## LO84

### The incidence of fall-related intracranial bleeding in older adults taking anticoagulants, antiplatelets and neither medication: a meta-analysis

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**Introduction:** It is unclear whether anticoagulant or antiplatelet medications increase the risk for intracranial bleeding in older adults after a fall. Our aim was to report the incidence of intracranial bleeding among older adults presenting to the emergency department (ED) with a fall, among patients taking anticoagulants, antiplatelet medications, both medications and neither medication. **Methods:** This was a systematic review and meta-analysis, PROSPERO reference CRD42019122626. Medline, EMBASE (via OVID 1946 - July 2019), Cochrane, Database of Abstracts of Reviews of Effects databases and the grey literature were searched for studies reporting on older adults who were evaluated after a fall. We included prospective studies conducted in the ED where more than 80% of the cohort were 65 years or older and had fallen. We contacted study authors for aggregate data on intracranial bleeding in patients prescribed anticoagulant medication, antiplatelet medication and neither medication. Incidences of intracranial bleeding were pooled using random effect models, and I2 index was used to assess heterogeneity. **Results:** From 7,240 publication titles, 10 studies met inclusion criteria. The authors of 8 of these 10 studies provided data (on 9,489 patients). All studies scored low or moderate risk of bias. The pooled incidence of intracranial bleeding among patients taking an anticoagulant medication was 5.1% (n = 5,016, 95% Confidence Interval (CI): 4.1 to 6.3%) I2 = 42%, a single antiplatelet 6.4% (n = 2,148, 95% CI: 5.4 to 7.6%) I2 = 75%, both anticoagulant and antiplatelet medications 5.9% (n = 212, 95% CI: 1.3 to 13.5%) I2 = 72%, and neither of these medications 4.8% (n = 1,927, 95% CI: 3.5 to 6.2%) I2 = 50%. A sensitivity analysis restricted to patients who had a head CT in the ED reported incidences of 6.1% (n = 3,561, 95% CI: 3 to 8.3%), 8.4% (n = 1,781, 95% CI: 5.5 to 11.8%), 6.7% (n = 206, 95% CI 1.5 to 15.2%) and 6.6% (n = 1,310, 95% CI: 5.0 to 8.4%) respectively. **Conclusion:** The incidence of fall-related intracranial bleeding in older ED patients was similar among patients who take anticoagulant medication, antiplatelet medication, both and neither medication, although there was heterogeneity between study findings.

**Keywords:** antithrombotics, falls, intracranial bleeding

## LO85

### Unhelmeted injured cyclists in the emergency department: demographics, cycling behaviour, and attitudes towards helmet use

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**Introduction:** We seek to characterize unhelmeted injured cyclists presenting to the emergency department (ED): demographics, cycling behaviour, and attitudes towards helmet use. **Methods:** This was a prospective cohort study in a downtown teaching hospital, from May 2016 - Sept 2019. Injured cyclists presenting to the ED were recruited if they were not wearing a helmet at time of injury and over age 18. Exclusion criteria included intoxication, inability to consent, or admission to hospital. A standardized survey was administered by a research coordinator. Descriptive statistics were used to summarize the data, and survey responses reported as percentages. **Results:** We surveyed a convenience sample of 68 unhelmeted injured cyclists (UICs) with mean age of 33.6 years (range 18 to 68, median 29.5 years). Ratio of males to females was 1:1. The majority of UICs cycled most days per week or every day in non-winter months (89.6 %, n = 60). Cycling in Toronto was perceived as somewhat dangerous (45.6%, n = 31) or very dangerous (5.9%, n = 4) by most, and very safe (2.94 %, n = 2) or somewhat safe (19.12%, n = 13) by few. Almost a third (29.4 %, n = 20) had been in a cycling accident in the prior year, some of these (15.0%, n = 3) prompting an ED visit. All cyclists were riding their personal bike (100 %, n = 68) at time of injury, and most (98.5%, n = 67) had planned to cycle when they departed home that day. Purpose of trip was primarily for commuting to work (50%, n = 34), social activities (19.1%, n = 13), school (7.4%, n = 5), and recreation (7.4%, n = 5). Bicycle helmet ownership was low (41.2 %, n = 28). UICs reported rarely (10.3%, n = 7) or never (64.7%, n = 44) wearing a helmet when cycling. Reported factors discouraging helmet use included inconvenience (33.8%, n = 23), lack of ownership (32.4%, n = 22), discomfort (29.4%, n = 20), and 'messed hair' (14.7%, n = 10). Few characterized helmets as unnecessary (10.3%, n = 7) or ineffective (1.5%, n = 1). The majority had a college diploma or more advanced education (77.9%, n = 53), and spoke English at home (85.3%, n = 58). **Conclusion:** Unhelmeted injured cyclists surveyed were frequent commuter cyclists who do not regard cycling as safe, yet choose not to wear helmets for reasons largely related to convenience rather than perceptions regarding safety or necessity. Initiatives to increase helmet use in this subgroup should address the reasons given for not wearing a helmet, potentially using principles of adult education and behavioral economics.

**Keywords:** bicycle, health promotion, injury prevention

## LO86

### Lack of association between four biomarkers and the presence of persistent post-concussion symptoms after a mild traumatic brain injury

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**Introduction:** Mild Traumatic Brain Injury (mTBI) is a common problem: each year in Canada, its incidence is estimated at 500-600 cases per 100 000. Between 10 and 56% of mTBI patients develop persistent post-concussion symptoms (PPCS) that can last for more than 90 days. It is therefore important for clinicians to identify patients who are at risk of developing PPCS. We hypothesized that blood biomarkers drawn upon patient arrival to the Emergency Department (ED) could help predict PPCS. The main objective of this project was to measure the association between four biomarkers and the incidence of PPCS 90 days post mTBI. **Methods:** Patients were recruited in seven Canadian ED. Non-hospitalized patients, aged ≥14 years old with a documented mTBI that occurred ≤24 hrs of ED consultation, with a GCS ≥13 at arrival were included. Sociodemographic and clinical data as well as blood samples were collected in the ED. A standardized telephone questionnaire was administered at 90 days post ED visit. The following biomarkers were analyzed using enzyme-linked immunosorbent assay (ELISA): S100B protein, Neuron Specific

Enolase (NSE), cleaved-Tau (c-Tau) and Glial fibrillary acidic protein (GFAP). The primary outcome measure was the presence of persistent symptoms at 90 days after mTBI, as assessed using the Rivermead Post-Concussion symptoms Questionnaire (RPQ). A ROC curve was constructed for each biomarker. **Results:** 1276 patients were included in the study. The median age for this cohort was 39 (IQR 23-57) years old, 61% were male and 15% suffered PPCS. The median values (IQR) for patients with PPCS compared to those without were: 43 pg/mL (26-67) versus 42 pg/mL (24-70) for S100B protein, 50 pg/mL (50-223) versus 50 pg/mL (50-199) for NSE, 2929 pg/mL (1733-4744) versus 3180 pg/mL (1835-4761) for c-Tau and 1644 pg/mL (650-3215) versus 1894 pg/mL (700-3498) for GFAP. For each of these biomarkers, Areas Under the Curve (AUC) were 0.495, 0.495, 0.51 and 0.54, respectively. **Conclusion:** Among mTBI patients, S100B protein, NSE, c-Tau or GFAP during the first 24 hours after trauma do not seem to be able to predict PPCS. Future research testing of other biomarkers is needed in order to determine their usefulness in predicting PPCS when combined with relevant clinical data.

**Keywords:** biomarkers, mild traumatic brain injury, persistent post-concussion symptoms

### LO87

### Influence of co-injuries on post-concussion symptoms after a mild traumatic brain injury

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**Introduction:** Each year, 3/1000 Canadians sustain a mild traumatic brain injury (mTBI). Many of those mTBI are accompanied by various co-injuries such as dislocations, sprains, fractures or internal injuries. A number of those patients, with or without co-injuries will suffer from persistent post-concussive symptoms (PPCS) more than 90 days post injury. However, little is known about the impact of co-injuries on mTBI outcome. This study aims to describe the impact of co-injuries on PPCS and on patient return to normal activities. **Methods:** This multicenter prospective cohort study took place in seven large Canadian Emergency Departments (ED). Inclusion criteria: patients aged ≥ 14 who had a documented mTBI that occurred within 24 hours of ED visit, with a Glasgow Coma Scale score of 13-15. Patients who were admitted following their ED visit or unable to consent were excluded. Clinical and sociodemographic information was collected during the initial ED visit. A research nurse then conducted three follow-up phone interviews at 7, 30 and 90 days post-injury, in which they assessed symptom evolution using the validated Rivermead Post-concussion Symptoms Questionnaire (RPQ). Adjusted risk ratios (RR) were calculated to estimate the influence of co-injuries. **Results:** A total of 1674 patients were included, of which 1023 (61.1%) had at least one co-injury. At 90 days, patients with co-injuries seemed to be at higher risk of having 3 symptoms ≥2 points according to the RPQ (RR: 1.28 95% CI 1.02-1.61) and of experiencing the following symptoms: dizziness (RR: 1.50 95% CI 1.03-2.20), fatigue (RR: 1.35 95% CI 1.05-1.74), headaches (RR: 1.53 95% CI 1.10-2.13), taking longer to think (RR: 1.50 95% CI 1.07-2.11) and feeling frustrated (RR: 1.45 95% CI 1.01-2.07).

We also observed that patients with co-injuries were at higher risk of non-return to their normal activities (RR: 2.31 95% CI 1.37-3.90). **Conclusion:** Patients with co-injuries could be at higher risk of suffering from specific symptoms at 90 days post-injury and to be unable to return to normal activities 90 days post-injury. A better understanding of the impact of co-injuries on mTBI could improve patient management. However, further research is needed to determine if the differences shown in this study are due to the impact of co-injuries on mTBI recovery or to the co-injuries themselves.

**Keywords:** co-injuries, mild traumatic brain injury, post-concussion syndrome

### LO88

### S100B serum protein level for the detection of clinically significant intracranial hemorrhage in patients with mild traumatic brain injury: a prospective cohort study

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**Introduction:** Clinical assessment of patients with mTBI is challenging and overuse of head CT in the emergency department (ED) is a major problem. During the last decades, studies have attempted to reduce unnecessary head CTs following a mTBI by identifying new tools aiming to predict intracranial bleeding. S100B serum protein level might be helpful reducing those imaging since a higher level of S-100B protein has been associated with intracranial hemorrhage following a mTBI in previous literature. The main objective of this study was to assess whether the S100B serum protein level is associated with clinically important brain injury and could be used to reduce the number of head CT following a mTBI. **Methods:** This prospective multicenter cohort study was conducted in five Canadian ED. MTBI patients with a Glasgow Coma Scale (GCS) score of 13-15 in the ED and a blood sample drawn within 24-hours after the injury were included. S-100B protein was analyzed using enzyme-linked immunosorbent assay (ELISA). All types of intracranial bleedings were reviewed by a radiologist who was blinded to the biomarker results. The main outcome was the presence of clinically important brain injury. **Results:** A total of 476 patients were included. Mean age was 41 ± 18 years old and 150 (31.5%) were female. Twenty-four (5.0%) patients had a clinically significant intracranial hemorrhage while 37 (7.8%) had any type of intracranial bleeding. S100B median value (Q1-Q3) of was: 0.043 ug/L (0.008-0.080) for patients with clinically important brain injury versus 0.039 μg/L (0.023-0.059) for patients without clinically important brain injury. Sensitivity and specificity of the S100B protein level, if used alone to detect clinically important brain injury, were 16.7% (95% CI 4.7-37.4) and 88.5% (95% CI 85.2-91.3), respectively. **Conclusion:** S100B serum protein level was not associated with clinically significant intracranial hemorrhage in mTBI patients. This protein did not appear to be useful to reduce the number of CT prescribed in the ED and would have missed many clinically important brain injuries. Future research should focus on different ways to assess mTBI patient and ultimately reduce unnecessary head CT.

**Keywords:** biomarker, head computed tomography, mild traumatic brain injury