

7 days for the IV and non-IV groups. **Results:** Our analysis included 31 802 patient visits treated by 185 physicians. The average patient age was 37.8 years with 64.3% being female and the majority triaged as CTAS 3 (82.5%). On average 24% of these visits were treated with IV therapies; 90<sup>th</sup> percentile; 34%. For physicians seeing in excess of 100 cases, the variation in IV therapy use ranged from 1% to 47%. Patients receiving IV therapies demonstrated a 44% greater average LOS (6.2 hours vs 4.3 hours) and those receiving IV therapies had higher 7-day ED revisit rates (12.0% vs 8.8%) as well as 7-day ED revisits resulting in readmission (2.4% vs 1.0%). 'mso-spacerun:yes' > Secondary outcomes were a comparison of ED LOS, ED revisits at 7 days and ED revisits resulting in admission at 7 days for the IV and non-IV groups. **Conclusion:** This is the first study to examine physician preference for the use of IV therapies in a low-acuity population and has demonstrated in excess of a 47-fold variation between both extremes of use. Reducing practice variation in this area of ED care by standardizing indications for IV therapies could result in more rational resource utilization and improved throughput.

**Keywords:** resource utilization, low-acuity visits, IV therapies

#### MP026

##### **Implementation of an ED atrial fibrillation and flutter pathway improves rates of appropriate anticoagulation in patients not previously on these medications**

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**Introduction:** Atrial fibrillation and flutter (AFF) are the most common arrhythmias presenting to the emergency department. Without anticoagulation, AFF increases stroke risk; individuals with paroxysmal AFF have a similar prognosis. A coordinated ED AFF electronic order-set and management pathway was developed at our institution. The primary objective of this study was to measure rates of appropriate anticoagulation (AAC) on discharge from the ED for patients presenting with AFF not previously on antithrombotic or anticoagulant medications. Secondary objectives included comparison of the following outcomes pre and post-pathway (PRE & POST): AFF Clinic referral rates, ED return rates, and mortality. **Methods:** This was a retrospective case series of patients presenting to our quaternary care ED with AFF pre and post AFF pathway implementation. Cases were identified using an administrative database covering 120 000 annual ED visits. Trained research assistants and the primary investigator extracted data from the electronic medical record. 20% of all charts were double collected to ensure accuracy ( $k = 0.85$ ). Descriptive variables were described using counts, means, medians and confidence intervals. Chi-square statistics of dependent samples were calculated for the primary outcome. **Results:** We examined 307 cases of AFF presenting to our ED ( $n = 130$  PRE;  $n = 177$  POST). Demographic variables were similar PRE and POST: mean age (66.0 [95%CI 63.8-68.3] PRE; 65.0 [63.0-67.0] POST), % male (59.2% PRE; 59.3% POST), presenting rhythm (66.2% A.fib [58.0-74.3] A. flutter 29.2% [21.4-37.0] PRE; 61.0% A.fib [53.8-68.1] A. flutter 17.5% [11.9-23.1] POST), and CHADS<sub>2</sub>VASC score (2.1 [1.8-2.4] PRE; 1.9 [1.7-2.1] POST). The rate of AAC rose from 39.1% PRE to 77.8% POST ( $P < 0.01$ ). AFF clinic referral rates increased from 16.9% PRE to 25.4% POST (not significant). ED return rates within 30 days for AFF, CHF, major bleeding and CVA were unchanged. 30 day mortality rates were not statistically different (1.5% PRE vs. 2.8% POST). **Conclusion:** The implementation of a

coordinated ED AFF pathway was associated with significant improvements in the proportion of patients discharged with appropriate anticoagulation who had not previously been on antithrombotic or anticoagulant

medications. ED return rates and mortality did not change significantly.

**Keywords:** atrial fibrillation, anticoagulation, emergency medicine

#### MP027

##### **Automated cardiopulmonary resuscitation quality data abstraction for complete episodes of out-of-hospital cardiac arrest resuscitation**

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**Introduction:** Cardiopulmonary resuscitation (CPR) quality assurance and research has traditionally been limited to the first five minutes of resuscitation due to significant costs in time, resources and personnel from manual data abstraction. Moreover, CPR quality can be affected during prolonged resuscitations, which represents significant knowledge gaps. The objective of this study was to develop a software program to help automate the abstraction of CPR quality data from electronic defibrillators. **Methods:** We developed a software program to facilitate and help automate data abstraction from electronic defibrillator files for entire resuscitation episodes. Internal validation of the software program was performed on 50 randomly selected cardiac arrest cases with resuscitation durations of up to 60 minutes. CPR quality data variables such as number of ventilations, number of compressions, minute compression rate, minute compression depth, minute compression fraction, minute end-tidal CO<sub>2</sub>, were manually abstracted independently by two trained data abstractors and by the automated software program. Error rates and the time needed for data abstraction were measured.

**Results:** A total of 9826 data points were abstracted. Manual data abstraction resulted in a total of six errors (0.06%) compared to zero errors by the software program. The mean time  $\pm$  SD needed for manual data abstraction was 20.3  $\pm$  2.7 minutes compared to 5.3  $\pm$  1.4 minutes using the software program ( $p = 0.003$ ). **Conclusion:** Our CPR quality data abstraction software was 100% accurate in abstracting CPR quality data for complete resuscitation episodes and showed a significant reduction in data abstraction duration. This software will enable quality assurance programs and future cardiac arrest studies to evaluate the impact of CPR quality during prolonged resuscitations.

**Keywords:** cardiopulmonary resuscitation (CPR), quality, emergency medical services (EMS)

#### MP028

##### **Dynamic changes of prehospital serial 12-lead electrocardiogram for remote diagnosis of suspected ST-segment elevation myocardial infarction**

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**Introduction:** Accurate and efficient interpretation of prehospital 12-lead electrocardiogram (ECG) in patients with suspected ST-segment elevation myocardial infarction (STEMI) can improve outcomes, especially in rural regions. In the Chaudière-Appalaches region, Quebec, a prehospital serial 12-lead ECG monitoring system is used for remote interpretation of ECG abnormalities by emergency physicians via a telemedicine platform, the Unité de Coordination Clinique des Soins Préhospitaliers d'Urgence (UCCSPU). The objective of the study was to evaluate the use of serial monitoring of dynamic ECG changes in patients with suspected STEMI during emergency medical services

(EMS) transport. **Methods:** A retrospective cohort study with suspected STEMI patients monitored with prehospital serial ECGs was performed from August 2006 to December 2013. The data was extracted from UCCSPU clinical databases and verified by an emergency physician supervisor. During EMS transport, the serial ECG monitoring system automatically produced and transmitted every 2 minutes a 12-lead ECG without artefacts. STEMI criteria were based on the Third Universal Definition of Myocardial Infarction. Dynamic ECG change was defined as an ST-segment elevation or depression that meets diagnostic criteria (eg. initial non STEMI (NSTEMI) changing to STEMI and vice versa). **Results:** Among the 752 patients identified with suspected STEMI, 728 (96.8%) were included in the study due to missing data. The majority (614/728; 84.3%) had a consistent ST segment without significant dynamic changes throughout transport, of which 521 were identified as STEMI and 93 as NSTEMI. The remaining 114 patients (15.7%) had dynamic ECG changes: 41 (36%) evolved from NSTEMI to STEMI, 40 (35.1%) changed from STEMI to NSTEMI, and 33 (28.9%) had more than one dynamic ST-segment change. Overall, 59 patients (8.1%) had a final STEMI ECG diagnosis after an initial NSTEMI ECG interpretation. **Conclusion:** In this study, the serial ECG system enabled the remote diagnosis of STEMI in 8.1% of patients during EMS transport following an initial NSTEMI diagnosis. Serial monitoring of dynamic changes can allow for more rapid diversion to primary percutaneous coronary intervention facilities, potentially improving patient outcomes. Further studies are needed to evaluate the clinical impact, and costs and benefits of implementing this technology.

**Keywords:** ECG interpretation, STEMI, emergency medical services (EMS)

#### MP029

##### **Mobilizing citizens, decision-makers and healthcare professionals to find solutions for improving emergency care in a remote Northern emergency department: a pilot study**

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**Introduction:** Our national study of rural EDs showed they have limited access to CT scans, ICU, and most specialties, while Level 1 and Level 2 trauma centers are on average 300 km away. However, equivalent information on Northern/remote EDs is scarce. **Objectives:** This pilot study aimed to: 1) describe local access to services; and 2) mobilize citizens, decision-makers and healthcare professionals to envisage solutions to improving emergency care in a Northern/remote hospital. **Methods:** This descriptive, qualitative study was performed in a northern ED in Quebec. The head nurse received a prevalidated questionnaire about access to specific services, ED and patient characteristics (Objective 1). Focus groups (5) and individual interviews (11) were conducted with citizens/patients, decision-makers, physicians, nurses, paramedics, pharmacists, and mental health workers (Objective 2). Descriptive statistics are reported as means, medians and percentages for Objective 1. A thematic analysis was conducted for Objective 2. **Results:** **Objective 1:** The city (population 2875) is a mining community 962 km from Quebec City. The 2010 annual ED census was 6692. Proportions of patient visits at triage levels 1-5 were 0.2%, 3.2%, 13.4%, 25.4% and 56.7% respectively. The ED was staffed by one physician and two nurses per shift. The hospital had 24/7 access to basic X-ray and laboratory but no local access to speciality care, ICU, CT scan or ultrasound, with nearest services 28 km away. **Objective 2:** Analysis of qualitative data highlighted concerns for personal safety; telecommunication problems; lengthy transports; limited access to in-service training, advanced imaging, and consultants; and recruitment and retention difficulties.

Solutions included pre-hospital training, telemedicine, protocols, and networking with academic centers/medical schools, North Shore colleagues, and Labrador City Hospital. **Conclusion:** This isolated northern ED has limited access to services. Valuable qualitative information obtained enabled us to better understand the challenges and explore solutions towards improving Northern/remote emergency care.

**Keywords:** Northern emergency department, improving emergency care, mobilization

#### MP030

##### **Problems in paramedic-physician telecommunication**

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**Introduction:** Clear paramedic-physician telecommunications (patches) are critical in systems utilizing on-line medical control. In systems using extensive medical directives individual paramedics patch infrequently. Investigations of specific problem calls indicated that communication problems were more common than believed. Existing literature on this topic is sparse. This project is a quality assurance exercise undertaken to understand the extent and nature of problems in paramedic-physician telecommunications. **Methods:** Retrospective analysis of anonymized transcriptions made from MP3 audio files recorded as part of normal operating procedures by the Central Ambulance Communication Centre during January-March 2014. All calls where telecommunication occurred between paramedics from 4 ambulance services and base hospital physicians providing on-line medical oversight during ambulance calls were included. Transcripts were read multiple times and data extracted onto spreadsheets for frequency analysis. Further thematic framework analysis of emergent themes was done. **Results:** All 42 patches were transcribed and used for analysis. 36 (85.7%) were for termination of resuscitation orders, 4 (9.5%) were for advice, and 2 (4.8%) were for orders not covered by medical directives. Communication problems were identified in 40 (95.2%) patches. Most had multiple problems. These included disconnections (23.8%), difficulty hearing one another (40.5%) - indicated by phrases such as "sorry?" "what?", "I can't hear you" - or caused by individuals interrupting each other (83.3%), and talking simultaneously (47.6%). Signaling the end of "talk turns" - such as "10-4" or "over" - was never used. Instead, terms like "yah" and "OK" were used. When communication went awry, time was spent trying to repair the mis/poor communication. This led to repeating information or attempting to 'sell' the case by providing information unnecessary for decision making - such as during a request for termination of resuscitation, "there is vomit on the floor". **Conclusion:** Paramedic-physician telecommunication problems were extremely common. They involved technical (mechanical problems) and human factors (disorganized radio 'technique'). The high incidence of telecommunication problems identified is concerning. Critical clinical decisions (e.g. ceasing resuscitation) depend on clear communication. Further study of these issues is warranted.

**Keywords:** telecommunication, paramedic, patch

#### MP031

##### **Synovial fluid analysis in the diagnosis of septic arthritis: comparing local data to the literature**

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**Introduction:** A hot, painful, swollen joint is a common presentation to the emergency department. Of the potential etiologies, septic arthritis (SA) is the most devastating. Prompt diagnosis and treatment are