

data from Ontario, Canada. Patients who were discharged home from an ED in Ontario with a primary diagnosis of chest pain from April 1, 2004 to March 31, 2010 were included. High-risk patients were defined as the presence of diabetes or pre-existing cardiovascular disease, while low-risk patients were defined as the absence of these conditions. ED volume was categorized as low, medium, or high, based on tertiles of annual chest pain patient volume. The primary outcome of this study was all-cause mortality one year after the index ED visit. Mantel-Haenszel Chi-Square was used to compare crude outcome rates. **Results:** There were 56,767 high-risk patients. The average age was 66 years and 53% were male. All-cause mortality rates were 6.8%, 6.3%, and 6.0% ($p = 0.028$), and rates of hospitalization for acute coronary syndrome were 5.8%, 4.6%, and 4.0% ($p < 0.001$) among low, medium, and high volume EDs respectively. There were 216,527 low-risk patients. The average age was 64 years and 42% were male. All-cause mortality rates were 2.0%, 1.9%, and 1.6% ($p < 0.001$), and rates of hospitalization for acute coronary syndrome were 1.5%, 1.4%, and 1.0% ($p < 0.001$) among low, medium, and high volume EDs respectively. **Conclusion:** Higher volume EDs were associated with decreased rates of all-cause mortality and admission for acute coronary syndrome among chest pain patients who were discharged home. Future research should study the reasons for this finding and attempt to improve outcomes in lower volume EDs.

Keywords: chest pain

LO006

Interarm blood pressure differential as a clinical marker for acute aortic dissection in the emergency department

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Introduction: Acute Aortic Dissection (AAD) is life threatening, requiring early diagnosis. Although previous literature suggest interarm BP differential is an independent predictor of AAD, up to 20% of a healthy population can have a significant differential. Our objectives were to assess the rate of bilateral BP measurement in acute non-traumatic truncal pain patients, and the association of BP differential with non-traumatic AAD. **Methods:** This is a historical matched case control study: participants were adults >18 years old presenting to two tertiary care EDs with a triage diagnosis of truncal (i.e. chest, abdominal, flank, back) pain. Cases were selected based on an ED or in-hospital diagnosis of non-traumatic AAD confirmed by CT or Echo. Controls were from a single calendar year matched in a 1:1.5 ratio by sex and age within 5 years. ED and referral consult BP measurements were used. Exclusion criteria: clear diagnosis on basic investigation (i.e. UTI, pneumonia, pneumothorax, acute fracture) or pain >14 days/no pain. Sample size of 126 cases and 183 controls was calculated based on 20% exposure in controls (80% power and alpha of 5%), to detect an OR >2. P-values were calculated using chi square analysis. **Results:** A total of 294 (119 cases, 175 controls) patients were included (mean 66 +/-14.5yrs, 59.5% male). Cases (199 potential: 119 included; 80 excluded). Controls (8239 potential: 305 reviewed; 175 included; 130 excluded). Bilateral BP was measured in 70.6% of cases ($n = 84$, mean difference = 15.5mmHg) versus 31.3% of controls ($n = 55$, mean difference = 10.9mmHg). Among included controls, most common diagnoses were: Unspecified Chest (36.0%) or Abdominal (9.7%) Pain, ACS (12.6%), Muscular Back Pain (5.1%), and Renal Colic (4.0%). BP differential >10mmHg was found in 58.8% of cases and 40.7% of controls ($P = 0.10$). A BP differential >20mmHg was found in 31.3% of cases and 22.2% of controls ($P = 0.37$). BP differential >20mmHg did not significantly increase the odds of AAD (OR 2.0 (95%CI

0.82-4.90), $p < 0.129$). **Conclusion:** Interarm BP differential is not routinely measured in ED patients with acute non-traumatic truncal pain, and there is no significant difference in the presence or magnitude of differentials in patients with or without AAD. Therefore, physicians should not rely on BP differentials to aid in their diagnosis or exclusion of AAD.

Keywords: aortic dissection, blood pressure

LO007

A pragmatic randomized and controlled evaluation of nurse-initiated protocols

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Introduction: Emergency department (ED) overcrowding is a common and complicated challenge for EDs worldwide. Nurse-initiated protocols, diagnostics and/or treatments implemented by nurses prior to patients being seen by a physician or nurse practitioner, have been suggested as a potential strategy to improve patient flow. **Methods:** This randomized, pragmatic, controlled evaluation of 5 nurse-initiated protocols occurred in a crowded inner-city ED. Six physicians and 44 registered nurses, 3 clinical nurse educators and 3 unit managers were involved in revising 5 patient-complaint focused protocols prior to evaluation. Thirty (30/180) emergency nurses were provided 1 hour of training on inclusion and exclusion criteria, procedure and evaluation methods. Data was abstracted in a manner concealing patient allocation. Primary outcomes evaluated included time to diagnostic test, treatment, consultation or ED length of stay. This evaluation was completed following both the CONSORT and SQUIRE guidelines. **Results:** Time to acetaminophen for the intervention group ($n = 11$) was 1h:04 min on average (95%CI 30min to 1h:37min) whereas the control group ($n = 9$) was 3h:35min (95%CI 2h:21min to 4h:48min). The average length of stay of a suspected fractured-hip in the intervention group ($n = 5$) was 3h:34min (95%CI 1h:49min to 5h:19min) and 7h:34min for the control group ($n = 4$) was (95%CI 5h:26min to 9h:42min). Time to troponin in the intervention group ($n = 29$) was one quarter (average 48min, 95% CI 32min to 64min) of the time it was in the control group ($n = 14$) (average 3h:16min, 95%CI 1h:53min to 4h:39min; $p < 0.001$). The vaginal bleeding in pregnancy protocol reduced length of stay by roughly fifty-percent; the intervention group ($n = 11$) had a length of stay of 4h:57min (95%CI 3h:46min to 6h:08min) compared to 8h:33min (95% CI 6h:23min to 10h:44min) for the control ($n = 7$) ($p < 0.001$). There was no statistical difference in the length of stay for patients who received protocolized diagnostics for abdominal pain. **Conclusion:** Targeting specific patient groups with carefully written protocols can improve the timeliness of care. A cooperative and collaborative interdisciplinary group are essential to success. Having a system in place to ensure ongoing quality in protocol application and interdisciplinary support has proven more difficult than improving the primary outcomes in this evaluation.

Keywords: nurse protocols, standing orders, order sets

LO008

Assessment of the need for diagnostic imaging in extremity injuries by advanced care paramedics

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Introduction: Emergency department (ED) crowding is a national challenge. Initiatives to help address this at our ED include the use of a six-bed fast-track unit staffed by advanced-care paramedics (ACPs). Institutional byelaws only allow diagnostic imaging (DI) ordering by

physicians (MD). An ACP requesting DI at the time of first assessment would likely improve patient flow. We investigated whether ACPs can safely and cost-effectively request DI for extremity injuries without increasing cost or exposing patients to unnecessary radiation. **Methods:** A prospective evaluation of a convenience sample of patients presenting with an extremity injury sustained within 48 hours of presentation. At time of initial assessment, the ACP, following specific guidelines, recorded whether or not they believed an x-ray was indicated, and if so, what DI views they felt appropriate. Their opinion was blinded from the physician subsequently assessing the patient. An ACP opinion of the need for DI was compared with the subsequent test ordered by the MD. The MD decision to order DI was considered 'gold standard'. Opinions were considered "matched" if the MD ordered DI of the same body part that the ACP believed was indicated. Sensitivity, specificity, positive predictive and negative predictive values (PPV, NPV) were calculated. Using data from our ED information system, we estimated the time that would have been saved by allowing ACPs to order DI. **Results:** Of 199 patients 192 images were ordered and 89 fractures were diagnosed. ACPs and MDs agreed that DI was necessary 94.70% of the time (95% CI: {90.6%, 97.4%}). There were 8 x-rays the ACP did not order that the MD did order, of which one showed a fracture. Twice, the ACP would have ordered an x-ray that the MD did not. In terms of identifying the need for DI, ACPs were 95.8% sensitive and 71.4% specific. The PPV was 98.9% (95% CI: {95.8%, 99.8%}), and the NPV was 38.5% (95% CI: {15.1%, 67.7%}). On average, ACP opinion of DI indication was made 54.1 minutes (95% CI: {48.0, 60.2}) earlier than that of the MD. **Conclusion:** The overall agreement between MDs and ACPs was almost 95%. ACPs are more likely to under-order x-rays than to over-order them, lowering the risk of increasing radiation exposure and cost. ACP DI ordering may decrease the time of processing of patients with extremity injuries by almost an hour.

Keywords: paramedic, diagnostic imaging, emergency department

LO009

Impact of physician navigators on measures of emergency department efficiency

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Introduction: The Physician Navigator (PN) is a novel position created to manage patient flow in real-time at a very-high volume emergency department (ED). When paired with an emergency physician, PNs actively track patient wait times, and direct the physician to see and re-assess patients in a particular order to improve measures of emergency department efficiency, and maximize patient flow. Anecdotal evidence has shown that PNs decrease length-of-stay times for non-resuscitative patients in the setting of increased patient volumes, and without additional nursing or physician hours. The objective was to study the operational impact of PN on emergency department patient flow. **Methods:** A 48-month pre-/post-intervention retrospective chart review at an urban community emergency department from September 2011 to September 2015. The PN program started on March 1, 2013. The main outcome is emergency department length-of-stay (LOS). Secondary outcomes include time to physician-initial-assessment (PIA), left-without-being-seen rates (LWBS), left-against-medical-advice (LAMA), and physician satisfaction rates. Autoregressive integrated moving average models were generated for Canadian Triage and Acuity Scale (CTAS) 2 to 5 patients to quantify the immediate impact of the intervention on the outcome levels, and whether the impact was sustained over time. **Results:** Interim results are provided. 399,958 patients attended the ED during the study period. Daily patient volumes

increased 11.2% during the post-intervention period. There were no significant increases in the number of physicians shifts/day, and physician hours/day during the post-intervention period. Post-intervention, for CTAS 2-5 patients, there was a reduction in average LOS by 0.04 hours/PN ($p < 0.05$), and 90th-percentile LOS by 0.14 hours/PN ($p < 0.05$). For secondary outcomes, there was a decrease in overall average PIA by 6.37 minutes/PN ($p < 0.05$), and 90th-percentile PIA by 8.29 minutes/PN ($p < 0.05$). LWBS rates decreased by 40.8% ($p < 0.05$). There were no significant changes in LAMA rates. **Conclusion:** The implementation of Physician Navigators is associated with significant reductions in LOS, PIA, and LWBS rates for non-resuscitative patients at a very-high volume emergency department. **Keywords:** patient flow, efficiency

LO010

Clinical assessment of transient ischemic attack patients for symptomatic carotid disease in the emergency department

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Introduction: TIAs precede about 30% of strokes, with 4-10% having a stroke within 90 days of their TIA. In patients with a TIA due to symptomatic carotid disease, diagnosis and treatment within 2 weeks has been shown to have much better outcomes, while delay beyond 12 weeks no longer reduces subsequent stroke risk. The objective of this study was to determine the clinical findings associated with symptomatic carotid disease following an ED visit for TIA to indicate patients requiring prompt carotid imaging. **Methods:** We performed a prospective Canadian multicenter cohort study, at 13 academic sites, of ED patients with TIA or non-disabling stroke from 2006-2014. Treating ED physicians indicate clinical features on standardized data collection forms. Symptomatic carotid disease was carotid stenosis 50-99%, or carotid dissection, adjudicated by stroke neurology to be the etiology of the index event. Patients were followed by medical review and telephone up to 90 days. Univariate analysis was conducted for clinical features associated with patients who were eventually found to have symptomatic carotid disease as a cause for their TIA. **Results:** The cohort included 305 patients with and 5,277 without symptomatic carotid disease. Positive predictors of symptomatic carotid disease included older age (74.0 yrs vs 68.0 yrs $p < 0.0001$), male sex (62.9% vs 47.9%; $p < 0.0001$), history of weakness (63.3% vs 41.4%; $p < 0.0001$), language disturbance (52.1% vs 40.0%; $p < 0.0001$), weakness on physical exam (25.5% vs 17.1%; $p = 0.0002$), history of hypertension (74.8% vs 59.5%; $p < 0.0001$), and known history of carotid stenosis (18.9% vs 3.1%; $p < 0.0001$). Negative predictors of symptomatic carotid disease included first ever TIA (56.8% vs 68.8%; $p < 0.0001$), history of altered sensation (39.4% vs 45.8%; $p = 0.0322$), lightheadedness (13.0% vs 22.4%; $p = 0.0002$), and vertigo (3.6% vs 12.7%; $p < 0.0001$). **Conclusion:** TIA patients with older age, male sex, weakness, language disturbance or history of carotid stenosis need to be promptly imaged to assess for symptomatic carotid disease.

Keywords: diagnostic imaging, clinical assessment, transient ischemic attack (TIA)

LO011

Identification of mild acute cerebrovascular syndrome (ACVS) in the emergency department: validation of an ACVS clinical classifier to help distinguish mimics

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