injuries make up a significant proportion of total ED visits and approximately half of these patients receive CT imaging in the ED. The CWC campaign did not seem to impact imaging utilization for head injuries in the 14 months following its launch. Further efforts, including local quality improvement initiatives, are likely needed to increase adherence to its recommendation and reduce imaging utilization for head injuries.

Keywords: Choosing Wisely, head injury, emergency department

LO67

The impact of CPR quality during entire resuscitation episode on survival from cardiac arrest

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Introduction: High-quality cardiopulmonary resuscitation (CPR) is essential for patient survival. Typically, CPR quality is only measured during the first 10 minutes of resuscitation. There is limited research examining the quality of CPR over the entire duration of resuscitation. **Objective**: To examine the quality of CPR over the entire duration of resuscitation and correlate the quality of CPR to patient survival. **Methods:** This was a retrospective observational study using data from the Toronto RescuNET Epistry-Cardiac Arrest database. We included consecutive, adult (>18) OHCA treated by EMS between January 1, 2014 and September 30, 2015. High-quality CPR was defined, in accordance with 2015 AHA Guidelines, as a chest compression rate of 100-120/min, depth of 5.0-6.0 cm and chest compression fraction (ccf) of >0.80. We further categorized high-quality resuscitation as meeting benchmarks >80% of the time, moderate-quality between 50-80% and low-quality meeting benchmarks <50% of the resuscitation. We used multivariable logistic regression to determine association between variables of interest, including CPR quality metrics, and survival to hospital discharge. **Results:** A total of 5,208 OHCA met our inclusion criteria with a survival rate of 8%. The median (IQR) duration of resuscitation was 23.0 min (15.0,32.7). Overall CPR quality was considered high-quality for ccf in 81% of resuscitation episodes, 41% for rate, and 7% for depth. The percentage of resuscitations meeting the quality benchmarks differed between survivors and non-survivors for both depth (15% vs 6%) and ccf (61% vs 83%) (P value <0.001). After controlling for Utstein variables maintaining a chest compression depth within recommendations for >80% showed a trend towards improved survival (OR 1.68, 95% CI 0.96, 2.92). Other variables associated with survival were public location, initial CPR by EMS providers or bystanders, witnessed cardiac arrest (EMS or bystander), and initial shockable rhythm. Increasing age and longer duration of resuscitation were associated with decreased survival. **Conclusion:** Overall, EMS providers were not able to maintain rate or depth within guideline recommendations for the majority of the duration of resuscitation. Maintaining chest compression depth for greater than 80% of the resuscitation showed a trend towards increased survival from OHCA.

Keywords: cardiac arrest, cardiopulmonary resuscitation, emergency medical services

LO68

Extracorporeal membrane oxygenation in the emergency department for resuscitation of out-of-hospital cardiac arrest patients: a systematic review

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Introduction: With one person in Canada suffering an out-of-hospital cardiac arrest (OHCA) every 12 minutes and an estimated survival to hospital discharge with good neurologic function ranging from 3 to 16%, OHCA represents a major source of morbidity and mortality. An evolving adjunct for resuscitation of OHCA patients is the use of extracorporeal membrane oxygenation-assisted CPR (ECPR). The purpose of this systematic review is to investigate the survival to hospital discharge with good neurologic recovery in patients suffering from OHCA treated with ECPR compared to those who received standard advanced cardiac life support with conventional CPR (CCPR) alone. **Methods:** A systematic database search of both MEDLINE & EMBASE was performed up until September 2016 to identify studies with ≥5 patients reporting ECPR use in adults (age ≥16 years) with OHCA. Only studies reporting survival to hospital discharge were included. All identified studies were assessed independently using predetermined inclusion criteria by two reviewers. Study quality and risk of bias were evaluated using the Newcastle Ottawa regulations assessment scale. **Results:** Of the 1065 records identified, 54 studies met all inclusion criteria. Inter-rater reliability was high with a kappa statistic of 0.85. The majority of studies were comprised of case series (n = 45) of ECPR with 5 to 83 patients/study. Out of the 45 case series, 37 presented neurologic data at hospital discharge and demonstrated a broad range of patients surviving with good neurologic outcome (0 to 71.4%). Only 9 cohort studies with relevant control group (CCPR) were identified (38 to 21750 patients/study). Preliminary analysis demonstrated that 6 cohort studies were sufficient quality to compare ECPR to CCPR. All 6 studies showed significantly increased survival to hospital discharge with good neurologic recovery (ECPR 10.6 to 41.6% vs CCPR 1.5 to 7.7%, respectively). **Conclusion:** Given the paucity of studies using appropriate comparators to evaluate the impact of ECMO, our confidence in a clinically relevant difference in outcomes compared to current standards of care for OHCA remains weak. Interestingly, a limited number of studies with suitable controls demonstrated a potential benefit associated with ECPR in the management of OHCA in selected patients. In this state of equipoise, high quality RCT data is urgently needed.

Keywords: cardiac arrest, extracorporeal cardiopulmonary resuscitation, survival with good neurologic outcome

LO69

Evaluating the impact of night shifts on emergency medicine resident competence in simulated resuscitations

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Introduction: Sleep deprivation negatively affects cognitive and behavioural performance. Emergency Medicine (EM) residents commonly work night shifts and are then expected to perform with competence. This study examines the impact of night shifts on EM resident performance in simulated resuscitation scenarios. **Methods:** A retrospective cohort study was completed at a single Canadian academic centre where residents participate in twice-annual simulation-based resuscitation objective structured clinical examinations (OSCEs). OSCE scores for all EM residents between 2010-2016 were collected, as well as post-graduate year (PGY1-5), gender, and shift schedules. OSCEs were scored using the Queen's Simulation Assessment Tool (QSAT) evaluating four domains: primary assessment, diagnostic actions, therapeutic actions and communication, and an overall global assessment score (GAS). A night shift was defined as a late evening (beyond 23:00) or overnight shift within the three days before an OSCE. A mixed effects linear regression model was used to model the

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association between night shifts and OSCE scores while adjusting for gender and PGY. **Results:** A total of 136 OSCE scores were collected from 56 residents. PGY-5 residents had 37.1% (31.3 to 34.0%; $p < 0.01$) higher OSCE scores than those in PGY-1 with an average increase of 8.8% (7.5 to 10.1%; $p < 0.01$) per year. Working one or more night shifts in the three days before an OSCE reduced the total and communication scores by an average of 3.8% ($p = 0.04$) and 4.5% ($p = 0.04$) respectively. We observed a significant gender difference in the effects of acute shift work ($p = 0.03$). Working a night shift one night prior to an OSCE was not associated with total score among male residents ($p = 0.33$) but was associated with a 6.1% (-11.9 to -0.2; $p = 0.04$) decrease in total score among female residents. This difference was consistent across PGY and was primarily due to an 8.5% (-15.5 to -1.6%; $p = 0.02$) decrease in communication scores and a 6.7% (-13.1 to -0.3%; $p = 0.04$) reduction in GAS. **Conclusion:** Proximity to night shifts significantly impaired the performance of EM trainees in simulated resuscitation scenarios, particularly in the domain of communication. For female residents, the magnitude of difference in total scores after working such shifts one night prior to a resuscitation OSCE was approximately equal to the difference seen between residents one year apart in training.
Keywords: shiftwork, simulation, sleep deprivation

LO70

Do automatic external defibrillators improve rates of return of spontaneous circulation, survival to hospital discharge and favourable neurological survival in Canada?

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Introduction: Survival for victims of out-of-hospital cardiac arrest (OHCA) is typically 8-12%. Recent evidence has shown that public access automatic external defibrillators (AED) may improve survival. The objectives of this study were to determine whether AEDs improve rates of return of spontaneous circulation (ROSC), overall survival, and favourable neurological survival (FNS) in Canada. **Methods:** The BC Resuscitation Outcomes Consortium prospectively collected detailed prehospital and hospital data on consecutive non-traumatic OHCAs from 2011-2015 within BC's four metropolitan areas. We included all EMS-treated adult patients. Data were collected in accordance with recognized Utstein criteria. We described frequencies with counts, means and medians where appropriate, and the Z-test was used to compare population proportions. **Results:** We examined 7577 OHCAs from 2011-2015. AEDs were deployed on 223 patients in this period (mean age 60.4 yrs [95% CI 45.7-75.1] and 83.9% male; non-AED OHCAs mean age 66.2 yrs [48.4-83.8] and 67.3% male). Seventy seven percent of AED deployments occurred in public locations, 69.1% were witnessed by bystanders and CPR was initiated in 98.7% of these cases. Fifteen percent of non-AED OHCAs occurred in public locations, 38.3% were bystander witnessed, and 45.4% received bystander CPR. AEDs delivered shocks to 61.4% of patients, and EMS crews found an initial shockable rhythm upon scene arrival in 60.5% of AED deployments (22.9% for non-AED cases). AED OHCA patients had higher rates of ROSC at any time (67.2% vs 47.6%; difference of 19.6% [12.9-26.2 $p < 0.01$]), and ROSC at ED arrival (61% vs 35.4%; difference of 25.6% [19.2-32.0 $p < 0.01$]). AED OHCA patients had higher rates of survival to hospital discharge (23.8% vs 8.5%; difference 15.3% [11.5-19.1 $p < 0.01$]). Detailed neurologic outcome data was not available for all patients, yet for those which it was available AED OHCA patients had improved outcomes (modified Rankin score < 2) compared to non-AED OHCA patients (9.0% vs 5.4%; difference 3.6% [0.6-6.6 $p < 0.02$]. **Conclusion:** Automatic external defibrillators markedly improve rates of ROSC at any time, sustained ROSC at ED arrival, survival to hospital discharge, and FNS in Canada. Continued support for public access AED programs is essential to improve patient outcomes.
Keywords: cardiac arrest, automatic external defibrillator, survival

LO71

For patients suffering from out-of-hospital cardiac arrest, is survival influenced by the capabilities of the receiving hospital?

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Introduction: Patients suffering from out-of-hospital cardiac arrest (OHCA) are frequently transported to the closest hospital after return of spontaneous circulation (ROSC). Percutaneous coronary intervention (PCI) is often indicated as a diagnostic and therapeutic procedure following OHCA. This study aimed to determine the association between the type of destination hospital (PCI-capable or not) and survival to discharge for patients with OHCA and prehospital ROSC. We hypothesized that being transported to a PCI-capable hospital would be associated with a higher survival to discharge. **Methods:** The present study used a registry of adult OHCA between 2010 and 2015 in Montréal, Canada. We included adult patients with non-traumatic OHCA and prehospital ROSC. The association of interest was evaluated with a multivariate logistic regression model to control for demographic and clinical variables (age, gender, time of day, initial rhythm, witnessed arrest, bystander CPR, presence of first responders or advanced care paramedics, prehospital supraglottic airway placement, delay before paramedics' arrival). Assuming a survival rate of 40% and 75% of the variability explained by other factors included in the model, more than 1200 patients needed to be included to detect an absolute difference of 10% in survival between both groups with a power of more than 90%. **Results:** A total of 1691 patients (1140 men and 551 women) with a mean age of 64 years (standard deviation 17) were included, of which 1071 (63%) were transported to a PCI-capable hospital. Among all patients, 704 patients (42%) survived to hospital discharge. We observed a significant independent association between survival to discharge and being transported to a PCI-capable hospital (adjusted odds ratio [AOR] 1.46 [95% confidence interval 1.09-1.96]) after controlling for confounding variables. Having an initial shockable rhythm and presence of first responders also increased survival to discharge (AORs 3.67 [95% confidence interval 2.75-4.88] and 1.53 [95% confidence interval 1.12-2.09], respectively). **Conclusion:** Patients experiencing ROSC after OHCA could benefit from a direct transport to a PCI-capable hospital. This benefit might also be related to unmeasured interventions other than PCI these hospitals can provide (e.g. high-level intensive care or cardiovascular surgery).
Keywords: out-of-hospital cardiac arrest, percutaneous coronary intervention, survival

LO72

Implementation of an educational program to improve the cardiac arrest diagnostic accuracy of ambulance communication officers: a concurrent control before-after study

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