introduction:** The Advanced Trauma Operative Management (ATOM) course was developed as a model for teaching operative trauma techniques to surgical residents, fellows, and attending surgeons as the number of operative cases decreases in the US. In 2008, Japan was successful in establishing a new ATOM training site at Jichi Medical University, and by October, 2010, four courses were provided.

**Methods:** The ATOM course consists of lectures and a porcine operative experience. Comprehensive evaluation of ATOM was designed to assess participant learning in the cognitive, affective, and psychomotor domains. Data on the first 43 participants was retrospectively collected and analyzed.

**Results:** Participants included: 17 expert traumatologists, and 26 general surgeons. Mean scores for knowledge significantly improved from 61.9±13.6 (before) to 72.6±14.0 (after, p<.001). Similarly, self-confidence scores increased significantly from 65.4±17.9 (before) to 81.2±9.6 (after, p<.0001).

**Discussion:** This course creates life-like situations in a standardized fashion that, along with didactic instruction that improves knowledge and operative confidence for practicing trauma surgeons and general surgeons.

**O5 An Educational Program for Medical Emergency Team: Impact of Using - High-Fidelity Mannequin (Sim-Man® 3G, Laerdal)**

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**Introduction:** Though Rapid Response System (RRS) has been widely considered as an important strategy for in-hospital patient safety in many countries, there are some obstacles to disseminate RRS in Japan. One of issues is lack of the training program for Medical Emergency Team (MET). We developed a new program using the high-fidelity mannequin and evaluated the efficacy of this program.

**Method:** To establish the most effective educational new program for MET training, we designed four processes : 1) development of scenario using the high-fidelity mannequin ; 2) improvement of the environment for the trainees ; 3) completion of evaluation sheets ; 4) promotion of post-simulation debriefing session. We performed the simulation training for thirty-two participants divided into 4 groups. We prospectively investigated improvement in ability of team building, clinical assessment and crisis management between the first and second scenario drills. Each group's performance was scored by two evaluators, according to a checklist with 72 items (full score 72 points).

**Result:** The average score showed significant difference between the first and the second scenario drills (24.4 vs. 36.3,  $p < 0.05$ ). We also observed remarkable differences in the performance between the two scenario drills. 26 of 32 (81.3%) trainees were satisfied with the MET simulation training.

**Conclusion:** The new MET training using high-fidelity mannequin is effective and helps in providing better education for trainees.

**O6 A new classification of head injury-the work group report-**

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In March 2008, The Task Force Group for The Organ Injury Classification (TFGO-IC) of the Japanese Association of the Surgery of Trauma (JAST) revealed the renewal version of classification of traumatic injury. This "Classification 2008" was revised for further understanding of pathophysiology of systemic injuries and for more practical decision making of treatment as well as predicting more precise patient outcome based on the concept of the previous classification concerning with radiographical findings. However, "Classification 2008" did not include the part of injuries of central nervous system, especially, the head injury although it would be treated more frequent than any other kinds of trauma. In July 2008, The Task Force Group for The Head Injury Classification was settled in JAST collaborated to the Japan Society of Neurotraumatology to edit a new classification of head injury in Japan. The TFGHIC called two regular meetings on 7-30-2009 and 10-10-2009 for the purpose of formalizing a collaborative process of Classification updates, publication, and implementation shared by those with a stake in traumatic brain injury care. The mission of partnership is to improve the practical suggestion for helping any physicians who is handling with difficult clinical decision making of head injury. The original version of classification was revised in 8 times subsequently and final version was determined in December 2008. In order to continue to improve outcomes for TBI and to establish better relationships between trauma physician and neurosurgeon, this brand-new classification was endorsed as a common language to treat the acute TBI patients at the ER. Basically, this classification was made based on the Gennarelli Classification of Head Injury, it is necessary to generate strong recommendation of interpretation of imaging studies that were obtained for precise diagnosis. We assume this new classification of head injury as the most practical, evidence-based resource for the management of head injury in Japan.

**O7 Factors Associated with Prehospital Delay in Acute Stroke**

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**Background:** The aim of this study was to investigate the factors associated with prehospital delays in patients with acute ischemic stroke who are indicated to receive thrombolysis if arriving within 2 hours.

**Methods:** Data were prospectively collected from patients eligible for intravenous thrombolytic therapy if arriving within the therapeutic time window. Patients were divided into 2 groups depending on whether they arrived within 2 hours to understand factors associated prehospital delay.

**Results:** The non-delayed group included 27 patients (14.7%) and the delayed group included 157 patients (85.3%). The factors associated with prehospital delays after symptom onset were worsening of symptoms, development of symptom at home, and arrival at the ED by self or from other institutes. Those with a risk of atrial fibrillation arrived earlier at the ED.

**Conclusion:** Early symptom recognition and arrival at the hospital are important in acute stroke. Further effort to improve these parameters should be made in terms of public health.

**O8 Transition of the Number of Ambulance Dispatch and Operation Time in Kawasaki-City Fire Department, Kanagawa Prefecture**

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**Introduction:** With the increase of the Emergency Medical Service (EMS) demand, the number of ambulance dispatch has also increased. Though the Medical Control Council of Kawasaki-City has tried to decrease unnecessary ambulance dispatch, it has not decreased the on-site work load. So we investigated the detail background of this problem.

**Method:** The number of ambulance dispatch and operation time (OT) of EMS from 2003 to 2007 were investigated. OT was divided into four parts : Time from report (recognition) to a. EMS arrival at the scene, b. initiation of transfer, c. arrival at the hospital, d. leaving the hospital, and e. returning to the fire station.

**Result:** The total number of ambulance dispatch in 2003 was 55,701. After increased to 59,636 (+7.1%) in 2005, it has decreased to 58,631 (+5.3%) in 2007. The total OT has continuously increased from 63' 8" in 2003 to 74' 47" (+18.5%) in 2007. There was a significant increase in "b" and "e" from 2003 to 2007, from 16' 54" to 22' 12" (+31.4%), and from 20' 4" to 26' 33" (+32.3%), respectively, whereas it was stable in "a", "c", and "d".

**Discussion:** Our efforts in preventing unnecessary ambulance dispatch has decreased the number of ambulance dispatch. However, the work load of EMS remains unchanged, because the time for hospital assignment at the scene and for staying at the hospital have prolonged. We speculate that unfavorable results were affected by the deterioration in function of emergency hospitals. Further efforts to decrease OT of EMS should be considered.

### O9 Effect of supraglottic airway devices management on out-of-hospital cardiac arrest: propensity-adjusted analysis in Japan Utstein registry

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**Background:** Supraglottic airway devices (SGA) are often used for out-of-hospital cardiac arrest (OHCA) patients. However it remains unclear whether a use of SGA improves survival outcomes of OHCA compared with bag-valve-mask (BVM) alone.

**Material and Method:** Data of OHCA patients from January 1, 2005 through December 31, 2008 were extracted from the nationwide Utstein-style registry of Japan. We excluded patients younger than 18 and older than 75 of age. Also excluded are cardiac arrest witnessed by EMS personnel, trauma- or malignancy-related cardiac arrest and patients for whom resuscitation was not attempted. The primary outcome measure was 1-month survival with minimal neurologic impairment (CPC 1 or 2) and secondary outcome was return of spontaneous circulation (ROSC) before arriving at hospital. The propensity-adjusted analysis and conditional logistic regression modeling technique were used to calculate the relative risk (RR) of SGA over BVM, adjusting for potential confounders including witness status of the arrest, bystander cardiopulmonary resuscitation, AED use, initial ECG rhythm, and call-response interval.

**Results:** Out of a total of 53,062 eligible patients, the propensity score matching yielded 18,025 matched pairs. A RR (95%CI) of SGA for the CPC score at 1-month post-arrest was 0.41 (0.36-0.48) and a RR (95%CI) of SGA for the ROSC was 0.54 (0.49-0.60).

**Conclusion:** Our large-scale database analysis has revealed that a use of SGA is negatively associated with both the immediate outcome and neurological outcome. The results appear to warrant prospective, interventional trial concerning the effectiveness of the use of SGA over BVM.

### O10 Validation of extravascular lung water measurement by single transpulmonary thermodilution: Human autopsy study

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**Introduction:** Gravimetric validation of single-indicator extravascular lung water (EVLW) and normal EVLW values have not been well studied in humans thus far. The aims of this study were (1) to validate the accuracy of EVLW measurement by single transpulmonary thermodilution with postmortem lung weight measurement in humans and (2) to define the statistically normal EVLW values.

**Methods:** We evaluated the correlation between premortem EVLW value by single transpulmonary thermodilution and postmortem lung weight from 30 consecutive autopsies completed within 48 hours following the final thermodilution measurement. A linear regression equation for the correlation was calculated. In order to clarify the

normal lung weight value by statistical analysis we conducted a literature search and obtained the normal reference ranges for postmortem lung weight. These values were substituted into the equation for the correlation between EVLW and lung weight to estimate the normal EVLW values.

**Results:** EVLW determined using transpulmonary single thermodilution correlated closely with postmortem lung weight ( $r = 0.904$ ,  $p < 0.001$ ). A linear regression equation was calculated:  $EVLW \text{ (mL)} = 0.56 \times \text{lung weight (g)} - 58.0$ . The normal EVLW values indexed by predicted body weight were  $7.5 \pm 3.3 \text{ mL/kg}$  for males and  $7.3 \pm 3.3 \text{ mL/kg}$  for females.

**Discussion:** A definite correlation exists between EVLW measured by the single-indicator transpulmonary thermodilution technique and postmortem lung weight in humans. The normal EVLW value is approximately  $7.4 \pm 3.3 \text{ mL/kg}$ .

\*Trial Registration:\*\* \*Clinical trial registration information: UMIN-CTR: UMIN000002780

### O11 A Clinical trial of the administration of autologous incubated bone marrow stromal cells into cerebrospinal fluid in five spinal cord injury patients

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**Objective:** A clinical trial to determine the feasibility and safety of spinal cord injury treatment by administration of autologous bone marrow stromal cells (BMSCs) into cerebrospinal fluid (CSF) in the acute phase after the injury.

**Methods:** Five patients with tetraplegia due to cervical spinal injury, who met the eligibility criteria, were registered under written informed consents. Iliac bone marrow was obtained during cervical stabilization with bone graftment, which occurred within three days post injury. BMSCs were incubated in vitro and multiplied reaching a cell count of 106. Their quality and function were verified with surface markers and a neurite extension test. BMSCs were administered into the CSF by lumbar puncture within 3 weeks post injury. Neurologic function was evaluated according to the American Spinal Injury Association Impairment Scale (AIS) and their motor scores.

**Results:** Motor function was remarkably improved in the first three cases. Motor score gains and AIS changes (initial to 6M) were as follows; case 1, 11 points, A to A; case 2, 66 points, B to D; case 3, 58 points, C to D. However, no improvement was observed in the other two cases with extensive spinal injury. No deleterious effect due to the cell administration was observed at all.

**Conclusion:** This study shows that the administration of BMSCs into CSF is safe, feasible, and potentially beneficial. We must accumulate more cases to evaluate the effectiveness and safety of this clinical trial.

**O12 Outcome after admission to intensive care unit following out-of-hospital cardiac arrest (OHCA): Comparison between cardiac etiology and non-cardiac etiology**

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**Purpose:** To describe the post resuscitation intensive care unit course of emergency department patients who initially survive out-of-hospital cardiac arrest (OHCA) of a cardiac etiology and non-cardiac etiology.

**Methods:** We retrospectively evaluated of survival patient after OHCA admitted to ICU after CPR of a tertiary hospital from January, 2005 to December, 2009. We analyzed all variables and compared the data of patients between cardiac etiology group and non-cardiac etiology group.

**Results:** Sixty four patients, 34 cardiac etiology patients and 30 non-cardiac etiology patients, were included in this study. The mean age was 57.3±15.1 years in cardiac group and 61.9±15.7 years in non-cardiac group (p=0.2350). The duration of CPR in hospital was significant longer in cardiac group than non-cardiac group (20.7±20.7 min vs 12.4±7.2 min, p=0.0390) Admission decision time to ICU was 285.2 ± 202.2 min in cardiac group and 327.7±264.1 min in non-cardiac group (p=0.4713). The CPC score of 5 were 8 patients (33.3 %) in cardiac group and 14 patients (46.7 %) in non-cardiac group (p=0.3171). Nine patients of 12 ST elevation myocardial infarction patients were treated with emergency primary coronary intervention, they had good prognosis.

**Conclusion:** The CPC scores in cardiac etiology group were higher than non-cardiac etiology group, but there was no difference in statistical analysis (p=0.3171). Early PCI and therapeutic hypothermia in cardiac etiology OHCA are needed to increase survival. Optimal care for OHCA required a multidisciplinary effort that included post cardiac arrest care bundle in ICU and practitioners in emergency medicine, cardiology, critical care medicine, and rehabilitation.

**O13 4G/5G polymorphism of plasminogen activator inhibitor-1 gene is associated with multiple organ dysfunction in critically ill patients**

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**Purpose:** To evaluate the role of 4G/5G polymorphism of plasminogen activator inhibitor (PAI)-1 gene on plasma PAI-1 level and the effect of PAI-1 in severity and outcome of critically ill patients.

**Methods:** Forty-one consecutively ICU admitted patients' PAI-1 gene polymorphisms, plasma PAI-1 and arterial lactate concentrations were measured and severity scores were recorded.

**Results:** Distribution of genotypes for 4G/4G, 4G/5G and 5G/5G were 39%, 51% and 10%, respectively. Homozygotes for the 4G allele exhibited higher plasma concentration of PAI-1 antigen (p-value .02 for 4G/4G vs. 5G/5G and .08 for 4G/5G vs. 5G/5G). Seventeen patients of 41 patients (41%) died before hospital discharge. Mortality for 4G/4G is 62.50%, 4G/5G 33.33% and 5G/5G 0%. There were significant co-relationships of plasma PAI-1 concentration with arterial lactate concentration (R<sup>2</sup>=0.62) and with severity scores such as SOFA (R<sup>2</sup>=0.72), MODS (R<sup>2</sup>=0.67) and DIC (R<sup>2</sup>=0.81).

**Conclusion:** Our results indicate that 4G allele of 4G/5G PAI-1 polymorphism is responsible for higher plasma PAI-1 concentration. By impairing fibrinolysis higher plasma PAI-1 causes multiple organ failure and thus affects outcome. Hence therefore we can say presence of 4G allele of 4G/5G PAI-1 gene polymorphism would be a warning sign and PAI-1 would be a biomarker of severity in critically ill patients.

**O14 Is the non-hyperglycemic hyperlactatemia as an ominous predictor of patient's outcome ?**

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**Background:** This study investigated the serum lactate level in fatal cases treated in the ICU along with other individual background characteristics such as serial blood glucose changes, and age, sex, severity, survival time and treatment contents.

**Method:** The subjects patients cases who died in the ICU from January, 2008 to March, 2010. Cases with a peak serum lactate above 50mg · dl<sup>-1</sup> after ICU admission were assigned to the hyperlactatemia group. These cases were divided into 3 groups according to the concomitant blood glucose; A: >150, B: 150->, >80, C: >80 mg · dl<sup>-1</sup>. The total counts of the cases, age, sex, APACHE II score, peak lactate (mg · dl<sup>-1</sup>), living period (hr), and treatments such as insulin medication, CHDF, IABP and PCPS were compared among the 3 groups.

**Result:**

Group	A	B	C
count	4	21	15
age	63.4	73.3	63.4
M/F	1/3	14/7	10/5
APACHE II score	33.2	38.5	33.2
living period	77.6	83	77.6
peak lactate	148.9	121.4	148.9
insulin	2/4	15/21	7/15
IABP	2/4	9/21	4/15
PCPS	2/4	9/21	4/15
CHDF	1/4	14/21	10/15
death<24hr	3/4	8/21	4/15

**Summary:** 1) Hyperlactate accounted for nearly 90% of the fatal ICU cases (40/45). 2) Groups B and C of the hyperlactatemia cases (blood glucose >150 mg · dl<sup>-1</sup>) accounted for nearly 90% (36/40). 3) The ratio of CHDF use was significantly high in groups B and C. 4) There were no significant differences in any other factors among the three groups.

**Conclusions:** Non-hyperglycemic hyperlactatemia could therefore be an ominous predictor of a patient's outcome in the ICU.

**O15 Treatment of severe sepsis and septic shock**

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**Background:** The validity of the treatment methods recommended by the Survival Sepsis Campaign Guidelines is being investigated in many studies worldwide. An investigation of the treatment of severe sepsis and septic shock conducted in March 2006 at the Department of Emergency Medicine at National Center for Global Health and Medicine found that infusion volume was significantly higher in the survival group than in the non-survival group, and there were no significant intergroup treatment differences other than fluid therapy.

**Subjects and Methods:** Subjects were 132 patients with severe sepsis and septic shock who were transported to our emergency room between 2001 and October 2009. Patients were divided into the pre- and post-groups using the March 2006 investigation as the cutoff point. Changes in treatment methods and outcomes were investigated retrospectively, and statistical analysis was performed to compare the survival and non-survival groups and to identify the treatment method having the greatest contribution to favorable treatment outcome.

**Results:** In both the pre- and post-groups, 1hr infusion volume was significantly higher in the survival group compared to the non-survival group (1191ml vs 633ml  $p<0.01$ , 1592ml vs 850ml  $p<0.01$ , respectively). In addition, 72hr survival rate was significantly higher in the post-group compared to the pre-group (90% vs 65%  $p<0.01$ ). Fluid therapy was the only treatment method that significantly contributed to increases in survival rate.

**Discussion:** These findings suggest that it is possible to achieve favorable treatment outcomes for severe sepsis and septic shock through aggressive, initial fluid therapy, in addition to treatment of infection.

#### O16 Comparison of estimated creatinine clearance rate and serum creatinine level as screening index of contrast-enhanced computer tomography related contrast induced nephropathy in Emergency Department

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**Introduction:** Currently, contrast-enhanced computer tomography (CECT) is essential element to diagnose emergency patients in emergency department (ED). But commonly used intravenous contrast can induce to the development of contrast induced nephropathy (CIN) that is associated with prolonged hospitalization and adverse clinical outcomes. Serum creatinine level (S-Cr) is universally used to screen for CECT related CIN in ED, but still CECT related CIN have occurred frequently. Estimated creatinine clearance rate (ECCr) is easily available in ED and is a better index to indicate the renal function rather than S-Cr. Hence ECCr will prefer to screen the CECT related CIN rather than S-Cr. Our objective was to evaluate the clinical significance of estimated creatinine clearance rate to screen the CECT related CIN in comparison with S-Cr.

**Method:** we performed retrospective study that enrolled 792 adult patients with CECT in ED during the period of march 1, 2009 through july 31,2009. For ECCr, CIN, risk factor of CIN, patient demography (age, sex, height, weight, body mass index (BMI), underlying disease hypertension (HTN), diabetes mellitus (DM)), S-Cr before CECT(pre-Cr), S-Cr after CECT (post-Cr), urinary study (protein, glucose) before CECT were recorded. CECT related CIN defined as condition in which increasing of S-Cr  $>0.5\text{mg/dl}$  (CIN I) and  $\geq 25\%$  (CIN II) compared with baseline S-Cr. ECCr was calculated by using Cockcroft-Gault formula, and divide into 2 groups, normal group was  $\text{ECCr} \geq 90\text{ml/min}$  and abnormal group was  $\text{ECCr} < 90\text{ml/min}$ .

**Results:** In screening of CECT related CIN, when  $\text{ECCr} \geq 90\text{ml/min}$ , CIN I and CIN II only occurred 12 and 27 (1.5% and 3.4%,  $P<0.001$ ), conversely when  $\text{S-Cr} < 1.5\text{mg/dl}$ , CIN I and CIN II occurred 58 and 110 (7.3% and 13.9%,  $P<0.001$ ). we found association between CIN and Age  $> 65$  (CIN I  $p=0.009$ , CIN II  $p=0.005$ ), Urine protein (CIN I  $p<0.001$ , CIN II  $p=0.002$ ) and glucose (CIN I  $p=0.004$ , CIN II  $p<0.001$ ), but no association was found between CIN and HTN, DM, BMI, serum glucose.

**Conclusion:** The results of this study suggest that S-Cr is the most commonly used screen test for CECT related CIN, nevertheless CECT related CIN occurred up to 7.3% and 13.9% hence ECCr can be considered as screening index to reduce occurrence of CECT related CIN. Future prospective studies should evaluate predominance of ECCr over S-Cr in reducing the incidence of CECT related CIN.

#### O17 Sepsis-induced suppression of Th1 phenotype is not due to the rise in Th2 cells

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**Background:** Sepsis alters CD4+T cells, suppressing the Th1 phenotype and inducing apoptosis. Once stimulated, naïve CD4+T cells exclusively commit to one of the T helper phenotypes by transcription of lineage-specific genes.

**Methods:** C57Bl/6 mice had cecal ligation and puncture or sham surgery. CD4+T cells were enriched from disaggregated spleens at 8 and 18 hrs after surgery and were analyzed by qRT-PCR for mRNA expression of markers that reflect lineage commitment: T-bet, Gata3, Ror $\gamma$ t, Foxp3, PUMA, IL2 and IL6. In a separate cohort of animals, intracellular PUMA and phospho-p53 (Ser46) protein abundances were measured by FACS at 18-20 hrs.

**Results:** Remarkable downregulation of T-bet, and Gata3 was found in CD4+T cells from septic animals compared to sham. ROR $\gamma$ T expression was not altered by sepsis. IL2 and Foxp3 had modest ( $<2$ -fold) increases at 8 hrs, but were normalized by 18 hrs. IL6 and PUMA showed significant sepsis-induced upregulation ( $>6$  fold). Intracellular staining for phospho-p53 (Ser46) and PUMA showed a significant increase in CD4 splenocytes in septic compared to sham mice.

**Conclusion:** Sepsis suppressed the expression of both Th1 and Th2 lineage specific transcription factors while increasing mRNA and protein expression of PUMA, a potent pro-apoptotic protein. These data suggest that sepsis does not suppress the Th1 phenotype by increasing the number of cells that commit to the Th2 phenotype. Instead, transcription of lineage-specific markers for both Th1 and Th2 cells are initially suppressed by sepsis. Furthermore, p53- and PUMA-mediated apoptosis may play a role in the sepsis-induced depletion of CD4 splenocytes.

#### O18 A Survey on the Practical Usage of Emergency Ultrasound for Emergency Physician Attending the Emergency Ultrasound Course

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**Purpose:** We surveyed on the practical usage of emergency ultrasound for emergency physician to provide educational guideline in emergency ultrasound course.

**Method:** From September 2007 to April 2010, emergency physicians who attended in the emergency abdominal ultrasound course of the Korean Society of Emergency Imaging Study Group were the subjects of this study. Before course, subjects answered questionnaires that included 17 items on the degree of knowledge acquisition and 15 items on self confidence in scanning using 10 point Likert scale.

**Result:** The number of subjects was 127 with an average age of  $32.3 \pm 3.5$  years old. Of 127 subjects, 106 (83.5%) were males and 21 (16.5%) were females, and 97 (76.4%) were specialists and 30 (23.6%) were residents. In the questions on the degree of knowledge acquisition and the self confidence in scanning, FAST (Focused Abdominal Sonographic examination for Trauma) was the highest ( $5.1 \pm 2.9$ ,  $4.9 \pm 3.1$ , respectively) and ocular scanning was the lowest ( $1.8 \pm 1.9$ ,  $1.7 \pm 1.9$ , respectively). In the comparison between EM specialists and EM residents, most items of questionnaires except obstetric and ocular scanning in the degree of knowledge acquisition and obstetric, ocular and lung scanning in self confidence in scanning showed statistically significant differences ( $p<0.05$ ).



**Conclusion:** The degree of knowledge acquisition and self confidence in scanning were generally low. Emergency patient oriented ultrasound education and various frequent scanning for patients visiting emergency room are necessary.

### **O19 Can measuring procalcitonin help to shorten the duration of antibiotic therapy for septic patients?**

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**Purpose:** We examined whether the duration of antibiotic therapy for septic patients could safely be shortened based on semiquantitative procalcitonin (PCT) measurements compared with no measurements.

**Patients and Method:** Patients were the consecutive septic patients comprising: 1) those admitted to our ICU, 2) administered antibiotics for at least 4 days, and 3) stopped the antibiotics during their ICU stays. This was matched case control study as follows. Patients were treated from July 2009 to April 2010 with reference to their serum PCT (PCT group). On the other hand, all patients prior to June 2009 were treated without the PCT measurement (control group). In the PCT group, when PCT was below 0.5 ng/ml, we examined whether to halt antibiotic therapy.

**Result:** Both PCT and control groups had 38 patients. At baseline, both groups were similar regarding age, male / female, APACHE II scores, the ratio severe sepsis / septic shock, the ratio of non survivor and the focus of infection. Antibiotic therapy was significantly shorter in the PCT group than in the control group (7 (6 - 9) d versus 8 (7 - 17) d,  $p = 0.037$ ). At the end of the antibiotic therapy, both groups were similar regarding WBC values ( $7060 (6100 - 9450) \times 10^3 / \mu\text{l}$  versus  $7810 (5980 - 9940) \times 10^3 / \mu\text{l}$ ,  $p=0.427$ ). On the other hand, CRP values were significantly higher in PCT group than in control group (7.1 (2.4 - 9.2) mg/dl versus 2.7 (1.6 - 6.8) mg/dl,  $p=0.011$ )

**Conclusion:** Semiquantitative PCT measurements safely shortened the period of antibiotic therapy for septic patients. The values of PCT were a better tool to determine when to stop antibiotic therapy than CRP.

**P1 The experience of infection control about Pandemic influenza A (H1N1) at 2009 in a Korean regional hospital**

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After the first report of Pandemic influenza A in April 2009, national preventive measures against have taken place. In South Korea, Pandemic influenza A was first confirmed on April 30th in a nun who has visited Mexico for missionary work. Since early July, confirmed cases in South Korea increased. Therefore, we operated one isolated clinics for our outpatients, started fever monitoring against all inpatients as well as outpatients. On 25th Aug, two year-old girl, was the first confirmed Pandemic influenza A in our hospital. She received anti-viral drug and was segregated at home. Ahead of second semester, we conjoined with the school health center and performed fever monitoring and screening test for professors and students who visited foreign countries. Our hospital organized the local countermeasure committee in association with community health care center. Since the 20th of October, there has been a tenfold increase in confirmed patients. Therefore, for every medical staffs and students, we conducted fever-monitoring and preventive anti-viral medication. At the end of October, all of the medical personnel were vaccinated and by the mid of November, vaccination was conducted to the public. Since then, the number of patients has declined sharply and there has been no patient since April, 2010. During last 5 months, 9,000 among the patients who visited our hospital took the screening test for Pandemic influenza A and 79% of them took the confirmation test. And 36.6% of them was confirmed and 1 patient died (mortality was 0.03%). Thus we would like to report our experience.

**P2 Effective disaster education for paramedics**

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**Background:** In Japan, no effective disaster medical education has been established yet for paramedics. Though the Disaster Medical Team (DMAT) did the medical treatment on the scene was established to prevent the only large earthquake and mass causality for the mainly developed for physician.

**Purpose:** Aim of this study was to develop a life-saving treatment procedure within confined spaces and to establish effective disaster education for paramedics.

**Material and Method:** 90 paramedics and 30 physicians were enrolled in this study: Group 1) 60 paramedics with CSM education who underwent a 3-hour disaster training course developed for paramedics; Group 2) 30 paramedics without CSM education; Group 3) 30 physicians with the same CSM education. To examine the efficacy of this course, confined-space scenario simulation was carried out before and after the 3-hour training course: The following scenario was used. In patients trapped in collapsed houses by an earthquake, the paramedics had to start advanced disaster medical treatment (airway management, venous access, drug administration). The skill (quality and promptness of care) of the paramedics was measured. The statistical analysis was performed by an unpaired t-test.

**Result:** Group 1 showed greater skill at airway management, IV access, and drug administration and a higher knowledge of disaster medicine than Group 2 ( $p < 0.01$ ). In addition, the Group 1 showed a shorter time to completion of tracheal intubation than Group 3 ( $p < 0.01$ ). The time to completion of tracheal intubation was also significantly shorter in Group 1 as compared to Group 2 which did not attend the CSM educational program.

**Discussion:** According to the law for paramedics in Japan, paramedics cannot administer drugs or IV fluids on their own in patients with a beating heart. However, in the event of a major disaster, medical treatment by paramedics at the scene is permitted to save the lives of patients at the scene.

**Conclusion:** In this study, the success of a disaster medical training course for paramedics was demonstrated. From our little experience, paramedics are as adept as physicians at the disaster scene. Moreover, confined-space medical training is suitable for the disaster education and the emergency treatment simulation education in continuing education for paramedics.

**P3 Implementation strategy for the Japan Triage and Acuity Scale**

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**Introduction:** Consistent with the situation in a majority of other nations, Japan's emergency care system is becoming increasingly burdened by sick patients. Currently there is no standardized evaluation system to stratifying emergency patients by presenting complaint or acuity level. With limited human and facility capacity, the need for a robust national triage system is evident.

**Methods:** The Japanese Society for Emergency Medicine (JSEM) and Japanese Association for Emergency Nursing (JAEM) have organized the Japan Emergency Triage Joint Committee (JETJC) to search for suitable triage system. We reviewed numerous relevant articles and developed a strategy.

**Results:** The JETJC contacted the Canadian Triage and Acuity Scale National Working Group (CTAS NWG) who agreed to collaborate and share their educational materials and processes. Work has begun to develop and implement Japan Triage and Acuity Scale (JTAS) based on CTAS. Concurrently, there are plans to develop a Japan Emergency Department Information System to introduce and support the concepts of evidence based emergency medicine.

**Discussion:** JTAS will allow Japanese emergency physicians and administrators to capture standardized acuity information on emergency patients that can then be used to ensure the right patients are being treated in the right place, at the right time, and by physicians with the right kind and level of training. With the anticipated introduction of Japan Prehospital Acuity Scale (JPAS), coordinated with JTAS, it should be possible to improve ambulance safety and support Japan's emergency medical technicians by helping develop clear destination criteria protocols.

**P4 Success rate for establishing a venous line in CPA patients by paramedics and a proposal for intraosseous infusion**

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**Purpose:** It is important to have a venous line in CPA patients as an emergency treatment in pre-hospital settings. However, it is not easy to establish venous line for various reasons. We investigated the spring-loaded bone injection gun (BIG) as a rapid and easy intraosseous puncture device for its usefulness in establishing a venous line.

**Methods:** We retrospectively investigated the success, failure, or untried rates for venous line establishment by inquiring into the paramedic records of some Osaka fire department headquarters. We measured the time required and success rate for establishing venous line using the BIG in a training leg by 30 volunteer paramedics in spacious (open light space) and difficult situations for venous line, such as in dark or narrow spaces as in the cabin of ambulance.

**Results:** The rates of success, failure, and untried venous line in the emergency settings are 20, 37, and 43%, respectively. Success rate of the BIG in the spacious area was as high as 97%, and even higher than 90% in the situations difficult for venous

line establishment. Time required for venous line placement with the BIG was 16.9 seconds in the spacious, 16.0 seconds in the dark, and 15.2 seconds in the narrow space areas, with no difference between them.

**Discussion and Conclusion:** Establishing venous line with the BIG was quick, very simple and is unaffected by the environment. Application of the BIG will be useful as an alternative to facilitate an infusion line in pre-hospital settings.

**P5 Fact-finding in Emergency Technician (rescuer) “Childbirth assistance” Education and Considerations**

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**Introduction:** Sudden childbirths have increased in frequency and an increase in the ratio of emergency technicians (EMT) has become important.

**Object:** To re-examine the childbirth assistance education of emergency technicians and examine methods of childbirth assistance education in the future.

**Method:** Study 1: Investigation of the education curriculum related to childbirth in Emergency Technician training schools throughout the country. Study 2: 103 emergency technicians filled out a questionnaire concerning childbirth.

**Study results and Considerations:** Study 1: In processing the standard results comparing the education curriculum related to childbirth in emergency technical training schools and fire fighting schools throughout the country, 10 hours of childbirth assistance curriculum was included in the 225 to 360 hours of the Emergency Technician training process, and 720 hours of the Midwife Assistance curriculum. Study 2: In the questionnaire survey of emergency technicians, the emergency technicians who underwent education for providing assistance during childbirth showed significantly greater skill ( $p < 0.05$ ) in the proper execution of childbirth, however, no differences in the ability for providing appropriate childbirth assistance was observed depending on the number of years as an emergency technician. Significant differences ( $p < 0.05$ ) were recognized in the fact that personnel would like to re-learn childbirth assistance methods and management laws of the newborn babies.

**Conclusion:** Childbirth assistance study is considered to be essential for emergency technicians. Continuing education on proper childbirth and childbirth assistance and present post education which can be learned is considered to be an important topic that must be addressed for the future.

**P6 Usefulness of the newly developed multifunctional ECG monitoring system with ECG analysis capabilities for EMS transportation**

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**Introduction:** In Japan, cardiac sudden death due to acute myocardial infarction (AMI) has been increasing every year. Decision making during transport to hospital by paramedics is critically important. However, there exist problems which hinder accurate ECG assessment for AMI patients in pre-hospital settings. Reducing ECG noise will help improve survival rates of AMI patients.

**Methods:** We compared ECG-monitoring taken from 12 healthy volunteers (age: 24.2 ± 1.3 years) transported in different conditions (road conditions and vehicle speed) using different monitoring systems. Twelve lead ECG was evaluated by the Multiple Risk Factors Intervention Trial (MRFIT) criteria. We used a conventional 12 lead ECG monitor (FDX) and a newly developed multifunctional ECG monitor (RC). Subjects were transported on a smooth road at 50km/hr (Condition 1), a gravel road at 30km/hr (Condition 2), 20-degree uphill at 30km/hr (Condition 3) and 20-degree downhill at

30km/hr (Condition 4).

**Results:** In Condition 1, FDX noise was  $0.18 \pm 0.08$  with the baseline variation  $0.25 \pm 0.08$  while RC noise was  $0.11 \pm 0.03$  with the baseline variation  $0.12 \pm 0.04$ . In Condition 2, FDX noise was  $0.38 \pm 0.12$  with the baseline variation  $1.76 \pm 0.14$  while RC noise was  $0.15 \pm 0.05$  with the baseline variation  $0.23 \pm 0.13$ . In Condition 3, FDX noise was shown to be higher than that of RC (FDX:  $1.89 \pm 0.55$ , the baseline variation  $2.69 \pm 0.66$ . RC:  $0.43 \pm 0.13$ , the baseline variation  $0.92 \pm 0.54$ ). In Condition 4, FDX noise was shown to be higher than that of RC (FDX:  $2.30 \pm 0.33$ , the baseline variation  $3.04 \pm 0.45$ ; RC:  $0.56 \pm 0.25$ , the baseline variation  $1.05 \pm 0.65$  [ $P < 0.05$ ]).

**Discussion:** This study with RC showed its high analysis capabilities even in poor road conditions. The newly developed RC was shown to be useful in multifunctional ECG monitoring during EMS transportation.

**Conclusion:** The results of this study have indicated that the multifunction ECG analysis capabilities are useful in ECG interpretation and less susceptible to noise and artifacts at the time of emergency medical transportation.

**P7 Effectiveness of early defibrillation and CPR during the marathon race in Tokyo**

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**Background:** The Tokyo marathon, the “flagship” marathon race in Japan (with the participation of more than 35000 runners), was first held in 2007. Over the last 20 years, more than “120 cases of Sudden Cardiac Arrest” have been reported during marathon races in Japan. Therefore, the Tokyo marathon medical committee was instituted to establish the safety of the participants during marathon races. Our slogan is as follows: [Early defibrillation within 3 minutes, no deaths during Tokyo marathon race]. To achieve this, we developed a quick-response roadside rescue team (QRRRT) which provide BLS and early defibrillation on the roadside throughout the route of the marathon race.

**Purpose:** The purpose of this study was to evaluate the effectiveness of QRRRTs during the Tokyo marathon.

**Method:** QRRRTs divided into three teams, as follows, covered the entire stretch of 42.195km: 1) 18 Mobile AED teams (bicycle AED teams, covering every 1.2-1.5km, for providing prompt and adequate CPR, AEDs with BVM ventilation); 2) 28 on-foot BLS + AED teams (58 paramedic students covering every 800m -1km for providing quick shocks and CPR). The treatment documents were analyzed for off-line medical control.

**Results:** During the last 4 years, 4 cases of SCA on the road were reported, however, successful recovery of spontaneous circulation was obtained in all the cases by prompt defibrillation and CPR (CPR start  $1.0 \pm 0.7$ min, shock delivered  $4.6 \pm 2.5$ min). None of the patients died; all patients showed a favorable neurological outcome (CPC1) and returned to full-time work within 3 weeks.

**Conclusion:** We found that the QRRRT system for the marathon route was highly effective. Future studies are warranted to improve the participant safety during marathon races.

**P8 A Case Report of Splenic Pseudo-aneurysm: Should It Be Treated?**

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A 13-year-old male was brought to the trauma center following a 3m fall. Primary survey was intact but a Focused Assessment by Sonography for Trauma (FAST) revealed peritoneal effusion. Multi-detector-row CT (MDCT) showed an American Association for the Surgery of Trauma organ injury scale (AAST-OIS) grade III splenic injury without a contrast blush. Non-operative management (NOM) was indicated with close observation. His hospital course was uneventful. MDCT detected a splenic pseudo-aneurysm (sPA) which measured 5.6 mm in diameter three days later. NOM was continued! MDCT later revealed the sPA to have increased to 10.0mm in diameter the following day. He was therefore diagnosed to have an impending rupture of the sPA. He underwent transcatheter arterial embolization (TAE) for the sPA. He was discharged 11 days after admission without any complications following TAE.

A sPA is a non-bleeding vascular injury and often predicts NOM failure. However the natural history is still unknown. The diagnostic strategy following blunt splenic trauma is to observe the injury by MDCT on day 1, 3 and 7 for early detection of delayed bleeding. The impending rupture of sPA could be diagnosed with serial MDCT in order to avoid delayed bleeding and should be treated by TAE. The significance of serial surveillance by MDCT is unclear. Further investigation of similar cases is therefore required.

**P9 Inter-hospital Transfer Reduced the Unexpected Trauma Death Rate in Japan**

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**Introduction:** There is no hierarchy system of Trauma center in Japan. However about fifteen percent of traumatized patients was transferred for definitive care. The purpose of this study is to determine whether the inter-hospital transfer is acceptable or not.

**Material and Methods:** Twenty three thousand six hundred thirty one cases of ambulance transport were registered on Japan Trauma Data Bank (JTDB) 2004-08. Ten thousand fifty one cases had data deficit and the remaining 13580 are used to calculate the probability of survival (Ps) by TRISS method. We divided into two groups for the analysis. Direct transport group (DG) defines as the cohort of 9967 patients who transport directly by ambulance and had over 50 % of Ps. Inter-hospital transferred group (IG) defines as the cohort of 1744 patients who transferred to other facility with over 50 % of Ps Unexpected trauma death rate was compared with two groups.

**Results:** Unexpected death rate ( $\pm$  SE) by TRISS method was 3.6 ( $\pm$  0.4) % in IG and 5.2 ( $\pm$  0.2) % in DG. There was a statistical difference between the two groups. ( $p=0.005$ )

**Conclusion:** Inter-hospital transfer reduced the unexpected trauma death rate in Japan. The referral facilities should designate the higher hierarchy in Trauma system. This is the first report of patient transfer with JTDB which is a national representative trauma data base of Japan.

**P10 Analysis of cardiopulmonary arrest (CPA) during a marathon and investigation of the medical support system**

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**Background:** Cardiopulmonary arrest (as CPA) has been noted to occur at a high frequency during a marathon races, however, a medical support system for marathon races has not yet been established in Japan.

**Object:** The aim of this study was to analyze the occurrence of CPA during marathon races.

**Method:** The CPA data were obtained from the internet, major newspapers, case reports and a questionnaire survey. Three studies were performed as follows. Study 1, Analysis of the frequency of CPA during marathon races in the last 20 years. Study 2, Precise analysis of the circumstances related to CPA during a marathon race. Study 3, Investigation of the medical support system for marathon races.

**Result:** Study 1. There have been 119 reports of CPA during marathon races in the last 20 years, and ROSC (Return of Spontaneous Circulation) was achieved in 34% (37/109). However, the rate of ROSC increased to 65% (31/48) in last 5 years as compared with that during 2000-2005. In study 2, more than 90% of the cases of CPA were suitable candidates for defibrillation; bystander CPR had been carried out in 95% of the cases; the rate of ROSC was higher in the cases where bystander CPR and defibrillation had been carried out. Study 3, While an increased number of AEDs (automatic electronic defibrillator) have been installed for marathon races recently, 85% of marathon races prepare only less than 10 AEDs. An increase in the number of AEDs installed is necessary.

**Discussion:** The rate of ROSC during marathon races increased each year due to the increasing number of bystander CPRs and early defibrillation rate. However, it is thought that a larger number of AEDs are still needed to ensure the highest safety during marathon races.

**Conclusion:** A medical support system involving placement of a reasonable number of AEDs on the roadside in the route of a marathon race is necessary to ensure the safety of the participants.

**P11 Effects of mini-Anne training on layperson CPR**

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**Purpose:** The aim of this study was to explore the efficacy of 90-minute CPR training programs using the mini-Anne kit for layperson CPR.

**Subjects and Method:** Two hundred and fifty-six university students who participated in a 90-minute CPR program were subjected in this study. The students were randomly divided into four groups: Group A (N=64) received conventional CPR and AED training using Resusci-Anne; an instructor to student ratio of 1:4 and a student and mannequin ratio of 1:4. Group B (N=72) completed a 90-minute self-learning CPR and AED training using mini-Ann kits at home. Group C (N=60) completed a 90-minute CPR and AED training program using mini-Ann kits with video instruction in a large classroom of 30 students; No instructor taught and a student to mannequin ratio of 1:1. Group D (N=60) completed a 90-minute CPR and AED training program using mini-Ann kits with one instructor taught in a large classroom of 30 students; no DVD instruction and a mannequin ratio of 1:1. Voice feedback was provided from the instructor as needed.

**Data collection:** After the completion of the 90-minute CPR training programs, CPR skills and a written test was given for each individual. Following data were collected using a recording mannequin (Resusci-Anne; Laerdal, Norway) and evaluated: 1) Time: time interval from collapse until the start of ventilation, duration of ventila-

tion, and time until the re-start of chest compressions after AED were recorded; and 2) CPR quality: accuracy of rhythm, depth and recoil of chest compression, and accuracy of adequate ventilation were evaluated. The statistical analysis was performed using an ANOVA and the Tukey test.

**Results:** The Group D showed a significantly shorter time until the start of chest compressions and the re-start of chest compressions after AED use than the other groups ( $P < .05$ ). All the groups were evaluated as providing an average CPR performance, with chest compressions of the correct recoil, rhythm, and depth. However, the duration of ventilation was longer in the groups B and C than in group D. The groups B, C, and D also exhibited an incorrect open airway procedure compared with the group A ( $P < .05$ ). Overall, in the group D, CPR performance was significantly better than in group C ( $P < .05$ ).

**Conclusion:** We found that a 90-minute CPR training program using mini-Ann successfully performed by one instructor for 30 participated with verbal feedback. Also, the use of mini-Ann provided time and cost consuming effective CPR training for lay rescuer.

#### P12 A case of uremic pericarditis requiring pericardial drainage

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**Introduction:** The number of patients who have uremic pericarditis is decreasing because of increasing use of hemodialysis. However, we experienced a case of uremic pericarditis requiring pericardial drainage.

**Case:** A 56-year-old man with history of diabetes mellitus was transferred by ambulance from another hospital with hemodynamic shock. He was in shock with a prominent jugular vein dilatation. Echocardiography revealed a large pericardial effusion. We diagnosed him as having cardiac tamponade and performed an emergent pericardial drainage. After the procedure, the patient recovered rapidly from shock. He further required hemodialysis and fully recovered. His uremia was considered to be secondary to end stage diabetic nephropathy.

**Conclusion:** We experienced a case of uremic pericarditis. Pericardial effusion due to uremic pericarditis, which usually responds to hemodialysis, can sometimes cause cardiac tamponade, requiring urgent pericardial drainage.

#### P13 Extreme hyperkalemia in a patient poisoned with a new glyphosate potassium herbicide; Report of a case

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**Background:** Glyphosate is widely used as a main ingredient of herbicides. Such herbicides ingested for suicide cause gastrointestinal complications and hypovolemic shock due to the action of surfactant. However, hyperkalemia after ingestion of glyphosate herbicide has not previously been reported. Recently, the new herbicide Roundup Maxload™, containing glyphosate potassium, has been marketed. We have observed an extreme case of hyperkalemia after ingestion of this new herbicide.

**Case report:** A 65-year-old female was transferred to our emergency and critical care center after ingesting two types of commercially available glyphosate herbicide products. On admission, her consciousness level was depressed to Glasgow Coma Scale E3, V2, and M6. Vital signs were as follows; blood pressure 83/88mmHg, pulse 59/m, and respiratory rate was 24/m. Arterial blood gas analysis showed metabolic acidosis and an extreme hyperkalemia of 9.22 mEq/L. Electrocardiogram showed absence of P wave and a tall, tapering T wave. On admission, gastric lavage was followed by intragastric administration of activated charcoal together with a ca-

thartic. Immediately after recognition of hyperkalemia, sodium bicarbonate, glucose and insulin, and calcium gluconate were also administered intravenously. Five hours later, plasma concentration of potassium decreased to 4.31 mEq/L, and the patient discharged on day 10.

**Conclusion:** In case of Roundup™ poisoning, we have to take into consideration that Roundup Maxload™ contains a high concentration of potassium, and may result in hyperkalemia.

#### P14 Effects of Hypertonic Saline Resuscitation on Production of iNOS and Cytokines in Hemorrhagic Shock Model in Mice

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We examined effects of hypertonic saline resuscitation on production of iNOS (NOS2) and cytokines after hemorrhagic shock in mice.

**Methods:** Male C57BL/6J mice 8 to 12 weeks old as wild type and B6.129P2 (NOS2) mice as iNOS gene knock out were used. Mice were anesthetized and blood was withdrawn until a mean arterial pressure of  $40 \pm 5$  mmHg was reached, and maintained for 60 min. Resuscitation was performed as follows: HS; with hypertonic saline (4 ml/Kg of 7.5% NaCl) and shed blood (SB), 2LR; with lactated Ringer's solution (2 times the volume of the SB) and SB. Expression of iNOS was examined in spleen. Cytokines of IL-6, IL-10, TNF- $\alpha$  and MCP-1 in blood were also examined.

**Results:** 1) NOS2 of HS and 2LR groups in spleen in wild type increased compared to the control group at 2h ( $p < 0.05$ ) and 6h ( $p < 0.01$ ). At 6h, group of HS was significantly lower than group of 2LR in wild type ( $p < 0.05$ ). 2) At 2h, plasma IL-6, IL-10, TNF- $\alpha$  and MCP-1 levels in all the groups studied were significantly elevated than the control levels ( $p < 0.01$ ). IL-6, TNF- $\alpha$  and MCP-1 levels in the HS resuscitated groups were significantly lower compared with those in each 2LR resuscitated groups ( $p < 0.01$ ). In addition, the IL-6 levels were significantly higher in iNOS knockout animals than in wild animals in both type of resuscitation ( $p < 0.05$ ). However, TNF- $\alpha$  and MCP-1 levels were significantly lower in iNOS knockout animals than in wild animals in both type of resuscitation ( $p < 0.05$ ). On the other hand, the IL-10 levels showed no significant difference between HS and 2LR groups in both wild type and iNOS knockout groups.

**Discussion:** Production of iNOS and cytokines after hemorrhagic shock and resuscitation may have important role for post injury multiple organ failure and immunosuppressive condition. Hypertonic saline resuscitation may modulate iNOS and cytokines to obtain beneficial effects.

#### P15 The mRNA expression of fatty acid amide hydrolase in human whole blood may correlate with recovery in patients with sepsis

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**Introduction:** An excessive accumulation of anandamide (N-archidonylethanolamine, AEA) is associated with septic shock. Results of previous studies have suggested that mRNA coding for the AEA degrading enzyme fatty acid amide hydrolase (FAAH), which converts AEA into arachidonic acid and ethanolamine, might

be down-regulated in septic shock.

**Method:** We used real-time reverse transcription PCR assays to measure relative FAAH mRNA concentrations in the whole blood of 30 healthy donors and eight patients with severe sepsis or septic shock to ascertain whether such down-regulation takes place. IL-6 and IL-8 were measured by ELISA. Cytokines of septic patients were measured on admission and at the 7th day after admission.

**Result:** The levels of APACHE II score, IL6 and IL-8 were significantly reduced from  $19.50 \pm 1.61$ ,  $264.20 \pm 50.85$  pg/dl and  $82.95 \pm 40.19$  pg/dl on admission to  $10.12 \pm 2.03$ ,  $78.23 \pm 24.18$  pg/dl and  $25.28 \pm 9.47$  pg/dl at the 7th day after admission, respectively ( $P < 0.01$ ). The levels of the FAAH mRNA were  $14.23 \pm 7.30$  in healthy male and  $11.20 \pm 3.62$  in healthy female. On the contrary, the levels of the FAAH mRNA in patients on admission with sepsis were significantly reduced to  $0.16 \pm 0.05$  ( $P < 0.01$ ). At the 7th day after admission, the levels of FAAH mRNA in patients with sepsis were increased to  $0.33 \pm 0.05$  (not significant compared to admission day levels).

**Discussion:** These findings indicate that mRNA expression of FAAH in human whole blood may correlate with sepsis, and may be an interesting biomarker for predicting the onset of septic shock. Further investigation should be carried out to determine the relevance of FAAH and cytokines.

#### P16 Early Traumatic Deaths

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**Objectives:** In Korea, trauma is the 3rd common cause of death. Death occurring in the pre-hospital stage is 50% of the total death and 20% out of these 50% deaths are death that are preventable. The purpose of our study is to calculate the preventable death rates in current pre-hospital system and compare our results with American standard results.

**Materials and Methods:** We conducted a study with expired trauma patients in the emergency department at the Korea University Medical Center in Anam, Guro (tertiary medical centers) and Ansan (secondary medical center) from January 1, 2005 to December 31, 2009. The data of the patients were reviewed retrospectively by the characteristics, conditions on admission and trauma severity. The patient's RTS (Revised Trauma Score) and ISS (Injury Severity Score) were calculated. Preventable death rate was calculated by TRISS (The Trauma Score-Injury Severity Score).

**Results:** A total of 168 patients (Anam 52 patients, Guro 45 patients and Ansan 71 patients) were included. All patients were intubated and received CPR. 72% patients were male and traffic accident was the most common form of trauma with 52.4% and fall being second with 28.6%. Head injury, solitary or multiple, was the most common cause of death with 55.4%. 38 deaths were preventable. Out of 22.6% preventable death rate, 15.5% was potentially preventable and 7.1% was definitely preventable. By logistic regression analysis, the relationship of time interval until transfusion and x-ray imaging and death was statistically significant in the hospital stage. In the pre-hospital stage, the time from injury to hospital showed significant relationship with the mortality rate.

**Conclusions:** The preventable death rate in our study was 22.6%. The only factor that had significant influence on the preventable death rate in the pre-hospital stage was the time from injury to hospital arrival. The time to transfusion and x-ray imaging were the two factors that showed significance in the hospital stage. Other factors did not show any significant relationship. While most of the trauma patients are being treated in general hospitals in Korea, it is important to shorten the time of delay in the field and transfer the patient to the hospital as quickly as possible. In the hospital stage, the primary survey and treatment, including fluid resuscitation and transfusion, as well as evaluations to aid diagnosis should proceed simultaneously. The composition of a trauma team in the hospital for an organized evaluation and treatment without delay is also necessary.

#### P17 Visceral Vascular Injuries in Japan

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**Introduction:** A visceral vascular injury is extremely rare and lethal. The mortality rate and incidence are unknown in Japan. The purpose of this study is to determine these rates.

**Material and Methods:** Two authors (KN and TF) individually searched the AIS cords of visceral vascular injuries in the data set of the Japan Trauma Data Bank (JTDB) 2004-07 that was provided to the participating institutes. The incidence and mortality were determined from this data set.

**Results:** Twenty thousand two hundred fifty-seven cases were registered in the JTDB 2004-07. Ninety-seven cases were identified with the AIS code for visceral vascular injuries. The incidence was calculated to be 0.005%. Twenty-two cases had insufficient data deficit with regard to the mortality at the time of discharge and the remaining 75 were used for the analysis. The mean age was  $49.5 \pm 2.0$ . Seventy-two percent of the cases were males. There were 31 cases of death and the overall mortality rate was 41.3%. Eleven of 75 had insufficient data deficit with regard to the revised trauma score and the remaining 66 were used to calculate the probability of survival (Ps) using the TRISS method. The mean Injury Severity Score was  $24.0 \pm 1.5$ . The mean Revised Trauma Score was  $5.6 \pm 0.3$ . The mean number of accompanying injured organs was 4.57.

**Conclusions:** The incidence of visceral vascular injury in Japan is much lower than that found by the University of Southern California (0.09%). This is the first report regarding the incidence and mortality of visceral vascular injuries in Japan.

#### P18 A clinical study of emergency room thoracotomy to cardiopulmonary arrest in our emergency and critical care center

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We retrospectively evaluated patients on whom we performed emergency thoracotomy in our emergency and critical care center. During twenty-seven months, between December 2007 and February 2010, 1088 cardiopulmonary arrest patients were treated in our center. We performed emergency room thoracotomy on 167 patients in whom cardiopulmonary resuscitation was ineffective. There were 107 cardiopulmonary arrests that were of cardiac origin and 44 cardiopulmonary arrests that were due to trauma. We admitted 40 patients to the intensive care unit. Four patients (2.4%) survived. The causes of the cardiopulmonary arrest in these four patients were cardiac, accidental hypothermia, traumatic asphyxia, and cardiac tamponade. In the accidental hypothermia patient, cardiac massage and rewarming by emergency room thoracotomy seemed to be effective.

#### P19 A New Pulse CO Oximetry Technique to Detect Carbon Monoxide Poisoning-A Case Report

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Carbon monoxide (CO) poisoning is the leading cause of fire-related death in Japan. However, CO poisoning patients are often misdiagnosed due to its flu-like vague symptoms. CO poisoning induces hypoxemia as acute poisoning, but also has long term toxic effects on the central nervous system and the heart. Recent advances in

pulse oximetry have made it possible to measure carboxyhemoglobin (CO-Hb) concentration noninvasively and continuously, whereas conventional invasive CO-Hb measurement requires a blood sample. This is a case report of CO poisoning which was identified using a new pulse CO-oximeter (Rad-57, Masimo Corp.). A 68-year old female was found presenting severe headache, nausea, and fatigue at her house. A dispatched EMT attached Rad-57 on her finger, and the pulse oximeter showed high CO-Hb level of 45%. She was transferred to our hospital, and high CO-Hb level was confirmed on arrival to our unit by blood gas analysis (CO-Hb 34.5 %) and Rad-57 (SpCO 34 %). HBO therapy was then started in one hour after her arrival. She recovered quickly and was able to be discharged to her home without any complications or sequelae. Upon her arrival, we asked the fire department to search for the source of CO generation. No origin of CO was found in her room. Eventually, a car left idling was unearthed in a garage. The new pulse CO-oximeter provides rapid non-invasive detection of CO poisoning at a prehospital scene as well as at an emergency room, and facilitates rapid diagnosis and treatment for CO poisoning patients.

**P20      A Case of Perforation of the Sigmoid Colon due to an Incarcerated Inguinal Hernia with Acute Coronary Syndrome: A Multi-disciplinary Approach during the Perioperative Period**

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A 72-year-old male was brought to the emergency department in a state of unconsciousness and shock with a bulging area in his left groin. Diagnostic imaging showed that he had free air in the peritoneum due to a perforation of the lower intestinal tract caused by an incarcerated inguinal hernia. An electrocardiogram showed sinus tachycardia, ST elevation in V1-4 and deep Q wave in aVf. The echocardiographic findings revealed diffuse severe cardiac hypokinesis with a 22% ejection fraction, which suggested the coexistence of Acute Coronary Syndrome (ASC). Laparotomy was performed for panperitonitis which was the primary pathogenesis of his condition. The surgery revealed massive purulent ascites and an incarcerated, devitalized and perforated sigmoid colon. The patient was treated with peritoneal lavage, segmental resection and colostomy. Aggressive fluid resuscitation, the administration of broad spectrum antibiotics, and endotoxin removal therapy with polymyxin B immobilized fibers-Direct Hemoperfusion (PMX-DHP) for septic shock was indicated after the operation. The patient developed ventricular tachycardia and unstable circulation on postoperative day 1, with an elevation of Troponin I. Coronary intervention was indicated for ACS at this time. Coronary angiography (CAG) showed three diseased vessels and we implanted intracoronary stents.

Extracorporeal cardiac support with Intra-aortic Balloon Pumping was required for 3 days after coronary intervention. Parental support with vasopressors was needed for several days, however, the patient's circulation thereafter gradually stabilized. He was discharged after 4 months.

This was a rare case of acute abdomen and ACS. The critical phase was successfully managed using a multi-disciplinary approach.