



The Top 100 Abstracts from the First Pan-Pacific Emergency Medicine Congress

□ IMPROVING CPR QUALITY IN EMS SERVICES BY SOUND RHYTHM BOX “E.R. 100 GOO-JAI”. N. Prasertsukjinda, N. Rojtinnakorn, Accident and Emergency, Maharat Nakhon Ratchasima Hospital, THAILAND.

Objective: To invent a mechanical box that uses sound (MP3) to keep strokes while doing cardiopulmonary resuscitation (CPR). **Methods:** E.R. 100 Goo-Jai has multiple functions to help CPR teams correctly perform chest compressions; such as the functions to keep strokes at 100/min, breathing assistance 10 times/min, and a reminder for adrenaline administration every 3 min. This equipment is available for both Basic Life Support and Advanced Life Support. **Results:** After using this equipment in the resuscitation room, the success of CPR was evaluated by the number of patients who had a return of spontaneous circulation (ROSC), CPR success rate, and CPR team satisfaction. The results showed 45/50 patients (90%) had ROSC in, on average, 12 min and 48 s (compared with 17 min before using this equipment). CPR success rate increased to 54.1% (before = 51/225 patients, 22.6%). The CPR success rate in Emergency Medical Services (EMS) was 4/5 patients, 80% (before = 65/96 patients, 67.7%) and CPR teams satisfaction was 97%. **Conclusions:** E.R. 100 Goo-Jai is useful mechanical equipment that can improve CPR quality in the Emergency Department and EMS services in Maharat Nakhon Ratchasima Hospital.

□ EVALUATION OF THE CHEST COMPRESSION LANDMARKS ACCORDING TO THE 2010 AMERICAN HEART ASSOCIATION (AHA) GUIDELINE FOR CARDIOPULMONARY RESUSCITATION (CPR) BY USING COMPUTED TOMOGRAPHY (CT) EXAMINATIONS FOR INFANTS. J. E. Han, H. J. Yang, E. Y. Kim, Emergency Department, Gil Hospital/Gachon University, Incheon, KOREA.

Objective: To verify that the left ventricle (LV) is compressed and the abdomen avoided using the chest compression landmarks in infants according to the 2010 American Heart Association (AHA) guidelines for cardiopulmonary resuscitation (CPR) using computed tomography (CT) examinations. **Methods:** Using chest CT examinations in 63 infants from March 2002 to July 2011, we retrospectively measured distances of inter-nipple line (INL) and lower third (LT) of the sternum from xiphoid process. The distances between LV maximal diameter (LVMD) and xiphoid processes were also measured to determine whether LVs were covered using the resuscitation techniques. These distances were compared with distances of 20 adults' digits performing the two-finger and the two-thumb techniques on templates of infant's chests. **Results:** The mean distances of the INL and the LT of

the sternum were 32 ± 8 mm and 12 ± 2 mm, respectively. The LVMD was placed 15 ± 6 mm from the xiphoid process. When applying the mean distances of adults' digits (28 mm and 23 mm for two-finger and two-thumb, respectively), the LV was covered in 57 patients (90.5%) and 59 patients (93.7%), respectively. The upper abdomen was compressed in 22 patients (34.9%) by the two-finger technique and in 16 patients (25.3%) by the two-thumb technique with the range of 0.3 mm–10.8 mm. **Conclusions:** When applying 2010 AHA CPR guidelines for infants, the chest compression landmarks adequately cover the LV in more than 90% of patients. In 25–35% of infants, the upper abdomen is compressed from a few millimeters to 11 mm.

□ DESMOPRESSIN EFFICACY IN ACUTE RENAL COLIC. K. Masoumi, A. Forouzan, A. A. Darian, H. Kalantar, Emergency Medicine Department, Imam Khomeini General Hospital - Ahvaz Jundishapur University of Medical Science, Tehran, IRAN; S. S. Beladi Moosavi, Internal Medicine Department, Imam Khomeini General Hospital - Ahvaz Jundishapur University of Medical Science, Tehran, IRAN.

Objective: The relief of acute pain is key in the modern practice of Emergency Medicine. Many medications are used for relieving pain in renal colic. Desmopressin could contribute to the rapid relief of pain in renal colic and may be the only immediate therapy necessary for some patients. **Methods:** Patients 18–55 years old with acute renal colic who presented to the Emergency Department were evaluated randomly if they had no exclusion criteria. Patients received 40 μ g desmopressin acetate nasal spray (DDAVP, sanofi-aventis, Bridgewater, NJ). Pain score was recorded at 15, 30, 45, and 60 min after DDAVP administration by visual analogue scale. At 30 min, diclofenac Na+ 75 mg was injected intramuscularly if there was any degree of pain. At 45 min, morphine sulfate 5 mg was administered intravenously (i.v.) if pain score was > 5 . At 60 min, morphine sulfate 5 mg i.v. was injected if there was any degree of pain. **Results:** Seventy patients were evaluated, including 12 females and 58 males, with mean age of $33/7 \pm 10/1$ years. Two patients in 30 min had no pain and were discharged home in 60 min without any drugs. Others received 75 mg diclofenac in 30 min; 21 patients (30%) had no pain in 60 min and were discharged without opioids. Forty-seven patients (67%) were given opioids. Of these, 14 patients had a pain score > 5 in 45 min and received 5 mg morphine i.v., but only one person had no pain in 60 min, and 13 patients (18.5%) received a second dose of morphine in 60 min. Thirty-four patients received one dose of morphine alone. There are no side effects. Comparison of pain scores in 0 and 30 min and in 0 and 45 min, and between 30 and

45 min showed significant results. Conclusions: Our study showed that DDAVP administration (40 μ g intranasal spray) can cause effective pain relief in acute renal colic alone and especially in association with sodium diclofenac, with early discharge and more satisfaction for patients.

□ **STYLET WITH INFRARED SENSOR HELPS PROPER POSITIONING DURING ENDOTRACHEAL INTUBATION.** Y. Song, Y. Chee, Department of Electrical Engineering, University of Ulsan, KOREA; J. Oh, T. Lim, Department of Emergency Medicine, Hanyang University, KOREA.

Objective: When performing endotracheal intubation, placing the tip of the tube in the proper position quickly is important. In this study, we introduce a new method for proper position placement using an infrared (IR) sensor that is inexpensive and harmless. Methods: We developed an IR sensor stylet system that attached an IR sensor at the tip of stylet; this system measures the specific distance from the carina. Through the calibration, the IR sensor system's lamp turns on when the endotracheal tube (ETT) tip reaches 20 mm above the carina. Therefore, the intubation performer recognizes the placement of the ETT tip 20 mm above the carina through the lamp. To place the ETT tip 40 mm from carina, after the lamp turns on, the performer should pull the ETT back 20 mm through the ETT marker. In this study, 5 fresh swine airways were used, and 10 performers each performed 10 attempts on the sample airways. Results: For the target distance, which is 40 mm between ETT tip and carina, mean (SD) of total data was 37.9 (3.5) mm, and all of data are located within the 20–60 mm range. These results demonstrate that the ETT tip reached its appropriate location in all of the experiments. Conclusions: The IR sensor stylet could help to position the tip of the ETT to the appropriate depth above the carina in trachea. For application in a clinical situation, further studies should be verified in varying airways and tracheas of humans.

□ **EFFECTIVENESS OF HYPERBARIC OXYGEN AND OZONE APPLICATIONS IN TISSUE HEALING AT GENERATED SOFT TISSUE TRAUMA MODEL OF RATS: AN EXPERIMENTAL STUDY.** A. O. Yildirim, M. Eryilmaz, Emergency Medicine, Gata Military Medical Faculty, Etlik, Ankara, TURKEY; M. Eroglu, Emergency Medicine, Gata Haydarpaşa Military Hospital, Istanbul, TURKEY; S. Bilgic, M. Durusu, U. Kaldirim, Emergency Medicine, Gata Military Medical Faculty, Etlik, Ankara, TURKEY; E. Eyi, Emergency Medicine, Hakkari Military Hospital, Hakkari, TURKEY; S. K. Tuncer, Emergency Medicine, Gata Military Medical Faculty, Etlik, Ankara, TURKEY; T. Topal, Physiology Department, Gata Military Medical Faculty, Etlik, Ankara, TURKEY; B. Kurt, Pathology Department, Gata Military Medical Faculty, Etlik, Ankara, TURKEY; S. Dilmen, Emergency Medicine, Elazığ Military Hospital, Elazığ, TURKEY; M. Serdar, Biochemistry Department, Gata Military Medical Faculty, Etlik, Ankara, TURKEY.

Objective: There are some trials about the effectiveness of hyperbaric oxygen therapy (HOT) and ozone therapy in cases

in which the pathophysiology is associated with tissue ischemia. In this study we aimed to interpret the effectiveness of hyperbaric oxygen and ozone therapies in an experimental soft tissue trauma model. Methods: Soft tissue trauma was generated by dropping a weight of 500 g to the thigh region from a height of 45 cm after anesthesia. Subjects were randomized to the three main groups of HOT (n=21), ozone (n=21), and control (n=21). HOT (2 h a day 2.5 atmospheres) and ozone/oxygen mixture (0.7 g/Kg/day) was applied to the subjects. Subjects of both groups were sacrificed on the first, third, and seventh days by random selection after the blood and the tissue samples were obtained. Lipid peroxidation (LPO), superoxide dismutase, glutathione peroxidase, hypoxia-inducible factor-1, and inducible nitric oxide synthase (iNOS) levels in the blood samples and the levels of inflammation and edema in the tissue samples were compared between the two groups. Results: Statistically significant reduction was found in the levels of iNOS and LPO in the HOT and ozone groups compared with the control group. The histopathological examination showed that the inflammation was reduced in both the HOT and the ozone groups compared with the control group, compatible with the findings above. A significant reduction in inflammation was found in both the HOT and the ozone groups compared with the control group. Additionally, significant decrease in the edema was observed in all three groups histopathologically. Conclusions: We consider that the HOT and the ozone therapy have beneficial effects in soft tissue trauma treatment. There is no obvious evidence that shows superiority of one or the other between these two groups.

□ **A 45° SET SQUARE METHOD FOR ACCURATE NEEDLE INSERTION IN ULTRASOUND-GUIDED INTERNAL JUGULAR VENOUS CATHETERIZATION.** J. H. Kim, Emergency Department, Severance Hospital/Yonsei University, Seoul, KOREA.

Objective: Until now, there was no standardized method for insertion of introducer needle in ultrasound-guided internal jugular venous catheterization (IJVC). The needle insertion site and angle have been determined on the basis of the performer's experience. We designed a new standardized approach (called 45° set square method) that determines the site and the angle of needle insertion during ultrasound-guided IJVC to improve first-attempt success rate and reduce complications. The purpose of this study was to investigate the clinical usefulness of the novel 45° set square method for IJVC by ultrasound guidance in the Emergency Department (ED). Methods: This study was a prospective, randomized controlled, clinical trial conducted in the ED. A total of 41 patients requiring a central venous catheterization were enrolled in the study. They were randomized to either the conventional ultrasound guidance or 45° set square group. The primary outcome measure was success rate within three attempts, and secondary measures were the number of trial, first-attempt success, procedure time, complications, and technical difficulty score. Results: All 41 participants successfully completed this study. Twenty-one consecutive patients were enrolled in the 45° set square group; 20 consecutive patients were enrolled in the conventional group. The 45° set square group (100%) was superior to the conventional group

(60%) in overall success rate within three attempts ($p = 0.001$) and the number of attempts ($p < 0.001$). There were significant differences between the two groups in puncture time ($p = 0.004$), hematoma ($p = 0.048$), and technical difficulty score ($p < 0.001$). Conclusions: The 45° set square method is an effective and safe method for ultrasound-guided internal jugular venous catheterization in the ED.

□ **INITIAL HIGH ScvO₂ IS RELATED TO ORGAN DYSFUNCTION IN SEVERE SEPSIS AND SEPTIC SHOCK PATIENTS.** S. Lee, Y. Hong, J. Park, E. Lee, S. Kim, Emergency Medicine, Korea University Anam Hospital, Seoul, KOREA.

Objective: To find whether initial high ScvO₂ is related to severity of organ dysfunction and predicts in-hospital mortality in severe sepsis or septic shock patients. Methods: This was a secondary analysis of 169 patients with severe sepsis or septic shock that were prospectively included in this study at an emergency department (ED). Hemodynamic variables, sepsis-related organ failure assessment (SOFA) score, arterial blood gas studies, and in-hospital mortality were obtained at the time of presentation. Oxygen extraction ratio (ER) was calculated with $(1 - \text{ScvO}_2) / \text{SaO}_2$. We compared the data according to the level of ScvO₂. Results: A total 133 patients were selected for analysis. The patients were classified into three groups according to the ScvO₂ levels: low ScvO₂ < 70% ($n = 71$), normal ScvO₂ 70–80% ($n = 47$), and high ScvO₂ > 80% ($n = 15$). Extraction rates of each group were $36.3 \pm 18\%$ for the low ScvO₂ group, $20.6 \pm 4.6\%$ for the normal ScvO₂, and $13.1 \pm 5.5\%$ for the high ScvO₂. The SOFA scores of each group were 6.3 ± 3.5 , 5.7 ± 3.1 , and 8.3 ± 4.5 , respectively ($p = 0.048$). In-hospital mortality of each group was 29.6% for the low ScvO₂, 21.3% for the normal ScvO₂, and 46.7% for the high ScvO₂ ($p = 0.160$). Conclusions: Initially high ScvO₂ level was associated with the severity of organs dysfunction and high in-hospital mortality in severe sepsis and septic shock. These results may reflect low tissue oxygen extraction ratio due to microcirculatory and mitochondrial dysfunction in septic shock patients.

□ **FACTORS ASSOCIATED WITH ACUTE KIDNEY INJURY IN PATIENTS AFTER CARDIAC ARREST TREATED WITH THERAPEUTIC HYPOTHERMIA.** S. Kim, C. S. Youn, K. N. Park, Emergency Department, Seoul St. Mary's Hospital, College of Medicine, The Catholic University of Korea, Seoul, KOREA.

Objective: Acute kidney injury (AKI) caused by renal ischemic-reperfusion injury occurs in patients after cardiac arrest. AKI is a consistent and powerful predictor of in-hospital mortality, and is associated with an increase in hospital length of stay, hospital costs, and resource utilization. We investigate risk factors associated with AKI after cardiac arrest treated with therapeutic hypothermia (TH). Methods: We performed an observational cohort study of patients aged more than 18 years, who were successfully resuscitated following cardiac arrest and treated with TH by our institutional protocol from March 1, 2009 to May 31, 2012. Patients who were previous end-stage renal disease or pre-existing AKI patients on renal replacement therapy, and had no available biochemical results within 12 h

after cardiac arrest, were excluded from this study. AKI was categorized using the peak and estimated baseline serum creatinine, into: 1) no AKI, 2) risk of AKI, 3) Kidney injury, 4) Kidney failure; according to the RIFLE criteria. Results: There were 136 patients after cardiac arrest treated with TH during the study period; 130 patients were included in the final analysis. Twenty-seven of 130 patients (20.7%) had AKI class injury/failure during the first 3 days of hospitalization after cardiac arrest. On multivariate binary logistic regression analysis, the event of cardiogenic shock (odds ratio [OR] 5.949, 95% confidence interval [CI] 1.401–25.271, $p = 0.016$), higher serum lactate level at 6 h (OR 1.335, 95% CI 1.023–1.744, $p = 0.034$) after return of spontaneous circulation (ROSC) and the cumulative dose of epinephrine during resuscitation (OR 4.347, 95% CI 1.040–18.164, $p = 0.044$) were independently associated with AKI. Conclusions: The development of AKI after cardiac arrest was associated with hemodynamic status during therapeutic hypothermia and serum lactate after ROSC. These associated risk factors for AKI after cardiac arrest could be useful in clinical decision-making, resources utilization, and outcome prediction.

□ **WHAT IS THE OPTIMAL INSERTION ANGLE BETWEEN THE SKIN AND NEEDLE IN ULTRASOUND (US)-GUIDED INTERNAL JUGULAR VEIN (IJV) CATHETERIZATION?** H. Jeon, Emergency Department, Bundang Jesaeng Hospital, Bundang, KOREA.

Objective: We tried to identify whether the optimal insertion angle between the skin and needle in US-guided IJV catheterization would be changed depending on the patient's central venous pressure (CVP). Methods: Using the 3.5-cm-long linear probe, we measured the distance from the skin to the IJV's outer and inner surface on the longitudinal scan's midline in supine-positioned patients who were indicated for central venous catheterization regardless of suspected diagnoses in the Emergency Department. We calculated the angle between the skin and the imaginary line from the puncture site to the IJV's internal center on screen's midline (defined as optimal angle, which is considered as the safest approach) on the longitudinal scan. We measured patients' CVP after catheterization. We divided the patients into three groups based on the CVP (low CVP < 5 cm H₂O, 5 ≤ middle CVP ≤ 10 cm H₂O, and high CVP > 10 cm H₂O) and compared their mean anteroposterior (AP) diameters and optimal angles using analysis of variance statistics. Results: A total 56 patients were enrolled; 36 were women (64.3%). Mean age, AP diameter, and optimal angle were 62.9 ± 16.8 years, 1.01 ± 0.40 cm, and $29.1 \pm 5.01^\circ$, respectively. Thirteen, 32, and 11 patients belonged to the low, middle, and high CVP groups, respectively. Normality was acquired in AP diameter and optimal angle by Shapiro-Wilk test ($p > 0.05$). The mean AP diameter of the low CVP group was significantly lower than the middle and high CVP groups (0.68 ± 0.30 , 1.06 ± 0.31 , and 1.23 ± 0.49 cm, respectively, $p < 0.05$). There was no significant difference among the three groups' mean optimal angles (28.1 ± 6.1 , 30.1 ± 4.5 , and $28.0 \pm 5.0^\circ$, respectively). Conclusions: The optimal angle between the skin and needle in ultrasound-guided IJV catheterization remained at about 30° regardless of CVP, even though the IJV's diameter is altered in proportion to the CVP.

□ **THE EFFECTIVENESS OF ULTRASONOGRAPHY IN VERIFYING THE PLACEMENT OF A NASOGASTRIC TUBE IN PATIENTS WITH LOW CONSCIOUSNESS AT AN EMERGENCY CENTER.** H. M. Kim, B. H. So, Emergency Medicine, St. Vincent's Hospital/The Catholic University of Korea, Suwon, KOREA; K. N. Park, Emergency Medicine, St. Mary's Hospital/The Catholic University of Korea, Seoul, KOREA; S. M. Choi, Emergency Medicine, St. Mary's Hospital, Uijeongbu/The Catholic University of Korea, Uijeongbu, KOREA; W. J. Jeong, Emergency Medicine, St. Vincent's Hospital/The Catholic University of Korea, Suwon, KOREA.

Objective: This study was designed to compare the effectiveness of using auscultation, pH measurements of gastric aspirates, and ultrasonography as physical examination methods to verify nasogastric tube (NGT) placement in Emergency Department (ED) patients with low consciousness who require NGT insertion. **Methods:** The study included 47 patients who were all over 18 years of age. In all patients, tube placement was verified by chest X-ray study. Auscultation, pH analysis of gastric aspirates, and ultrasonography were conducted on each patient in random order. The mean patient age was 57.62 ± 17.24 years, and 28 males (59.6%) and 19 females (40.4%) were included. The NGT was inserted by an ED resident. For pH testing, gastric aspirates were dropped onto litmus paper, and the resulting color of the paper was compared with a reference table. Ultrasonography was performed by an Emergency Medicine specialist, and the chest X-ray examination was interpreted by a different Emergency Medicine specialist who did not conduct the ultrasonography test. The results of the auscultation, gastric aspirate pH, and ultrasonography examinations were compared with the results of the chest X-ray examination. **Results:** The sensitivity and specificity were 100% and 33.3%, respectively, for auscultation and 86.4% and 66.7%, respectively, for ultrasonography. Kappa values were the highest for auscultation at 0.484 compared to chest X-ray studies, followed by 0.299 for ultrasonography and 0.444 for pH analysis of the gastric aspirate. Ultrasonography has a positive predictive value of 97.4% and a negative predictive value of 25%. **Conclusions:** Ultrasonography is useful for confirming the results of auscultation after NGT insertion among patients with low consciousness at an ED. When ultrasound findings suggest that the NGT placement is not gastric, additional chest X-ray study should be performed.

□ **A DISASTER MEDICAL ASSISTANCE TEAM (DMAT) EXPERIENCE AFTER YEON-PYEONG ISLAND ARTILLERY BOMBARDMENT INCIDENT.** J. Cho, H. Ahn, H. Yang, J. Kim, W. Park, S. Hyun, M. Kim, Department of Emergency Medicine, Gachon University Gil Hospital, Incheon, KOREA; J. Kim, Department of Emergency Medicine, Incheon Emergency Information Center, Incheon, KOREA.

Objective: The purpose of this study was to use a review of the regional disaster that occurred on November 23, 2010, to improve the National Disaster Medical System and to operate the Disaster Medical Assistance Team (DMAT) and the Mobile Emergency Support Unit better. **Methods:** The Yeonpyeong

Islands are located about 85 km from the land of South Korea and about 1300 people live there. The incident involved around 170 artillery shells and rockets, and both military and civilian targets. We retrospectively analyzed 30 victims of the artillery bombardment incident in Incheon, Korea by using reports of the on-site DMAT members and recordings of notifications to the Incheon 1339 Emergency Medical Information Centers (EMIC) from the scene of the accident. **Results:** The DMAT went to the scene 14 h after the incident due to the access restriction and the site being far from the mainland. On the next day, November 24, we examined 30 patients. Most of the diagnoses were multiple contusion, acute stress reaction, and cerebral concussion. Ten patients were transported to the hospital for admission by the ship. Diagnoses of admitted patients were angina pectoris (n = 2), acute stress reaction (n = 4), tympanic membrane rupture (n = 1), cerebral concussion (n = 4), etc. **Conclusions:** Our National Disaster Medical System still contains many problems, especially lack of cooperation between related parts, and insufficient communication. This study shows that we should recheck our National Disaster Medical System and construct a cooperative military, fire department, maritime police, EMIC, local government, and regional medical service system.

□ **ADDING TRIAGE TEMPERATURE DATA TO CHIEF COMPLAINT FOR BIOSURVEILLANCE IN THE EMERGENCY DEPARTMENT.** D. Cochrane, J. Allegra, Emergency Medicine, Morristown Medical Center, NJ, Design: Retrospective cohort. Setting: Four New Jersey EDs (October 1, 2007 to May 31, 2009). **Observations:** We determined outbreak periods by visual inspection of New Jersey Department of Health influenza like-illness (ILI) weekly activity data. We determined daily volumes using three classifiers: 1) chief complaints (CC) Fever, 2) $T > 37.8$, 3) presence of either CC Fever OR $T > 37.8$ (Combined). We defined an outbreak signal as a daily volume greater than the 28-day moving averages plus 2 SDs. Any signal outside of the ILI outbreak period was considered a false positive (FP).

Objective: Biosurveillance systems commonly use Emergency Department (ED) patient CC to monitor ILI. Triage nurses measure patients' temperature, making it possible to directly identify patients meeting one of the criteria for ILI: temperature $> 37.8^\circ\text{C}$ ($T > 37.8$). Our objective was to determine whether adding triage temperature to CC fever improved the detection of the onset of ILI outbreaks and decrease FP. **Methods/Results:** By visual inspection, we identified three ILI outbreaks. During the 581 days of the study, there were 213,645 ED visits with complete data. The number of visits identified by each classifier was: 1) CC fever - 18,144, 2) $T > 37.8$ - 17,925, 3) Combined - 25,801. For the first outbreak, both $T > 37.8$ and Combined signaled the outbreak 1 day earlier than CC fever, but for the second and third outbreaks, CC fever and Combined both signaled the outbreaks earlier than $T > 37.8$, by 10 and 13 days, respectively. The number of FP signals for each classifier was: 1) CC Fever, 13; 2) $T > 37.8$, 16; 3) Combined, 14. **Conclusions:** In this small pilot study, adding the triage temperature to CC fever did not greatly improve the detection of the onset of ILI outbreaks or decrease the number of FPs. Further study is needed comparing these classifiers over more ILI outbreaks.

□ **RAMATHIBODI HOSPITAL MEDICAL RESPONSE TO THE MASS CASUALTY INCIDENT ON 7TH OCTOBER 2008 USING THE TEMPLATE FOR OBSERVER REPORTS OF CRISES.** Y. Apibunyopas, Emergency Department, Thammasat University Hospital, THAILAND.

Objective: The main objective of this paper was to study the medical response of Ramathibodi Hospital to the mass casualty incident on October 7, 2008. The secondary objective was to report the outcome in the standardized manner by using the template for observer of crises based on Guideline for Evaluation and Research in the Utstein Style. Methods: This study was a management research about medical response of Ramathibodi Hospital to the event on October 7, 2008. The report of the study was written according to the template for observer reports of crises. Data were obtained by reviewing the patient records and electronic database, and by interviewing medical personnel on duty during the incident. SPSS version 15.0 (IBM, Armonk, NY) was used for data collection and analysis. The statistic applied in the study was a descriptive statistic. Results: A total number of 78 casualties presented to the Emergency Department (ED) of Ramathibodi Hospital. Most patients arrived during the first and second hour after the incident. Most were male (65.4%), with a mean age of 41.3 years. All casualties were contaminated by tear gas. Most of them suffered from non-critical injuries. Forty-four patients (56.4%) had Injury Severity Score 1. Fifty-three patients (67.9%) were discharged from the ED. Twenty-three patients (29.5%) were admitted to the general ward and one patient (1.3%) was admitted to the Intensive Care Unit. One patient died from this event. Ramathibodi Hospital medical response to the event in terms of decontamination, triage, operative treatment, radiological investigation, blood transfusion, surge capacity, and communication was effective. Conclusions: Firstly, Ramathibodi Hospital medical response to the mass casualty incident on October 7, 2008 was appropriately conducted. Secondly, the template for observer reports of crises that was used as a writing template for reporting the outcome of this study was useful in terms of making the results of this study organized and well structured.

□ **EFFECT OF VENUE ALCOHOL SALES ON SPECTATOR MEDICAL USAGE RATES AT SPORTING EVENTS.** B. Adkins, D. Ritchie, S. Stearley, W. Lubbers, T. Trott MSIV, Department of Emergency Medicine, University of Kentucky, Lexington, KY.

Objective: Event medicine research has identified several factors that increase medical usage rates at mass gatherings such as high ambient temperatures, inclement weather, and larger crowds. We hypothesize that venue-based alcoholic beverage sales increase the volume and acuity of patients seeking medical care at events. Methods: De-identified spectator care center data were collected from 2009–2011 from college basketball games played at two comparable urban climate-controlled indoor arenas located in the same state about 80 miles apart. Venue #1 seats 22,090 patrons and sells alcoholic beverages. Venue #2 seats 23,500 patrons and does not permit alcohol sales. Data were collected from each facility for number of total visits and ambulance transports. Venue #1 collected data from 29 games in the calendar year January 1, 2011 to January 1,

2012. Venue #2 collected data from academic years spanning from July 2009 to June 2011. Results: Venue #1 with alcohol sales treated 108 patients at their care center, averaging 3.72 patients per game. Eleven patients or 0.38 patients per game were sent via Emergency Medical Services (EMS) to the hospital. Venue #2 without alcohol sales treated 79 patrons at their care center in 37 games, an average of 2.14 patients per game. Seven patients were sent to the hospital by EMS, averaging 0.19 transports per game. Conclusions: Venue alcohol sales correlates with higher medical usage rates at indoor events. Ambulance transfer rates at the facility with alcohol sales doubled the other facility, suggesting treatment of more high-acuity patients. Study weaknesses include small sample sizes, lack of data acquisition uniformity, and absence of specific documentation regarding alcohol's involvement with each patient. Further research with prospective data and detailed documentation could better demonstrate the effect of alcohol sales on event medical care.

□ **AIRCRAFT MEDEVAC BY MEDICAL MODULES OF EMERCOM OF RUSSIA.** I. Yakirevich, A. Popov, Medical Unit, Central State Airmobile Rescue Service, EMERCOM of Russia, Moscow, Russian Federation.

Objective: During elimination of medical consequences of emergencies, the issues concerning victims' mass evacuation to a specialized hospital are constantly brought up. At the disposal of the Central Airmobile Rescue Service of EMERCOM of Russia there are two types of medical modules. Medical Airplane Module (MMS) is used for medical evacuation of 4 victims aboard an Ilyushin 76 aircraft. Medical Helicopter Module (MMV) is used for medical evacuation of 2 victims aboard an MI-8 helicopter. MMS and MMV ensure mobility and versatility. Methods: From December 2008 until now, 37 medical evacuations were carried out using MMS aboard an Ilyushin 76 aircraft: traffic accident victims, terrorism act victims, and victims of man-made catastrophes. In total, 272 patients were evacuated (including 16 children); 68 victims with artificial lungs ventilation (ALV). Medical evacuation of severely injured victims from regional hospitals to Moscow specialized hospitals to provide efficient and modern medical aid was carried out using MMV. In total, 27 patients were evacuated, 5 with ALV. The majority of victims were in severe and extremely severe condition with associated multi-system trauma. Closed craniocerebral injury was observed in 75% of victims, with mass affection of locomotor apparatus, mine and explosion trauma, gunshot wounds, burn shock, and burn disease. Constant monitoring, oxygen therapy, ALV, analgesia and sedation, intensive and anti-shock care were carried out in flight. Condition was evaluated according to Glasgow, APACHE II and SOFA scales. Results: MMS and MMV application in case of mass evacuation in flight ensures spared victims' transportation, total monitoring, and treatment continuity. It enables caregivers to carry out anesthetic and resuscitation treatment, intensive care, monitoring and treatment of all the victims. Conclusions: The quality of mass medical evacuation of extremely injured victims has considerably improved, and the time of transportation from emergency area to specialized hospitals to render them efficient medical aid has decreased.

□ **GRAPHICAL UNDERSTANDING OF GEOGRAPHIC DIFFERENCES IN EMS TRANSPORTATION TIME FOR STROKE PATIENTS IN KOREA USING CONTROL CHARTS.** Y. Sohn, H. C. Ahn, J. Y. Ahn, Y. H. Lee, S. M. Park, W. W. Lee, H. S. Kwon, Emergency Medicine, Hallym University Sacred Heart Hospital, Seoul, KOREA.

Objective: Many clinicians are well aware that a golden hour exists for the use of thrombolytics in stroke patients. Consequently, some have been reporting that pre-hospital delay is one of the major causes of delayed treatment beyond 3 h and that a definite pre-hospital delay happens in some restricted regions of Korea. To the best of our knowledge, no studies have reported on the geographic diversity of stroke care in Korea. We therefore evaluated whether Emergency Medical Services (EMS) transportation differs depending on area, using a motion chart supported by Google, and then we used a funnel plot to determine if geographic differences are significant. Methods: We obtained data from the "Emergency Medicine Annual Report" published by the National Emergency Medical Center in Korea. We were able to construct a motion chart showing the percentage of therapeutically eligible stroke patients against the volume of total visiting patients according to area for the previous few years. We plotted these data as a funnel plot, which is a well-known statistical control chart that shows warning and control limits. Results: The motion chart clearly revealed some areas with a poor quality of EMS transportation over a few years. The funnel plot showed that four areas out of 16 political districts in Korea are across a control limit and one area is within a warning and control limit. Conclusions: Our analysis indicates that several areas need to be investigated carefully, because those areas have a low percentage of therapeutically eligible stroke patients when compared with a similar volume of visiting patients at EDs across Korea. So the use of control charts, such as motion charts and funnel plots, could also improve the quality of several medical fields in addition to treatment of stroke patients.

□ **AN EVALUATION OF A MASS-CASUALTY INCIDENT WHICH DEVELOPED AFTER A BUS FELL OFF THE INCHEON BRIDGE.** S. Kang, H. M. Jung, S. H. Yun, J. H. Kim, S. B. Han, J. S. Kim, J. H. Paik, Emergency Medicine, Inha University Hospital, Incheon, KOREA.

Objective: Field triage, medical care, and transportation are important and life-saving medical tasks performed at the site of mass-casualty incidents (MCIs). We investigated the MCI of an express bus that fell off the Incheon bridge and evaluated problems. We are willing to provide information for equipping and local disaster planning. Methods: We surveyed the local emergency medical system response time, transportation time, and patients' clinical data from paramedic and hospital medical records. We assess the adequacy of triage, field medical care, and transportation. Results: Twenty-four people who were on the bus were evacuated. Sixteen patients (66.7%) were transported to one hospital; 12 persons were dead on the scene. There was transport delay in living patients because transportation of the dead was carried out early. Advanced airway and vascular assess were not performed on any patients. Conclusions: When we

reviewed these MCIs, there was no appropriate medical control such as triage and transportation. In the construction of emergency medical service system preparing MCIs or disasters, we suggest the integration and unification of 119 rescue services and emergency medical information centers for effective medical control. Disaster drills should be performed with the guideline of local emergency medical services.

□ **THE EFFECT OF HURRICANE KATRINA ON VIOLENCE AGAINST WOMEN IN ORLEANS PARISH.** L. Moreno-Walton, J. Avegno, B. Lee, Emergency Medicine, Louisiana State University Health Sciences Center, New Orleans, LA, I. Espinal, General Studies, Oberlin College, Oberlin, OH.

Objective: To compare sexual assault rates, severity, and characteristics pre- and post-Hurricane Katrina (K). Methods: Retrospective chart review for the 5-year periods pre- and post-K examining rates and parameters of severity. Pearson's chi-squared test was used for categorical data; Wilcoxon rank test for non-parametric data. Odds ratios (OR) were calculated. Results: Victims were younger pre-K ($p = 0.0139$). Women who were assaulted post-K were less likely to be black; OR 0.44, 95% confidence interval (CI) 0.3652–0.5364; more likely to test positive for drugs, OR 1.75 95% CI 1.4271–2.1425, ($p \leq 0.0001$); less likely to have suffered trauma, OR 0.65 95% CI 0.5382–0.7898, ($p \leq 0.0001$). Women who were assaulted pre-K were more likely to have known the assailant, OR 0.79, 95% CI 0.6489–0.97474, $p < 0.0001$. Conclusions: Despite the correlation between disasters and increased rates and severity of trauma to women discussed in the literature, Hurricane Katrina had no such effect.

□ **OUTCOME REPORTS OF OUT-OF-HOSPITAL CARDIAC ARREST IN KOREA - NATIONAL EMERGENCY DEPARTMENT INFORMATION SYSTEM OF CARDIAC ARREST (NEDIS-CA) 2008–2009.** M. J. Lee, Department of Emergency Medicine, School of Medicine, Kyungpook National University, Daegu, KOREA; H. J. Yang, Department of Emergency Medicine, Gachon University of Medicine and Science, Incheon, KOREA; H. D. Yoon, Department of Emergency Medicine, National Emergency Medical Center, Seoul, KOREA; G. W. Kim, Department of Emergency Medicine, Ajou University School of Medicine, Suwon, KOREA; H. Kim, Department of Emergency Medicine, Wonju College of Medicine, Yonsei University, Wonju, KOREA; T. H. Rho, Division of Cardiology, Department of Medicine, College of Medicine, The Catholic University of Korea, Seoul, KOREA; J. S. Cho, Department of Emergency Medicine, Gachon University of Medicine and Science, Incheon, KOREA.

Objective: Sudden cardiac death is often fatal, and the majority of out-of-hospital cardiac arrest (OHCA) studies have been conducted as retrospective or individual prospective studies. This study was based on a national prospective registry entitled "Research on the Actual State of OHCA in Korea," which was conducted by the NEDIS-CA (National Emergency Department Information System for Cardiac Arrest) consortium. This is the first national Web-based prospective, multicenter study to be

conducted on OHCA in Korea. **Methods:** The research was conducted at 29 emergency medical centers using a structured reporting system and medical records from January 2008 to July 2009. Demographic features, initial electrocardiographs, locations of events, bystander cardiopulmonary resuscitation (CPR), time variables, and clinical data were collected. **Outcomes of OHCA** were categorized as survival to discharge or neurologic status at discharge. **Results:** A total of 6684 admitted OHCA cases were included; 6197 Emergency Medical Services (EMS)-assessed CA, 4156 resuscitation-attempted CA, and 484 initial shockable rhythms. EMS-assessed OHCA patients had a median age of 72 years, and 58.4% were men. Although 74.3% were witnessed by a bystander, only 7.7% received bystander CPR. In witnessed events, they had a median collapse to Basic Life Support intervals of 10.5 min and collapse to defibrillation intervals of 25.0 min. The survival rate at hospital admission was 18.2% and overall survival to hospital discharge was 4.3%. The shockable group showed higher rates of return to spontaneous circulation (64.7%) and survival to admission (35.3%), but lower survival to discharge (7.6%). Also, the calculated proportion of EMS-assessed OHCA was 1 in 268 Emergency Department visits. **Conclusions:** The overall OHCA and ventricular fibrillation survival discharge rates in Korea were 4.3% and 7.6%, respectively, which is lower than those reported in other countries. Our results indicate that fatalities are directly related to a low bystander CPR rate and delayed resuscitation. Strategies are required to reinforce the chain of survival in Korea.

□ **RESCUER FATIGUE DURING NINE MINUTES OF HANDS-ONLY CPR.** C. K. Hong, Department of Emergency Medicine, Samsung Changwon Hospital, Sungkyunkwan University School of Medicine, Changwon, KOREA; S. O. Park, Department of Emergency Medicine, Konkuk University Medical Center, Seoul, KOREA; C. S. Choi, Changwon Emergency Medical Information Center, Samsung Changwon Hospital, Sungkyunkwan University School of Medicine, Changwon, KOREA; Y. Lee, A. J. Sung, J. H. Lee, K. W. Cho, S. Y. Hwang, Department of Emergency Medicine, Samsung Changwon Hospital, Sungkyunkwan University School of Medicine, Changwon, KOREA.

Objective: There have been few studies on the use of long-standing hands-only cardiopulmonary resuscitation (CPR) by a lone rescuer. This study aims to evaluate the long-standing (9 min) hands-only CPR by a lone rescuer, and the change of chest compression depth over time. Also, this study was done to compare the effect of age on chest compression depth. **Methods:** From a total of 404 adult lay-persons who participated in CPR training, 91 subjects were enrolled in the simulation trial of 9 min of hands-only CPR using a manikin with a Skill-Reporter™ (Laerdal, Wappingers Falls, NY). The quality of the chest compression over time and the effects of rescuer age were analyzed. **Results:** Of the 91 participants, 74 (81%) fully completed the 9 min of CPR. No significant differences of incomplete CPR rate between each age group were observed. No significant differences in the degree of reduction in effective chest compressions were observed based on the time course among the different age groups. The total number of compres-

sions decreased abruptly beginning at the 6-min time point (5 min vs. 6 min, $p = 0.038$). **Conclusions:** Most trained laypersons (approximately 80%) completed the 9 min of hands-only CPR. The rate of chest compressions saw a significant decrease at the 6-min time period. We could not find a significant difference in the decrease of adequate chest compressions over time among the various age groups in the pilot simulation study. In the future, a larger-scaled follow-up study may be needed.

□ **TOP TEN ISSUES IN ASIAN EMS.** Y. Y. Ng, Medical Department, Singapore Civil Defense Force, SINGAPORE; S. D. Shin, Department of Emergency Medicine, Seoul National University, Seoul, KOREA; H. Tanaka, Department of Emergency Medicine, Kokushikan University, Tokyo, JAPAN; M. Ong, Medical Department, Singapore General Hospital, SINGAPORE.

Objective: The issues faced in Asian Emergency Medical Services (EMS) have never been described as a collective group. EMS leaders and medical directors in the Asian EMS council were surveyed to understand the range of issues commonly faced by them. **Methods:** An anonymized e-mail survey was sent out to 150 members of the Asian EMS council, a voluntary organization formed by like-minded EMS physicians in Asia to advocate for better EMS training, care, and research. Demographic data and qualitative questions were asked regarding the top issues faced by them in their respective EMS systems. **Results:** Twenty-seven respondents from nine countries answered the survey; 44% of EMS directors work on a volunteer basis in a two-tier (65%) EMS service that does not charge fees (81.5%). Most EMS services are urban (85%), fire service-based (52%), and most paramedics are EMT-I equivalent (62.5%). The top issues of concern were that of care quality, training and education, finances, career pathways, and public perceptions. Many EMS directors mentioned the need to advocate for higher standards of care and evidence-based care. Respondents also mentioned a need to create an “Asian standard of care” as cultural and social norms in EMS differ greatly between Western and Asian countries. **Conclusions:** There continues to be many challenges in EMS management in Asia. The issues faced by other developed countries, although similar, have very different context and backgrounds compared to Asian countries.

□ **CAN A CITY-WIDE DIVERSION POLICY SUCCEED?** B. Adkins, R. Humphries, P. Howard, Department of Emergency Medicine, University of Kentucky, Lexington, KY; J. Seamon, Department of Emergency Medicine, Michigan State University-Grand Rapids, Grand Rapids, MI; J. Pope, Department of Emergency Medicine, University of Kentucky, Lexington, KY.

Objective: Emergency Medical Services (EMS) diversion will be significantly reduced by a city-wide “no divert” policy without widespread provider dissatisfaction. **Methods:** Representatives of all hospitals in a city of 300,000 met to discuss potential solutions to excessive ambulance diversion. The committee agreed to halt EMS diversion for 3 months to evaluate the impact on patient care, hospital safety, and provider satisfaction. The Veteran’s Administration Hospital did not

participate and exceptions were made for power outages, hospital computer malfunctions, and specialty unavailability. Diversion statistics were compared before and after the pilot. EMS providers, emergency nurses, and emergency physicians were surveyed at pilot completion with 99 responses (51 nurses, 46 paramedics, 2 physicians). Results: Monthly diversions averaged 61/month for the previous 2 calendar years. During the pilot, the average number of monthly diversions was <12 per month, an 82% reduction. Survey results: 58% overall did not perceive an increase in ED volume (61% of paramedics, 42% of nurses, and 100% of physicians). Fifty-one percent overall perceived less tension between Emergency Department (ED) staff and EMS (51% of nurses, 48% of paramedics, and 100% of physicians). Fifty-one percent overall perceived no compromise of patient safety (89% of paramedics, 49% of nurses, and 100% of physicians). Fifty-seven percent of those surveyed did not recognize an impact on workload (59% of paramedics, 37% of nurses, and 100% of physicians). Conclusions: The suspension of a city-wide diversion policy can significantly reduce EMS diversion without creating a global provider concern over workload, patient safety, or EMS/ED staff relations. The study would benefit from a longer trial and more respondents, particularly with more physician input. Recognition of specific safety concerns among the nurse group would also be very beneficial in future research. Finally, the survey allows for potential agenda-based responses among participants who have a preference for protocol termination or continuity.

□ **THE DIFFERENCE BETWEEN EMERGENCY RECOGNITION AND SAFETY CONSCIOUSNESS ACCORDING TO A COMMUNITY EDUCATION PROGRAM FOR A RURAL EMERGENCY MEDICAL SERVICE SYSTEM IN A RURAL COUNTRY: INTERVENTION STUDY.** S. M. Lee, J. W. Jeung, H. Y. Lee, B. K. Lee, K. W. Jeung, H. H. Ryu, B. J. Chun, T. Heo, Y. I. Min, Emergency Department, Chonnam National University Hospital, Gwangju, KOREA.

Objective: Compared to urban areas, rural ones have access to relatively restricted emergency medical services (EMS), both in quality and quantity. They, however, are in bigger need for such services due to their safety accidents and underlying diseases based on the aged population model. We set out to investigate whether education for EMS would be helpful for the utilization of poor resources of EMS in rural areas and how efficient it might be. Methods: Goheung (n = 796) and Haenam (n = 819) were selected; they seemed to be similar in terms of area, population composition, and quality and quantity of EMS. While one area received "Life Helper for the Village," one of the educational programs for EMS, the other did not. A questionnaire containing items about the recognition of EMS and their roles as the primary responder was administered. Results: Significant differences were found in the recognition of EMS and safety awareness in Goheung, to which education for EMS was provided. However, we did not find the relationship between injury or accident development and education for a rural EMS system in two areas. Conclusions: It is thus required to provide education for developing common residents into primary responders in alienated rural and fishing

villages, offer them ongoing and repeating education to increase their recognition of EMS and safety awareness, and expand such education to the areas in a similar situation.

□ **DETECTING PREHOSPITAL HEMOPERITONEUM REMOTELY THROUGH FAST AND 3 G NETWORK: A SIMULATION STUDY.** K. J. Hong, K. J. Song, S. W. Song, Department of Emergency Medicine, Seoul National University Boramae Medical Center, Seoul, KOREA; S. D. Shin, Department of Emergency Medicine, Seoul National University Hospital, Seoul, KOREA.

Objective: Prehospital focused assessment with sonography for trauma (FAST) is used to diagnose hemoperitoneum and determine whether transportation to a trauma center is necessary. The goal of this study was to simulate detecting prehospital hemoperitoneum remotely through FAST and a 3 G network. Methods: We developed a real-time image transmission system for prehospital ultrasound. In the system, ultrasound image is initially acquired using portable sonography (Sonosite Inc., Bothell, WA) and transmitted to the Emergency Department (ED) through a 3 G network. One emergency medical technician (EMT) acquired a prehospital FAST image inside an ambulance. Image acquisition and transmission was conducted at 3, 5, 10, and 15 km from the ED and during migration between. At each point, the EMT performed FAST with hepatorenal view using two phantom models randomly: normal model and hemoperitoneum model. Eight Emergency Physicians interpreted FAST images. We analyzed sensitivity, specificity, and area under the curve (AUC). We also conducted subgroup analysis by grade of emergency physicians (board, senior resident, junior resident), moving status of ambulance vehicle and distance from ED. Results: A total of 17 image acquisitions and transmissions were attempted with a success rate of 15/17 (88.2%). Two emergency medicine (EM) boards, four senior residents, and two junior residents were recruited to detect presence of fluid collection of the hepatorenal area. Sensitivity, specificity, and AUC value of overall Emergency Physicians was 67.9%, 78.1%, and 0.73 (95% confidence interval 0.65–0.81), respectively. Subgroup analysis of the EM board was 85.7%, 95.8%, and 0.90, respectively. Higher-grade Emergency Physicians showed significantly higher value of AUC (board: 0.90, senior resident: 0.69, junior resident: 0.63, $p = 0.01$). There was no significant difference of AUC regarding moving status of ambulance or distance from ED ($p = 0.34, 0.98$). Conclusions: Simulation of detecting hemoperitoneum using prehospital FAST through 3 G network showed acceptable performance. Higher grade of Emergency Physicians showed better performance.

□ **IMPLEMENTATION OF SCREENING, BRIEF INTERVENTION AND REFERRAL TO TREATMENT (SBIRT) FOR MEDICALLY UNEXPLAINED PSYCHIATRIC SYMPTOM.** K. J. Hong, K. J. Song, Department of Emergency Medicine, Seoul National University Boramae Medical Center, Seoul, KOREA; S. D. Shin, Department of Emergency Medicine, Seoul National University Hospital, Seoul, KOREA; I. K. Lyoo, Department of Psychiatry, Seoul National University Hospital, Seoul, KOREA; J. S. Choi,

Department of Psychiatry, Seoul National University Boramae Medical Center, Seoul, KOREA.

Objective: Emergency Department (ED) visits involving mental problems are increasing. Patients with psychiatric disease often present physical symptoms rather than psychiatric ones. We defined these cases as Medically Unexplained Psychiatric Symptom (MUPS). The objective of this study is to develop and implement an ED-based SBIRT program for MUPS. **Methods:** We implemented a SBIRT program for MUPS at two academic EDs in a metropolitan area. When patients' physical symptoms were not properly explained with routine medical evaluation like physical examination or laboratory and imaging study by Emergency Physicians, we performed screening for mental health problems. For patients younger than 65 years, we conducted the Hospital Anxiety and Depression Scale. And for geriatrics older than 65 years, we conducted the Mini-Mental State Examination in the Korean version, Short Geriatric Depression Scale-Korean version, and Goldberg's anxiety scale. If there was positive finding of the screening scale or a clinician suspected psychiatric disease despite a negative screening scale, they were referred for psychiatric consultation. Psychiatrists confirmed whether the patient could be diagnosed as having a mental problem. **Results:** We operated the SBIRT for MUPS from June 2011 to March 2012 at 2 EDs. During the study period, 1564 cases were included. Common physical symptoms were chest pain (27.1%), dizziness (22.1%), and pain (12.8%). Seven hundred ninety-six (67.8%) of 1173 younger adults and 159 (40.7%) of 391 geriatrics showed positive screening results. Finally, 547 patients were referred for psychiatric interview and 459 cases (83.9%) were diagnosed with a mental health problem by a psychiatrist. Common psychiatric diagnoses were depression (30.5%) and anxiety (29.6%). **Conclusions:** We successfully developed and implemented a MUPS SBIRT program at the ED. The positive predictive value of the program was 83.9%.

□ IMPLEMENTATION OF ED BASED IN-DEPTH SURVEILLANCE FOR SUICIDAL ATTEMPT: DESCRIPTIVE STUDY. K. J. Song K. J. Hong, Department of Emergency Medicine, Seoul National University Boramae Medical Center, Seoul, KOREA; S. D. Shin, Department of Emergency Medicine, Seoul National University Hospital, Seoul, KOREA; I. K. Lyoo, Department of Psychiatry, Seoul National University Hospital, Seoul, KOREA; J. S. Choi, Department of Psychiatry, Seoul National University Boramae Medical Center, Seoul, KOREA.

Objective: South Korea has the highest suicide rate among all Organization for Economic Cooperation and Development member countries. The Emergency Department (ED) is the first contact place for suicidal attempters. Suicidal attempters require emergency care for combined injuries and appropriate referral to the psychiatric service. The goal of this investigation is to implement ED-based in-depth surveillance for suicidal attempt and to analyze ED management process, descriptively. **Methods:** We implemented an ED-based in-depth surveillance program for suicidal patients at two academic EDs in a metropolitan area. All adult patients older than 18 years who visited the ED for suicidal attempt were included. Emergency

Physicians and psychiatrists conducted face-to-face interviews and collected clinical information. After Emergency Physicians treated acute trauma and intoxication resulting from suicide attempts, psychiatrists evaluated these patients. After 1, 3, and 6 months, trained interviewers performed telephone follow-up about treatment compliance and presence of suicidal idea. **Results:** From June 2011 to April 2012, 73,417 adults visited study EDs. Three hundred thirty-five (0.5%) of them were registered as suicidal attempters. During ED stay, only 110 (32.8%) attempters agreed to psychiatric consultation; 5.4% of 335 died in the ED and 28.1% were discharged against medical advice; 18.1% of enrolled patients answered during their ED stay that they had plans to attempt suicide again. In the telephone survey at 1, 3, and 6 months after discharge, the response rate was 64.1%, 53.6%, and 44.7%, respectively. Among responders, the rate of continuing psychiatric treatment was 52.0%, 50.0%, and 39.5%, respectively. The rate of presenting suicidal idea at the interview time was 13.9%, 10.5%, and 14.8%, respectively. **Conclusions:** We implemented ED-based in-depth surveillance for suicide attempt. The result showed a low rate of psychiatric consultation and high rate of discharge against medical advice, which require further intervention for an effective program.

□ EVALUATION OF MEDICAL TRAINING COURSE FOR CREWS OF HELICOPTER EMERGENCY MEDICAL SERVICES (HEMS) IN KOREA. J. I. Lee, K. H. Lee, O. H. Kim, Y. S. Cha, K. C. Cha, H. Kim, S. O. Hwang, Emergency Department, Yonsei University Wonju College of Medicine, Wonju Christian Hospital, Kangwon-do, KOREA.

Objective: The two doctors' HEMS system was launched in Korea in 2011. We developed the medical training course for crews of HEMS. We analyzed the effectiveness and satisfaction of the HEMS training course. **Methods:** We developed the 2-day medical training program for HEMS. After or during the courses, we surveyed the satisfaction of the course. The medical training program consists of theoretical and practical training. After the program finished, a six-point-scale questionnaire about the training course was administered. **Results:** Of the 37 dedicated HEMS personnel who attended the course, 9 were doctors, 12 emergency medical technicians, 4 nurses, and 12 pilots, co-pilots, or people for communication services. Satisfaction scores for the course were 5.27 ± 0.70 (median 5) in theoretical programs, and 5.41 ± 0.75 (median 6) in practical and simulation programs. The practical and simulation training program's satisfaction was higher than the theoretical programs. In the detailed score of the course satisfaction, the theory of the national HEMS education program overview was 5.30 ± 0.66 (median 5), overview of the HEMS (median 5) was 5.38 ± 0.64 , the structure of helicopter was 5.27 ± 0.65 (median 5), and 5.22 ± 0.75 in aviation physiology (median 5); the actual helicopter transportation was 5.32 ± 0.67 (median 5), the helicopter that transported the corresponding treatment was 5.24 ± 0.72 (median 5), helicopter transport safety theory was 5.41 ± 0.69 (median 6), flight management and aircraft communications was 5.27 ± 0.69 (median 5), the health care information and management was 5.05 ± 0.81 (median 5), and helicopter transport safety was highest

(5.41 ± 0.69). Conclusions: The highest satisfaction in the medical training course for HEMS crew was for the Advanced Cardiac Life Support simulation course. The trainees preferred the simulation course over the theoretical course.

□ **ON-LINE MEDICAL CONTROL BY BOARD-CERTIFIED EMERGENCY PHYSICIANS DOES NOT INCREASE PREHOSPITAL IV PLACEMENT.** W. Cha, Department of Emergency Medicine, Samsung Medical Center, Seoul, KOREA; S. Shin, Department of Emergency Medicine, Seoul National University Hospital, Seoul, KOREA; Y. Kim J. Rhee, Department of Emergency Medicine, Seoul National University Bundang Hospital, Bundang, KOREA.

Objective: The aim of this study was to evaluate whether on-line medical control by board-certified Emergency Physicians increases the rate of prehospital intravenous (i.v.) placement. Methods: This study is a before-and-after study evaluating the effect of a new on-line medical control program. An enhanced on-line medical control program for maintaining care quality was initiated in October 2011. Emergency medical technicians (EMTs) are required to receive on-line medical control when advanced life support is indicated for EMT-I or appropriated decision is required for both levels of EMTs. On-line medical control was provided by dedicated medical directors from the Health Department on the basis of protocol; they were simultaneously working in Emergency Departments. We compared volume of medical control over arrest and shock patients and placement of i.v. to these cases during an 80-day period for each arm. We also compared the quality of Basic Life Support (BLS) using the bundle score. Results: During 160 days of the study period, 75 emergency physicians from 19 institutes participated in the program; 26 (34.7%) of these completed a medical director's course before the program. There were 987 and 1134 arrest cases during the control period and study period, respectively. The placement of i.v. did not significantly increase (1.52% and 1.32%, respectively, $p < 0.70$). However, BLS performance such as airway management (49.2%, and 53.6%, respectively, $p = 0.04$), positive ventilation (68.0% and 71.8%, respectively, $p = 0.06$), chest compression (78.1% and 82.8%, respectively, $p = 0.006$), and automated external defibrillator placement (75.5% and 80.3%, respectively, $p = 0.008$) showed significant improvement. For shock patients, there were 2034 and 1651 patients, respectively. i.v. placement did not increase significantly (6.98% and 7.63%, respectively, $p = 0.45$). However, BLS as O₂ supply (45.4% and 50.7%, respectively, $p = 0.01$) and electrocardiogram monitoring (32.7% and 38.2%, $p < 0.001$) improved significantly. Conclusions: Enhanced emergency physician-based medical control did not increase prehospital i.v. placement.

□ **DISCREPANCIES OF ATTITUDE TOWARD ON-LINE MEDICAL CONTROL AMONG EMERGENCY MEDICAL TECHNICIANS.** S. Lee, Department of Emergency Medicine, Samsung Medical Center, Seoul, KOREA; Y. J. Kim, Department of Emergency Medicine, Seoul National University Bundang Hospital, Bundang, KOREA; W. C. Cha, Department of Emergency Medicine, Samsung Medical Center, Seoul, KOREA; S. D. Shin, Department of Emergency

Medicine, Seoul National University Hospital, Seoul, KOREA; J. E. Rhee, Department of Emergency Medicine, Seoul National University Bundang Hospital, Bundang, KOREA.

Objective: Direct medical control of Emergency Medical Technicians (EMTs) provides rare occasions where EMTs and physicians interact outside Emergency Departments. However, EMTs come from different background and baseline knowledge, which makes the communication complicated. We conducted a survey of EMTs in order to evaluate discrepancy of attitude between two levels of EMTs. Methods: In this study setting, prehospital care is provided solely by a single-tiered dispatch system operated by the Fire Department. Ambulances are staffed with EMT-Intermediate and EMT-Basic in most areas. EMTs are enforced to receive on-line medical control when advanced life support is indicated or appropriated decision is required. On-line medical control was provided by dedicated medical directors of the Health Department on the basis of protocol; they were simultaneously working in Emergency Departments. The survey consisted of a total of 17 questionnaires including provider's experience, attitude, opinion, and satisfaction about the new enhanced program and was done for all participating EMTs after 3 months of the program. We described the demographics and compared the responses between both levels of EMTs. Results: A total 720 (69.3%) out of 1039 ambulance crews replied to the survey (367 [51.0%] of EMT-I and 261 [36.3%] of EMT-B). About the enhanced medical control system, 56.3% of EMT-I and 43.0% of EMT-B answered that it had a positive effect ($p = 0.01$). In order to make the system better, 72.7% of EMT-I and 59.7% of EMT-B ($p = 0.01$) answered that regular meetings for communication with medical directors are required; 64.4% of EMT-I and 46.5% of EMT-B thought additional education and training was necessary to make the medical control more effective ($p = 0.001$). Conclusions: Although overall, EMTs thought direct medical control was an effective method, there was significant discrepancy between different levels of providers. A more specific approach may be required for each level of EMTs.

□ **THE IMPACT OF HURRICANE KATRINA (K) ON PENETRATING TRAUMA (PT) IN NEW ORLEANS.** L. Moreno-Walton, A. McFarlin, S. D'Andrea, Emergency Medicine, Louisiana State University Health Sciences Center, New Orleans, LA; A. Plyer, Demography, Greater New Orleans Community Data Center, New Orleans, LA; J. Avegno, Emergency Medicine, Louisiana State University Health Sciences Center, New Orleans, LA.

Objective: Assess impact of Hurricane Katrina (K) on penetrating trauma (PT) in New Orleans. Methods: A retrospective review of Trauma Registry from January 1–August 2005 (pre-K data = 3824 entries) and April 2006–December 2010 (post-K data = 3076 entries). Data were analyzed by the calculation of totals and percentages. Odds ratios (OR) and confidence intervals (CI) were calculated for discrete variables. Results: Mean rate of PT post-K = pre-K. Pre-K crude died of wounds in Emergency Department (ED) rate = 7.48%; 4.71% post-K. Patients less likely to be resuscitated pre-K (OR 0.612; CI 0.498–0.759). Victims of PT pre-K surviving resuscitation were more likely to die, even when adjusted for Injury Severity Score (ISS). K had a negative impact on risk of black race (OR

0.489; CI 0.430–0.556). There was no impact on age as a risk factor. Alcohol and drugs were more likely to be associated with PT post-K than pre-K (OR 1.71, 95% CI 1.16–1.37), (OR 1.28, 95% CI 1.164–1.411). There was no statistically significant difference in ISS levels. K made New Orleans (NO) residence less of a risk factor (OR 0.499, CI 0.449–0.554), and post-K the impact of being within the city limits was also diminished (OR 0.773, CI 0.701–0.851). There were no differences in the distribution of dispositions from the ED to the floor, operating room, intensive care unit, step-down unit, or home. Although all-cause mortality for victims of PT was significantly higher pre-K, the disposition of survivors was not affected by K. Conclusions: Rates of PT actually decreased following K. Mechanism of PT, gender, age, ISS, ED, and hospital disposition were unaffected. Victims of PT had improved overall survival post-K. They were more likely to be intoxicated, suggesting a higher level of post-K substance use, but a higher level of disinhibition effect and lower level of intent. Being black, living in NO, and being in NO were less of a risk post-K than they were pre-K.

□ **FACTORS AFFECTING PUBLIC RECOGNITION AND WILLINGNESS TO PERFORM BYSTANDER CPR IN DAEGU METROPOLITAN CITY.** H. W. Ryoo, J. Park, M. Lee, K. Seo, S. Shin, Emergency Department, Kyungpook National University Hospital, Daegu, KOREA.

Objective: Immediate bystander cardiopulmonary resuscitation (CPR) is the most essential factor for lifesaving in out-of-hospital cardiac arrest patients. We investigated the factors affecting recognition and willingness to perform CPR among the general population of Deagu metropolitan city. Methods: We randomly selected 1000 persons from all over Deagu city by using quota sampling and conducted a questionnaire survey regarding their knowledge, experiences of, and attitudes toward CPR through face-to-face interviews. We performed descriptive statistics followed by multivariable logistic regression analyses. Results: 89.5% of the subjects answered that they know CPR, and 65.0% answered that they know how to perform CPR. But correct answers about position, depth, and rate of chest compression were only 43.7%, 10.2%, and 15.8%, respectively. Among them, 55.5% of the subjects were willing to attempt CPR for their families and friends and 32.4% were willing to attempt CPR for strangers. Willingness to attempt CPR was independently associated with men (odds ratio [OR] 1.6, 95% confidence interval [CI] 1.2~2.1), awareness of exemption clause for the layperson CPR (OR 2.8, 95% CI 1.5~5.1), and having trained in CPR (OR 2.1; 95% CI 1.5~2.9). Conclusions: Awareness of exemption clause for the layperson CPR and experience of CPR training closely associated with willingness to attempt CPR. Legal information about the fact that CPR performed by a layperson is excluded from legal liability should be emphasized during CPR training.

□ **CHARACTERISTICS OF SEVERE HEAT RELATED ILLNESS VICTIMS OF EMERGENCY DEPARTMENT VISITS FROM NATION-WIDE REGIONAL IN-DEPTH SURVEILLANCE SYSTEM.** S. W. Song, K. J. Song, K. J. Hong, Department of Emergency Medicine, Seoul National University Boramae Medical Center, Seoul,

KOREA; Sang Do Shin, Department of Emergency Medicine, Seoul National University Hospital, Seoul, KOREA.

Objective: With climate change/global warming, the significant heat wave event has increased, and extreme heat wave events have a negative impact on public health. The purpose of this study was to identify characteristics of severe heat-related victims through the in-depth Surveillance system of Severe Heat-related Illness (SSHI) based on Emergency Department (ED) visits. Methods: We developed a nationwide regional in-depth surveillance system based on EDs and implemented in 14 EDs chosen by regional cluster random sampling method in Korea. Suspected severe heat-related illness cases, including heat stroke and heat exhaustion, were watched and the information reported using a Web-based registry. Daily heat-index was calculated using daily maximal temperature and relative humidity at that time of national climatic database. We used Poisson analysis in analyzing the association between severe heat-related illness and heat index, and chi-squared test for identifying risk factors. Results: Between June 1 and August 11 of 2012, 28 severe heat-related cases were reported by 13 of the 14 EDs participating in the SSHI; 22/28 (79%) were male, and mean age was 53.4 (range 14–82) years. Of 28 cases, 12 were heat stroke (43%) and 16 were heat exhaustion (57%), with about 79% of all cases occurring between 9:00 a.m. and 6:00 p.m. Seven of 28 (25%) were outdoor working status and 5/28 (18%) were unemployed status. The ED outcomes were normal discharge (54%), ward admission (18%), intensive care unit (14%), transfer (11%), and death (4%). The Poisson regression for association between daily heat index and severe heat-related illness was statistically significant (incidence rate ratio 1.52, 95% confidence interval 1.29–1.82). Conclusions: Outdoor working conditions and unemployed status may be associated with severe heat-related disease, and there was significant association with climate change. A surveillance system that monitors ED visits may be useful in assessing adverse health effects of summer heat waves.

□ **DEVELOPMENT OF PUBLIC HEALTH ASSESSMENT TOOLKIT FOR EMERGENCY RESPONSE TO REGIONS WHERE CLIMATE DISASTERS FREQUENTLY OCCUR.** S. W. Song, K. J. Song, K. J. Hong, Department of Emergency Medicine, Seoul National University Boramae Medical Center, Seoul, KOREA; Y. J. Lee, Department of Emergency Medicine, Inje University College of Medicine, Gyungnam, KOREA; S. S. Hwang, Department of Social and Preventive Medicine, School of Medicine, Inha University, Incheon, KOREA.

Objective: Meteorological disasters can significantly affect public health, and we need a rapid, feasible, and reliable public health assessment toolkit to respond to and meet the needs in a timely manner. The purpose of this study was to create a Public Health Assessment toolkit for Emergency Response (PHASER) for regions where climate disasters frequently occur. Methods: From March through August 2012 we undertook four tasks. 1) Reviewing national climate disaster database, we selected the four potential candidates where there was a high possibility that a climate disaster would occur. 2) We discussed the methodology of collecting Geographic Information Systems

(GIS)-based census data with a core member of the Korean census office. 3) Conducting a literature review, we created a framing document of sample selection, training, and data collection to survey public health after a climate disaster. 4) We introduced and educated the community partners on the PHASER toolkit in four candidates. Results: Geoje, Jeju, Ulsan, and Paju were selected for the potential candidates. We developed the PHASER toolkit with seven process phases: 1) Decision to conduct PHASER; 2) Collecting census data; 3) Two-stage cluster sampling method; 4) Selected clusters mapping and assessment appropriateness of its locations; 5) Filed interview and reporting using GIS-based mobile PHASER application; 6) Weighted analysis; 7) Writing report and disseminating the results. We solved the method of collecting census data with the cooperation of the Korean statistical information service, and household census data of community level will be offered online. The PHASER toolkit contains interview items for eight levels of engagement. Conclusions: We developed the PHASER toolkit to prepare for climate disaster and we planned to apply this toolkit soon after a climate disaster does happen. We expect that the PHASER toolkit can be used by public health practitioners and emergency management officials to determine the public health status and basic needs of the affected community in a quick and low-cost manner.

□ PRESENT SITUATION OF HELICOPTER EMERGENCY MEDICAL SERVICES (HEMS) IN KOREA.

C. Lee, J. Cho, H. Yang, J. Kim, W. Park, G. Lee, Department of Emergency Medicine, Gil Hospital/Gachon University, Incheon, KOREA.

Objective: In Korea, resources of emergency medical services were concentrated in metropolises and metropolitan areas. So, establishment of an efficient medical transport system is needed for emergency patients in a rural area. And Helicopter Emergency Medical Services (HEMS) is expected to shorten transportation time to advanced facilities and advanced treatment at the scene. The aim of our study was to investigate the present situation of the HEMS pilot project of in Korea. **Methods:** Between September 23, 2011 and March 22, 2012, emergency patients in islands and vulnerable areas were transported by helicopter to Incheon and Jeollanam-do. The medical team, including an Emergency Physician, boarded a helicopter with advanced medical equipment and rushed to the scene. The operation time of the helicopter was from sunrise to sunset. Target diseases were acute myocardial infarction, stroke, severe trauma, and post-resuscitation state. **Results:** During this period, the number of total requests was 209, transport number was 138, cease number was 14, and reject number was 57. The average daily transport number was 0.4 times/helicopter. In the Emergency Department, 50 patients (37%) were admitted to the intensive care unit, 40 patients (30%) were admitted to the general ward, 18 patients (14%) underwent an operation or intervention, 10 patients (8%) transferred to another hospital, and no patients died. Mean call to take-off time was 8 min, and mean of total transport time was 44 min. Mean of back-and-forth transport distant was 90 km. **Conclusions:** For the past 6 months, transport number was relatively low, but that has gradually increased. Fortunately, there were no accidents. Research and development of a more efficient HEMS system is needed.

□ **POST-ANOXIC SEIZURE WAS NOT RELATED TO MORTALITY AND NEUROLOGIC OUTCOME IN POST-CARDIAC ARREST SYNDROME: A RETROSPECTIVE COHORT STUDY.** J. J. Kim, H. S. Lee, W. J. Kim, H. J. Yang, S. Y. Hyun, Emergency Department, Gachon University Gil Hospital, KOREA.

Purpose: The aim of this study is to evaluate relevance of post-anoxic seizure with prognosis in case of out-of-hospital cardiac arrest (OHCA) patients who were treated with therapeutic hypothermia (TH) and research prognostic role of portable EEG in post-cardiac arrest syndrome (PCAS) patients with seizure. **Methods:** One hundred-eighty OHCA patients admitted to our emergency intensive care units during July of 2008 and June of 2011, and 147 patients who had been treated with therapeutic hypothermia were included. Portable EEG had been taken after 24 h after induction of TH and classified by attending neurologist. As outcome variables, overall mortality and neurological outcome at 6 months after hospital discharge were evaluated. (Good neurological outcome; Cerebral performance category (CPC) 1, 2: Poor neurological outcome; CPC 3-5.) **Results:** Among 147 patients, 94 patients (63.9%) were male, mean age was 51. Eighty-three patients (56.5%) survived and almost 30% (43/147) of patients had a good neurological outcome. Sixty-five patients (44.2%) had seizures and among this group, 19 patients (29.2%) were discharged with good neurological outcome. There was no statistical relevance between seizure group and non-seizure group. With multiple logistic regression analysis, initial rhythm, APACHI II score, time from basic life support to return of spontaneous circulation (OR 2.169; 95% CI 1.158 -4.063, OR 1.107; 95% CI 1.064 -1.152, OR 1.014; 95% CI 1.006 -1.022, respectively) had statistical importance, but seizure group (OR 0.67, 95% CI 0.356 -1.032, $p = 0.065$) had no statistical relevance with mortality. Factors associated with good neurological outcome was VF/VT initial rhythm ($p = 0.005$), cardiac cause of arrest ($p = 0.001$), high initial body temperature ($p < 0.001$), low APACHI II score ($p = 0.010$), shorter time interval between arrest from basic life support ($p = 0.005$). **Conclusion:** In our study, post-anoxic seizure group showed no statistical relevance with mortality and neurologic outcome. We should treat aggressively in PCAS with seizure. Larger, prospective studies are needed to evaluate post-anoxic seizure activity in PCAS.

□ **COMPLAINTS LODGED BY EMERGENCY DEPARTMENT PATIENTS IN A TEACHING HOSPITAL.** Abraham Wai, Accident & Emergency Medicine Academic Unit, The Chinese University of Hong Kong, Hong Kong, CHINA.

Objective: Emergency Departments (EDs) are notorious for its high complaint rate by patients. This is because EDs are usually congested with a large number of patients, the waiting time is long, and consultation time for each patient would be very limited. Short consultation and limited availability of diagnostic investigations are two major contributing factors for diagnostic challenges and errors. Complaints are defined as feedback from Emergency patients or their representatives requiring replies. **Methods:** Retrospective case review of complaints received by the ED in 2009–2010. Demographics of patients and

their complaint issues analyzed preset categories. Results: There were 114 complaints lodged in 2009–2010, out of an annual attendance of around 300,000. Demographics, residential area, and billing status of complainants are comparable with the general patient pattern in this ED. Most of the complaints arose during the night time when the manpower is thin in the ED. For urgent cases, complaint validity is 86% (65% in 1990–1994); for non-urgent cases, validity is 78% (58% in 1990–1994). In our data, 45% were diagnosis and treatment related (it was 29% in 1990–1994). Fifty percent were related to missing diagnosis and improper management. Around 30% were related to inadequacy of care. Nature of complaints: Access: 17% (long waiting time and access block); Communication: 22% (staff manner); Treatment and Diagnosis: 45%; Treatment and Diagnosis Subgroup analysis: 83% of these complaints are substantiated; 38% of substantiated cases are Medical and Orthopedics patients. Out of valid complaints, the majority (75%) can be remedied by further explanation and apology. Conclusions: This is a pilot review on the limited number of complaint cases lodged in 2009 and 2010. Communication is an important ring to improve patient satisfaction. Important diagnostic challenge should be emphasized repeatedly among staff. For better analysis, a larger-scale prospective study would be recommended.

□ EFFECTIVENESS OF VIRTUAL LEARNING COMPARED TO CLASSROOM EDUCATION IN APPROACH TO DIAGNOSIS OF BIOTERRORISM AND CHEMICAL TERRORISM AMONG EMERGENCY PHYSICIANS. M. A. Moghaddam G. Molavi, Emergency Medicine, Imam Hossein Hospital affiliated with Shahid Beheshti University of Medical Sciences, Tehran, IRAN.

Objective: Emergency Physicians have an important role in detecting chemical and biological terrorist attacks. The present study compared the effectiveness of virtual vs. classroom teaching methods among Emergency Physicians in detecting chemical and biological terrorist attacks. Methods: The quasi-experimental study was performed on Emergency Physicians with a convenient sampling method. Study samples were divided into two groups for virtual and classroom teaching. Teaching materials were about six category A biological terrorism attacks (Anthrax, Plague, Tularemia, Viral Hemorrhagic Fever, Botulism, Smallpox) and five chemical terrorism attacks (Chlorine, Phosgene, Mustard, Lewisit, Nerve Agents). This study was conducted to assess knowledge before and after training. A questionnaire to determine the ability to diagnose chemical and biological terrorism was designed and confirmed by two educational experts. Results: There were 160 Emergency Physicians enrolled in the study. Ninety-six (60%) were men and 64 (40%) were women. Average age was 36.2 ± 5.5 years. In the virtual teaching method, pretest correct diagnoses of diseases were 30.6%, and after the training, score improved to 81.6%. In the classroom teaching method, pretest correct diagnoses of diseases were 41.9%, and after the training, score improved to 72.9%. Mean score difference in virtual learning was 51%. Mean score difference in the classroom education method was 31%. Difference in score improvement between two learning methods was significant ($p < 0.02$). Conclusions: Based on the results of this study, it seems that virtual learning is more effective than classroom ed-

ucation in approach to diagnosis of chemical and biological terrorism among Emergency Physicians.

□ CAN CONTEMPORANEOUS FEEDBACK USING WEB 2.0 APPLICATION TWITTER PROVIDE MORE EFFECTIVE EVALUATIONS THAN TRADITIONAL END-OF-BLOCK EVALUATIONS? Bobby Desai, Emergency Medicine, University of Florida, Gainesville, FL.

Background: Inconsistencies in work schedules and faculty supervision are barriers to monthly emergency medicine (EM) resident evaluations. Direct and contemporaneous resident feedback may be effective in providing specific details that determine a resident's evaluation. Objectives: To determine whether Twitter, an easy-to-use Web 2.0 application that is available on smartphones and the Internet, can provide direct and contemporaneous resident feedback that is easily accessible and easy to store and refer back to. Methods: First- to third-year EM residents were administered a survey to assess their thoughts on the current monthly evaluation system. Subsequently, residents obtained a Twitter account and were instructed to follow one general faculty Twitter account for ease in data collection. Following completion of an 8-week study period, a second survey was administered to assess resident thoughts on contemporaneous feedback and evaluations vs. the traditional form. Results: Of 24 EM residents, 13 were available for study. A total of 220 "tweets" were provided by seven faculty to the residents, with a mean of 11 tweets (range 8–17) per resident. The 13 residents received a total of eight formal evaluations from 19 faculty. The second survey demonstrated that this method provided more detailed evaluations and increased the volume of feedback. Conclusions: Contemporaneous feedback and evaluation provides a greater volume of feedback that is more detailed than end-of-block evaluations. Twitter is an effective and easy means to provide this feedback. Limitations included the length of study time and the inability to have all EM residents involved in the study.

□ AN OUTBREAK OF METHEMOGLOBINEMIA AFTER EATING NOODLES BOILED IN WATER CONTAINING ANTIFREEZE. Y. J. Park, S. P. Kim, S. J. Kim, S. H. Cho, N. S. Cho, Emergency Medicine, Chosun University Hospital, Gwangju, KOREA.

Objective: Sodium nitrite is used commercially as a coloring agent, a food preservative, and a corrosion inhibitor. Accidental poisoning usually results from the ingestion of contaminated food and water and causes gastrointestinal irritation, vasodilatation, and methemoglobinemia with subsequent tissue hypoxia. We describe an outbreak case of sodium nitrite-induced methemoglobinemia following the ingestion of water contaminated with industrial antifreeze. Methods: Eight workers who ate the noodles were hospitalized with severe stomachache. The eight workers employed at a construction site had instant cup noodles as a mid-morning snack 3 h earlier. They boiled and poured the water containing antifreeze into the cups mistakenly. Workers had put antifreeze into a 120-L water drum a day earlier to prevent the water from freezing over night. Without realizing it, they boiled the contaminated water to cook instant noodles. One

worker ate all the noodles, while the eight others stopped, complaining about an unusual smell. One worker died on the scene, with the other workers immediately transferred to the Emergency Department. Results: They complained that the noodle tasted "unpleasant" and soon afterwards experienced nausea, vomiting, dizziness, weakness, sweating, and diarrhea. They noted cyanosis and sinus tachycardia, hypotension. Subsequent investigation demonstrated a methemoglobin concentration of 64.6%, which was corrected by the intravenous administration of 1 mg/kg methylene blue 3 h after the onset of symptoms. The patients made a prompt, uncomplicated recovery and were discharged home 4 days later. Conclusions: Antifreeze "ingredients label" contains sodium nitrite 20%, surfactant 10%, silicon dioxide 5%, water 60%, and others 5%. Accidental poisoning of industrial antifreeze causes methemoglobinemia, and its continuing commercial availability necessitates that physicians consider the diagnosis and institute treatment with methylene blue promptly to prevent a fatal outcome.

□ **A CLINICAL REVIEW OF ACUTE POISONING IN GERIATRIC PATIENTS FROM RURAL GANWON PROVINCE.** J. Y. Lee, Department of Emergency Medicine, Hallym University Chuncheon Sacred Heart Hospital, Seoul, KOREA.

Objective: Recently, there has been an increase in acute poisonings in the elderly, which may be associated with attempts at suicide. The purpose of this study was to compare and analyze the clinical aspects and outcomes of acute poisonings in aged individuals with those of younger individuals. Methods: We performed a retrospective analysis of 207 patients seen in the Emergency Department (ED) with acute poisoning from January 2009 to December 2010. Two groups were created, > 65 years and < 65 years. The following were carefully compared: annual frequency, gender distribution, cause of poisoning, poisoning substance, motive for suicide, past psychiatric history, psychiatric interview, psychiatric diagnosis, disposition after ED visit, disposition after admission, poisoning severity score (PSS), duration of hospitalization, intensive care unit admission rate, and mortality. Results: The annual frequency was 0.1% in the > 65 group and 0.3% in the < 65 group, 0.4% in total. The cause of poisoning was accidental more often in those > 65 years than in those < 65 years. As motive for suicide, health problem was cited more often in the older group ($p=0.000$). The older group had fewer interviews with psychiatrists and were more often diagnosed with depressive disorder ($p=0.010$, $p=0.041$, respectively). PSS and mortality were higher in the older group ($p=0.002$, $p=0.010$, respectively). Conclusions: A better understanding for the cause of poisonings and the poisonous substance used in the aged population is needed. And because of the more serious effects of acute poisonings to the elderly patient, they should readily receive regular comprehensive care including psychiatric care.

□ **A CASE OF TRANSIENT DIABETES INSIPIDUS ASSOCIATED WITH TETRODOTOXIN POISONING.** D. H. Wi, School of Medicine, Department of Emergency Medicine, Wonkwang University, Iksan, KOREA; S. H. Kim, Emergency Medicine, Gunsan Medical Center, Gunsan, KOREA.

Objective: Ingestion of puffer fish can result in severe and potentially lethal intoxication. Tetrodotoxin is a potent neurotoxin well known for its ability to inhibit neuromuscular function. To our knowledge, the only previous report on diabetes insipidus occurring in association with tetrodotoxin is one case in Singapore. Case Report: A married couple (69-year-old man and 57-year-old woman) ingested two green rough-backed puffer fish (*Lagocephalus lunaris*). Results: They complained of paraesthesia of the perioral area and extremity and developed not only grade IV intoxication but also an increased urine output (4455 mL/day, 5035 mL/day), elevated serum sodium (157.4 mEq/L, 166.7 mEq/L), and elevated serum osmolality (324 mosmol/kg, 339 mosmol/kg), which suggested the development of diabetes insipidus. The administration of desmopressin was successful in normalizing urine volume. Conclusions: The patients were discharged the 20th and 18th hospital day without any complications.

□ **BRUGADA ELECTROCARDIOGRAPHIC PATTERN AND SEIZURE INDUCED BY PROPRANOLOL OVERDOSE.** P. S. Leung, C. Wan, S. Tsui, Accident and Emergency Department, Queen Mary Hospital, Hong Kong, CHINA.

Objective: Since the first description of Brugada syndrome in 1992, it has become the focus of interest among cardiologists and Emergency Physicians. Apart from its inherited form associated with SCN5A gene mutation, the acquired or drug-induced form was a relatively new concept. Although many agents had been implicated for manifestation of Brugada electrocardiographic pattern, it was not commonly described among patients with propranolol overdose. Case Report: We report a 44-year-old Chinese woman with history of bipolar affective disorder and drug overdose being admitted to the Accident and Emergency Department with generalized tonic-clonic convulsion after ingestion of around 500 mg propranolol. Initial assessment showed reduced consciousness, hypotension, and repeated brief seizures. Electrocardiogram showed sinus bradycardia, widened QRS complex, terminal R wave in aVR, normal corrected QT interval, and right bundle branch pattern with coved type ST-segment elevation > 2 mm with downward sloping over right precordial leads at conventional positions, which was consistent with "type one" pattern. Fluid boluses, sodium bicarbonate solution, and glucagon were administered. Serum cardiac markers and biochemistry results were within normal limits. Neither her personal nor family histories revealed syncope, documented arrhythmia, aborted or complete sudden cardiac death. Results: Propranolol was well known for its membrane-stabilizing ability and high lipophilicity. It could readily cross the blood-brain barrier, reduce seizure threshold, and alter consciousness. There was significant correlation between widened QRS complex and seizure. The sodium channel blocking effect in the context of propranolol overdose led to electrical heterogeneity of epicardial and endocardial action potentials. Avoidance of the offending agent, installation of an implantable cardioverter-defibrillator, and quinidine therapy might be treatments of choice. Early referral to a cardiologist, risk stratification, and family screening might also help in suspected cases. Conclusions: It was important to recognize the Brugada electrocardiographic pattern and ventricular arrhythmia as

secondary effects of drug overdose, and appreciate sodium channel blocking properties of propranolol.

□ **BLOOD ALCOHOL CONCENTRATIONS AND SELF-REPORTED ALCOHOL CONSUMPTION IN ACUTE POISONING PATIENTS WHO VISITED AN EMERGENCY DEPARTMENT.** S. H. Woo, W. J. Lee, Department of Emergency Medicine, The Catholic University of Korea, Incheon St. Mary's Hospital, Incheon, KOREA.

Objective: To examine the age and gender distribution of the blood alcohol concentrations (BACs) of acute poisoning patients who visited the Emergency Department (ED) and their self-reported alcohol consumption. Methods: A retrospective medical record review was conducted for all patients who visited the ED after acute poisoning between January 2004 and February 2008. Data regarding patient age, gender, BAC, self-reported alcohol consumption, substances of poisoning, elapsed time after exposure, and suicide attempts were collected. Patients were classified into two groups according to serum alcohol levels. A history of self-reported alcohol consumption was collected from the patient or their guardian at the time of their visit to the ED. Results: A total of 255 patients with acute poisoning were evaluated for their blood alcohol level. The alcohol group (65.5%) represented a higher proportion of the patients who arrived at the hospital due to acute poisoning than the non-alcohol group (34.5%). The men had a higher mean BAC than the women ($p = 0.019$), and the BAC significantly differed with age ($p = 0.035$). Self-reported alcohol intake showed 96.6% sensitivity and 86.7% specificity. Conclusions: The alcohol group represented a higher proportion of acute poisoning patients. The self-reported alcohol intake in this patient population showed high specificity and sensitivity. To assess the levels of consciousness in acute poisoning patients, careful histories of alcohol intake must be gathered from the patient or their guardian in the ED.

□ **SERIAL MEASUREMENTS OF SERUM C-REACTIVE PROTEIN AND ALBUMIN LEVELS IN THE PREDICTION OF PROLONGED MECHANICAL VENTILATION IN PESTICIDE-INTOXICATED PATIENTS.** S. W. Park, I. J. Wang, S. H. Lee, D. S. Lee, Emergency Medicine, Pusan National University Hospital, Busan, KOREA.

Objective: This study investigated whether serial measurements of serum C-reactive protein (CRP) and albumin levels can predict prolonged mechanical ventilation (PMV) in patients with pesticide intoxication. Methods: We retrospectively analyzed 36 pesticide-intoxicated patients who were admitted to the intensive care unit and received mechanical ventilation for > 72 h between January 2010 and December 2011. Patients were divided into two groups: patients on mechanical ventilation for ≥ 15 days (PMV group; $n = 9$) and patients on mechanical ventilation for < 15 days (non-PMV group; $n = 27$). Clinical and laboratory parameters were measured at presentation to the Emergency Department. CRP and albumin levels were measured at presentation and 9 days thereafter. Results: The PMV group had a higher Acute Physiology and Chronic Health Evaluation (APACHE) II score, a longer duration of increased CRP levels, and a larger decrease (Δ ; initial-peak) in albumin levels than the non-PMV groups. Of these parameters, the duration of

increased CRP levels for > 4 days (odds ratio [OR] 2.06, 95% confidence interval [CI] 1.10–3.86) and decrease in albumin levels > 2.0 g/dL (OR 7.81; 95% CI 1.04–58.67) were independently associated with PMV. The area under the receiver operating characteristic curves of the duration of CRP rise and decrease in albumin levels were 0.799 (95% CI 0.82–0.99) and 0.785 (95% CI 0.71–0.98), respectively. Conclusions: Serial measurements of serum CRP and albumin levels can identify patients at risk for PMV, and the time course of CRP and albumin levels may be used to monitor disease progression or treatment effectiveness in pesticide-intoxicated patients.

□ **CLINICAL REVIEW OF INTOXICATED PATIENTS WITH TOXIC ALCOHOL.** N. Rhee, S. P. Chung, I. C. Park, Department of Emergency Medicine, Yonsei University College of Medicine, Seoul, KOREA; K. R. Lee, Department of Emergency Medicine, Konkuk University School of Medicine, Gwangjin-gu, KOREA; H. J. Kim, Department of Emergency Medicine, College of Medicine, Konyang University, Nonsan, KOREA; G. B. Kim, Department of Emergency Medicine, National Health Insurance Corporation Ilsan Hospital, Goyang-si, KOREA; Y. S. Cho, Department of Emergency Medicine, College of Medicine, Bucheon Hospital of Soonchunhyang University, Bucheon, KOREA; I. Kwon, Department of Emergency Medicine, Inje University Haeundae Paik Hospital, Busan, KOREA; S. H. Kim, Department of Emergency Medicine, College of Medicine, Chungnam National University, Daejeon, KOREA.

Objective: Toxic alcohols are responsible for accidental, suicidal poisonings, resulting death, or permanent sequelae. Major therapeutic modalities are inhibition of alcohol dehydrogenase and extracorporeal elimination. In Korea, there are a few case reports of toxic alcohol intoxication. The purpose of this study is to review the clinical characteristics of patient with toxic alcohol intoxication. Methods: We retrospectively reviewed the medical records of patients presenting to eight Emergency Departments (ED) with toxic alcohol intoxication from June 2006 to November 2011. Those patients who ingested methanol, isopropyl alcohol, ethylene glycol, and other alcohols except ethanol were included in the study. Their clinical characteristics, including anion gap, osmolar gap, and estimated concentration of toxic alcohol were analyzed. Results: During the study period, 21 patients who ingested toxic alcohol, including 12 ethylene glycols and 9 methanols, were identified. Their mean anion gap was 18.7 ± 6.9 at ED arrival. The osmolar gap was elevated in 13 patients. The oral and intravenous ethanol was administered in 11 patients to inhibit alcohol dehydrogenase. Extracorporeal eliminations such as hemodialysis were performed in 9 patients. There was no death, but one case resulted in permanent blindness. Conclusions: This study suggests that ethylene glycol and methanol were major causes of toxic alcohol intoxication. The patients presented with high anion gap metabolic acidosis and mainly treated with oral ethanol and hemodialysis.

□ **STRYCHNINE POISONING – A DIAGNOSTIC DILEMMA IN EMERGENCY: A CASE REPORT.** R. Giri, General Practice and Emergency Medicine, B.P. Koirala Institute of Health Science, Dharan, NEPAL.

Objective: Strychnine poisoning is rare, usually fatal before reaching the hospital. Diagnosis is straightforward with a history of ingestion, but becomes challenging if history is unclear. Literature search shows no case reports from Nepal, hence, true incidence is not known. **Case Report:** A 32-year-old woman presented to the Emergency Department (ED) after referral from a peripheral center with a diagnosis of tetanus. The patient was agitated, anxious, and experiencing muscle spasms. Vital signs were stable and she was fully conscious. There was generalized increase in muscle tone and the reflexes were brisk. Sensory stimuli increased muscle twitching. History was not clear, so injection tetanus toxoid was started even with no obvious site of injury. The patient admitted to ingesting an unknown amount of some white powder after repeated questioning the next day. The powder was presumably present in the house for a long time. Routine investigations, including arterial blood gas (ABG), showed metabolic acidosis with high creatinine. There was no evidence of myoglobinuria. The patient was in the ED for more than 48 h under regular diazepam, judicious fluid management, and regular monitoring. By the time the patient was relieved of the spasm, ABG became normal, urine output was adequate, and creatinine leveled off. **Conclusions:** Strychnine is a bitter, white powder alkaloid derived from the seeds of the tree *Strychnos nux-vomica*. In Nepal, the alkaloid was used by municipal offices to kill stray dogs and as a rodenticide, but is not available nowadays. Moreover, any patient with spasm should prompt the diagnosis of tetanus because it is a major public health concern. Although clinical symptoms can mimic tetanus, rabies, and epilepsy, strychnine has to be kept in mind. With early diagnosis and supportive management, the patient can survive.

□ **ANTIOXIDANT STATUS, OXIDANT STATUS, AND OXIDATIVE STRESS INDEX LEVELS IN SCORPION ENVENOMATION.** B. Al, Emergency Department, Gaziantep University Hospital, Gaziantep, TURKEY; P. Yarbil, Emergency Department, Sehitkamil State Hospital, Gaziantep, TURKEY; S. Zengin, Emergency Department, Gaziantep University Hospital, Gaziantep, TURKEY; S. Taysi, M. Ozmen, Department of Biochemistry, Gaziantep University Hospital, Gaziantep, TURKEY; C. Yildirim, Emergency Department, Gaziantep University Hospital, Gaziantep, TURKEY.

Objective: The purpose of this study was to evaluate the variations of pre- and post-treatment antioxidant status (TAS) and oxidant status (TOS) levels in scorpion envenomation, and of oxidative stress index (OSI) calculated with these levels. **Methods:** Forty-four cases of scorpion envenomation who applied to Gaziantep University Medical Faculty Emergency Clinic between May 2009 and October 2010, and a control group of 20 volunteers, were enrolled in the study. Serum, plasma, and erythrocyte packages were prepared for each patient at the first application and at the control after 1 month, and stored at -80°C in the freezer. The Spearman correlation test was used for all values calculated, and the Tukey test was used in multiple comparisons. **Results:** No correlation was observed between age and gender and the levels of TAS, TOS, or OSI. TAS, TOS, and OSI levels in the first application were higher than the control levels taken 1 month later. TAS, TOS, and OSI arrival

levels were higher than healthy control group levels. In patients who received scorpion serum, both arrival and control levels of TAS, TOS, and OSI were higher than those of patients who did not receive scorpion serum. TAS, TOS, and OSI levels in patients who were stung at more than one site were higher. **Conclusions:** Patients who received or did not receive scorpion antivenom were improved, and TAS, TOS, and OSI levels regressed. The significant increase in TOS and OSI levels in patients who received scorpion serum was not experienced in TAS levels.

□ **THE RECOVERY RATE OF PSEUDACHOLINESTERASE IN ORGANOPHOSPHATE POISONED GERIATRIC PATIENTS.** S. M. Park, Department of Emergency Medicine, Hallym University Sacred Heart Hospital, Seoul, KOREA; H. Kim, Department of Emergency Medicine, Wonju College of Medicine, Yonsei University, Wonju, KOREA; H. C. Ahn, Y. S. Lee, Department of Emergency Medicine, Hallym University Sacred Heart Hospital, Seoul, KOREA.

Objective: The plasma cholinesterase activity can vary with a variety of physiological factors. We performed this study to evaluate the clinical characteristics of organophosphate intoxication in geriatric patients. **Methods:** We conducted a retrospective study of 118 patients (geriatric group mean age 72 ± 6 years, non-geriatric group mean age 48 ± 12 years) who ingested organophosphate insecticides from January 2000 to December 2008. Patients were divided into two age groups: < 65 years old (non-geriatric group, $n = 84$), and over 65 years old (geriatric group, $n = 34$). We excluded liver cirrhosis, cancer, malnutrition, low serum albumin states, and infection. **Results:** The plasma cholinesterase level recovered gradually in the geriatric group; it recovered rapidly in the non-geriatric group (15 days after ingestion: 1382.8 ± 1202.8 vs. 3230.5 ± 1853.4 U/L, $p = 0.000$; 20 days after ingestion: 1759.3 ± 829.8 vs. 4369.3 ± 2278.2 U/L, $p = 0.000$). The initial plasma cholinesterase level didn't differ between the two groups (662.0 ± 1613.1 vs. 898.4 ± 846.7 , $p = 0.516$). The incidence rate of amount of ingestion, the mean blood pressure, the mean pulse rate, the mean respiratory rate, and pH, PaO_2 , PaCO_2 , the lactate level and the amylase level didn't differ between the two groups. The incidence rate of aspiration pneumonia, shock, and central nervous system depression were significantly different between the geriatric and non-geriatric groups (46.2% vs. 19.7% vs. 19.6%, $p = 0.010$; 47.1% vs. 24.2%, $p = 0.006$; 43.8 vs. 18.5, $p = 0.006$). **Conclusions:** In organophosphate-poisoned patients, the rate of recovery of pseudocholinesterase was lower, but the incidence rate of intubation, the incidence rate of aspiration pneumonia, the incidence of shock, the incidence of abnormal central nervous system, and the severity were higher in geriatric patients than in middle-aged patients.

□ **IONIZED CALCIUM CAN BE THE PREDICTOR OF OUTCOME AMONG PATIENTS WITH ACUTE POISONING.** H. W. Ryu, M. J. Lee, J. B. Park, K. S. Seo, Department of Emergency Medicine, School of Medicine, Kyungpook National University, Daegu, KOREA; C. S. Park,

Won Joon Jeong, Hyun Jin Kim, Department of Emergency Medicine, Konyang University Hospital, Daejeon, KOREA.

Objective: Ionized hypocalcemia is important in critical emergency care, but the correlation between ionized hypocalcemia and fatality risk in poisoning patients has not been well established. This study aims to determine the clinical value and impact of initial ionized calcium (iCa⁺⁺) in predicting severity in the poisoning population, and evaluate its usefulness over the other outcome predictors: Base deficit, Glasgow Coma Scale (GCS), MODS (multiple organ dysfunction score), and PSS (poisoning severity scoring) systems. **Methods:** A prospective study was performed on 294 consecutive poisoning patients admitted to two emergency medical centers from July 2010 to June 2012, who underwent arterial blood gas analysis. Arterial blood gas, complete blood cell count, blood chemistry, GCS score, and vital signs were measured to obtain iCa⁺⁺, base deficit, MOD score, and PSS. All the above factors were evaluated to be associated with fatal outcome. **Results:** The most intoxicating substance was herbicide, followed by sedatives, pesticides, household products, and hydrocarbons. Overall mortality rate was 17.6%. The univariate analysis confirmed the following to be corrected with fatality: initial GCS, amylase, initial white blood cell count, C-reactive protein, bicarbonate, actual base deficit, and iCa⁺⁺ levels. Also, other severity scoring systems were associated with mortality. On receiver operating characteristic (ROC) curve analysis, the iCa⁺⁺ cutoff point for mortality prediction was 3.88 mg/dL. The sensitivities of iCa⁺⁺, base deficit, bicarbonate, and MODS were 85.2%, 73.3%, 76.9%, and 81.5%, and their specificities were 68.7%, 70.4%, 64.0%, and 69.6%, respectively. ROC curve analysis determined the areas under the curves of these parameters to be 0.802, 0.705, 0.698, and 0.811. **Conclusions:** The initial ionized calcium level (≤ 3.9 mg/dL) was confirmed as a significant risk factor associated with fatal outcome in acute intoxicated patients. It could be more effective in quick diagnosis and prediction of the mortality than other variables.

□ **THE RELATIONSHIP BETWEEN RHABDOMYOLYSIS AND ALCOHOL INGESTION IN DOXYLAMINE INTOXICATED PATIENTS.** M. J. Kim, C. W. Hong, H. S. Choi, O. Y. Kwon, J. S. Lee, H. P. Hong, Y. G. Ko, Emergency Medical Center, Kyung Hee University Medical Center/Kyung Hee University/Kyung Hee Hospital, Seoul, KOREA.

Objective: Doxylamine is commonly used to relieve insomnia, and it's also an intoxicating drug frequently used in Korea. This drug is relatively safe, but is known to induce rhabdomyolysis on occasion. We saw many cases of alcohol ingestions in doxylamine intoxications, but few previous studies have documented the effects of alcohol on rhabdomyolysis. Thus, the purpose of this study was to determine the effect of alcohol on rhabdomyolysis in doxylamine-intoxicated patients. **Methods:** This study was conducted on 91 patients admitted in an Emergency Department after doxylamine intoxication during the period from January 2001 to March 2012. Using the protocol made beforehand, the amount of drug ingestion, past history, laboratory results, and whether or not alcohol was ingested, were recorded. Rhabdomyolysis was defined as serum creatine kinase

over 1000 U/L. Data were analyzed using SPSS (IBM, Armonk, NY) package with logistic regression, *t*-test, and Fisher's test. **Results:** The alcohol ingestion was detected in 52% of the study patients. The presence of hematuria, and alcohol ingestion were significantly related to the development of rhabdomyolysis. **Conclusions:** The doxylamine-intoxicated patients with alcohol ingestion may have high incident rates of rhabdomyolysis. Therefore, doxylamine-intoxicated patients who drank alcohol at the same time should take notice of rhabdomyolysis.

□ **WHAT IS THE MEANING OF CARDIAC TOXICITIES IN THE CLINICAL COURSE OF ACUTE CARBON MONOXIDE POISONING?** I. Lee, Emergency Department, Ajou University Hospital, Suwon, KOREA; Y. Jung, G. Kim, Y. Min, E. Park, J. Lee, S. Choi, Emergency Department, Ajou University School of Medicine, Suwon, KOREA.

Objective: The aim of this study was to investigate the significance of cardiac manifestations and their clinical correlation with the clinical course in acutely carbon monoxide-poisoned patients. **Methods:** A retrospective study was conducted on consecutive patients who visited an emergency medical center and were diagnosed with acute carbon monoxide poisoning during a period of 36 months. A standardized data extraction using medical records including demographic, clinical, laboratory, and radiological data, and the occurrence of cardiac abnormalities, was performed on enrolled patients. Additionally, subgroup analysis was performed on patients who showed abnormal results with echocardiography. **Results:** A total of 293 patients were enrolled during the study period. The gender ratio was 1:0.52 (male:female), and the mean age was 38.64 ± 16.91 years. Cardiac toxicities after acute carbon monoxide poisoning were observed in 50.5% ($n = 148$) of the total patients: hypotension in 11 patients (3.8%), electrocardiographic abnormality in 101 patients (34.5%), and cardiac enzyme abnormality (creatinine phosphokinase, creatine kinase-MB, and tro-T) elevation in 158 patients (53.9%). Among the patients showing cardiac toxicities, echocardiography was performed on 56 patients: 44 patients were normal and 12 patients were abnormal (global hypokinesia in 5 patients and any regional wall akinesia in 7 patients). All of the abnormal findings were normalized in follow-up echocardiography within 10 days after first evaluation. The SOFA (Sequential Organ Failure Assessment) score in the cardiac toxicity group and in the non-cardiac toxicity group was 2.53 ± 2.29 and 2.19 ± 2.12 , respectively ($p = 0.860$). Except for 5 patients who died within 3 h after ED admission, all of the patients discharged alive. At 3 months after discharge, none of the patients had died. **Conclusions:** The importance of cardiac toxicity after acute carbon monoxide poisoning was not significant by itself in the clinical course, and the short-term prognosis of cardiac toxicity was not likely to be unfavorable in acute CO poisoning.

□ **CLINICAL CHARACTERISTIC OF INTENTIONAL CARBON MONOXIDE POISONING.** M. K. Cho, H. J. Kim, Emergency Medicine, Yonsei University College of Medicine, Seoul, KOREA.

Objective: The purpose of this study is to identify changes of characteristics of patients with carbon monoxide (CO) poisoning, and distinctive differences of the intentionally exposed patients. **Methods:** We retrospectively reviewed medical records of CO poisoning patients who visited nine Emergency Departments between January 2010 and December 2011. Clinical information including age, gender, hospitalization, type of discharge, cause and location of exposure, site of onset, concentration of initial carboxyhemoglobin (COHb), methods of treatment, and presence of neurologic complication were collected. The subjects were divided into intentional and non-intentional groups to compare the differences. **Results:** A total 209 subjects were recruited. Median age was 38 (29–49.5) years. They complained of nausea and vomiting frequently, and the most common exposures occurred in winter, usually at home. Cause of exposure was usually fire, followed by incomplete combustion of fuels. The median of the initial blood COHb was 13.15%. The intentionally exposed patients were up to 21%. They were significantly younger, more frequently discharged against medical advice, and showed higher initial blood COHb level (22.85%) than the non-intentional group. **Conclusions:** This study suggested that the intentional CO poisoning usually discharged against medical advice with an even higher initial COHb level. Sufficient explanation of delayed neurologic sequelae and short-term follow-up observation should be recommended for the patients with intentional exposure.

□ **IDIOSYNCRATIC ACUTE CHOLANGITIS AFTER ACUTE DAPSONE INGESTION.** K. W. Go, H. Lee, Y. W. Kim, D. H. Park, J. C. Choi, W.-S. Shin, Emergency Department, Inje University, Pusan Paik Hospital, Gyungnam, KOREA.

Objective: In summary, we report a case of visceral organ involvement, acute cholangitis after acute dapsone ingestion by idiosyncratic drug reaction, which responded to corticosteroid therapy successfully. **Methods:** A 67-year-old Korean woman presented to the Emergency Department (ED) with a history of acute dapsone ingestion. She intentionally ingested 40 tablets of dapsone in a suicide attempt, and 24 h later was sent to our ED. She had a past history of hypertension and chronic heart disease. She was given gastric lavage, but activated charcoal was not administered at a local hospital. **Results:** She was immediately initiated on intravenous methylene blue for methemoglobinemia, and concentration of blood was decreased and cyanosis was recovered. But on the third hospital day, the patient suffered epigastric pain, and we noted tenderness on the right upper quadrant. After 4 hospital days we recognized the elevation of laboratory findings of bilirubin, amylase, and lipase; on the 7th hospital day, we identified total bilirubin 12 mg/dL, direct bilirubin 8.5 mg/dL, amylase 232 IU/L, lipase 551 U/L, and C-reactive protein 17.31 g/dL. Computed tomography and ultrasonography of the abdomen and pelvis showed reactive gallbladder wall-thickening, but no obstructive lesion or stone. **Conclusions:** This was not a case about side effects after acute or chronic use of dapsone, but a case about acute ingestion of a large quantity of dapsone at once, the case symptoms of which resolved within 1 week, and she had no dermatologic complaint, and no evidence of cardiac or other visceral organ involvement was

found. In summary, we report a case of acute dapsone overdose ingestion accompanied by unusual idiosyncratic acute cholangitis, and this is the first report of acute dapsone intoxication with hepatic involvement in the form of acute cholangitis. Also we suggest corticosteroid therapy in such severe cases.

□ **SEIZURE AND TRANSIENT EXPRESSIVE APHASIA IN HALLUCINOGENIC MUSHROOM (PSILOCYBE) POISONING: A CASE REPORT.** S. De Sagun, S. M. Tabunar, Department of Emergency Medicine, University of the Philippines, Philippine General Hospital, Manila, PHILIPPINES.

Objective: To our knowledge, few articles in the literature have reported atypical presentation of Psilocybe poisoning. This case report will put emphasis on the need to recognize this unusual presentation and toxidrome of Psilocybe poisoning for early diagnosis and management, which will therefore save time and resources of the patient. **Case Report:** The patient was a 23-year-old male gardener from Cavite, with an unremarkable past medical history. He misidentified small white mushrooms under a mango tree as same species of mushrooms he used to eat in his hometown in Baguio. Two hours after eating three raw caps of these mushrooms, he experienced abdominal pain, diarrhea, vomiting, dizziness, headache, and visual hallucinations. Three hours post-ingestion, he had a grand mal seizure for 10 seconds. Seven hours post-ingestion, he fully regained consciousness but was aphasic. When brought to the Emergency Department of UP-Philippine General Hospital 9 h post-ingestion, he was normotensive (120/80 mm Hg), tachycardic (heart rate 120 beats/min), febrile (38.4 °C), and aphasic, but with otherwise essentially normal systemic findings. Nine and a half hours post-ingestion, he had another seizure, which was resolved by diazepam 5 mg intravenous. Ten hours post-ingestion, resolution of aphasia was noted. **Results:** Work-up for metabolic problem and hypercoagulability were normal. Patient had leukocytosis (13,000) on complete blood count and sinus tachycardia on electrocardiogram. Bedside toxicologic test for methemoglobinemia was negative. Primary consideration then was Psilocybe poisoning, which was later on confirmed by identification of the mushrooms by a mycologist. After 2 days of observation without recurrence of symptoms, the patient was discharged. **Conclusions:** Seizure and transient expressive aphasia as unusual presentation of Psilocybe poisoning, as in the case presented, will add to the well-known psychedelic effects of Psilocybe mushrooms. This case report also emphasizes the importance of recognition of toxidrome and the time of presentation of symptoms in mushroom poisoning.

□ **BROWN SKIN DISCOLORATION AND BLACK URINE ALONG WITH SYNCOPE AFTER DERMAL EXPOSURE OF CONCENTRATED CRESOL.** S. T. Huang, Emergency Department, Mackay Memorial Hospital, TAIWAN.

Objective: Provide the characteristic image of cresol poisoning, which may be useful in diagnosis. **Case Report:** We report a case of a 61-year-old male patient who presented to the Emergency Department (ED) after dermal exposure with cresol. He had the habit of soaking his feet in cresol-soap solution for 2–3 h three times a week in the last half of the year. This time, he soaked both his feet in a basin filled with 500 mL of

50% cresol-soap solution for 3 h. He was brought to ED by his family. Results: 1) Brownish burns of his feet and black urine after dermal exposure with cresol. 2) Conscious change and syncope. Urine levels of p-cresol, m-cresol, and phenol were 2608, 5391, and 156 mg/g creatinine, respectively, and o-cresol was undetectable at 1 h post-exposure. Conclusions: The laboratory methods for detection and quantification of cresol are not routinely available and also time-consuming. Thus, the main objective of this report is to provide the characteristic image of cresol poisoning, which may be useful in diagnosis.

□ PSEUDACHOLINESTERASE LEVEL AND CLINICAL APPEARANCE WITH ORAL AND NON-ORAL ROUTES OF ORGANOPHOSPHATE INTOXICATION.

J. Park, H. Kim, Emergency Department, Wonju Christian Hospital, Wonju, KOREA.

Objective: Organophosphates are commonly used in most agricultural pesticides and carry a high risk and incidence of poisoning. Pseudocholinesterase is used for diagnosis of intoxication and estimation of severity. This study was performed to compare pseudocholinesterase level change and severity by oral route and non-oral route. **Methods:** We compared and analyzed pseudocholinesterase level change and clinical appearance in an oral route group and a non-oral route group among patients who visited the Emergency Department due to organophosphate poisoning from January 2000 to May 2012. **Results:** A total 147 patients were enrolled: 125 in the oral route group and 22 in the non-oral route group. Pseudocholinesterase level was lower in the oral route group than the non-oral route group at the early stage. However, there were no differences in the groups after 10 days. Respiratory complications occurred in 78 patients in the oral route group and 6 patients in the non-oral group ($p = 0.002$). In the oral route group, 81 of 125 patients needed mechanical ventilation and 26 patients suffered from aspiration pneumonia. In the other group, 8 patients needed mechanical ventilation and one of 22 patients suffered from aspiration pneumonia. But there were significant differences in nervous system abnormality, shock, and mortality rate between the two groups. **Conclusions:** A pseudocholinesterase level in the oral route group was lower than in the non-oral route group at the early stage. Severity and frequency of respiratory complications rate was high in the oral route group.

□ THE SURVEY OF ORGANOPHOSPHATE AND CARBAMATE INTOXICATION STATUS OF THE REPUBLIC OF KOREA USING THE NATIONAL PATIENTS SAMPLE OF THE YEAR 2009.

K. H. Kim, Department of Emergency Medicine, Inje University Busan Paik Hospital, Busan, KOREA; I. H. Kwon, W. H. Yeo, J. Y. Lee, H. Y. Park, K. H. Park, J. Cho, Department of Emergency Medicine, Inje University Haeundae Paik Hospital, Busan, KOREA.

Objective: Organophosphate and carbamate insecticides poisoning is common in the Republic of Korea (ROK), but the nation-wide statistical data were not presented. This year, the Health Insurance Review and Assessment (HIRA) starts providing the patients sample data of 2009. It is called the HIRA-NPS-2009, including about 13% of hospitalized patient data and 1% of outpatient data. We analyzed it to investigate the inci-

dence of organophosphate and carbamate intoxication and characteristics. **Methods:** The International Classification of Diseases, 10th Revision Code for organophosphate and carbamate poisoning is T60.0. The patient data, including the code T60.0 as a diagnosis, was subtracted from the HIRA-NPS-2009. We analyzed it by classifying according to age, gender, the initial managing hospital's class, the number of inter-hospital transfers, the last managing hospital's class, the mortality rate, and the length of admission. **Results:** A total 259 records were found. The records of the same patient were rolled into one record, and patient records that were not relevant to poisoning were excluded. Finally, we gathered a total 146 cases: 99 patients were male and 47 were female. The mortality case (rate) totaled 17 (11.6%), male 12 (12.1%), and female 5 (10.6%). The mean age was 56.8 ± 19.2 years (male 56.2 ± 17.4 , and female 58.1 ± 22.8 years). The median length of hospital stay was 6 days (male 6, and female 5). There were 16 inter-hospital transfer cases (8 once and 8 twice, respectively). As for the initial managing hospital's class, 61 patients paid a visit to the tertiary hospital, 77 to the general hospital, and 8 to the hospital. As for the last managing hospital's class, 59 patients were treated at the tertiary hospital, 81 at the general hospital, 5 at the hospital, and 1 at the nursing home. **Conclusions:** We successfully found out the characteristics of organophosphate and carbamate poisonings in the ROK. The annual survey with the HIRA-NPS will be needed.

□ CLINICAL CHARACTERISTICS OF PATIENTS WITH INDOXACARB INSECTICIDE POISONING.

Sang Min Jung, Kyung Woo Lee, Department of Emergency Medicine, Gyeongsang National University Hospital, Jinju, KOREA.

Objective: Indoxacarb poisoning is known to produce methemoglobinemia, which occasionally can make a critical situation. But indoxacarb poisoning is rarely reported across the world. The purpose of this study is to report the clinical features and management of indoxacarb poisoning to provide guidelines for indoxacarb poisoning treatment. **Methods:** Ten patients presented to Gyeongsang National University Hospital from January 2008 to December 2011 following indoxacarb poisoning. Their medical records were analyzed retrospectively. General characteristics, epidemiology of poisoning, observed clinical symptoms, develop of methemoglobinemia, treatment methods, and clinical outcome were investigated. **Results:** Methemoglobinemia developed in 8 patients, 5 of 8 patients presented with cyanosis, 6 of 8 presented with dyspnea, and 3 of 8 presented generalized tonic clonic-type seizure. Two patients suffered from cardiac arrest, but successfully resuscitated. Four patients were treated with methylene blue for methemoglobinemia. One patient was treated with high-dose vitamin C. Patients experienced rhabdomyolysis, pneumonia, hemolytic anemia, pancreatitis, and heart failure as a complication of poisoning. **Conclusions:** In 10 cases of indoxacarb poisoning, we observed a variety of clinical features and complications associated with methemoglobinemia. We also confirmed effect of methylene blue therapy and high-dose vitamin C therapy for methemoglobinemia. In the future, we need to investigate the relationship between amount of ingestion and clinical features and prognosis.

□ **ADIPONECTIN PROTECTS ALVEOLAR TYPE II CELLS FROM PARAQUAT-INDUCED CYTOTOXICITY VIA ATTENUATING OXIDATIVE STRESS.** Y. Cao Y. He, Emergency Department, West China Hospital/Sichuan University, Chengdu, CHINA; T. Yuan, National Engineering Research Center for Biomaterials, Sichuan University, Chengdu, CHINA; R. Yao, Emergency Department, West China Hospital/Sichuan University, Chengdu, CHINA.

Objective: The true mechanism of paraquat (PQ)-induced cytotoxicity in lung remains unknown, limiting our understanding of its cytotoxicity potential. However, oxidative stress has been purported as a main mechanism of it. As a result, many antioxidants were used to try to relieve the injury from PQ. Adiponectin (APN, an adipose tissue-derived hormone) has been demonstrated to exert potential antioxidation and anti-nitration properties. The present study determined the effect of gAd (globular form of adiponectin) upon PQ-induced cytotoxicity in the human carcinogenic alveolar basal epithelial cell line (A549 cells), and attempted to dissect its underlying mechanism(s) of action. Methods: We evaluated in vitro the protective effect of gAd on PQ-induced cytotoxicity in A549 cells by using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-2H-tetrazolium bromide (MTT) assay and CCK-8kit, determined the intracellular $O_2^{\bullet-}$ through immunofluorescence and flow cytometry (FCM), and detected the apoptosis rate that happened to the A549 cells poisoned by PQ for 24 h or not, followed by treatment with gAd or Tiron for another 24 h. Results: Paraquat decreased the viability of A549 cells dose-dependently, while Tiron, gAd, and spermine improved, suggesting that these three agents could inhibit the PQ-induced cytotoxicity. However, gAd significantly increased the apoptosis, but Tiron did not. As to $O_2^{\bullet-}$, the immunofluorescence showed that both Tiron and gAd decreased it to some extent; the results of flow cytometry (FCM) contradicted this, demonstrating that gAd might protect the induced cells by affecting the production of $O_2^{\bullet-}$, and reducing other forms of cell death, but not apoptosis. Conclusions: Taken together, these results demonstrate that gAd might protect alveolar type II cells from PQ-induced cytotoxicity via attenuating oxidative stress, reducing other forms of cell death but not apoptosis in concert.

□ **PROGNOSTIC FACTORS OF LENGTH OF HOSPITAL STAY IN SNAKE ENVENOMATION VICTIMS IN KOREA.** S. S. Kwon, W. I. Choi, K. W. Lee, Emergency Medicine, Keimyung University Dongsan Medical Center, Daegu, KOREA.

Objective: Venomous snakes are about 200 species worldwide; in Korea, there are three venomous Crotalidae snakes. So life-threatening snake envenomation in Korea is rare, but the incidence of hospitalization of snake envenomation is high. In Korea, the chief complaint of snake envenomation is painful local swelling. In the clinical setting, Emergency Physicians may predict the prognosis of snake envenomation victims by history, physical examination, progression of symptoms, and laboratory test. We researched the prognostic factors of hospital length of stay in snake envenomation victims. Methods: From 2009 to 2011, we enrolled 74 snake envenomation victims. We conducted this study prospectively. Inclusion criteria were

history of snake bite, objective sign of snake bite, and direct access to an Emergency Department. We collected the clinical variables and laboratory data. We categorized the snake envenomation victims as envenomation grade, envenomation site, and laboratory data compatible with rhabdomyolysis. We compared subgroups in outcome such as length of hospital stay. Results: The mean age was 58.8 years; sex ratio was 1:0.85. There was no statistical difference between subgroups by envenomation grade or envenomation site. We found that level of creatine kinase (CK) correlated to the length of hospital stay. In the subgroup with a fivefold increase in level of CK, length of hospital stay is longer than in another subgroup. Conclusions: We concluded that frequent laboratory test follow-up was needed to assess the snake envenomation victims' prognosis, such as length of hospital stay.

□ **CAN MRI FINDINGS IN CARBON MONOXIDE POISONING PREDICT CARBON MONOXIDE ENCEPHALOPATHY?** G. T. Kim, I. J. Choi, Y. H. Oh, Emergency Medicine, Dankook University Hospital, Cheonan, KOREA.

Objective: Carbon monoxide (CO) is a tasteless, odorless, non-irritating, but highly toxic gas. CO encephalopathy (COE) may occur from 3 days up to 240 days after acute CO exposure, and has poor prognosis. Brain magnetic resonance imaging (MRI) changes after CO poisoning are variable and well reflect the neuropathological lesions. The areas of the brain that are the most sensitive to the effects of CO poisoning include the globus pallidus and other basal ganglia, the white matter, and the cerebral cortex. This study was conducted to investigate the role of MRI in predicting COE in patients with CO poisoning. Methods: This retrospective study was conducted with 38 patients who had MRI studies for detection of neuropathological lesions after the acute stage of CO poisoning from January 2010 to December 2011. MRI was checked in the early stage of CO poisoning within 7 days after exposure; primary end point was COE. COE was obtained by telephone interview at 6 months after CO exposure. COE was defined as a disorder with persistent neurologic sequels or delayed neuropsychiatric sequels. Results: Of the CO-poisoned patients, 78.9% had COE (7 patients with the persistent neurologic sequels and 21 patients with delayed neuropsychiatric sequels). The only predictor for COE was MRI findings in univariate and multivariate analysis. But COHb levels, consciousness level, and hyperbaric therapy were not significant. The strong suggestive MRI findings of the COE were lesions located in deep or subcortical white matter, diffuse global hypoxic injury, and cerebellum or brainstem. The MRI findings were affected with treatment modality (odds ratio 4.712, $p=0.011$). Conclusions: MRI findings can predict COE in patients with acute CO poisoning.

□ **QTC PROLONGATION AND TORSADES IN BUPROPION OVERDOSES PRESENTING TO UNITED STATES EMERGENCY DEPARTMENTS.** L. Giroski, Emergency Medicine, Somerset Medical Center, Somerset, NJ; R. Shih, Emergency Medicine, Morristown Medical Center, Morristown, NJ.

Objective: Bupropion is an atypical antidepressant commonly used for depression and smoking cessation. It is structurally dissimilar to other antidepressants and is an inhibitor of norepinephrine and dopamine uptake. It is associated with QTc prolongation in therapeutic use and in overdose. There are limited data assessing QTc prolongation and torsades de points (TDP) in cases of overdose. The purpose of this study is to assess the incidence of QTc prolongation and the development of TDP in cases of bupropion overdose presenting to Emergency Departments (EDs). **Methods:** Design: A multi-center retrospective ED study design was utilized. **Subjects:** Consecutive patients with the primary ED diagnosis of antidepressant overdose were identified over a 21-month period. **Epidemiologic data** were collected, as well of the occurrence of electrocardiographic QTc measurements and the development of TDP. **Results:** Out of 1,590,248 consecutive ED patients from 20 EDs, 355 patients were identified with the primary final diagnosis of antidepressant overdose. Of these, 33 cases involved bupropion as the primary toxicant. The mean age of study subjects was 27.2 years (range 1.5–58.7 years); 30% were male; 67% of cases were intentional ingestions. The mean bupropion dose ingested was 1267 mg (range 50–4500 mg). The average QTc was 423 ms; 5 (15%) cases had prolonged QTc measurements (> 440 ms). There were no cases of TDP. **Conclusions:** Bupropion overdose is rarely associated with QTc prolongation. No cases of Torsades de points were seen in this ED case series.

□ **SOME CHARACTERISTICS OF PATIENTS WITH MAJOR DEPRESSIVE DISORDER WHO WERE TREATED WITH DRUG INTOXICATION IN THE EMERGENCY DEPARTMENT.** S. W. Kim, J. H. Wee, J. H. Park, S. P. Choi, Emergency Department, The Catholic University of Korea, Seoul, KOREA.

Objective: There have been so many patients who presented to Emergency Departments (EDs) complaining of drug intoxication (DI), and of those, some had major depressive disorder (MDD) in their medical history. The aim of this study was to determine some characteristics of MDD patients who were treated with DI in the ED. **Methods:** A retrospective review was performed on 268 patients who were treated with DI between July 2007 and November 2011. Of these patients, we included only the patients who were over 18 years old. Age, gender, causes, time of ingestion, kinds of drugs, history of suicide attempt, outcome, and other characteristics were collected and compared to other patients who did not have MDD. **Results:** There were 244 patients included in this study; 52 patients (21.3%) had MDD in their history. Compared with non-MDD patients, 49 MDD patients (94.2% vs. 81.8%) had more suicidal intent ($p=0.048$), 18 (34.6% vs. 19.8%) had history of suicide attempt ($p=0.027$), and 34 (65.4% vs. 34.4%) took more than two kinds of drugs ($p<0.001$). There were no differences in age, sex, treatment outcome, disease severity, or ingestion time among MDD and non-MDD patients. **Conclusions:** In treating DI patients with MDD, physicians must consider that they have greater tendency to have suicidal ideation and to take multiple drugs.

□ **PROTECTIVE EFFECT OF [D-ALA2, D-LEU5] ENKEPHALIN ON PARAQUAT-INDUCED OXIDATIVE STRESS IN MIXED NEURON AND GLIAL CO-CULTURES.** H. Kim, S. W. Lee, J. S. Park, J. H. Min, K. H. Hwang, J. I. Hwang, K. M. Bak, Emergency Department, Chungbuk National University Hospital, Cheongju, KOREA.

Objective: Paraquat (1,1'-dimethyl-4,4'-bipyridinium dichloride [PQ]), an effective and widely used herbicide, was commercially introduced in 1962. It is reduced by the electron donor nicotinamide adenine dinucleotide phosphate, and then reduced PQ transfers the electrons to molecular oxygen, resulting in the production of reactive oxygen species (ROS), which are related to cellular toxicity. [D-Ala2, D-Leu5] enkephalin (DADLE) is a synthetic δ -opioid agonist that induces hibernation and promotes survival of neurons and glial cells in the central nervous system. Several mechanisms for the attenuation of hypoxic injury have been suggested, including control of intracellular signaling pathways via the δ -opioid receptor (DOR). However, the influence of DADLE on PQ-induced ROS production has not been investigated. **Methods:** To investigate neuronal injury after PQ and the effect of DOR stimulation by DADLE on PQ toxicity, we used a lactate dehydrogenase assay, 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-2H-tetrazolium bromide (MTT) assay, and immunofluorescence live/dead staining. To elucidate the DADLE effect on PQ-induced ROS production, we monitored the immunofluorescence of intracellular ROS and measured malondialdehyde (MDA), superoxide dismutase (SOD), and glutathione peroxidase (GPx) activities. **Results:** DADLE protected the neuron and glial cells from PQ-induced cytotoxicity. DADLE for a period of 24 h significantly reduced intracellular ROS, decreased MDA concentration in the supernatant, and normalized SOD and GPx activities. This protective effect might be attributable to the suppression of PQ-induced ROS generation. **Conclusions:** DADLE decreased paraquat-induced neuronal injury via suppression of PQ-induced ROS production.

□ **CLINICAL ANALYSIS OF ACUTE DRUG POISONING VICTIMS BY INTENTIONAL POISONING.** Seung Hyun Ko, Emergency Medicine, Catholic University of Daegu Medical Center, Daegu, KOREA; Kyung Won Lee, Emergency Medicine, Keimyung University Dongsan Medical Center, Daegu, KOREA.

Objective: The suicide rate in Korea is one of the highest among Organization for Economic Cooperation and Development (OECD) countries. Suicide attempts in Korea are predominantly through intentional acute drug ingestions. This study aims to compare the characteristics of acute drug poisoning victims between intentional poisoning and accidental poisoning. **Methods:** A retrospective study was conducted for the year 2011. The study group included adults (over 16 years old) with acute drug poisoning. We followed the definition of acute poisoning of the American Association of Poison Control Centers. Exclusion criteria were: 1) a victim of adverse effect of therapeutic dose, 2) a victim of chronic exposure, 3) missing data on emergency medical record, and 4) unknown cause of poisoning. During the study period, 195 patients enrolled in this study. **Results:** Comparing an intentional poisoning group and

an accidental poisoning group, there was no statistical difference in mean age, sex ratio, initial vital signs in the Emergency Department (ED), or time from exposure to ED. But the initial mental state in the ED, transportation, previous suicide history, ED treatment, length of stay in ED, and Poisoning Severity Score showed a statistical difference ($p < 0.05$). Conclusions: We concluded that intentional drug poisoning is associated with more serious outcomes than accidental poisoning in Korean adult group. Prevention and public education will be needed for decreasing suicide rate of poisoning in Korea.

□ COMPARISON OF THE TRAUMA AND INJURY SEVERITY SCORE (TRISS) AND MODIFIED EARLY WARNING SCORE WITH RAPID LACTATE LEVEL (THE ViEWS-L SCORE) IN BLUNT TRAUMA PATIENTS. S. Jo, J. B. Lee, Y. H. Jin, T. Jeong, J. Yoon, Department of Emergency Medicine, Chonbuk National University Hospital, Jeonju, KOREA.

Objective: The early warning score (EWS) has been used in the past as a predictor for clinical outcome. Recently, rapid lactate levels have been shown to add predictive value to the EWS among critically ill medical patients, and the VitalPACTM EWS-lactate (ViEWS-L) score was introduced. We compared the predictive value of the ViEWS-L score to the trauma and injury severity score (TRISS), which is a pre-existing risk-scoring system used in blunt trauma patients. Methods: Retrospective observational study was performed among blunt trauma victims admitted consecutively via the Emergency Department (ED) of urban, tertiary hospitals between April 1, 2010 and March 31, 2011, who were 15 years or older and had an injury severity score (ISS) of 9 or higher. Lactate level, the ViEWS, and revised trauma score (RTS) at presentation to the ED, and the ISS and TRISS at hospital discharge, were obtained. The ViEWS-L score was calculated according to the formula: $\text{ViEWS-L} = \text{ViEWS} + \text{lactate (mmol/L)}$. The ability to predict mortality based on the ViEWS-L score and the TRISS was assessed by using 2×2 decision matrices and area under the receiver operating characteristic curve (AUC) analysis and calibration analysis. Results: A total of 299 patients were available for analysis. Thirty-three of these cases resulted in mortality (11.0%). The mean ViEWS-L score was 4.9 ± 4.2 , and the mean TRISS score was 91.7 ± 15.6 for all patients. The ViEWS-L score was better than TRISS at predicting hospital mortality (AUC 0.838; 95% confidence interval [CI] 0.771–0.906 vs. AUC 0.734; 95% CI 0.635–0.833, $p = 0.031$). Calibration of the ViEWS-L score ($\chi^2 = 11.13$) was also superior to that of the TRISS ($\chi^2 = 16.97$). Conclusions: The prognostic value of the ViEWS-L score in terms of discrimination and calibration of acuity was better than that of the TRISS in blunt trauma patients admitted via the ED with ISS of 9 or higher.

□ SIGNIFICANCE OF MACROPHAGE MIGRATION INHIBITORY FACTOR IN TRAUMATIC CONDITION AND EFFECT OF HYPERTONIC SALINE. J.-Y. Kim, S.-H. Choi, Y.-H. Yoon, Y.-D. Cho, S.-M. Park, S.-W. Moon, S.-W. Lee, Y.-S. Hong, G.-S. Han, Emergency Medicine, Korea University College of Medicine, Seoul, KOREA;

C. Han, Emergency Medicine, Ewha University Hospital, Seoul, KOREA.

Objective: Trauma-induced suppression of cellular immune function likely contributes to sepsis, multiple organ dysfunction syndrome, and death. Recently, by controlling immune and inflammatory responses, macrophage migration inhibitory factor (MIF) is thought to play an important role in the pathophysiology of septic shock and chronic inflammatory diseases. However, the role of MIF in trauma-like conditions is unknown. Generally, hypertonic saline (HTS) has been known for its anti-inflammatory effect. Therefore, the experiments were conducted to evaluate MIF after stimulating lipopolysaccharide (LPS), which induced infection, or fMLP, which induced trauma-like condition, either in the presence or absence of HTS in macrophage or polymorphonuclear leukocyte (PMN), in response to early phase injury. Methods: The effects of HTS on LPS-induced MIF were evaluated in macrophage with $1 \mu\text{g/mL}$ LPS. HTS at 10, 20, or 40 mmol/L above isotonicity was added. MIF concentrations of the supernatant were determined by enzyme-linked immunosorbent assay (ELISA), and cell lysates were used for Western blot analysis to determine the MIF expression. For traumatic conditions, the effects of HTS on fMLP-induced MIF were evaluated in PMNs with $1 \mu\text{M}$ fMLP. HTS at 10, 20, or 40 mmol/L above isotonicity was added. MIF concentrations of the supernatant were determined by ELISA, and cell lysates were used for Western blot analysis and RT-PCR to determine the MIF expression and mRNA MIF. Results: MIF concentrations and MIF expression were higher in LPS-stimulated macrophage than control, and HTS restored MIF level to control. Levels of MIF were not changed in PMN cells by fMLP, which induced trauma-like condition. Conclusions: MIF seems to be a promising candidate for future sepsis in traumatic condition.

□ PATTERN AND SEVERITY OF HORSE RELATED INJURIES PRESENTING TO THE EMERGENCY ROOM. S. W. Lim, S. M. Park, Y. D. Sohn, J. Y. Ahn, Emergency Medicine, Hallym University Sacred Heart Hospital, Seoul, KOREA.

Objective: Horse racing-related injuries have not been studied well in Korea, although horse racing takes place very regularly in the territory. The injury rate is understandably high due to the weight of the horses and the speed they can achieve. Mainly, we encountered professional injuries from the local horse riding park. The purpose of this study was to identify incidence and injury patterns, as well as risk factors associated with severe equestrian trauma. Methods: All patients with equestrian injuries who visited an Emergency Department (ED) between June 2007 and May 2011 were reviewed. We retrospectively reviewed their medical records and collected the data about demography, mechanism and pattern of injury, and final diagnoses. We calculated the New Injury Severity Score (NISS) of patients and divided them into two groups: minor trauma (NISS < 9) vs. moderate-to-severe trauma (NISS \geq 9). Results: During the study period, 288 patients presented to the ED with horse-related injury; 8 patients were excluded from the study because they were transferred out. The median age was 33 years (range 13–60 years). The most

common cause of the injury was fall (168, 60.0%). The most common region of the injury was face (123, 43.9%). The intermediate value of NISS was 3 (1–75). And the number of patients who were diagnosed with moderate-to-severe injury was 32 (11.4%). Thoracic injury occurred less often with fall, and thoracic injury, abdominal injury, and facial injury were significantly much more likely to occur with crash. When thoracic injury was accompanied with injury to other parts of the body, moderate-to-severe injury was significantly frequent. Conclusions: In horse-related injury, the most common region of the injury was face. And when thoracic injury was accompanied, severity of damage tended to be significantly high. Horse-racing is much more violent than general horse-riding. So jockeys who participate in horse-racing should use other protective equipment in addition to helmet and boots.

□ DIAGNOSTIC ACCURACY OF OBLIQUE CHEST RADIOGRAPH FOR OCCULT PNEUMOTHORAX.

S. Matsumoto, T. Funabiki, Y. Toyoda, T. Orita, M. Shimizu, M. Yamazaki, M. Kitano, Department of Trauma and Emergency Surgery, Saiseikai Yokohama-shi Tobu Hospital, Yokohama, Japan; M. Kishikawa, Division of Emergency Medicine and Critical Care, Fukuoka City Hospital, Fukuoka, JAPAN.

Objective/Background: An occult pneumothorax (OPX) is a pneumothorax not seen on a supine chest X-ray study, but detected on computed tomography (CT) scanning. OPX may become life-threatening if tension develops. However, critical patients in severe shock are difficult to transport to the CT suite, and many hospitals in developing countries do not have access to CT. We previously reported a method to detect occult pneumothorax with oblique chest radiograph (OXR) (*Ann Emerg Med* 2011;57:378–81). The aim of this study was to evaluate the usefulness of OXR in the diagnosis of the OPX. **Methods:** We conducted a prospective study at our trauma centers. All consecutive blunt chest trauma patients who were clinically suspected to have pneumothorax on arrival at the Emergency Department (ED) were included in this study. The patients underwent OXR in the supine position in the ED, and underwent CT scans for the gold standard as soon as possible. OPX size on CT was classified, according to previous report by Wolfman et al., as minuscule, anterior, and anterolateral (*AJR Am J Roentgenol* 1998;171:1317). **Results:** Forty-seven patients (66% men, 50.2 ± 21.5 years, 54% with traffic accident injury) were enrolled. Of the 26 OPXs found in the 50 hemithoraces, 8 OPXs were minuscule, 10 were anterior, and eight were anterolateral. Sensitivity and specificity of OXR for detecting OPX were 76.9% and 100.0%, respectively. Positive and negative predictive values were 100.0% and 80.0%, respectively. All OPXs that couldn't be detected by OXR corresponded to minuscule and could be conservatively managed without tube thoracostomy. **Conclusion:** In trauma patients who have difficulty being transferred to CT scan, OXR may be effective to detect OPX with risk of progression.

□ EFFECT OF CYCLOSPORINE A ON HEMODYNAMIC AND SURVIVAL IN HEMORRHAGIC SHOCK MODEL OF RATS.

C. W. Kang, J. H. Lee, K. Kim, Y. H. Jo,

M. J. Lee, H. A. Ryu, Emergency Medicine, Seoul National University Bundang Hospital, Bundang, KOREA.

Objective: Hemorrhagic shock causes global ischemia-reperfusion injury and contributes morbidity and mortality. The inhibition of mitochondrial permeability transition pore opening during ischemia-reperfusion can ameliorate injuries in the specific organs. We investigated the effects of cyclosporine A on hemodynamics and survival in hemorrhagic shock. **Methods:** Male Sprague-Dawley rats were subjected to pressure-controlled hemorrhagic shock (mean arterial pressure = 38 ± 1 mm Hg) for 90 min. After the hemorrhagic shock period, rats were randomly allocated to one of three groups (control group, n = 7; CsA10 group, n = 7; CsA50 group, n = 5). Cyclosporine A (10 mg/kg for CsA10 group; 50 mg/kg for CsA50 group) or vehicle (normal saline) were administered via tail vein for 10 min and those who shed blood were transfused for 15 min. Survival time and blood pressure were observed until death and compared among groups. **Results:** Survival times were significantly longer in CsA groups than in the control group (median survival time was 283.5 min in the control group, 365 min in the CsA10 group, and 720 min in the CsA50 group; log-rank test $p = 0.0121$ for control vs. CsA10, $p = 0.0011$ for CsA10 vs. CsA50). Mean arterial pressure (MAP) during the reperfusion and observation period was significantly higher in CsA groups than in the normal saline group. **Conclusions:** Cyclosporine A increased MAP dose-dependently during resuscitation period and consequently increased survival time.

□ COMPARISON BETWEEN BLIND AND ULTRASOUND GUIDED TECHNIQUES OF AXILLARY NERVE BLOCK FOR PAIN RELIEF OF PATIENTS WITH RADIUS AND ULNAR BONE FRACTURES IN THE EMERGENCY ROOM.

S. M. Hosseini Kasnavieh, Emergency Department, Sina Hospital Tehran University of Medical Sciences, Tehran, Iran; H. B. Ghafari, Emergency Department, Ina Hospital Tehran University of Medical Sciences, Tehran, Iran; F. Hosseini Kasnavieh, Department of Psychiatry, Yaze University of Medical Sciences, Tehran, Iran; O. Yahyazadeh, Department of Psychiatry, Kish Hospital, Kish Island, Iran; A. Khalilnejad, Nursing Department, Kish Hospital, Kish Island, Iran.

Objective: Comparison between blind and ultrasound-guided techniques of axillary nerve block for pain relief of patients with radius and ulnar bone fractures in the Emergency Department (ED). **Methods:** This study has been accomplished as a uni-blinded randomized clinical trial, in which 80 patients participated and were randomized to two 40-member groups to receive axillary nerve block with either a blind technique or an ultrasound-guided technique. All patients were recorded by a pain assessment scale before and after the procedure. **Results:** The findings of this study indicated the ultrasound-guided technique for axillary nerve block as a simple and safe procedure that could be accomplished by Emergency Physicians even more simply than the blind (surface anatomic landmark-based) technique. Patients undergoing ultrasound-guided femoral nerve block were demonstrating a higher rate of cooperation for diagnostic and interventional modalities, and were

tolerating less severe pain during ED stay than the other group. All the differences mentioned above between procedures with and without ultrasound guidance were statistically significant. Conclusions: This study indicated that the ultrasound-guided technique for axillary nerve block is a simple, useful, and safe technique that could be done by Emergency Physicians more effectively than surface anatomic landmark-guided technique. However, it is recommended that a more extensive survey be done on this topic with a larger study population and possibly more centers involved, and comparison be done between these local interventions and systemic ones such as analgesic medications.

□ **BREAK THE FAST WITH FEAST (eFAST)?** H. Kataria, Emergency Department, University Hospital Aintree, Liverpool, UK; J. Mcvicar, Emergency Department, Royal Liverpool University Hospital, Liverpool, UK.

Objective: In patients with major trauma, FAST (focused assessment with sonography in trauma) often is the initial imaging examination. This systematic review of literature aims to establish whether thoracic ultrasound should be used to detect pneumothorax in traumatic patients presenting to an Emergency Department (ED) as an extension of FAST (eFast). Methods: A comprehensive literature search was conducted to identify relevant literature. The Medline and Embase Healthcare databases were individually searched, with terms mapped to Thesaurus and then with keywords related to Ultrasound, Pneumothorax, and Chest trauma. The following criteria were used to include a study for review: Participants: Studies that enrolled adult emergency trauma patients. Intervention: Thoracic ultrasound was performed in the ED for the detection of pneumothorax. Comparator: Chest computed tomography (CT) scan was used as the gold standard. Outcome: Studies that used the primary outcome measure to identify the diagnostic accuracy of ultrasound to detect pneumothorax. Results: Nine studies were found to meet the search strategy criteria. All studies were individually appraised including the Quality Assessment of Studies of Diagnostic Accuracy included in Systematic Reviews tool. When comparing with the gold standard of CT scan, thoracic ultrasound has been found to have sensitivity from 46.5% to 100% and specificity of 94% to 100%. This would be level 1b in terms of hierarchy of evidence. This degree of specificity can be acceptable to use ultrasound as a “rule in” test. The major weakness of the evidence is that each study has a small number of patients, and power calculation was not done in any study. Conclusions: Ultrasound is a reliable tool to detect pneumothorax in trauma patients. It is portable, rapid, and has high specificity similar to the gold standard of CT scan. Therefore, we recommend that FAST in trauma should be extended to include thoracic ultrasound (eFAST), but the introduction of this modality will require training and maintenance of skills.

□ **SENGSTAKEN-BLAKEMORE TUBE APPLICATION TO INTRACTABLE TRAUMATIC EPISTAXIS FOR HE-MOSTASIS.** G.-W. Kim B. Kang, Emergency Medicine, Ajou University Medical Center, Suwon, KOREA; W. Jeon, Emergency Medicine, Inje University Ilsan Hospital, Goyang,

KOREA; Younggi Min, Emergency Medicine, Ajou University Medical Center, Suwon, KOREA.

Objective: Airway establishment and hemorrhage control may be difficult to achieve in patients with massive oronasal bleeding from maxillofacial injuries, although it is rare. This study was formulated to investigate hemostatic effectiveness for managing these challenging injuries. Methods: Trauma registries from the author’s emergency medical center were queried over a 3-year period for injuries with abbreviated injury scale face ≥ 3 and transfusion of ≥ 3 units of blood within 24 h. Patients with severe epistaxis and inserted Sengstake-Blakemore (SB) tube were included, and patients with extra-head and face injury, for example, hemothorax or hemoperitoneum, were excluded. Patient demographics, hemodynamic status, hemostatic procedures, and outcome were analyzed. Results: Twelve patients were identified. Initial airway management was by endotracheal intubation in all patients. Emergent cricothyrotomy and tracheostomy were necessary in 9 and 3 patients, respectively. Anterior packing alone didn’t control bleeding in all patients. Transarterial embolization was used in 5 patients. SB tube was successful for definitive control of hemorrhage in 11 patients and kept in for 3 days in ICU. Systolic blood pressure was increased a mean 25.3 mm Hg after SB tube application. Overall mortality was 4 deaths directly attributable to maxillofacial injuries and severe head injuries, and no complication in nasal cavity from the SB tube. Conclusions: SB tube application was easy to apply and highly successful in controlling hemorrhage in the ED.

□ **THE APPROPRIATENESS OF TRAUMA TEAM ACTIVATION BY EMERGENCY PHYSICIAN IN THE EMERGENCY DEPARTMENT.** K. M. Cha, S. P. Choi, J. H. Wee, J. H. Park, Emergency Department, The Catholic University of Korea, Seoul, KOREA.

Objective: Rapid multidisciplinary trauma care by the trauma team is essential for severely injured patients. There are different protocols for the trauma team’s activation in each hospital. Correct trauma triage is needed to appropriately use medical resources. The aim of this study was to evaluate the performance of the activation protocol of our trauma team. Methods: This was an observational, retrospective cohort study. Injured patients with trauma team activation (TTA) and severely injured patients admitted to a surgical intensive care unit with a trauma diagnosis (Injury Severity Score [ISS] > 15) were investigated from March 1, 2010 to May 31, 2012. The TTA protocol was analyzed with respect to sensitivity, positive predictive value (PPV), and overtriage (1 – PPV). Undertriage was defined as the probability of no TTA conditional on severe injury. Results: Two hundred twenty-nine patients were included. There were 201 patients with TTA and 28 patients without TTA. Of the 201 patients with TTA, 103 were identified as severely injured (ISS > 15), yielding a sensitivity of 79%, PPV of 51%, and overtriage of 49%. Undertriage was 21% (n = 28) when considering all severely injured patients (n = 132). Among 12 criteria of our TTA, “injury in two or more body regions” accounted for 86% of the overtriage. Of the patients with undertriage, 75% represented isolated head injury and 29% inter-hospital transfers. Conclusions: The overtriage

of TTA protocol is relatively high in our hospital. We need to modify some of the TTA criteria. To decrease undertriage, patients with head injuries should be more carefully assessed.

□ **A NEW REDUCTION TECHNIQUE OF ANTERIOR SHOULDER DISLOCATION.** Hyuk-sool Kwon, Department of Emergency Medicine, Hallym University Sacred Heart Hospital, Seoul, KOREA.

Background: There are several methods to reduce anterior shoulder dislocations, and each method has its own efficacy, safety, and reliability. Most techniques need supine position of patients, and changing position from sitting or standing to supine can be uncomfortable and painful. The aim of this case series was to introduce a new method to reduce an anterior shoulder dislocation to avoid position change, which have been termed SEET (sitting, elevation, and extraction technique). **Methods:** Between February 2012 and August 2012, a total of 12 patients with an acute anterior shoulder dislocation without fracture were enrolled. All patients underwent reduction of the dislocation by only one Emergency Physician. A visual analog scale was used to determine the intensity of the pain felt by the patient during reduction. The patient is in the sitting position; the hand of the dislocated arm is elevated and placed on the practitioner's shoulder. The affected arm is grasped around the elbow and gently extracted when the pectoralis muscle of the anterior axillary line is massaged by the practitioner's another hand. **Results:** All patients were male, and reduction was achieved with the SEET method in all of the patients; no complication was noted. The mean duration of the reduction maneuver was 1.56 ± 1.25 min, and the mean visual analog pain score was 1.55 ± 1.21 . **Conclusions:** The sample size is small, but the SEET method case series shows an effective, faster, and less painful method of reduction of an anterior shoulder dislocation. It is easily performed by only one physician and the patient doesn't have to lie on the bed. The result of this study can provide background information for planning a properly designed randomized controlled trial.

□ **5TH METACARPAL FRACTURES UP TO 50 DEGREES CAN BE MANAGED WITH NEIGHBOUR STRAPPING ALONE.** M. Majeed, D. Yeo, Emergency Medicine, University Hospital Birmingham, Birmingham, UK.

Objective: Is neighbor strapping (NS) enough to manage 5th metacarpal (MC) fractures with angulation < 50 degrees. **Methods:** All the patients who were diagnosed with 5th MC neck fracture were included. Patients who had any other 5th MC fracture were excluded. Data were collected for a 5-month period from October to February 2012. The study was carried out at University Hospital, Birmingham. **Results:** We had 68 patients diagnosed with 5th MC fracture, 8 female and 60 male. The mean age was 36 years (16–60 years). Thirteen patients had open reduction internal fixation (ORIF; rotation, angulation > 50) and 10 had some special splints, so were excluded from the group. The remaining 39 had NS, and 2 had plastering done. Both groups (as per discharge letters) were followed up to 2 months and there were no complaints about outcome, which was described as grip and range of movements. **Conclusions:** The management of fifth metacarpal

neck fractures is still controversial (Poolman et al., 2005). The role of manipulation is doubtful, as the initial reduction achieved is difficult to maintain by non-operative means (Braakman, 1997; Lowdon, 1986). This is also supported by the fact that angulation at the fracture site has little influence on the functional outcome (Ford et al., 1989; McKerrill et al., 1987; Porter et al., 1988; Statius Muller et al., 2003). The extent of acceptable palmar angulation remains debated, varying from 20° to 70°. Our study has a small number, but results show no significant difference in the outcome for patients managed with NS or plaster. This supports the existing evidence. Therefore, patients with 5th MC fractures who don't qualify for ORIF should be managed with NS instead of any kind of plastering.

□ **IS WHOLE BODY CT SAFE AND COST EFFECTIVE IN MANAGING MT (MAJOR TRAUMA) PATIENTS IN THE EMERGENCY DEPARTMENT (ED)?** M. Majeed, D. Yeo, J. Kayani, Emergency Medicine, University Hospital Birmingham, Birmingham, UK.

Objective: In all patients with multi-system blunt trauma (significant mechanism), whole body computed tomography (WBCT) is safe and cost effective. **Methods:** All patients admitted following blunt multi-system trauma from April 2011 through April 2012 were included in the study. WBCT (CT of the head, cervical spine, chest, abdomen, and pelvis) had the following inclusion criteria: 1) motor vehicle crash at > 35 mph; 2) falls of > 15 feet; 3) car vs. pedestrian; 4) assaulted with a depressed level of consciousness; 5) ejection from vehicle. **Radiological findings and changes in treatment based on these findings were recorded.** **Results:** There were 452 patients, with a mean age of 55 years, who underwent WBCT during the 12-month observation period, of which 336 (74%) had a positive scan. This led to change in their further management plan; 116 patients were discharged home as WBCT was negative and physiological parameters were stable during their 4-h stay in the ED. This saved around £38,000 by spending only £20,000. **Conclusions:** Improvements in CT scan technology have brought about new paradigms in the use of CT scans in trauma. It is faster, cheaper, and more accurate. Its use is more mechanism driven than just on physiological parameters. This method of CT scanning has been both welcomed and encouraged in the current climate. By instituting a protocol of liberal scanning and studying the results of a mechanism-driven approach for CT scanning, we changed the treatment plan for 74% of patients, saved £93,000 and unnecessary admission as well. On the other hand, if we would have just observed these 116 patients for 24 h, we would have spent more money, resources, and still might have done CT at the end. Therefore, WBCT should be encouraged on arrival in patients with major trauma for all these valid reasons.

□ **VALIDITY OF MORTALITY PREDICTION OF ISS AND NEW INJURY SEVERITY SCORE IN THE SEVERE TRAUMA PATIENTS BY INJURY MECHANISM.** J. Y. Hwang, K. H. Lee, O. H. Kim, K. C. Cha, Y. S. Cha, H. Kim, S. O. Hwang, Emergency Department, Yonsei University Wonju College of Medicine, Wonju Christian Hospital, Wonju, KOREA.

Objective: Injury Severity Score (ISS) and new ISS (NISS) are currently used as indicators of the severity of an injury. But predictive validity by injury mechanism is often controversial. This study compared the validity of mortality prediction of ISS and NISS by injury mechanism in multiple trauma patients. **Methods:** A retrospective analysis was made of 908 severe trauma patients (ISS > 15 points) of 25,882 patients registered in the injury registration system. The patient's gender, age, injury mechanism, ISS, and NISS, as well as deaths, were investigated. Cases were excluded if the data were incomplete. Validity of mortality prediction in 670 patients was analyzed. **Results:** The study group was composed of 468 (77.1%) male and 202 (22.9%) female patients, with a mean age (\pm SD) of 49 (\pm 20 years). By the mechanism of injury, there were traffic accidents 409 patients (67.3%), a fall 82 patients (12.2%), slip down 57 patients (8.5%), other blunt trauma 50 patients (7.5%), penetration 15 patients (2.2%), mechanical injury 6 patients (0.9%), flame injury 12 patients (1.8%), drowning 13 patients (1.9%), and suffocation 26 patients (3.9%). In the mortality prediction of severe trauma patients, the area under the receiver operating characteristic (ROC) curve for ISS was 0.820 (sensitivity 86.6%, specificity 51.3%), and for NISS was 0.957 (sensitivity 99.0% specificity 86.4%). In the mortality prediction of the blunt trauma patients of mechanism of injury, the area under the ROC for ISS was 0.816 (sensitivity 63.0% specificity 92.0%), and for NISS was 0.920 (sensitivity 100.0% specificity 70%). **Conclusions:** NISS had a higher validity of mortality prediction than ISS, especially in blunt trauma patients.

□ **DIFFERENTIAL IMPACT OF ALCOHOL ABUSE PATTERNS ON HOST INFLAMMATORY RESPONSE FOLLOWING TRAUMATIC INJURY.** L. Moreno-Walton, Emergency Medicine, Louisiana State University Health Sciences Center, Lexington, KY; J. Sulzer, Department of Physiology, Louisiana State University Health Sciences Center, New Orleans, LA; J. Engle, Emergency Medicine, Louisiana State University Health Sciences Center, Lexington, KY; L. Stuke, Department of Surgery, Louisiana State University Health Sciences Center, New Orleans, LA; P. Molina, Department of Physiology, Louisiana State University Health Sciences Center, New Orleans, LA.

Objective: To differentiate the impact of acute vs. chronic alcohol abuse on integrity of host response to an inflammatory challenge during the early post-traumatic injury (TI) period. **Methods:** Alcohol Use Disorders Identification Test (AUDIT) scores and Injury Severity Score (ISS) were calculated for each subject. Blood samples were obtained at time of admission and at post-admission days 1 and 5 for blood alcohol level (BAL), cytokine determinations, and cytokine response to lipopolysaccharide stimulation. Cytokine concentrations were determined by Luminex assay (Millipore, Billerica, MA). Correlations were calculated using Pearson's correlation coefficient. **Results:** Twenty-seven percent of patients were acutely intoxicated. Mean AUDIT score was 11 for BAL-positive (BALP) subjects, 5.7 for BAL-negative (BALN) subjects, and 7.9 overall (range 1–33). The difference between the means for AUDIT was not statistically significant ($p=0.168$). Mean ISS was 7.4 for BALP subjects, 16.5 for BALN subjects, and 12 overall (range 1–24). The difference between the means

for ISS was statistically significant ($p=0.006$). Plasma cytokine concentrations, AUDIT, and ISS did not correlate with BAL. Stimulated cytokine response did not correlate with BAL or ISS, but showed significant positive correlation with AUDIT (interleukin [IL]-1 $r=0.81$, $p=0.028$; IL-6 $r=0.75$, $p=0.05$; granulocyte macrophage colony-stimulating factor $r=0.89$, $p=0.011$; tumor necrosis factor $r=0.72$, $p=0.069$). **Conclusions:** Self-reported history of chronic ethanol (EtOH) abuse has greater impact on dysregulation of host response to inflammatory challenge than prevailing EtOH levels reflecting acute EtOH abuse in TI victims. These findings suggest that chronic EtOH abuse plays a more important role than acute EtOH intoxication in dysregulation of host response and should be taken into account when stratifying risk for secondary infection in trauma patients.

□ **A SEXUAL ASSAULT RESPONSE TEAM (SART): AN URBAN HOSPITAL EMERGENCY DEPARTMENT EXPERIENCE.** L. Moreno-Walton, Emergency Medicine, Louisiana State University Health Sciences Center, New Orleans, LA; M. Ryan, Emergency Medicine, Lincoln Medical and Mental Health Center, Bronx, NY; R. Nunez, Emergency Medicine, Florida Emergency Physicians, Maitland, FL; B. Alexander, Emergency Medicine, North Central Bronx Hospital, Bronx, NY.

Objective: We compared the care received by survivors of sexual assault before and after the inception of a Sexual Assault Response Team (SART) program in our Emergency Department (ED). **Methods:** Data for the study group were obtained prospectively over a 2-year period and compared to historical controls, for which the same data had been prospectively collected. Simple percentages were calculated. **Results:** Of the 173 SART patients, 100% were triaged category A; 95% were examined within 1 h of arrival, as opposed to 63% prior to SART. Colposcopy was done on 87% of SART patients and 27% of pre-SART, with genital injury documented in 55% of SART cases and 28% of pre-SART, and non-genital injury in 56% of SART and 49% of pre-SART patients. One hundred percent of SART patients received sexually transmitted disease, human immunodeficiency virus, pregnancy, hepatitis, and tetanus prophylaxis. No specific records were kept for pre-SART patients. There have been numerous incalculable results such as improved relations with the Special Victims Unit, the police, and the prosecutor's office; opportunities for leadership roles in the community as survivor advocates; recruitment of SART examiners from our ED staff; increased awareness of the impact of culture on survival from sexual assault; and opportunities for further research. **Conclusions:** Our SART program has resulted in improved health care for survivors of sexual assault and a benefit to our community. We believe our model has wide implications for care of survivors of sexual assault nationally.

□ **COMBINATION TREATMENT WITH 17 β -ESTRADIOL AND THERAPEUTIC HYPOTHERMIA FOR TRANSIENT GLOBAL CEREBRAL ISCHEMIA IN RATS.** J. S. Oh, Emergency Medicine, College of Medicine, The Catholic University of Korea, Uijeongbu St. Mary's Hospital, Uijeongbu, KOREA; S. W. Kim, Emergency Medicine, College of Medicine, The Catholic University of

Korea, Bucheon St. Mary's Hospital, Bucheon, KOREA; H. J. Cho, Trauma Surgery, College of Medicine, The Catholic University of Korea, Uijeongbu St. Mary's Hospital, Uijeongbu, KOREA; Y. Y. Kyong, Y. M. Oh, S. M. Choi, K. H. Choi, Emergency Medicine, College of Medicine, The Catholic University of Korea, Uijeongbu St. Mary's Hospital, Uijeongbu, KOREA; K. N. Park, Emergency Medicine, College of Medicine, The Catholic University of Korea, Seoul St. Mary's Hospital, Seoul, KOREA.

Objective: Therapeutic hypothermia is now regarded as the only effective treatment of global ischemic injury following cardiac arrest or airway obstruction. However, the clinical trials with individual neuroprotective drugs given after transient global cerebral ischemia performed to date have failed to demonstrate improved neurological outcomes. Numerous studies of the effects of 17 β -estradiol have yielded conflicting results depending on administration route and dose. Furthermore, combination treatments of hypothermia and many neuroprotective drugs have been studied, although not 17 β -estradiol. Herein, we investigated the neuroprotective effect of post-ischemic 17 β -estradiol administration combined with therapeutic hypothermia. **Methods:** Twenty-one rats were randomly divided into four groups: control (group I), therapeutic hypothermia (group II), 17 β -estradiol treatment (group III), and therapeutic hypothermia combined with 17 β -estradiol treatment (group IV). One rat was assigned to a sham operation group. With the exception of the sham-operated rat, all animals underwent transient global cerebral ischemia for 20 min by the four-vessel occlusion method. Hypothermia was maintained at 33 °C for 2 h in groups II and IV, and 17 β -estradiol (10 μ g/kg) was intraperitoneally administered to rats in groups III and IV. Neurological deficit scores and hippocampal CA1 neuronal injury were assessed 72 h post-ischemia. **Results:** The neurological deficit score was not significantly different among the groups. The percentage of normal neurons in the hippocampal CA1 was 7.32 \pm 0.88% in group I, 53.65 \pm 2.52% in group II, 51.6 \pm 3.44% in group III, and 79.79 \pm 1.6% in group IV. The mean differences among the groups were statistically significant, except between groups II and III. The neuroprotective effect in the combined treatment group was markedly greater than in the single treatment groups, which suggests that hypothermia and 17 β -estradiol work synergistically to exert neuroprotection. **Conclusions:** Post-ischemic administration of low-dose 17 β -estradiol appears to be neuroprotective following transient global ischemia, and its effect is potentiated by therapeutic hypothermia.

□ PROGNOSTIC PERFORMANCE OF DIFFUSION-WEIGHTED MAGNETIC RESONANCE IMAGING IN COMATOSE PATIENTS TREATED WITH MILD HYPOTHERMIA AFTER CARDIAC ARREST AND ITS ADDED VALUE IN THE CONTEXT OF NEURON-SPECIFIC ENOLASE-BASED PROGNOSTICATION. J. Kim, K. Kim, Department of Emergency Medicine, Seoul National University Bundang Hospital, Bundang, KOREA; B. S. Choi, C. Jung, Department of Radiology, Seoul National University Bundang Hospital, Bundang, KOREA; J. H. Lee, Y. H. Jo, J. E. Rhee, T. Y. Kim, K. W. Kang, Department of Emergency

Medicine, Seoul National University Bundang Hospital, Bundang, KOREA.

Objective: Magnetic resonance imaging (MRI)-based prognostication of comatose resuscitated cardiac arrest patient has shown promising results. However, it was not validated in patients treated with therapeutic hypothermia, and it is unknown how it might add to neuron-specific enolase (NSE)-based prognostication. We sought to evaluate the prognostic performance of regional apparent diffusion coefficient (ADC) in comatose out-of-hospital cardiac arrest (OHCA) patients treated with mild hypothermia and its added value to NSE-based prognostication. **Methods:** OHCA registry was analyzed to identify OHCA patients older than 15 years who were treated with therapeutic hypothermia and underwent brain MRI between 2008 and 2011. Quantitative measurement of regional ADC was done by a radiologist blinded to clinical outcome. **Results:** Among 43 eligible patients, 11 (18.6%) achieved good outcome (6-month Cerebral Performance Category [CPC] 1 or 2). Regional ADC of occipital cortex showed highest discriminatory power with its area under the curve of receiver-operating characteristic (AUROC) 0.943 (95% confidence interval [CI] 0.872–1.000) and predicted poor outcome with a sensitivity of 90.6% and a specificity of 100%. For NSE (48-h), its AUROC was 0.911 (95% CI 0.801–1.000) and it was significantly correlated with the regional ADC (Pearson's $r = -0.674$, $p < 0.001$). The ADC-based prognostication could identify an additional 5 (35.7%) poor-outcome patients among 14 with 48-h NSE < 78.9 ng/mL, a cutoff point suggested by a previous study. However, it did not provide additional prognostic information if 48-h NSE was > 78.9 ng/mL. **Conclusions:** Regional ADC-based prognostication was accurate in OHCA patients treated with mild hypothermia. However, in the context of 48-h NSE-based prognostication, it provided additional prognostic information only when 48-h NSE indicated good prognosis (48-h NSE < 78.9 ng/mL). **Uploaded image:** A scatterplot depicting the relationship between 48-h NSE level and regional (occipital) ADC value. Vertical gray dash line: 33 ng/mL; Vertical black dash line: 78.9 ng/mL.

□ PROGNOSTIC IMPLICATION OF INITIAL COAGULOPATHY IN OUT-OF-HOSPITAL CARDIAC ARREST. J. Kim, K. Kim, J. H. Lee, Y. H. Jo, T. Y. Kim, J. E. Rhee, K. W. Kang, Department of Emergency Medicine, Seoul National University Bundang Hospital, Bundang, KOREA.

Objective: We sought to investigate the prognostic implication of early coagulopathy represented by initial disseminated cardiovascular coagulation (DIC) score in out-of-hospital cardiac arrest (OHCA). **Methods:** OHCA registry was analyzed to identify patients with return of spontaneous circulation (ROSC) without recent use of anticoagulant between 2008 and 2011. Patients were assessed for prehospital factors, initial laboratory results, and therapeutic hypothermia. Outcome variables were survival discharge, 6-month Cerebral Performance Category (CPC), and survival duration within the first week after ROSC. Logistic regression and Cox-proportional hazards model were used for both univariate and multivariate analysis. **Results:** Among 273 eligible patients, initial DIC score was available in 252 (92.3%). Higher DIC score was associated with increased in-hospital death (odds ratio [OR] 1.89 per unit; 95% confidence

interval [CI] 1.48–2.41) and unfavorable long-term outcome (6-month CPC 3–5; OR, 2.21 per unit; 95% CI 1.60–3.05). The adjusted ORs for both outcomes were 1.61 (95% CI 1.17–2.22) and 1.84 (95% CI 1.26–2.67), respectively. We categorized DIC score in five groups as < 3, 3, 4, 5, and > 5, and analyzed differential mortality risk using Cox proportional hazards model. Compared with reference group (DIC score < 3), the adjusted hazard ratio for early mortality in each remaining group was 1.96 (95% CI 1.13–3.40), 2.26 (95% CI 1.27–4.02), 2.77 (95% CI 1.58–4.85), and 4.29 (95% CI 2.22–8.30), respectively (p -trend < 0.001). The area under the receiver operating characteristic of DIC score for prediction of unfavorable long-term outcome was 0.79 (95% CI 0.69–0.88). Conclusions: Increased initial DIC score in OHCA was an independent predictor for poor outcomes and early mortality risk.

□ **INDUCTION OF A SHORTER COMPRESSION PHASE IS CORRELATED WITH A DEEPER CHEST COMPRESSION DURING METRONOME-GUIDED CARDIOPULMONARY RESUSCITATION: A MANIKIN STUDY.** T. N. Chung, J. Bae, E. C. Kim, S. W. Choi, O. J. Kim, Emergency Medicine, CHA Bundang Medical Center, CHA University, Seongnam, KOREA.

Objective: Recent studies have shown that there may be an interaction between duty cycle and other factors related to chest compression quality. Duty cycle represents the fraction of compression phase. We aimed to investigate the effect of shorter compression phase on average chest compression depth during metronome-guided cardiopulmonary resuscitation (CPR). Methods: Two different beep sounds (880 Hz frequency for the first and 1760 Hz for the second) were synthesized for guiding one complete chest compression process (one for the down-stroke and the other for the release), and the patterns of the two beeps were varied to induce normal, fast, and very fast down-strokes. Senior medical students performed 12 sets of chest compressions on a ResusciAnne® (Laerdal, Wappingers Falls, NY) manikin with a PC skill-reporting system following the guiding sounds with three down-stroke patterns and four rates (80, 100, 120, and 140 compressions/min) in random sequence. Repeated-measures analysis of variance was used to compare the average chest compression depth and duty cycle among the trials. Results: The average chest compression depth increased and the duty cycle decreased in a linear fashion as the down-stroke pattern shifted from normal to very fast ($p < 0.001$ for both). Linear increase of average chest compression depth following the increase of the rate of chest compression was observed only with normal down-stroke pattern ($p = 0.004$). Conclusions: Induction of a shorter compression phase is correlated with a deeper chest compression during metronome-guided CPR.

□ **THE CORRELATION BETWEEN BENZODIAZEPINE CONCENTRATION AND SOFA SCORE DURING THERAPEUTIC HYPOTHERMIA AFTER CARDIAC ARREST.** J. Shin, K. Song, H. Kim, K. Hong, C. Park, Emergency Medicine, Seoul National University Borameae Medical Center, Seoul, KOREA.

Objective: The concentration of the sedatives, which is used for sedation during a therapeutic hypothermia (TH) after cardiac

arrest, has been an increasing concern in previous studies. We wanted to determine whether midazolam concentration influences the Sequential Organ Failure Assessment (SOFA) score during TH. Methods: This is a prospective pilot study. The protocol of TH is composed of induction plus maintenance phase for 24 h, rewarming phase for 14 h, and normothermia phase for 34 h. Midazolam (3 cc/h for 72 h) is continuously infused for sedation during TH. Dopamine or norepinephrine is infused, in case of the mean blood pressure being lower than 65 mm Hg. We took blood samples at an interval of 12 h after induction of TH to check the benzodiazepine (BZP) concentration. SOFA scores were calculated daily for the following 7 days. Enzyme-linked immunosorbent assay method was used for BZP concentration. Statistical analysis was performed using generalized estimating equations between drug concentration and SOFA score. Results: Five adult patients admitted to our Emergency Department, after out-of-hospital cardiac arrests, were included in this study. We obtained 64 blood samples and 42 SOFA scores. The mean BZP concentration of 5 patients were 44.216 ng/mL initially, and 126.25 ng/mL at 72 h (maximum) and 37.714 ng/mL at 144 h (minimum). There was no statistically significant correlation between BZP concentration and SOFA score ($p = 0.995$). Conclusions: In our pilot study, the increase of BZP concentration was up to three times during TH, but increase of BZP concentration was not influenced in organ failure and vasopressor requirement. Further large-sized, multi-center studies should be carried out for the confirmation of the correlation between the concentration of the sedatives and patient's status, such as organ failure, hemodynamic changes, vasopressor requirements, and mortality, during TH after cardiac arrest.

□ **THE EFFECTS OF FLASHLIGHT GUIDANCE ON PERFORMANCE FOR CHEST COMPRESSION OF CARDIOPULMONARY RESUSCITATION IN A NOISY ENVIRONMENT.** J. S. You, S. P. Chung, Emergency Medicine, Gangnam Severance Hospital, Seoul, KOREA; C. H. Chang, Anesthesiology and Pain Medicine, Gangnam Severance Hospital, Seoul, KOREA; I. Park S. Kim, Emergency Medicine, Severance Hospital, Seoul, KOREA; H. S. Lee, Emergency Medicine, Gangnam Severance Hospital, Seoul, KOREA.

Objective: In real cardiopulmonary resuscitation (CPR) situations, noise can arise from instructional voices and from environmental sounds in places such as the battlefield, industrial, commercial shopping, and high traffic areas. The World Health Organization suggested guideline limits for community noise in specific environments. In the specific environments mentioned above, noise levels were measured to be > 70 dB, which can induce annoyance and hearing impairment. A simple feedback device using flashlight stimulus was designed for overcoming noise-induced stimulus saturation during CPR. This study was conducted to determine whether flashlight guidance influences CPR performance in a simulated noisy setting. Methods: We recruited 30 senior medical students who, with no previous experience, using flashlight-guided CPR, participated in this prospective, simulation-based, cross-over study in a simulated cardiac arrest model of noisy situation. Noise was artificially

generated as patrol car and fire engine sirens. Siren noise intensity was adjusted to 80 ± 5 dB, with 60 pitches/min. The flashlight guidance emitted light pulses at the rate of 100 flashes/min from a light-emitting diode. Participants also received the instruction that suited a target rate of 100 compressions/min. CPR was randomly performed in one of two sequences. Compression rate and depth and percentage of compression with correct hand position were recorded with a ResusciAnne® manikin. Results: There were significant differences between the control and flashlight groups for mean compression rate (MCR), MCR/min, and visual analog scale. However, there were no significant differences for corrected compression depth (%), mean compression depth (mm), corrected hand position (%), and correctly released compression (%). The flashlight group MCR closely maintained the target 100 compressions/min. However, the control group MCR was distributed over a much wider range. The flashlight group had a tendency to maintain constant MCR, whereas the control group had a tendency to decrease MCR after 60 s. Conclusions: Flashlight-guided CPR is particularly advantageous in maintaining desired MCRs during compression-only CPR in noisy environments where metronome pacing might not be clearly heard.

□ **BETTER LACTATE CLEARANCE ASSOCIATED WITH GOOD NEUROLOGIC OUTCOME IN OHCA PATIENT TREATED WITH THERAPEUTIC HYPOTHERMIA.** T. Lee, M. J. Kang, T. G. Shin, M. S. Sim, I. J. Jo, K. J. Song, Department of Emergency Medicine, Samsung Medical Center, Seoul, KOREA.

Objective: The objective of this study was to examine the relationship between lactate clearance and neurologic outcome in survivors from out-of-hospital cardiac arrest (OHCA) patients treated with therapeutic hypothermia. Methods: We conducted protocol-based therapeutic hypothermia OHCA patient between January 2010 and March 2012. We collect the venous blood samples at induction (0 h), 6 h, 12 h, 24 h, 48 h, and 72 h for lactate measurement. Patients' neurologic outcome assessment was evaluated with Cerebral Performance Category (CPC). The good neurologic outcome group was CPC score 1 or 2 patients at 1 month after cardiac arrest. The poor neurologic outcome group was CPC score 3–5 patients. To compare lactate clearance, we extract patients whose initial lactate level was above 2.5 mmol/L from both groups into the high lactate subgroup. The 6-h and 12-h lactate clearance were calculated as follows; 6-h lactate clearance (%) = $0 \text{ h lactate} / 6 \text{ h lactate} \times 100$, 12 h lactate clearance (%) = $0 \text{ h lactate} / 6 \text{ h lactate} \times 100$. Results: Seventy-six patients enrolled: 34 patients were good neurologic outcome group and 42 patients were poor neurologic outcome group. The initial lactate level showed no significant statistical difference in both groups (6.07 mmol/L vs. 7.13 mmol/L, $p = 0.42$). But, lactate level at 6 h, 12 h, 24 h, and 48 h of the good neurologic outcome group were lower than the poor neurologic outcome group (3.81 vs. 6.00, $p < 0.01$; 2.91 vs. 5.00, $p < 0.01$; 2.17 vs. 3.86, $p < 0.01$; 1.57 vs. 2.21, $p = 0.03$, respectively). Lactate level at 72 h of both groups showed no statistical difference (1.52 vs. 1.97, $p = 0.14$). In the high lactate subgroup analysis, the 6-h and 12-h lactate clearance of the good neurologic outcome group were higher than those of the poor neuro-

logic outcome group (35.3 vs. 6.89%, $p = 0.01$; 54.5% vs. 25.6%, $p < 0.01$, respectively). Lactate clearance at 6 h and 12 h also had statistically significant receiver operating characteristic area of good neurologic outcome (0.67, 95% CI 0.52–0.81; 0.70, 95% CI 0.52–0.81). Conclusions: Patients with better lactate clearance in the early phase (after 6 h and 12 h) after OHCA were associated with good neurological outcome.

□ **SURVIVAL AND NEUROLOGIC OUTCOMES OF OUT-OF-HOSPITAL CARDIAC ARREST PATIENTS WHO TRANSFERRED AFTER RETURN OF SPONTANEOUS CIRCULATION FOR INTEGRATED POST-CARDIAC ARREST SYNDROME CARE: ANOTHER FEASIBILITY OF THE CARDIAC ARREST CENTER.** M. J. Kang, T. R. Lee, T. G. Shin, M. S. Sim, I. J. Jo, K. J. Song, Department of Emergency Medicine, Samsung Medical Center, Seoul, KOREA.

Objective: Therapeutic hypothermia (TH) and integrated post-cardiac arrest syndrome care have not been implemented widely due to some barriers. Resuscitation centers have been suggested to overcome this problem; the safety and efficiency of out-of-hospital cardiac arrest (OHCA) patients transported from the field to specialized hospitals that can perform TH has been proven. But the outcome of patients who transferred after return of spontaneous circulation (ROSC) is not well evaluated. So we evaluated survival and neurologic outcomes of the transferred OHCA patients and compared them with those of directly visited OHCA patients. Methods: We conducted a retrospective observational study of adult patients who registered in the Samsung Medical Center hypothermia database of cardiac arrest between January 2010 and March 2012. We compared outcomes between transferred patients (Transferred group) and non-transferred patients (SMC group). The primary outcomes were good neurofunctional status, defined as Cerebral Performance Category (CPC) 1 or 2 at 1 month, and the secondary outcome was survival at 1 month between the SMC group and the Transferred group. Results: A total 91 patients were enrolled in this study: 41 patients were in the SMC group and 50 patients (Transferred group) were transferred from other hospitals to SMC after ROSC. The ROSC to induction time of the Transferred group was longer than that of the SMC group (220 min vs. 72 min, $p < 0.01$). The initial tympanic temperature at induction of the Transferred group was higher than that of the SMC group (36.0 ± 1.4 °C vs. 35.1 ± 1.0 °C, $p < 0.01$). There was no statistical difference in good neurologic outcomes between the two groups (38% transferred group vs. 40.6% SMC group, $p = 0.90$). The 1-month survivals had no statistical difference between the two groups (66% transferred group vs. 75.6% SMC group, $p = 0.31$). In univariate and multivariate models, the ROSC to induction time and the induction time had no association with the good neurologic outcome. Conclusions: There was no significant difference in good neurologic outcome and survival at 1 month between the two groups.

□ **CHANGES OF INFLAMMATORY MEDIATORS DURING REWARMING PERIOD AFTER MILD THERAPEUTIC HYPOTHERMIA.** H. J. Lee, G. J. Suh, W. Y. Kwon, K. S. Kim, Y. S. Jung, Y. H. Kwak, Department

of Emergency Medicine, Seoul National University Hospital, Seoul, KOREA.

Objective: It is well known that rapid rewarming is related to poor outcome, but not as well known what kind of inflammatory processes occur during the rewarming period. We investigated what inflammatory mediators changed during the rewarming period after completion of therapeutic hypothermia for cardiac arrest victims. **Methods:** This study was conducted in an emergency intensive care unit (ICU) of a tertiary referral hospital. After informed consent, patients' blood samples were collected at admission and 0 h, 2 h, 4 h, and 8 h after the start of rewarming. Inflammatory mediators (E-selectin, soluble inter-cellular adhesion molecule (ICAM), interleukin [IL]-10, IL-1ra, IL-6, IL-8, monocyte chemoattractant protein-1, and tumor necrosis factor [TNF]- α) were measured using simultaneous Luminex Assay. Therapeutic hypothermia was applied for 24 h at 32°C. Rewarming after hypothermia was done for 8 h at the rate of 0.5°C. **Results:** Fifteen patients were enrolled and completed a schedule of 24 h hypothermia and 8 h rewarming. Levels of IL-10 showed significant change during the rewarming period; levels were decreased (basal: 30.5 \pm 61.0 pg/mL, rewarming 0 h: 4.3 \pm 8.8 pg/mL, rewarming 2 h: 4.4 \pm 10.6 pg/mL, rewarming 4 h: 3.6 \pm 8.8 pg/mL, rewarming 8 h: 2.7 \pm 3.7 pg/mL, *p*-value 0.042). Levels of MCP-1 showed a tendency to increase during the rewarming period but were not statistically definite (basal: 133.0 \pm 61.0 pg/mL, rewarming 0 h: 41.8 \pm 31.9 pg/mL, rewarming 2 h: 46.6 \pm 34.0 pg/mL, rewarming 4 h: 45.3 \pm 8.8 pg/mL, rewarming 8 h: 83.6 \pm 3.7 pg/mL, *p*-value = 0.06). E-selectin, s-ICAM, IL-6, IL-8, and TNF- α showed no significantly different levels during the rewarming period. All levels of IL-1ra were under detectable value. There were no inflammatory mediator level differences between good CPC (CPC 1, 2) and poor CPC (CPC 1–3) group. **Conclusions:** During the rewarming period, levels of IL-10 increased. Levels of other markers were not changed during the rewarming period. Further study is needed to achieve better understanding of the rewarming mechanism.

□ **EFFICACY AND SAFETY OF 72-HOUR TARGETED TEMPERATURE MANAGEMENT IN COMATOSE ASPHYXIAL ARREST SURVIVORS.** B. K. Lee, K. W. Jeung, H. Y. Lee, G. S. Lee, Y. H. Jung, Department of Emergency Medicine, Chonnam National University Hospital, Gwangju, KOREA.

Objective: Targeted temperature management (TTM) aimed at the cardiac arrest survivors has been a standard treatment. The TTM method recommended by resuscitation guideline 2010 is aimed at a core temperature of 33 \pm 1 °C during 12 to 24 h. The efficacy of the recommended TTM method in asphyxial arrest has not been proven. Therefore, we aimed to investigate the efficacy and safety of TTM aiming at a core temperature of 32 \pm 1 °C during 72 h in asphyxial arrest. **Methods:** We included comatose asphyxial arrest survivors from January 2002 to May 2012. The patients were divided into three groups according to treatment methods (normothermia 2002–2005; 24-h TTM 2006–2010; 72-h TTM 2011 to May 2012). Clinical and neurological outcome data of three groups were compared. Neurolog-

ical outcome was ranked as good or poor at discharge, with neurological outcome assessed according to the Cerebral Performance Category scale (CPC), with a poor outcome defined as a CPC 3–5. The incidences of complications after asphyxial arrest were also compared. **Results:** Normothermia, 24-h TTM, and 72-h TTM groups were 18, 24, and 20 patients, respectively. The mean age was 45.7 \pm 16.4 years. The median interval between detection and return of spontaneous circulation (ROSC) was 30.0 (20.0–41.5) min. Asystole was most frequent rhythm (79.0%), and hanging was the most frequent cause of asphyxial arrest (56.5%). The baseline characteristics were not different among the three groups. Normothermia, 24-h TTM, and 72-h TTM groups showed 1 (4.5%), 2 (8.3%), and 0 (0.0%) of good neurological outcome, respectively, and neurological outcome was not different (*p* = 0.772). Frequent complications were hypokalemia (66.1%), seizure (54.8%), elevated amylase (40.3%), and bed sores (29.0%). However, the incidences of complications were not different. **Conclusions:** Seventy-two-hour TTM showed no improvement of neurological outcome compared with other methods. However, 72-h TTM can be used safely. Further study is required due to limitation of sample size.

□ **PROGNOSTIC SIGNIFICANCE OF SERUM ALBUMIN ON LONG-TERM MORTALITY IN SURVIVORS FROM OUT-OF-HOSPITAL CARDIAC ARREST.**

I. W. Park, J. H. Lee, K. Kim, Y. H. Jo, K. Kang, J. Kim, C. Kang, S. Lee, C. J. Park, J. E. Lee, Department of Emergency Medicine, Seoul National University Bundang Hospital, Bundang, KOREA.

Objective: Hypoalbuminemia is known as a reliable predictor of mortality in patients with various illnesses. However, the prognostic value of serum albumin on out-of-hospital cardiac arrest (OHCA) patients has not been established. The purpose of the study was to investigate whether serum albumin concentration on hospital arrival may be useful in predicting the long-term mortality in survivors of OHCA. **Methods:** A retrospective analysis of an Emergency Department OHCA registry from January 2008 to December 2011 was conducted. The individual medical records were reviewed for data, including Utstein predictors of OHCA, underlying disease, and initial laboratory finding, including serum albumin. Primary outcome was survival at 6 months. The secondary outcome was Cerebral Performance Category (CPC) at 6 months. Albumin was categorized as quartiles as < 2.7 g/dL, 2.7–3.2 g/dL, 3.2–3.9 g/dL, and > 3.9 g/dL. Hazard ratios were estimated using Cox proportional hazard models in both univariate and multivariate analysis. All prognostic variables with their *p* value < 0.1 in univariate analysis were used in multivariate analysis for adjustment. **Results:** Of 546 OHCA patients, 139 patients had sustained return of spontaneous circulation (ROSC). Of those, 23 patients (16.5%) survived at 6 months, and 16 patients (11.5%) had favorable neurological outcome (CPC 1, 2). Survival rates at 6 months were significantly higher in patients with a higher albumin group, and neurological outcomes were also more favorable in the higher albumin group. In a Cox proportional hazard regression analysis for 6-month survival, patients with lower categories of albumin had increased mortality rates before and after multivariable adjustment (*p* value for linear trend < 0.05). **Conclusions:** Serum

albumin is a robust predictor of long-term mortality and associated with neurological outcome in patients with sustained ROSC from OHCA.

□ **DIFFERENCES IN EXERCISE LOAD AND VARIATION OF CHEST COMPRESSION DEPTH BETWEEN JRC-G2010 AND JRC-G2005 OVER 3 MINUTES SINGLE BYSTANDER CPR.** T. Yasukawa, Faculty of Rehabilitation, Kobe International University, Kobe, Hyogo, Japan; T. Fujikura, Rehabilitation Research Center, Kobe International University, Kobe, Hyogo, Japan; S. Naruse, M. Goto, M. Murakami, M. Uesugi, S. Takemasa, Faculty of Rehabilitation, Kobe International University, Kobe, Hyogo, Japan; T. Ohtsu, Rehabilitation Research Center, Kobe International University, Kobe, Hyogo, Japan; H. Koeda, Faculty of Rehabilitation, Kobe International University, Kobe, Hyogo, JAPAN.

Objective: The method of bystander cardiopulmonary resuscitation (CPR) taught by the instructor was changed into ≥ 50 -mm chest compression depth and a ≥ 120 beats/min rate, as required by the guideline of JRC-G2010 in Japan. Past study shows it is difficult to impose upon bystanders to maintain compression depth and constant rhythmic motion over 3 minutes due to fatigue. Clarifying the cause of compression deterioration is important to improve quality of basic CPR, and the optic motion capture system and biomechanical analysis system are suitable for analyzing these phenomena. The purpose of this study was to clarify the cardiopulmonary exercise load and compression depth change between JRC-G2005 and JRC-G2010. Methods: Single-person CPR was performed by six instructors (age 20 ± 0.0 years, weight 61 ± 7.9 kg, height 169.1 ± 8.0 cm) on Resusci Anne manikins (Laerdal, Barnevelde, Norway) with MAC3D motion analysis system (Motion Analysis Corporation, Santa Rosa, CA) and expired gas analysis system (Nihon-Kohden, Tokyo, Japan). All participants were attached to wrist motion tracking markers, then they performed two types of chest compression according to different guidelines, JRC-G2005 (G05) and JRC-G2010 (G10), under metronome sound and simultaneous LED blinking lamp guidance. Compression depth (mm) and VO_2/W (mL/min/kg) data were collected and converted to MET (metabolic equivalent) at periods of 1 and 3 min. Results: Average compression depth (ACD) was significantly decreased in the second period in both methods, 46.6 ± 6.1 mm to 44.8 ± 10.4 mm with G05, 55.1 ± 9.4 mm to 40.9 ± 7.1 mm with G10. The exercise loads were 3.6 ± 0.7 METs with G05 and 4.6 ± 0.8 METs with G10 at the first period; the second period they were 3.6 ± 0.6 METs with G05, and 4.9 ± 0.5 METs with G10. There were significant differences in METs between the second period of G10 and both of G05. Conclusions: The exercise load experienced by the bystander performing CPR had the potential to cause anaerobic metabolism and was of moderate intensity.

□ **IN-HOSPITAL CARDIAC ARREST: EFFECT OF THE PERFORMANCE OF CODE-BLUE TEAM ON PATIENT SURVIVAL.** H. J. Choi, G. T. Kim, S. B. Oh, H. S. Park, Y. H. Oh, Emergency Medicine, Dankook University Hospital, Cheonan, KOREA.

Objective: We sought to evaluate the effect of the performance of the Code-Blue Team on patient survival with in-hospital cardiac arrest. Methods: This study was performed as a retrospective analysis of a detailed cardiac arrest registry containing prospectively collected data during 2 years (from January 2010 to December 2011). The Code-Blue Team was organized for the resuscitation of patients with in-hospital cardiac arrest. At the end of 2010, the Code-Blue team members in our hospital were trained according to the 2010 American Heart Association guidelines for cardiac arrest. Activation system for the Code-Blue Team and the medical record for cardiac arrest were improved simultaneously through electronic ways. We compared the performance data of the Code-Blue Team and patient survival in 2011 (Education group) to in 2010 (Pre-education group). Results: Of the 531 (289 cases in 2010, Pre-Education group) cases included in the study, sex, age, initial cardiac rhythm, whether patients were witnessed, team activation through broadcasting, and the attempt of defibrillation did not differ between the Education and Pre-education groups. Time to arrest recognition (9.9 ± 8.2 vs. 11.0 ± 8.1 min), time to scene arrival (4.1 ± 2.6 vs. 12.4 ± 10.3 min), recognition to chest compression (15.6 ± 7.2 vs. 20.6 ± 10.6 min), and arrest to first epinephrine (12.4 ± 2.4 vs. 17.1 ± 7.2 min) were much shorter in the Education group than in the Pre-education group (all $p < 0.05$). Survival rate of the Education group (9.09%, 22 cases) was higher than the Pre-education group (8.33%, 24 cases), but it was not significant. Conclusions: Through the education for team members and the improvement in system for cardiac arrest management, the Code-Blue team showed a better performance. The survival rate of in-hospital cardiac arrest was not influenced by the performance of the Code-Blue team.

□ **SURVIVAL FROM OUT-OF-HOSPITAL CARDIAC ARREST BEFORE AND AFTER THE CHANGE OF COMPRESSION-VENTILATION RATIO FROM 15:2 TO 30:2.** H. W. Lee, I. W. Park, W. P. Hong, Emergency Medicine, Seoul National University Hospital, Seoul, KOREA; T. Y. Kim, Emergency Medicine, Seoul National University Bundang Hospital, Bundang, KOREA; S. K. Jung, Emergency Medicine, Seoul National University Hospital, Seoul, KOREA.

Objective: After publication of the 2005 guidelines for cardiopulmonary resuscitation and emergency cardiac care, 30:2 compression-ventilation ratio has been widely adopted in the pre-hospital and hospital fields as an initial chest compression method for out-of-hospital cardiac arrest (OHCA) patients. This study was performed to elucidate the impact of the change on survival outcome in our single-tertiary Emergency Department (ED). Methods: From the opening of our department in April 2004, we started to collect registry-based data for patients with OHCA. To compare the effect of the change in compression-ventilation ratio in the real world, we divided the period into two phases: the 15:2 phase (from April 2004 to March 2005, 1 year) and the 30:2 phase (from January 2007 to December 2010, 3 years) The period from the middle of 2005 to the end of 2006 was considered the transitional period for the implementation of new guidelines. The primary outcome was the

rate of return of spontaneous circulation, and the secondary outcome was survival to discharge. Results: Among the 288 patients enrolled in the 15:2 (n = 84) and 30:2 (n = 204) phases, characteristics were similar, including mean age (63.0 vs. 65.0 years), sex ratio (male 63.1% vs. 60.7%), and presumptive cause of arrest - cardiac (48.8% vs. 53.6%); return of spontaneous circulation rate did differ overall (40.5% among patients in the 15:2 phase vs. 61.8% among those in 30:2; $p < 0.05$). Survival discharge did differ overall (8.3% among patients in the 15:2 phase vs. 19.7% among those in 30:2; $p < 0.05$). Conclusions: The survival outcome from OHCA patients was significantly improved after the implementation of the 30:2 chest compression-ventilation ratio into the pre-hospital and hospital field around our single tertiary ED. The influences by other possible improving factors such as bystander cardiopulmonary resuscitation, pre-hospital automated external defibrillators, presenting rhythms, and arrest time, will be analyzed and presented independent from this study.

□ **IMPLEMENTATION OF THERAPEUTIC HYPOTHERMIA AFTER PEDIATRIC OUT-OF-HOSPITAL CARDIAC ARREST IN ONE TERTIARY EMERGENCY CENTER.** J. J. Kim, W. J. Kim, J. H. Jang, H. J. Yang, S. Y. Hyun, Emergency Department, Gachon University Gil Hospital, Incheon, KOREA.

Objective: Cardiac arrest in infants and children is more rare than in adults, but critical. The efficacy and feasibility of therapeutic hypothermia after cardiac arrest in adults is proven through many studies, but there are few data on pediatric out-of hospital cardiac arrest. We analyzed several variables in pediatric therapeutic hypothermia after out-of-hospital cardiac arrest. Methods: Infants and children (ages 1–17 years old) admitted to our emergency intensive care units after return of spontaneous circulation after out-of-hospital cardiac arrest from January 2009 to June 2012 were included in this study. Basal patients' characteristics and variables about therapeutic hypothermia were analyzed. Results: A total 42 patients after pediatric cardiac arrest visit our emergency center during the study period. Among these, 37 patients suffered out-of-hospital cardiac arrest: 12 patients were admitted to intensive care units and 9 patients received therapeutic hypothermia. Overall, survival discharge was 14.3% (6 of 42). Among admitted patients, 3 patients (33.3%) had a good Cerebral Performance Category. Two patients received endovascular cooling and 7 patients received surface cooling. Mean time from induction of therapeutic hypothermia to reaching the temperature with therapeutic range was 193.9 min. There were no critical adverse events during induction, maintenance, and rewarming period of therapeutic hypothermia. Conclusions: Therapeutic hypothermia after pediatric out-of hospital cardiac arrest was performed safely and effectively in one emergency center. The standardized pediatric therapeutic hypothermia protocol should be established to be used widely in pediatric intensive care units. Further larger studies are needed in pediatric therapeutic hypothermia.

□ **POSTANOXIC SEIZURE WAS NOT RELATED TO MORTALITY AND NEUROLOGIC OUTCOME IN POSTCARDIAC ARREST SYNDROME: A RETROSPECTIVE COHORT STUDY.** J. J. Kim, H. S. Lee, W. J. Kim, H. J. Yang, S. Y. Hyun, Emergency Department, Gachon University Gil Hospital, Incheon, KOREA.

Objective: The aim of this study was to evaluate relevance of post-anoxic seizure with prognosis in out-of hospital cardiac arrest (OHCA) patients treated with therapeutic hypothermia (TH) and to research the prognostic role of portable electroencephalogram (EEG) in post-cardiac arrest syndrome (PCAS) patients with seizure. Methods: One hundred eighty OHCA patients admitted to our emergency intensive care units during July of 2008 and June of 2011, and 147 patients who had been treated with TH were included. Portable EEG had been taken 24 h after induction of TH and classified by an attending neurologist. As outcome variables, overall mortality and neurological outcome at 6 months after hospital discharge were evaluated. Good neurological outcome = Cerebral Performance Category (CPC) 1, 2; Poor neurological outcome = CPC 3–5. Results: Among 147 patients, 94 patients (63.9%) were male; mean age was 51 years. Eighty-three patients (56.5%) survived, and almost 30% (43/147) of patients had a good neurological outcome. Sixty-five patients (44.2%) had seizures, and among this group, 19 patients (29.2%) were discharged with good neurological outcome. There was no statistical relevance between seizure group and non-seizure group. With multiple logistic regression analysis, initial rhythm, Acute Physiology and Chronic Health Evaluation (APACHE) II score, time from basic life support to return of spontaneous circulation (odds ratio [OR] 2.169; 95% confidence interval [CI] 1.158–4.063, OR 1.107; 95% CI 1.064–1.152, OR 1.014; 95% CI 1.006–1.022, respectively) had statistical importance, but seizure group (OR 0.67, 95% CI 0.356–1.032, $p = 0.065$) had no statistical relevance with mortality. Factors associated with good neurological outcome were ventricular fibrillation/ventricular tachycardia initial rhythm ($p = 0.005$), cardiac cause of arrest ($p = 0.001$), high initial body temperature ($p < 0.001$), low APACHE II score ($p = 0.010$), and shorter time interval between arrest and basic life support ($p = 0.005$). Conclusions: In our study, postanoxic seizure group showed no statistical relevance with mortality and neurologic outcome. We should aggressively treat PCAS with seizure. Larger, prospective studies are needed to evaluate post-anoxic seizure activity in PCAS.

□ **LUNG INJURY SCORE IN OUT-OF-HOSPITAL CARDIAC ARREST AFTER DROWNING.** J. H. Park, S. P. Choi, J. H. Wee, K. N. Park, C. S. Youn, Department of Emergency Medicine, College of Medicine, The Catholic University of Korea, Seoul, KOREA.

Objective: Hypoxic encephalopathy is the most common consequence of drowning patients, and respiratory involvement is also very common in these patients. Nevertheless, few data are available about the prediction capability of lung injury score in adult victims of drowning. Our goal was to study the value of lung injury score to predict neurologic

outcomes of comatose drowning patients after cardiac arrest. **Methods:** We conducted a retrospective, single-center study of adults with post-cardiac arrest syndrome after drowning, in a tertiary care teaching hospital. The authors measured lung injury score within 6 h using: 1) chest X-ray study evaluated for alveolar consolidation, 2) ratio of the partial pressure of oxygen in arterial blood to the inspiratory fraction of oxygen, and 3) positive end expiratory pressure. Mortality and neurologic outcome of survivors were determined 28 days after cardiac arrest using the Cerebral Performance Category score. **Results:** A total of 85 patients with cardiac arrest after drowning are included. Nine patients had good neurologic outcome (Cerebral Performance Category [CPC] ≤ 2), whereas 76 patients had bad neurologic outcome or died (CPC 3–5). Of 76 patients, 14 (18.42%) died within 28 days. In the good neurologic outcome group, 2 patients (22.22%) developed acute respiratory distress syndrome (ARDS). Within the poor prognosis group, ARDS occurred in 52 patients (68.42%). Area under the receiver operating characteristic curve of lung injury score was 0.757 to predict bad neurologic outcomes, and was 0.804 to predict patients dying within 28 days. **Conclusions:** Lung injury score is helpful in predicting the outcome of drowning patients.

□ **ONE-YEAR RETENTION OF CPR SKILL AND KNOWLEDGE IN ELEMENTARY SCHOOL.** H. Takahashi, H. Tanaka, T. Maezumi, H. Takyu, S. Shimazaki, EMS System, Graduate School, Kokushikan University, Tokyo, JAPAN.

Objective: As we know, children have superior memory to that of adults. Many studies report benefit and utility of cardiopulmonary resuscitation (CPR) knowledge in childhood. However, there is little known about the long-term retention of CPR skills in primary school-age children. **Purpose:** In this study, we evaluated the 1-year retention of CPR skill and knowledge after CPR education with a personal inflatable training manikin in elementary school. **Methods:** Fifty-two 6th grade public elementary school children were enrolled in this study. First, the students received 90-min CPR education at the end of 5th grade. All of the students' CPR skill and knowledge were checked 1 year later. CPR overall performance was scored (Good = 2, Fair = 1, No good = 0) by a Basic Life Support (BLS) instructor. **Results:** Ninety-eight percent ($n = 51$) could check for response and could call someone for help; 94% ($n = 49$) could tilt the head correctly; 90% ($n = 47$) could perform a check for normal breathing; 79% ($n = 27$) could perform mouth-to-mouth ventilation. Correct chest compression could be performed by as many as 83% ($n = 43$). The correct rhythm of the chest compression was seen in 96% ($n = 50$); 98% ($n = 51$) were able to use an automated external defibrillator (AED) safely and place an AED in the right position. **Conclusions:** One year after they received CPR training, students correctly remembered more than 80% of the CPR skill and knowledge. Because the actual training time tends to be longer than that of a conventional BLS course when an inflatable training manikin is used, this study led to excellent memory retention in the elementary school students. **Conclusion:** Students aged more than 10 years should receive CPR education in school.

□ **EVALUATION STUDY FOR THE QUALITY OF CHEST COMPRESSIONS IN A MOVING AMBULANCE.**

S. Gotoh, E. Sone, EMS System, Kokushikan University, Tokyo, Japan; T. Shirakawa, T. Kinoshi, H. Takahashi, EMS System, Graduate School of Kokushikan University, Tokyo, Japan; H. Tanaka, EMS System, Kokushikan University, Tokyo, Japan; S. Shimazaki, EMS System, Graduate School of Kokushikan University, Tokyo, JAPAN.

Objective: JRC 2010 cardiopulmonary resuscitation (CPR) guidelines recommend high-quality chest compressions. However, it is well known that it is difficult to perform chest compressions during out-of-hospital settings with a limited number (3 crew members on board each ambulance in Japan) of Emergency Medical Services (EMS) crew. **Objective:** The aim of this study was to identify the various factors that interfered with high-quality chest compressions in a moving ambulance. **Material and Methods:** Forty-five paramedic students who could perform high-quality CPR correctly were enrolled in this study. For 2 min, chest compression depth and the moving ambulance acceleration gravity were continuously recorded. Four different direct acceleration rates during ambulance transportation were classified as follows: a) stand still (0 km/h), b) straight acceleration (30 km/h), c) right curve acceleration (30 km/h), and d) left curve acceleration (30 km/h). Statistical analysis between the groups used analysis of variance and Tukey test. **Results:** Chest compression depths were identical in the stand-still group (57.6 ± 2.9 mm), straight group (59.2 ± 3.0 mm), and the left curve group (56.2 ± 3.0 mm), respectively. Significant reduction was found in the right curves (47.2 ± 6.6 mm) group ($p < 0.01$). An acceleration force of 0.6 G during ambulance right curve transportation resulted in significant interference with performance of chest compressions. **Discussion:** In this study, we found the factor interfering with the quality of chest compressions. An acceleration force with right curve may cause interference with high-quality chest compressions due to difficulty maintaining CPR position. **Conclusions:** It is necessary for EMS crew to use automatic chest compression devices or a real-time voice feedback device during uncertain conditions of ambulance transportation.

□ **COMPARISON OF EFFECTIVE CPR TRAINING OF LAYPERSONS.** T. Hara, H. Tanaka, A. Nakao, H. Takahashi, T. Kinoshi, T. Shirakawa, EMS System, Graduate School, Kokushikan University, Tokyo, JAPAN.

Objective: In Japan, out of hospital cardiopulmonary resuscitation (CPR) has been widely introduced. CPR education has been instituted for children as young as 10 years of age, and bystander CPR has increased in frequency. But effective 90-min CPR training for the school environment has not been evaluated. The aim of this study was to effectively investigate 90-min CPR training in the school environment. **Methods:** Two hundred fifty-six university students who were to be trained in CPR within 90 min were subjects in this study. The students were randomly divided into four groups as follows: Group A: ($n = 64$) received conventional CPR and automated external defibrillator (AED) training; Group B: ($n = 72$) received 90 min of self-learning at home with personal training kits; Group C ($n = 60$) received

90-min CPR and AED training by using personal CPR training kits (Mini-Anne; Laerdal, Wappingers Falls, NY) with video instruction; and Group D ($n = 60$) received 90-min CPR and AED training by using personal training (mini-Anne) kits with one instructor in a big classroom. Results: Group D shows a significantly shorter time than the other groups to the start of chest compressions and the re-start of chest compressions after AED use ($p < 0.05$). All groups showed favorable CPR perfor-

mance of chest compression, including correct recoil, rhythm, and depth. However, Groups B and C showed longer ventilation times than Group D. Groups B, C, and D showed more incorrect open airway procedures than group A ($p < 0.05$). Overall CPR performance was significantly better in Group D than in Group C ($p < 0.05$). Conclusions: We found that 90-min CPR training using mini-Anne was successfully performed with one instructor and their voice feedback.