

**LO33****Prehospital adverse events associated with nitroglycerin use in STEMI patients with right ventricle infarction**

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**Introduction:** Paramedics in our region do not perform 15-lead ECGs. As a result, patients experiencing a Right Ventricular Infarct (RVI) may receive nitroglycerin (NTG). In many cases, paramedics do not administer NTG to those with inferior STEMI out of concern that there may be an associated RVI. The purpose of this study is to determine if there is a difference in prehospital adverse events (AEs) associated with NTG administration in patients with unrecognized RVIs compared to those with an inferior STEMI and no RVI. **Methods:** Ambulance Call Records (ACR) of patients with prehospital STEMI between Jan 1, 2012 and Dec 31, 2015 were analyzed for the incidence of NTG administration. AEs were defined as HR < 60 bpm, systolic BP < 100 mmHg or drop of 1/3, GCS decrease of >2, syncope, arrest or death. Hospital records were reviewed to determine patients diagnosed with an inferior STEMI without RVI and those with a concurrent or primary RVI as diagnosed on angiography, ECG or discharge diagnosis. **Results:** Of the 334 ACRs that were filtered and manually reviewed, 144 were excluded (not STEMI, inter-facility transports, duplicate ACR) resulting in 189 patients that had a prehospital STEMI. The mean (SD) age was 66.9 (13.5) years and 70.6% were male. Of 189 STEMI patients, 82 (42.9%) received NTG. Nineteen (41.3%) of these patients were subsequently diagnosed with RVI and 27 (58.7%) had inferior STEMI without RVI. For patients receiving NTG, AEs occurred in 11 (57.9%) within the RVI group, and 10 (37.0%) within the inferior STEMI group ( $\Delta$  20.9%, 95% CI -7.8% to 45.4%,  $p = 0.2$ ). Cardiac arrest or death did not occur in either group. A total of 107 did not receive NTG and of these, 93 (86.9%) did not meet conditions or had contraindications for NTG use (22 RVI, 42 inferior STEMI). Three patients had a cardiac arrest and one died while in EMS care, none of which received NTG or had RVIs. **Conclusion:** Results of this study suggest no difference in the rate of AEs between patients with inferior STEMI and STEMI with RVI when NTG is administered in the prehospital setting. In our EMS system, the conditions and contraindications of NTG administration may be protective against AEs in RVIs, so the potential benefit of a prehospital 15-lead ECG may be limited.

**Keywords:** nitroglycerin, ST elevation myocardial infarction, prehospital

**LO34****System and patient level determinants of EMS offload delay**

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**Introduction:** Arriving EMS patients often experience offload delay due to a lack of available care spaces. Arrival in an overcrowded ED is the primary cause of offload delay, but patient characteristics may also play a role. Our objective was to describe system and patient level determinants of offload delay. **Methods:** From July 2013 to June 2016, administrative data was collated from the four Calgary Zone adult EDs. All CTAS level 2 and 3 patients arriving by ambulance were eligible for study. To define patient complexity and illness severity, we captured patient demographic data, living situation (homecare/facility vs. independent), vital signs, complaint category (medical, cardiovascular, mental health/neuro, GI, trauma/MS, other), biochemical parameters (serum Na, K, creatinine, hemoglobin, WBC), patient care needs (IV fluid bolus, IV antibiotics, CT scan, admission) and mortality at

7 and 30 days. **Results:** 162,002 EMS patients were studied. Of these, 67,785 went to a care space within 15 minutes (minimal offload delay), 53,185 between 15 and 59 minutes (moderate offload delay), and 41,032 at  $\geq 60$  minutes (severe offload delay). Vital signs, biochemical and hematologic parameters did not differ between groups. ED site was a strong predictor of offload delay (odds ratio {OR} = 1.0, 2.03, 2.14, 3.5 for the 4 EDs), as was arrival on weekday (OR = 1.38) or night shift (OR = 0.71). After adjusting for site, day and time of arrival, multivariate logistic regression models showed the following associations with offload delays of more than 15 minutes: male sex (OR = 0.94), age (OR = 1.01 per year of age), dependent living situation (OR = 1.15), CTAS 3 acuity (OR = 1.27), number of prior ED visits within a year (OR = 1.06 per visit), and complaint category: general medical (1.0), cardiovascular (0.90), mental health/neuro (0.90), GI (0.85), trauma/MS (0.61). Odds ratio estimates were precise—all with  $p < 0.001$ . Offload delay was associated with prolonged time to MD, increased EDLOS and higher LWBS/AMA rates. Delayed patients had similar rates of IV antibiotic use, but lower rates of IV fluid bolus, CT use, admission, and 7-day mortality. **Conclusion:** The strongest predictor of offload delay is arrival to a crowded ED, but patient factors including female sex, older age, dependent living status and repeat hospital use increase risk. Patients subjected to offload delay also appear to have lesser immediate care needs and lower short-term mortality.

**Keywords:** offload delay, determinants, overcrowding

**LO35****Impact of EMS direct referral to community care on services received**

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**Introduction:** The Community Referral by Emergency Medical Services (CREMS) program was implemented in January 2015 in Southwestern Ontario. The program allows Paramedics, who are interacting with a patient as a direct result of a call to 9-1-1, to directly refer patients in need of home care support to their local Community Care Access Centre (CCAC) for needs assessment. If indicated, subsequent referrals are made to specific services (e.g. nursing, physiotherapy and geriatrics) by the CCAC. Ideally, CREMS connects each patient with appropriate, timely care, supporting individual needs. Similar referral programs have been implemented in communities with preliminary data showing positive results. The primary objective of this project was to evaluate the success of the CREMS program by determining the number of referrals made by EMS in London-Middlesex to CCAC since implementation as well as the proportion of referred patients receiving a new or increase in service due to EMS referral. **Methods:** Data for all CCAC referrals from London-Middlesex EMS was collected for a thirteen month period (February 2015-February 2016). Data was evaluated for quantity of referrals and proportion that led to a patient receiving new or increased home care service. **Results:** There were 436 referrals made in the study period which represented 391 individuals. 54% of patients were between 65-84 years of age. Of the 391 patients, 162 (41%) were not known to CCAC and of those 119 (73%) received a new service due to EMS referral. The most common new services were occupational therapy (61%) and nursing (47%). Of the 229 (59%) of patients that were already known to CCAC, 101 (44%) received an increase in service due to EMS referral. No patients refused a new or increase in service. **Conclusion:** Of all patients referred to CCAC, 56% received a new service or had a change in existing services which suggests that a large number of patients benefited from early EMS referral to community services. The results of this project provide

impetus to continue and expand the CREMS program. Future studies will evaluate if the implementation of this program has reduced patient reliance on 911 requests for paramedic care as well as Emergency Department transports.

**Keywords:** emergency medical services

### LO36

#### Out-of-hospital cardiac arrest in British Columbia: Ten years of increasing survival

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**Introduction:** Survival for victims of out-of-hospital cardiac arrest (OHCA) is typically between 8 and 12%. We sought to report the trends in survival in British Columbia (BC) over a 10-year period. **Methods:** The BC Resuscitation Outcomes Consortium prospectively collected detailed pre-hospital and hospital data on consecutive non-traumatic OHCA's from 2006 to 2016 within BC's four metropolitan areas. We included EMS-treated adult patients without DNR orders. To describe baseline characteristics we organized patient characteristics in three time periods: 2006-09, 2010-13, and 2014-16 (first and last periods reported below). The primary and secondary endpoints were survival at hospital discharge and return of spontaneous circulation (ROSC). We tested the significance of year-by-year trends in baseline characteristics, and performed multivariable Poisson regression, using calendar year as an independent variable, to calculate risk-adjusted rates for survival. **Results:** Between January 1, 2006 and March 31, 2016 there were a total of 26 433 non-traumatic OHCA's, with 15 145 included in this study. There were significant decreases in the proportion with initial shockable cardiac rhythms (28% to 23%) and bystander witnessed arrests (42% to 39%), however significant increases in the proportion with bystander CPR (40% to 49%) and ALS treatment (86% to 97%), and the median chest compression fraction (0.81 to 0.87). There was a significant increase in the median time until termination of resuscitation in those who did not achieve ROSC (27 to 32 minutes), and a significant decrease in the proportion of patients who were transported in absence of ROSC (17% to 6.5%). There was a significant improvement in achieving ROSC (44% to 48%; adjusted rate ratio per year 1.02, 95% CI 1.01 to 1.02) and survival at hospital discharge (10% to 14%; adjusted rate ratio per year 1.05, 95% CI 1.04 to 1.06). Both subgroups of initial shockable (adjusted rate ratio per year 1.04, 95% CI 1.03 to 1.05) and non-shockable (adjusted rate ratio per year 1.08, 95% CI 1.06 to 1.12) cardiac rhythms demonstrated survival improvement. **Conclusion:** Despite a significant decrease in those with initial shockable rhythms, out-of-hospital cardiac arrest survival in BC's metropolitan regions increased by approximately 40% over a 10-year period. During this time there were system changes and quality of care improvements as provided by bystanders and professionals.

**Keywords:** cardiac arrest, cardiopulmonary resuscitation

### LO37

#### Routine application of defibrillation pads and time to first shock in prehospital STEMI complicated by cardiac arrest

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**Introduction:** ST-segment elevation myocardial infarction (STEMI) remains a significant cause of morbidity and mortality in North America, with recent studies suggesting that between 4 to 11% of patients diagnosed

with STEMI suffer an out-of-hospital-cardiac arrest (OHCA). Previously published research has shown that shorter time to initial defibrillation in patients with VF/VT OHCA increases functional survival. The purpose of this study is to assess whether the routine application of defibrillation pads in STEMI decreases the time to initial defibrillation in those who suffer OHCA. **Methods:** Ambulance call records (ACR) for patients diagnosed with STEMI in Middlesex-London in the prehospital setting from Jan 1, 2012 to Jun 30, 2016 were reviewed. Patients were included in the study if they were 18 years of age or older with a confirmed diagnosis of STEMI and suffered an OHCA with an initial shockable rhythm (VF or VT) while in paramedic care. The pre-pad protocol (routine application of defibrillation pads in STEMI patients) was implemented by Middlesex-London EMS in July 2014. If inclusion criteria were met, ACRs were reviewed to determine whether the pre-pad protocol was implemented and to extract the time to initial defibrillation and relevant demographic and event features. Associated hospital charts were reviewed to evaluate inpatient event features and survival. T-test was used to assess the difference between mean times to defibrillation. **Results:** 446 patients were diagnosed with prehospital STEMI. Of those, 11 patients experienced a paramedic witnessed cardiac arrest. Four of the 11 had defibrillation pads applied upon diagnosis of STEMI. In patients who received pre-pad application, the mean time to initial defibrillation was 17.71 sec, compared to 72.71 sec in patients who had pads applied following arrest (MD 54.97 sec CI 22.69 to 87.24 sec). All patients treated with the pre-pad protocol survived to discharge from hospital, while one patient in the routine care group died in the ED. **Conclusion:** Routine application of defibrillation pads decreases the time to initial defibrillation in STEMI patients who suffer OHCA. Larger studies are required to evaluate whether this decreased time to defibrillation translates into mortality benefit in this subset of patients who experience OHCA.

**Keywords:** cardiac arrest, ST-segment elevation myocardial infarction, pre-hospital

### LO38

#### Hypoglycemia is a rare peri-seizure finding in pre-hospital patients

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**Introduction:** Conventional wisdom states that hypoglycemia is a frequent peri-seizure phenomenon and must be tested for. Conventional wisdom also lists hypoglycemia as a cause of seizures. Recent literature disputes this. Paramedic medical directives continue to direct paramedics to determine the blood sugar level on all seizure patients. The purpose of this study was to determine the frequency of hypoglycemia in patients identified as having "seizure" as the primary or final problem code in Ambulance Call Reports (ACRs) from a large regional paramedic base hospital program. **Methods:** We conducted a retrospective analysis of iMedic platform, electronic ACRs, for a 2 year period (Jan 01, 2014 to Dec 31, 2015), from 8 Paramedic Services serving a rural and urban population of 1.4 million. 5854 calls, had "seizure" listed as a primary or final problem code. A 10% sample was generated using a random number table. ACRs were manually searched, data abstracted onto spread sheets, and the results analyzed using descriptive statistics (Wizard ver 1.8.16 for Mac). **Results:** 582 calls were analyzed. 430 (73.9%) were adults and 152 (26.1%) were paediatric (age <18). A blood sugar was determined in 501/582 (86.1%) of all calls; adults 388/430 (90.2%), paediatric 113/152 (74.3%). The Glasgow Coma Score, when measured, was 15 in 280/575 (48.7%) cases. Seizures were witnessed by paramedics in 47/582 (8.1%) calls; adults 33/430 (7.7%), paediatric 14/152 (9.2%). In calls where paramedics witnessed a seizure a blood sugar was determined 36/47 (76.6%) of the time; adults 25/33 (75.8%), paediatric 11/14 (78.6%). Hypoglycemia (BS <4.0 mmol/L in