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Communication interruptum: cellphone technology problems in paramedic-physician communication

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Introduction: Approximately 15 years ago cell phones replaced portable VHF radios as the means of communication between paramedics and base hospital physicians. Cellphones, like VHF radio, do not allow voice transmission and reception to occur simultaneously. Radio use requires a learned technique to signal the end of each speaker's turn talking. These techniques are not used in normal cellphone conversation. Poor cellphone reception and poor technique result in breakdowns in communication. The literature about paramedic-physician telecommunication is almost nonexistent. There is an extensive literature in other industries, such as aviation, concerning problems in radio communication. This literature predicts that communication breakdowns are common and have critical consequences. We sought to determine how frequently problems attributable to cell phone technology arose in paramedic-physician communication. **Methods:** We conducted a retrospective analysis of all patch calls between physicians and paramedics from 4 municipal paramedic services from January 01-December 31, 2014. MP3 audio files, recorded during normal operating procedures by the Central Ambulance Communication Centre, were anonymized and transcribed. Transcripts were read multiple times by the authors and analyzed using mixed methods-qualitative thematic framework analysis and quantitative descriptive statistics. **Results:** 161 calls were identified. 155 tapes were usable for analysis. 127 (81.9%) patches involved termination of resuscitation orders, 28 (19.1%) were for advice or other orders. The data set consisted of 567 pages of transcripts. Communication problems were identified in 138 (89.0%) patches. Most had multiple problems. Technical problems included disconnections (13.5%), or difficulty hearing (56.8%)-indicated by phrases such as "what?", "I can't hear you". Disorganized cell phone technique was common-individuals interrupted each other (34.2%), and talked simultaneously (54.8%). Signalling the end of "talk turns"-using terms such as "10-4" or "over"-was never used. **Conclusion:** In addition to technical problems (poor transmission, disconnections), disorganized cell phone 'technique' caused a high incidence of communication problems. This is concerning because critical clinical decisions (e.g. ceasing resuscitation) depend on clear communication. Understanding the limitations of cellphone technology might improve communication.

Keywords: paramedic, cell phone technology, communication

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Do biomarkers need clinical attention among pre-frail injured seniors seen in the ED

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Introduction: Frailty is associated with functional decline and physiological impairments in seniors with minor injuries. Serum biomarkers have also been suggested as potential markers of these impairments in clinical studies. However, no study has addressed the usefulness of serum biomarkers among pre-frail seniors consulting emergency departments (ED) in order to detect these impairments. **Objectives:** The purpose of the present study was to explore the association between several serum biomarkers and the frailty status of seniors seen in ED for a minor injury who are at risk of functional decline and 2) assist professionals in clinical decisions while identifying frail seniors in whom interventions should be started in order to prevent potential functional decline. **Methods:** This cross-sectional study includes 190 seniors retrieved from the larger CETI cohort and discharged home from 4 EDs after treatment of minor injuries. Their frailty status was measured by the Canadian Study of Health & Aging-Clinical Frailty Scale (CSHA-CFS). Then, patients were classified as "Robust" (CHSA-CFS levels 1 and 2) vs. "Pre-frail/Frail" (CHSA-CFS levels $\geq$3). Biomarkers (Albumin, Creatinine, C-reactive protein (CRP), Vitamin D, Ferritin, Glucose and Insulin-Growth Factor (IGF-1)) were obtained from blood samples. "Normal" vs. "Impaired" (low and/or high) clinical threshold values were used for statistical analyses. **Results:** The proportion of patients with clinically high creatinine levels (>105 µmol/L for male and >85 µmol/L for female) was higher in Pre-frails/Frails when compared to Robusts (P-value = 0.01). Also, regarding IGF-1, we observed that the proportion of patients with lower IGF-1 levels (<50 µg/L) was higher in patients showing Pre-frail/Frail status (P-value = 0.01). Finally, a significant correlation was found between frailty status and blood glucose (r = 0.22; P-value = 0.02) whereas a tendency was noted for CRP level (r = 0.14; P-value = 0.1). **Conclusion:** When compared to Robust seniors, Pre-frail/Frail individuals presenting to EDs tend to have physiological dysregulations that may help detect pre-frail status in community-dwellers. Larger prospective studies are needed to specify the usefulness and clinical implications of frailty biomarkers in the continuum of acute elder care.

Keywords: frailty, biomarkers, injury

P055

EMS boot camp: a real-world, real-time educational experience for emergency medicine residents

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Introduction / Innovation Concept: In 2014, Eastern Ontario paramedic services, their medical director staff and area community colleges developed an EMS Boot Camp experience to orient Queen's University and the University of Ottawa emergency medicine residents to the role of paramedics and the challenges they face in the field. Current EMS ride-alongs and didactic classroom sessions were deemed ineffective at adequately preparing residents to provide online medical control. From those early discussions came the creation of a real-world, real-time (RWRT) educational experience. **Methods:** Specific challenges unique to paramedicine are difficult to communicate to a medical control physician at the other end of a telephone. The goal of this one-day educational experience is for residents to gain insight into the complexity and time sensitive nature of delivering medical care in the field. Residents are immersed as responding paramedics in a day of intense RWRT simulation exercises reflecting the common paramedic logistical challenges to delivering patient care in an uncontrolled and dynamic environment. **Curriculum, Tool, or Material:** Scenarios, run by paramedic students, are overseen by working paramedics from participating paramedic services. Residents learn proper use of key equipment found on an Ontario ambulance while familiarize themselves with patient care standards and medical directives. Scenarios focus on prehospital-specific clinical care issues; performing dynamic CPR in a moving vehicle, extricating a bariatric patient with limited personnel, large scale multi-casualty triage as well as other time sensitive, high risk procedures requiring online medical control approval (i.e. chest needle thoracostomy). **Conclusion:** EMS Boot Camp dispels preconceived biases regarding "what it's really like" to deliver high quality prehospital clinical care. When providing online medical control in the

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future, the residents will be primed to understand and expect certain challenges that may arise. The educational experience fosters collaboration between prehospital and hospital-based providers. The sessions provide a reproducible, standardized experience for all participants; something that cannot be guaranteed with traditional EMS ride-alongs. Future sessions will evaluate participant satisfaction and self-efficacy with the use of a standard evaluation form including pre/post self-evaluations.
Keywords: emergency medical services, resident education

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Rural versus urban pre-hospital and in-hospital mortality following a traumatic event in Québec, Canada

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Introduction: Trauma remains the primary cause of death in people under 40 in Québec. Although trauma care has dramatically improved in the last decade, no empirical data on the effectiveness of trauma care in rural Québec are available. This study aims to establish a portrait of trauma and trauma-related mortality in rural versus urban pre-hospital and hospital settings. **Methods:** Data for all trauma victims treated in the 26 rural hospitals and 32 Level-1 and Level-2 urban trauma centres was obtained from Québec's trauma registry (2009-2013). Rural hospitals were located in rural small towns (Statistics Canada definition), provided 24/7 physician coverage and admission capabilities. Study population was trauma patients who accessed eligible hospitals. Transferred patients were excluded. Descriptive statistics were used to compare rural with urban trauma case frequency, severity and mortality and descriptive data collected on emergency department (ED) characteristics. Using logistic regression analysis we compared rural to urban in-hospital mortality (pre-admission and during ED stay), adjusting for age, sex, severity (ISS), injury type and mode of transport. **Results:** Rural hospitals (N = 26) received on average 490 000 ED visits per year and urban trauma centres (N = 32), 1 550 000. Most rural hospitals had 24/7 coverage and diagnostic equipment e.g. CT scanners (74 %), intensive care units (78 %) and general surgical services (78 %), but little access to other consultants. About 40% of rural hospitals were more than 300 km from a Level-1 or Level-2 trauma centre. Of the 72 699 trauma cases, 4703 (6.5%) were treated in rural and 67 996 (93.5%) in urban hospitals. Rural versus urban case severity was similar: ISS rural: 8.6 (7.1), ISS urban: 7.2 (7.2). Trauma mortality was higher in rural than urban pre-hospital settings: 7.5% vs 2.6%. Reliable pre-hospital times were available for only a third of eligible cases. Rural mortality was significantly higher than urban mortality during ED stays (OR (95% IC): 2.14 (1.61-2.85)) but not after admission (OR (95% IC): 0.87 (0.74-1.02)). **Conclusion:** Rural hospitals treat equally severe trauma cases as do urban trauma centres but with fewer resources. The higher pre-hospital and in-ED mortality is of grave concern. Longer rural transport times may be a factor. Lack of reliable pre-hospital times precluded further analysis.
Keywords: trauma, rural, mortality

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Diagnosis for mild traumatic brain injury in three Canadian emergency departments: missed opportunities

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Introduction: Patients with mild traumatic brain injury (mTBI) often present to the emergency department (ED). Incorrect diagnosis may delay appropriate treatment and recommendations for these patients, prolonging recovery. Notable proportions of missed mTBI diagnosis have been documented in children and athletes, while diagnosis of mTBI has not been examined in the general adult population. **Methods:** A prospective cohort study was conducted in one academic (site 1) and two non-academic (sites 2 and 3) EDs in Edmonton, Canada. On-site research assistants enrolled adult (>17 years) patients presenting within 72 hours of the injury event with clinical signs of mTBI and Glasgow comma scale score ≥13. Patient demographics, injury characteristics, and ED flow information were collected by chart review. Physician-administered questionnaires and patient interviews documented the recommendations given by emergency physicians at discharge. Bi-variable comparisons are reported using Pearson's chi-square tests, Student's t-tests or Mann-Whitney tests, as appropriate. Multivariate analyses were performed using logistic regression methods. **Results:** Overall, 130/250 enrolled patients were female, and the median age was 35. Proportions of successfully diagnosed mTBI varied significantly across study sites (Site 1: 89%; Site 2: 73%, Site 3: 53%; $p > 0.001$). Patients without a diagnosis were less likely to receive a recommendation to follow-up with their family physician (OR = 0.08; 95% CI: 0.03, 0.21) or advice about return to work (OR = 0.17; 95% CI: 0.08, 0.04) or physical activity (OR = 0.08; 95% CI: 0.04, 0.17). Patients with missed diagnoses had longer ED stays (median = 5.0 hours; IQR: 3.8, 7.0) compared with diagnosed mTBI patients (median = 3.9 hours; IQR: 3.0, 5.3). In the adjusted model, patients presenting to non-academic centers had reduced likelihood of mTBI diagnosis (Site 2: OR = 0.21; 95% CI: 0.08, 0.58; Site 3: OR = 0.07; 95% CI: 0.02, 0.24). **Conclusion:** The diagnostic accuracy of physicians assessing patients presenting with symptoms of mTBIs to these three EDs is suboptimal. The rates of missed diagnosis vary among EDs and were associated with length of ED stay. Closer examination of institutional factors, including diagnosis processes and personnel factors such as physician training, is needed to identify effective strategies to heighten the awareness of mTBI presentations.
Keywords: mild traumatic brain injury, concussion, practice variation

P058

Morbid obesity association with return of spontaneous circulation from sudden cardiac arrest treated in a large, urban EMS system in the United States

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Introduction: Patient co-morbidities contribute to survivability from out-of-hospital sudden cardiac arrest. Many studies have been conducted regarding contributing factors to sudden cardiac arrest survival, though very few studies have been published detailing specific analysis of morbid obesity association with return of spontaneous circulation (ROSC) in adults treated by paramedics. **Methods:** Adults in sudden cardiac arrest with resuscitation initiated, including at least one defibrillation, between July 1, 2016 and December 1, 2016 were enrolled. Due to an increasing prevalence of morbid obesity in the United States adult population, a novel defibrillation strategy, involving weight-based joule settings and double sequential external defibrillation (DSED) was initiated in June 2016. As exact body weight is logistically difficult to obtain in the EMS care environment, a paramedic-estimated weight at

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