our analysis. 4.1% (35/846) of trauma codes were activated after 30 minutes. Mean age was 40.8 years in the early group versus 49.2 in the delayed group p = 0.01. There was no significant difference in type of injury, injury severity or time from injury between the two groups. Patients were over 70 years in 7.6% in the early activation group vs 17.1% in the delayed group (p = 0.04). 77.7% of the early group were male vs 71.4% in the delayed group (p = 0.39). There was no significant difference in mortality (15.2% vs 11.4% p = 0.10), median length of stay (10 days in both groups p = 0.94) or median time to operative management (331 minutes vs 277 minutes p = 0.52). **Conclusion:** Delayed activation is linked with increasing age with no clear link with increased mortality. Given the severe injuries in the delayed cohort which required activation of the trauma team further emphasis on the older trauma patient and interventions to recognize this vulnerable population should be made. When assessing elderly trauma patients emergency physicians should have a low threshold to activate trauma teams.

Keywords: trauma team activation, triage

LO90

Trauma triage accuracy at a Canadian trauma centre

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Introduction: Trauma teams have been shown to improve outcomes in severely injured patients. The criteria used to mobilize trauma teams is highly variable and debated. This study was undertaken to define the triage accuracy at our level 1 trauma centre and identify the criteria predictive of appropriate activations. **Methods:** A 3-month prospective observational study was performed and all patients presenting to the ER who received a trauma flag were identified. Patient demographics, vital signs, trauma team activation and criteria for activation were documented. Trauma activations were deemed appropriate if the patient met any of the following; airway intervention, needle/tube thoracostomy, resuscitative thoracotomy, ED blood product transfusion, invasive hemodynamic monitoring, central line insertion, emergent OR (<8 hours), admission to ICU, and death within 72 hours. Over and undertriage rates were calculated and a multivariate logistic regression was performed to identify activation criteria predictive of appropraite activations. The activation criteria were then modified and the prospective study was repeated to assess the impact on triage accuracy. **Results:** Between September to December 2015, 188 patients received a trauma flag. 137 patients met the activation criteria, however only 78 received a trauma team activation. 57% of patients who had TTA met the definition of appropriate activation, while 45% who met criteria for activation met the definition of appropriate. The rates of under and overtriage were 30.4% and 30.3%, respectively. Logistic regression revealed the following criteria to be predictive of appropriate activation; hypotension (OR 10.2 95% CI 2.3,45.5), arrival by HEMS (OR 3.2, 95% CI 1.4,7.6), pedestrian struck (OR 3.5, 95% CI 1.4,8.5) and fall (OR 5.1, 95% CI 1.7, 15.1). Tachycardia (OR 1.1, 95% 0.3,4.6) and high energy MVC (OR 1.4, 95% CI 0.7,3.1) were not found to be predictive. The post-modification study occured between September to December 2016. Data analysis to assess the impact of criteria alteration are currently underway and will be presented at CAEP 2017. **Conclusion:** Triage accuracy for the mobilization of a multi-disciplinary trauma team is important, both to ensure optimal patient care as well as to reduce unnecessary resource strain. Our previous criteria lead to high rates of undertriage and subsequent modifications have been made. The impact of these changes will be ascertained and presented at CAEP 2017.

Keywords: trauma team, triage, activation criteria

LO91

Repeat exposures to culprit drugs contribute to adverse drug events in emergency department patients

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Introduction: Adverse drug events (ADEs), unintended and harmful events associated with medications, cause or contribute to 2 million annual emergency department (ED) visits in Canada. Australian data indicate that 27% of ADEs requiring admission are events caused by re-exposure to drugs that previously caused harm. Our **objective** was to estimate the frequency of repeat ADEs. **Methods:** We reviewed the charts of ADE patients who had been enrolled in 1 of 3 prospective studies conducted in 2 tertiary care and 1 urban community ED. In the parent studies, researchers enrolled patients by applying a systematic selection algorithm to minimize selection bias, and physicians and pharmacists evaluated patients prospectively to evaluate the causal association between the drug regimens and patient presentations. After completion of the parent studies, a research pharmacist and a physician independently reviewed the charts of ADE patients, abstracted data using electronic forms, and searched that hospital's records for previously recorded ADEs. The main outcome was a repeat ADE, defined as a same or same-class drug re-exposure, or repeat inappropriate drug withdrawal, causing a same or similar presentation as a prior ADE. Sample size was based on enrolment into the parent studies. **Results:** We reviewed the charts of 614 ED patients diagnosed with 655 ADEs. Of these, 20% (133/665, 95%CI 17.0-23.0%) were repeat events. Most repeat ADEs were moderate (61%) or severe (32%) in nature, and 33% (95%CI 25.1-41.1%) required hospital admission. The most commonly implicated drugs were warfarin (10%), hydrochlorothiazide (4%) and insulin (4%), and the most commonly implicated drug classes were antithrombotics (17%), psychotropics (12%) and analgesics (9%). Repeat ADEs commonly required clinical monitoring (59%), additional medications to treat the ADE (50%) and follow-up lab testing (35%). Overall, 61% (95%CI 51.3-70.7%) of culprit drug re-exposures were deemed potentially or definitely inappropriate. **Conclusion:** Inappropriate re-exposures to previously harmful medications cause a substantial number of recurrent ADEs, and may represent an ideal target for prevention. We were unable to search for repeat ADEs in the records of other hospitals that our patients may have visited, and could not detect ADEs that were not documented in the medical record. As a result, we likely underestimated the frequency of repeat ADEs.

Keywords: adverse drug events, patient safety, health services

LO92

Factors contributing to the development of adverse drug events treated in emergency departments

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Introduction: Adverse drug events (ADEs), unintended and harmful events associated with medications, commonly cause or contribute to emergency department (ED) presentations. Understanding provider, patient and system factors that contribute to their development may assist in developing effective preventative strategies. Our **objective** was to identify factors that contributed to the development of ADEs that caused ED presentations. **Methods:** We reviewed the charts of ADE patients enrolled in 1 of 3 prospective studies conducted in 3 tertiary care and 1 urban community ED. In the parent studies, researchers

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enrolled patients by applying a systematic selection algorithm to minimize selection bias, and physicians and pharmacists evaluated patients prospectively to evaluate the causal associations between the drug regimens and patient presentations. Subsequently, a research pharmacist and physician independently reviewed the charts of ADE patients from these cohorts, abstracting data using electronic forms. Reviewers recorded patient, provider and system factors that contributed to the development of ADEs. The main outcome was the presence of at least one contributing factor in the development of an ADE. We used descriptive statistics with appropriate measures of variance. The sample size was determined by enrolment into the primary studies. **Results:** We reviewed the charts of 670 patients diagnosed with 725 ADEs. We identified ≥1 contributing factors in 62% (95%CI 58-65%) of ADEs. Multiple contributing factors were present in 17% of ADEs (95%CI 13-20%). The most common contributing factors were inadequate patient counseling or instructions about medication use (15%), insufficient laboratory monitoring or follow-up of monitoring tests (12%), lack of staff education (7%), lack of provider adherence with recommended treatment guidelines (7%), and delayed or inadequate clinical reassessment after a medication change (6%). Provider errors in drug administration contributed to 0.3% of ADEs (95%CI 0.0-0.7). **Conclusion:** Contributing factors were identified for most ADEs. They were often related to inadequate counseling and follow-up, and were rarely the result of errors. Further research is required to understand how communication of medication instructions can be improved. Investments in technologies to reduce provider errors may not significantly reduce the numbers of ADE patients presenting to EDs.

Keywords: adverse drug event, patient safety, prevention

LO93

Prognostic value of S-100B protein for prediction of post-concussion symptoms following a mild traumatic brain injury: systematic review and meta-analysis

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Introduction: Mild traumatic brain injury (mTBI) is a major cause of morbidity but there are no validated tools to help clinicians predict post-concussion symptoms. This systematic review and meta-analysis aimed to determine the prognostic value of S-100B protein to predict post-concussion symptoms following a mTBI in adults. **Methods:** The protocol of this systematic review was registered with the PROSPERO database (CRD42016032578). A search strategy was performed on seven databases (CINAHL, Cochrane CENTRAL, EMBASE, MEDLINE, Web of Knowledge, PyscBITE, PsycINFO) from their inception to October 2016. Studies evaluating the association between S-100B protein level and post-concussion symptoms assessed at least seven days after the mTBI were eligible. Individual patient data were requested. Studies eligibility assessment, data extraction and risk of bias assessment were performed independently by two researchers. Analyses were done following the *meta-analysis using individual participant data or summary aggregate data guidelines* from the Cochrane Methodology Review Group. **Results:** Outcomes were dichotomised as persistent (≥3 months) or early (≥7 days <3 months). Our search strategy yielded 23,298 citations of which 29 studies presenting between seven and 223 patients (n = 2505) were included. Post-concussion syndrome (PCS) (16 studies), neuropsychological symptoms (9 studies) and health-related quality of life (4 studies) were the most frequently presented outcomes. The S-100B protein serum level of patients with no PCS was similar to that of patients experiencing persistent PCS (mean difference 0.00 [-0.05, 0.04]) or early PCS (mean difference 0.03 [-0.02, 0.08]). The odds of having persistent PCS (OR 0.56 (95% CI: 0.29-1.10) or early PCS (OR 1.67 (95% CI: 0.98-2.85) in patients with an elevated S-100B protein serum level was not significantly different from that of patients with normal values. No meta-analysis was performed for other outcomes than PCS due to heterogeneity and small samples. Studies' overall risk of bias was considered moderate. **Conclusion:** Results suggest that the prognostic value of S-100B protein serum level to predict persistent and early post-concussion symptoms is limited. Variability in injury to S-100B protein sample time and outcomes assessed could potentially explain the lack of association and needs further evaluation.

Keywords: traumatic brain injury, post-concussion symptom, meta-analysis

LO94

Prognostic value of neuron-specific enolase (NSE) for prediction of post-concussion symptoms following a mild traumatic brain injury: a systematic review

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Introduction: Mild traumatic brain injury (mTBI) is an understudied worldwide health problem and a socio-economic burden that remains a major cause of morbidity. However, there is no prognostication tool to help clinicians predict the occurrence of post-concussion symptoms. This systematic review aimed to determine the prognostic value of neuron-specific enolase (NSE) to predict post-concussion symptoms following a mTBI in adults. **Methods:** The protocol of this systematic review was registered with the International Prospective Register of Systematic Reviews (PROSPERO) database (registration number CRD42016033683). Seven databases (CINAHL, Cochrane CENTRAL, EMBASE, MEDLINE, PsycBITE, PsycINFO, Web of Knowledge/Biosis) were searched for cohort studies evaluating the association between NSE levels and post-concussion symptoms assessed at least seven days after the mild TBI. Grey literature was also screened using databases on dissertations and theses as well as abstracts from relevant congresses. Two researchers independently screened studies for inclusion, extracted data, and appraised their quality using the Quality in Prognostic Studies (QUIPS) tool from the Cochrane Collaboration Group. **Results:** Our search strategy yielded a total of 23,298 citations from which eight cohorts presented in 10 studies were included. Studies included between 45 and 141 patients (total = 608 patients). The most frequently assessed outcomes were post-concussion syndrome (PCS) (13 assessments), neuropsychological disorders (10 assessments), return to work or sick leave (2 assessments) and Glasgow Outcome Scale (GOS) (2 assessments). No association was found between an elevated NSE serum level and the occurrence of PCS. Of the 33 outcomes assessments performed, only three showed an association between a higher level of serum NSE and a post-concussion symptom (alteration of at least three cognitive domains at 2 weeks, standardised physician assessment at 6 weeks and headache at 6 months following a mild TBI). Included studies' overall risk of bias was considered moderate. **Conclusion:** Results of this systematic review conclude that based on current levels of evidence, serum NSE levels alone do not provide prognostic information on persistent or early post-concussion symptoms after a mTBI.

Keywords: traumatic brain injury, post-concussion symptom, systematic review

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