

Journal Update

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Introduction

During the COVID-19 pandemic to date the Emergency Medicine Journal has published regular summaries of key publications from other journals that are relevant to Emergency Medicine. As the pandemic enters a new phase, we have broadened this journal update to include research relevant to topics other than the COVID-19 pandemic. We aim to showcase the most interesting original research from all specialities relevant to emergency medicine. We will continue to use a multi-modal search strategy, drawing on both free open access medical education (FOAMed) resources and formal literature searches that we have used previously (1).

In this update, we identified 1,969 papers published between 1st May and 31st May 2021 through our searches. These were narrowed down to the five most interesting and relevant papers (decided by consensus within our group), providing a snapshot of those that we felt most deserved the attention of the EMJ readership. We have highlighted the main findings, key limitations and clinical bottom line for each paper.

The papers are ranked in one of 3 categories, allowing you to focus on the papers that are most vital to your practice:

- Worth a peek - interesting, but not yet ready for prime time
- Head turner - new concepts
- Game changer - this paper could/should change practice

This month's update was undertaken by the core editorial team based out of the EMERGING research group from Manchester. We look forward to next month's instalment by our colleagues from **TBC**

[The Ambulance Cardiac Chest Pain Evaluation in Scotland Study \(ACCESS\): A Prospective Cohort Study by Cooper et al \(2\)](#)

Recently there has been increasing interest in validating new pathways that incorporate pre-hospital point of care tests (POCTs) that may enable ACS to be ruled out in some patients. Some early research has suggested that this may be possible, even with a less sensitive POCT for cardiac troponin, when used alongside an established decision aid. Which, if successful, could potentially reduce unnecessary transport to hospital with faster reassurance for many patients, helping to unburden crowded EDs.

The Ambulance Cardiac Chest Pain Evaluation in Scotland Study (ACCESS) was a prospective diagnostic accuracy study that included patients who had called for an emergency ambulance with chest pain (2). The authors evaluated the accuracy of the HEART and HEAR scores (HEART without troponin testing). Paramedics collected data and took venous blood samples that were analysed for cardiac troponin. The primary outcome was major adverse cardiac events (MACE) within 30 days.

1,054 patients were included in the analysis of the HEAR score, while 357 patients had POCT cardiac troponin results available for evaluation of the HEART score. Neither HEART nor HEAR had very high sensitivity for MACE: a HEART score ≤ 3 had a sensitivity of 87.0% (95% CI 80.7 – 93.4%), while a HEAR score ≤ 3 had a sensitivity of 81.5% (95% CI 74.2 – 88.8%). The negative predictive values for each score were also below 90%. Meanwhile, at a threshold of ≥ 7 points, the HEART score had reasonably high specificity (94.8%) and could 'rule in' AMI for 14% of patients with over 70% positive predictive value. However, using the troponin assay alone (at a cut-off of 100ng/L) 'ruled in' the same proportion with very similar specificity and positive predictive value.

Bottom line

On this evidence the HEAR/HEART pathways could not be used to 'rule out' ACS.

[Assessment of an AI Aid in Detection of Adult Appendicular Skeletal Fractures by Emergency Physicians and Radiologists: A Multicenter Cross-sectional Diagnostic Study by Duron et al \(3\)](#)

This study aimed to assess how well a previously derived artificial intelligence (AI) system performed in aiding both radiologists and emergency physicians to correctly diagnose fractures from limb or pelvic x-rays. However, the derivation study only appears in the supplementary materials. This is

unusual for clinical prediction models. Perhaps standardisation of reporting is still being developed in AI research (4).

Stratified randomised sampling was used to collate 600 patient examinations (50 with and without fractures per examination location). True fractures were determined by two experienced radiologists, disagreements resolved by a third. 6 Radiologists and 6 Emergency physicians identified fractures in subsets with and without AI assistance.

Primary analysis used patient-wise sensitivity and specificity (correct identification of all fractures on an image). Across physicians, AI assistance improved sensitivity by 8.7% (70.8% to 79.4%, $P = 0.003$ for superiority) but when stratified, improvement was only statistically significant for hand and foot radiographs. Specificity improved with AI assistance by 4.1% (89.5% to 93.6%, $P < 0.001$ for non-inferiority). False positive fractures identification per patient were reduced 41.9% (0.113 to 0.066, $P=0.02$) and the time to read the radiograph reduced from 67 to 57 seconds but this was not significant. Amongst emergency physicians only, the AI aid improved sensitivity from 61.3% to 74.3% ~~a 13.0% improvement~~ ($P=0.3$). The AI model had an AUC of 0.91 (95% CI: 0.89, 0.94), improving to 0.94 (95% CI: 0.92, 0.96) with recent model updates.

However, interpretation was made without clinical information and obvious fractures were excluded, likely reducing emergency physician performance.

Bottom line: This AI tool may offer a promising solution to help support and improve fracture diagnosis in EDs, reducing errors.

Defining major trauma: a Delphi study by Thompson et al (5)

Major trauma is traditionally defined using the ISS (injury severity score). This is very difficult to know in real time and so is arguably of little use to treating clinicians. This study used Delphi methodology to build a consensus expert definition of major trauma. The expert panel ($n=55$) was comprised of paramedics ($n=20$) and unspecified doctors ($n=20$), though other professionals were involved (nurse $n=10$, other $n=5$). The authors set a predetermined level of consensus of 70% for elements to be included in the definition.

The definition of major trauma generated by the Delphi methodology has face validity:

'Significant injury or injuries that have potential to be life-threatening or life-changing sustained from either high or low energy mechanisms especially in those rendered vulnerable by extremes of age' (5)

The consensus building was conducted in the setting of UK emergency medicine. It may not translate to other geographies and is open to the criticisms that many Delphi studies receive. These include the reliance on convenience sampling, the definition of expert being debatable and the significant dropout rate between rounds.

However, this is a more holistic definition that is clearly patient outcome focused. It will also be able to better reflect the impact of single injuries with long term sequelae.

Bottom Line: The authors propose a more patient focused and holistic definition of major trauma as compared to the ISS.

Restrictive fluid management versus usual care in acute kidney injury (REVERSE-AKI): a pilot randomized controlled feasibility trial by Vaara et al (6)

Acute kidney injury (AKI) has traditionally had clinicians reflexively reaching for bags of intravenous fluid. However AKI patients are especially high risk for fluid overload. For critically ill patients with sepsis and acute respiratory distress, fluid restrictive approaches can be safe; what has not been concluded is whether fluid restriction is the preferred strategy in those critically ill patients with AKI.

This gap prompted a multicentre feasibility study in seven European/Australian ICUs which randomised 100 general “adequately resuscitated” ICU patients with acute kidney injury in a 1:1 ratio to receive either restrictive fluid management or usual care. Groups were a little uneven, with more co-morbidity (although younger age) in the usual-care arm.

The reported primary outcome measure was cumulative balance of fluid input and output at 72 hours (really this is a measure of study fidelity) which was 1148 ml lower (2200 to 96 ml) $p=0.033$ in the restrictive group. Other secondary and exploratory outcomes included less renal replacement therapy in the restrictive group, but no difference found in: furosemide use, days alive free of mechanical ventilation/vasopressors/ICU treatment/renal replacement therapy at 90 days/dialysis dependence at 90 days, or mortality at 90 days between the groups.

The pilot study with limited numbers suffers from obvious lack of blinding, multiple potential confounding factors on study outcomes and exclusion of patient with treatment limitations.

Whilst an ICU-based study, what this pilot does suggest for emergency department care, is to think more carefully about fluid provision for those in AKI who are normovolaemic. What it cannot do, however is provide evidence for definitive practice-change.

Bottom line: AKI in critically unwell patients may benefit from a fluid-restrictive approach if already adequately resuscitated but more data is needed

P2Y12 Inhibitors Plus Aspirin Versus Aspirin Alone in Patients With Minor Stroke or High-Risk Transient Ischemic Attack by Li et al (7)

Current acute management for high-risk TIAs or ischaemic strokes is for single agent therapy (9). Recent trials have examined the addition of further anti-platelet agents but they did not demonstrate a benefit (10). However there has been speculation that these trials failed to capture the early benefit of dual anti-platelet therapy (DAPT).

In this systematic review and meta-analysis Li et al sought to identify the benefit of DAPT in patients with mild ischaemic stroke or high-risk TIA when initiated within three days of presentation.

Although the study was not pre-registered on a registry, it did follow the appropriate reporting guidelines (8). The search strategy appears robust but it was not checked by a librarian or methodologist. DAPT was defined as aspirin plus ticagrelor or clopidogrel. Further inclusion criteria stipulated the studies to be a placebo-controlled trial that reported outcomes of cerebrovascular events, mortality haemorrhage or myocardial infarction.

The searches identified 1,334 papers of which four randomised control trials (totalling 21,067 patients) were included. Three of these studies had a low risk of bias and one had some concerns around the intervention. There was an absolute risk reduction of 24% in the pooled analysis of stroke recurrence within 90 days for DAPT initiated in 24 hours (RR of 0.76 - 95% CI 0.68-0.83 ($I^2=0\%$)). There was no effect identified in the pooled analysis for all-cause mortality and cardiovascular death. However, DAPT was associated with severe or moderate bleeding in a pooled analysis (RR 2.17 95% CI 1.15 – 4.08). The association was strongest with ticagrelor and treatment duration beyond 21 days (RR 3.25 and 2.86).

Clinical bottom line: initiation of DAPT within 24 hours of high-risk TIA or mild ischaemic stroke reduces the recurrence of stroke but was associated with an increased risk of bleeding.

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