the introduction of the stickers, these figures have increased to 89.8% and 79.2% respectively, a statistically significant improvement.

The data from this audit supports the continued use of PRF stickers to improve standard of documentation for non-traumatic cardiac arrests.

AP027

Resuscitation in EMS-witnessed prehospital traumatic cardiac arrest

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Background: Prehospital traumatic cardiac arrest (TCA) is undoubtedly associated with poor prognosis. The subgroup of patients with detectable vital signs (VS) upon Emergency Medical Services (EMS) arrival and a subsequent EMS-witnessed TCA is of special interest, since it might be associated with better outcome.

Materials and Methods: Sixty patients with EMS-witnessed prehospital TCA (Male/Female: 45/15, Mean age: 34.0±21.4 years, Median age: 25 years) were managed by EMS physicians in the area of Thessaloniki during a 10-year period (01.01.1995–31.12.2004). All patients had palpable carotid pulse and organized ECG activity upon EMS arrival and suffered a subsequent, at the scene or during transport, EMS-witnessed TCA.

Results: Mean EMS arrival time was 8.3±5.5 min. All patients but one, suffered blunt trauma. Palpable peripheral pulse was detected in 22 (36.67%) cases. Initial median GCS score was 6 (3–15). Pupils were found normal sized in 39 (65.0%) and dilated in 21 (35.0%) patients. Pupillary reflexes were present in 21 (35.0%) patients. During cardiopulmonary resuscitation, all patients received Advanced Life Support interventions by means of endotracheal intubation, fluid resuscitation and chest tube drainage as appropriate. In 25 (41.67%) cases, resuscitation efforts were terminated before arrival at hospital. In total, 35 (58.33%) patients exhibited return of spontaneous circulation. Thirty-two (53.33%) of them died, 12 in the Emergency Department, 17 in the Operating Room and 3 in the Intensive Care Unit. Finally, 3 (5.0%) patients survived to hospital discharge, but only 1 (1.67%) – suffering penetrating neck trauma – with full neurological recovery. Autopsy causes of death revealed severe isolated or multiple organ injuries.

Conclusions: The results of our study are in accordance to other similar literature studies and confirm the extremely poor survival rate after TCA. Moreover, resuscitation, even in EMS-witnessed TCA, seems to be in the majority of the cases futility.

AP028

The impact of delayed transfer to inpatient units for successfully resuscitated out-of-hospital cardiac arrest patients on survival to discharge

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Background: In the Guideline 2010, a new chain, the integrated post-cardiac arrest care was added as a new step. These patients need immediate transfer to intensive care units for high-level, bundled care. However, in many Emergency Departments (ED) patients remain in ED for many reasons, especially ED overcrowding. Our aim of this study is to evaluate the risk of prolonged ED boarding of once successfully resuscitated out of hospital cardiac arrest (OHCA) patients on their survival.

Materials and methods: A nationwide EMS-assessed OHCA database (2006–2008) which was constructed from ambulance run sheet and followed by medical record review was used. Patients with clear outcome and resumed cardiac etiology were selected from the registry. For the final analysis, we included patients with sustained return of spontaneous circulation (ROSC ≥20 min).

Patients with sustained ROSC who were transferred to inhospital unis within 6 hour after ROSC were grouped as the Not-Delayed Group (ND group), vice versa the Delayed Group (D group). Patients died within 6 hours were excluded. We performed univariate and multivariate analysis with potentially significant factors. Finally, sensitivity analysis with different time criteria were performed.

Results: During the study period, 54,499 OHCA were assessed by EMS in Korea. 4,931 of these had ROSC and were selected for final analysis. Then, 1,585 were excluded because they died within 6 hours. 2,319 were categorized as the ND group and 654 as the D group.

The D group showed significantly low rate of survival than the ND group (OR: 0.755 (0.623–0.917)). Sensitive analysis showed similar low rate of survival between 3 hour and 30 hours after ROSC. Moreover, the OR showed decreasing trend until 36 hours (p for trend <0.001).

Conclusions: OHCA patients with delayed transfer to inpatient units showed significantly lower rate of survive to discharge.

AP029

Cardiac arrest out of hospital – From tales to data

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Background: Treating out-of-hospital Cardiac Arrest (CA) is challenging and good results are thought to rely on rapid recognition and promptly response of Medical Emergency Teams (MET). This study aims to describe profile of CA on our geographical area and to audit our METs.

Materials and Methods: This retrospective study enrolled all cardiac arrest patients on our hospitals' geographical area from 1st January to 31st December 2010, to which the national emergency system (112) and our medical outreach emergency team was activated. Clinical and demographic data was collected from clinical registries. Time from collapse to ALS, time to ROSC, cause of cardiac arrest, co-morbidities and outcome were considered endpoints for this study. SPSS for Windows was used for data analysis.

Results: From a total of 1576 activations of our MET team, 349 (22.1%) were CA patients. We measured on this series an annual incidence of CA of 35.6 per 100.000 population. Mean [sd] time (minutes) from activation to MET being on-scene was 13.2 [8.5]. ALS was started to 143 (41.0%) patients and from these 96 (67.1%) of CA rythms were PEA/Asystole. Mean [sd] age (years) was 58.9 [20.0] and 84 (58.7%) were male. 13 (9.1%) of CA patients had return of spontaneous circulation (ROSC); from these 6 (46.2%) were PEA/Asystole. Mean [sd] time (minutes) from ALS start to ROSC was 13.8 [11.5]. Analysis of CA origin showed: 3 (23.1%) cardiac, 4 (30.8%) airway and breathing, 2 (15.4%) toxic and 4 (30.8%) non-identifiable.

Conclusions: Analysis of incidence and CA profile on our out-of-hospital population agrees to previous published data. METs' work allowed 9.1% of ROSC on this series, assuming a relevant role on our chain of survival system. Time-stamping of METs' work may have to be improved.

AP030

Misplacement of links of chain-of-survival induced by a wrong manual for emergency call in public facilities

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Background: Emergency call may be delayed due to human factors based on a wrong manual in public facilities, where the emergency call is made by the staff. The purpose of this study is to clarify whether the incidence of delayed emergency call may differ among public facilities and to identify the prescribed actions taken by the personnel after witnessing or recognizing cardiac arrests.

Materials and Methods: Basal data were collected prospectively from 950 OHCAs witnessed or recognized from April, 2003 to March, 2009 in public facilities including care facilities, schools and other institutions where citizens assemble. A questionnaire survey regarding emergency call was also performed to the public facilities.

Results: In care facilities (n=556) and educational institutions (n=8), incidence of CPR was higher than in other facilities (460/564 vs. 182/386, *p*<0.0001), and was often performed by a medical staff before the emergency call. The interval from collapse/recognition to call was significantly longer in care facilities and educational institutions (median (25%-75%); 2 (1–6) min vs. 2 (1–4) min, p=0.0005). Mono-variate analysis followed by multiple logistic regression analysis revealed that care facility was one of the independent factor associated with low incidences of shockable rhythm (adjusted odds ratio = 2.262 (1.073–4.878)) and 1-year survivals (5.988 (1.645–24.39)). Response to the questionnaire ranged from 47 to 58%. Most of care facilities and educational institutions had BLS educational courses (85 and 96%), and have a manual correspondent to serious medical emergencies (89 and 79%, respectively). The prescribed action that is commonly taken by the personnel after witnessing or recognizing cardiac arrests was to *report the situation and to follow directions of a supervisor or a medical staff.*

Conclusions: Although CPR is frequently and earlier performed, the emergency call may be delayed in care and educational facilities. The manual for medical emergencies in public facilities should be revised.

AP031

Comparison of threshold defibrillation between quasi-sinusoidal and rectilinear biphasic waveforms in high impedance porcine model

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Introduction: Impedance can alter the main parameters of biphasic pulses and/or

their waveform, which in its turn can influence defibrillation thresholds (DT). The aim of the study was to compare DT in two different biphasic waveforms on high impedance porcine model.

Methods: In 18 anesthetized pigs (33–60 kg) we evaluated energy of the TD (ETD) that would terminate electrically induced 20 sec VF. The quasi-sinusoidal pulse (BQS) has the amplitude of 2nd phase ~50% from 1st one and durations 5.6 and 4.4 ms respectively. The BQS pulse was delivered by MSIEE experimental defibrillator and biphasic rectilinear pulses (BRL) – defibrillator ZOLL E Series. These defibrillators compensate high impedance by controlling current with fixed pulse duration (10 ms). The pulses shape corresponded to load resistance 100 ohms regardless of pig chest impedance (43–77 ohms).

Results: ETD of BRL pulse in 11 from 18 pigs was 16 (8–26)% more, than BQS pulse, in 3 pigs 12 (9–13)% less than BQS pulse $p<0.02$) and in 4 pigs – practically equal values of ETD.

Conclusions: The results demonstrate that for transthoracic impedances about 100 ohms in applying BRL pulse moe threshold energy defibrillation is more often required, than in applying BQS pulse. This pulse (named the Gurvich-Venin pulse) has been employed in Russia for about 40 years (clinical efficacy 90–115 J = 80–90%). The first Russian AEDs will generate the optimizing Gurvich-Venin pulse.

AP032

AED implementation in Iasi, North-East Romania

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Background: In Romania (22 million people) until now there is no AED program for public access, AED exist only on ambulances with nurses, paramedics and firefighters trucks. Electrical therapy for VF using an AED, before emergency medical services arrival, improves the survival rate from out-of-hospital cardiac arrest. Local authority from Iasi, one of the largest city in Romania (339.889 people) in cooperation with EMS (SMURD Iasi) decided to implement a couple of AED in public places of the city. The initial number of AED is small (only five) but we hope that the use of these will increase the rate of survival in sudden cardiac arrest and the authority will have a good motivation to increase the number of AED available to bystanders.

Objective: The purpose of this study was to identify the best public place to put the AED related to city districts.

Method: We performed a retrospective study of sudden cardiac arrest produced in Iasi, distributed on city districts. The patients were included if they experienced a non-traumatic out of hospital cardiac arrest between 1st May 2010 and 30 April 2011, with or without chest compressions before EMS arrival, and received attempted defibrillation after EMS arrival.

Results: A total of 624 patients was included, 51% was female, the youngest patient was 2 years old, the oldest was 99 years old and the median value of age distribution was 71. The city is divided in 30 districts and we identify 4 districts which summated represent 240 cases of cardiac arrest (38.4%), one in Eastside (15.5%), 2 in central area (13.45%) and one in Westside (9.45%).

Conclusion: The data from this study will help our local authority to decide the best public places to make available the AED for public access.

AP033

Survival at hospital discharge of cardiac arrest patients according to aetiology

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There is abundant information regarding to survival to cardiac arrest (CA) of cardiac aetiology but it is not usual to find results compared with other aetiologies.

Our objective is to compare survival at hospital discharge in patients who suffer out-of-hospital CA according to its etiology

Methods: prospective cohort study from the Andalusian Registry of Out-of-hospital CA (Spain). Consecutive patients cared for by Andalusian emergency teams from Jan-2008 to Dec-2010. Dependent variable: CA aetiology (cardiac aetiology (CE) vs no cardiac aetiology (NCE). Multivariate analysis.

Results: Advance Life Support maneuvers were performed in 2960 patients. In 2331 (78.75%) cases CA was attributed to CE. In 607 (20.5%) cases were listed other causes, with the following pattern: respiratory 190 (6.4%), trauma 185 (6.25%), neurological 80 (2.7%), 52 toxic-pharmacological (1.75%), drowning 33 (1.1%), other (metabolic, sepsis, etc.) 67 (2.3%). In 22 (0.74%) cases there was not mentioned etiology.

The gender and age distribution between CE and NCE was: men 72.27% vs 66.88%, women 27.73% vs 33.12% ($p=0.011$) and 62.65 vs 50.37 years ($p<0.0001$) respectively.

Is achieved admission in 623 (26.7%) patients with CE vs 192 (31.6%) patients NCE ($p=0.016$) and hospital discharge with good neurologic status ($CPC_{1–2}$) in 173 (7.4%) vs 37 (6.1%) patients ($p=0.051$). Multivariate analysis: higher age (OR: 0.963, CI: 0.958–0.968, $p<0.0001$), sex male (OR: 0.674, CI: 0.549–0.828, $p<0.0001$)

Conclusions: NCE etiology affects a younger population with a higher proportion of women. Although better results are achieved initially, survival at discharge with good neurologic function shows no significant difference between groups.
Reference:
1. David JS, Gueugniaud PY, Riou B, Pham E, Dubien PY, Goldstein P, Freysz M, Petit P. Does the prognosis of cardiac arrest differ in trauma patients? Crit Care Med. 2007 Oct;35(10):2251–5.

AP034

The effectiveness of quick response roadside rescue team on the marathon race

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Background: Sudden cardiac arrest (SCA) often occurred during sports event. Last 20 years, more than 125 SCA occurred during marathon race in Japan. Therefore, we organize, quick response roadside rescue team (as QRRRT) to provide safety marathon race.

Purpose: Purpose in this study is to evaluate effectiveness of QRRRT on marathon.

Method: QRRRT consist with a medical director, paramedic and paramedics students. QRRRT covered whole 42.195 km roadside divided into the three teams as follows: 1) Mobile AED team (bicycle AED team, covered every 1.5 km; provide quick CPR with AED, with oxygenated BVM ventilation); 2) On foot BLS+AED team (paramedics students covered every 1 km; provide first aids quick shock and CPR); 3) Medical oversight team (head Qtr; 1 EMS physician and 2–3 paramedics take medical dispatch and command control). Standing medical order and treatment protocol during marathon race has been introduced. Head Qtr worked on GPS tracked medical dispatch and communication by using mobile phone or via e-mail for all staff and system. Thereafter, treatment document analyzed for off line medical control.

Results: Last 5 years, QRRRT supports 57 marathon race, out of these, 10 cases collapsed during marathon race on the QRRRT system. 8 cases successfully recovered (80.0%) spontaneously circulation by quick Defibrillation and CPR. 2 patients who manifested Asytole and PEA on the scene were not resuscitated. All 8 patients recovered and reached good neurologically outcome (CPC1) at 1 week at after incidents. They recovered full time work within 2 weeks.

Conclusion: We found that the QRRRT system on effectively prevent sudden cardiac death on the marathon race. Future studies must be warranted for developed safety systems.

AP035

Active compression–decompression (ACD) cardiopulmonary resuscitation (CPR) in out-of-hospital cardiac arrest

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Background: ACD-CPR is an alternative CPR technique, considered to lower the intrathoracic pressure during the decompression period and therefore to improve hemodynamics compared with standard (STD) CPR. The purpose of our study was to evaluate the ACD-CPR in patients with out-of-hospital cardiac arrest (OHCA) in Thessaloniki, the second largest city in Greece.

Materials and Methods: In Greece, Emergency Medical Service is two-tiered consisting of basic life support (BLS) ambulances and advanced life support (ALS) mobile intensive care units (MICUs). The patients of our study were treated over a 5-year period (01.01.2000–31.12.2004). Patients received either STD or ACD-CPR (CardioPump) according to the availability of the ACD device, since it was not included in the standard equipment of every BLS ambulance.

Results: From a total of 1752 non-traumatic OHCA, CPR was attempted in 1488 (84.93%), whereas 264 (15.068%) were considered as do not attempt resuscitation cases. Mean arrival time was 8.18 ± 6.7 min and 12.96 ± 6.3 min for BLS ambulances and MICUs respectively. 882 (59.27%) patients received ACD-CPR, whereas 606 (40.72%) underwent STD-CPR. Both groups were similar in regard to sex, age, initial rhythm and ALS interventions. In total, return of spontaneous circulation (ROSC) was achieved in 607 (40.79%) cases, whereas 171 (11.49%) patients were brought to the emergency department under CPR. As far as ROSC is concerned, there was a borderline statistical difference between the two groups [340 (38.54%) ACD-CPR vs 267 (44.06%) STD-CPR] ($p=0.034$). However, there was no statistical difference in