Title: EMJ monthly top five (May 2023)

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This month's update is by a team from Emergency Medicine Research Oxford (EMROx). We used a multimodal search strategy, drawing on free open-access medical education resources and literature searches. We identified the five most interesting and relevant papers (decided by consensus) and highlight the main findings, key limitations and clinical bottom line for each paper.

The papers are ranked as:
Worth a peek—interesting, but not yet ready for prime time.
Head turner—new concepts.
Game changer—this paper could/should change practice.

Door-to-furosemide time and clinical outcomes in acute heart failure by Marques *et al*.[1]
Topic: Diuretics in acute heart failure
Rating: Worth a peek

This paper sought to explore the short-term associations between timing of intravenous diuretics in acute heart failure (AHF) patients presenting to a single hospital in Portugal. The authors conducted a retrospective observational study with 493 patients recruited. Patients were categorised based on time of ED arrival and administration of intravenous furosemide. The primary outcome was a composite measure of heart failure re-hospitalization (HFH) and/or cardiovascular death at 30- and 90-days. The patients receiving delayed furosemide (> 1 hour from arrival) were less unwell and had lower rates of pulmonary oedema (9.8% vs 23.1%) at baseline but were more likely to experience the composite outcome at 30 days (OR 3.15 [95% CI 1.49–6.64]]. At 90 days this effect was no longer statistically significant.

This result is in line with the REALITY AHF study, a multicentre prospective observational study, but conflict with results from other observational studies (both prospective and retrospective). Limitations of the study include the retrospective design; no dosage details for the furosemide provided; single centre and no power calculation.

Bottom line
Early furosemide administration was associated with better clinical outcomes in this single-centre study and gives support to the practice of administering furosemide promptly following a diagnosis of AHF in the ED.

The effects of ultrasound guidance on first-attempt success for difficult peripheral intravenous catheterization: a systematic review and meta-analysis by Poulsen *et al*.[2]
Topic: Ultrasound for difficult peripheral intravenous cannulation.
Rating: Worth a peek

This systematic review and meta-analysis pooled data from seven randomised controlled trials (RCTs) with 994 patients to determine whether ultrasound is more effective than standard care for establishing first-time IV cannulation in patients with difficult IV access (DIVA). Patients were included if they had (a) no palpable or visible veins, (b) previous history of DIVA, (c) patient age <4 years, (d) suspicion of difficult catheterization by the operator, or (e) two or more unsuccessful attempts without ultrasound guidance before enrolment in the study.

The primary outcome was first-time success rate, and the secondary outcomes were overall success rate of IV cannulation and the number of attempts required. Random effects meta-analysis was used for all outcomes. First-time success was over three times higher in the ultrasound group (OR 3.07, 95% CI 1.66–5.65). After exclusion of studies at risk of bias, neither secondary outcome reached significance.

Bottom line
There is strong evidence to support the use of ultrasound-guided cannulation in patients with DIVA in ED, operating theatre, and intensive care unit settings. However, the decision to use ultrasound cannulation should be made on a case-by-case basis depending on the individual patient and the operator's experience.

Nebulized vs IV tranexamic acid for haemoptysis: a pilot randomized controlled trial by Gopinath *et al.*[3]
Topic: Route of administration of TXA in haemoptysis
Rating: Worth a peek

Tranexamic acid (TXA) has been proposed as an intervention in various forms of bleeding. This study assessed the route of administration of TXA for patients with haemoptysis. The study was a pragmatic open-label RCT from a single centre in New Delhi. 110 patients were randomised to receive either 500mg nebulized tranexamic acid or 500mg tranexamic acid IV. The primary outcome was cessation of bleeding at 30 minutes and secondary outcomes included amount of haemoptysis (at six, 12, and 24 hours), interventional procedures in the ED, and adverse effects of TXA administration.

55 patients were randomised to each arm, and fewer participants receiving nebulised TXA were still bleeding at 30 minutes (51% vs 73%, p=0.002). Patients receiving nebulised TXA also had significantly reduced haemoptysis over 24 hours with higher rates of ED discharge and lower rates of bronchial artery embolization. However, bronchospasm was more common in the nebulised group.

The main limitation is that the clinicians collecting the outcome data were not blinded to the intervention. In addition, the number of patients was small and 24-hour haemoptysis volume measurement did not distinguish between frank haemoptysis and blood-streaked mucus.

Bottom line
Patients with mild haemoptysis may respond better to treatment with nebulized rather than IV TXA but larger definitive studies are needed to validate the potential benefit of this approach.

Clinical outcomes following out-of-hospital cardiac arrest: The minute-by-minute impact of bystander cardiopulmonary resuscitation by Cournoyer *et al.*[4]

Topic**:** Effect of bystander cardiopulmonary resuscitation (CPR) on survival and good neurological outcome
Rating: Head-turner

Bystander CPR is an important part of the chain of survival in out-of-hospital cardiac arrest (OHCA). The authors aimed to evaluate the association between bystander CPR and ambulance response time with patient outcome after an OHCA. This was a retrospective cohort study with data extracted from a North American clinical registry.

The outcomes were survival to hospital discharge and good neurological outcome (Rankin scale 0-2). Multivariable logistic regression was used to report independent associations adjusted for age, sex, and location. 41,012 patients were included of whom 54% received bystander CPR.

Those that received bystander CPR were more likely to survive (adjusted odds ratio [aOR] 1.70 [95% CI 1.61 – 1.80]) and have a good neurological outcome (1.87 [1.70 – 2.06]) compared with those who did not receive bystander CPR. Longer ambulance response time was associated with worse outcomes irrespective of whether bystander CPR was commenced. Despite the likelihood of residual confounding, these findings are highly plausible.

Bottom line
Bystander CPR is important for survival and good neurological outcomes but cannot mitigate the detrimental effects of delayed ambulance responses. This is a particular concern given the increasing pressures on ambulance services.

Impact of the route of adrenaline administration in patients suffering from out-of-hospital cardiac arrest on 30-day survival with good neurological outcome (ETIVIO study)" by Monaco *et al*.[5]
Topic: Route of adrenaline administration and OHCA and neurological outcomes
Rating: Worth a peek.

Adrenaline is widely used in OHCA. However, it is unknown whether the route of adrenaline administration after OHCA effects outcomes. This retrospective observational study used the German Resuscitation Registry (a voluntary OHCA database) to identify adults that received CPR and adrenaline. Patients with cardiac arrest due to trauma or haemorrhagic arrests were excluded.

37,106 records were analysed, and patients categorised by route of adrenaline administration: IV, IO, IO followed by IV (IO+IV), and endotracheal followed by IV (ET+IV). Associations with route of adrenaline and outcome were determined after pairwise matching of each IO, IO+IV and ET+IV case with two IV cases using the "ROSC After Cardiac Arrest" score.

The IV group were more likely to survive to hospital discharge with cerebral performance category 1 or 2 than the IO group (OR 2.43, 95% CI 1.54–3.84) or the IO+IV group (OR 1.33, 95% CI 1.12–1.59). The ET+IV group included fewer patients and the results were not statistically significant. Despite efforts to adjust for baseline differences, it is very likely that residual confounders remain. For instance, patients who received IO adrenaline might not have received their adrenaline as promptly as the IV group if time was spent attempting to obtain IV access before resorting to IO administration.

Bottom line
These findings are consistent with better outcomes following IV adrenaline administration but are likely biased by confounding. The PARAMEDIC-3 trial (IV vs IO administration) should provide answers for this question.

Contributors :
S J Glover identified appropriate papers to be considered for inclusion, authored a review and edited all reviews for content

IJ Paul, VP Erasu, WP Gibbs reviewed papers for inclusion and authored a review

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References

[1] Marques P et al. Door-to-furosemide time and clinical outcomes in acute heart failure. Eur J Emerg Med. 2023 Apr 1;30(2):85-90.

[2] Poulsen E et al. The effects of ultrasound guidance on first-attempt success for difficult peripheral intravenous catheterization: a systematic review and meta-analysis. Eur J Emerg Med. 2023 Apr 1;30(2):70-77.

[3] Gopinath B et al. Nebulized vs IV Tranexamic Acid for Hemoptysis: A Pilot Randomized Controlled Trial. Chest. 2023 May;163(5):1176-1184.

[4] Cournoyer A et al. Clinical outcomes following out-of-hospital cardiac arrest: The minute-by-minute impact of bystander cardiopulmonary resuscitation. Resuscitation. 2023 Apr;185:109693.

[5] Monaco T et al. Impact of the route of adrenaline administration in patients suffering from out-of-hospital cardiac arrest on 30-day survival with good neurological outcome (ETIVIO study). Scand J Trauma Resusc Emerg Med. 2023 Mar 30;31(1):14.