Journal update monthly top five

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This month's update is by the Lancashire Teaching Hospitals team. 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.

Biomarkers and their association with bacterial illnesses in hypothermic infants by Holland *et al*.

Topic: sepsis in infants

Outcome rating: worth a peek

Serious bacterial infection (SBI) in young infants can present with fever or hypothermia, but differentiating which hypothermic infants will have SBI is challenging. This multicentre retrospective study conducted across four US academic paediatric EDs investigated whether biomarkers could identify SBI in hypothermic (<36.4°C) infants (<90 days).[1]

Hypothermic infants who had blood cultures and full blood count (FBC) performed in the ED were included (n=850). The primary outcome was SBI (urinary tract infection, bacteraemia, or meningitis with/without bacteraemia (n=55)). The levels of biomarkers in those with and without SBI were compared as continuous variables, and accuracy at identifying SBI was assessed using the area under the receiver operator curve (AUROC).

White blood cell (WBC) count, absolute neutrophil count (ANC) and platelets were all higher in those with SBI (p<0.01). WBC and ANC showed moderate ability to identify children with SBI (AUROC 0.70 and 0.77), but performance of platelets was poor (AUROC 0.6) at identifying SBI. ANC demonstrated the best performance with a cut-off of 4.5×10^9/L, providing a sensitivity of 0.69 (0.55 to 0.81) and a specificity of 0.77 (0.74 to 0.8). A secondary preplanned exploratory analysis comparing serum procalcitonin and neutrophil bands was limited by low numbers (n=15) and wide CIs.

The study is limited by its retrospective nature, with a quarter of all hypothermic infants (n=3516) having blood cultures and FBC performed and a low number of patients with SBI.

Bottom line

None of the studied biomarkers were sufficient for identifying SBI in infants <90 days old, so evaluation of this cohort remains challenging.

Emergency department paediatric readiness among US trauma centres: a machine learning analysis of components associated with survival by Newgard *et al*.

Topic: paediatric trauma

Outcome rating: worth a peek

This study aimed to use machine learning to identify the hospital, ED and patient variables affecting survival among paediatric (≤18 years old) trauma patients using data submitted to the US National Trauma Data Bank (NTDB) for the years 2012–2017.[2]

A total of 274 756 injured children were included from 458 trauma centres, excluding those centres with no deaths and those who saw <50 patients in 6 years. Among 29 patient, 25 ED and 59 hospital factors analysed, patient-specific variables were the strongest predictor of survival. However, at the ED level, variables showing association with survival were policy for mental health (+8.8% change in survival), policy on patient assessment/reassessment (+7.5%), specific respiratory equipment (+7.2%), policy on reduced-dose radiation (+7%), physician competency evaluations (+4.9%), measuring weight in kilogram (+3.2%), nursing team completing life support courses (+2.5%) and validated paediatric triage tool (+2.5%). Synergistically combining these was associated with a 268% cumulative improvement in survival.

The study was limited by including only 458 of 832 US trauma centres and relying on retrospective data, although the NTDB has a rigorous quality assurance process. Excluding children dead on arrival could mean under-reporting of critically ill children by misclassifying them. Additionally, adolescent patients <18 years of age may be cared for by adult services.

Bottom line

Paediatric trauma patient survival is predicted mostly by patient factors, but modifiable ED policy and procedural factors contribute.

Intranasal fentanyl and discharge from the emergency department among children with sickle cell disease and vaso-occlusive pain: a multicentre paediatric emergency medicine perspective by Rees *et al*.

Topic: paediatric analgesia

Outcome rating: worth a peek

Vaso-occlusive episodes (VOEs) in patients with sickle cell disease (SCD) often require strong opiate analgesia and may necessitate hospital admission. This observational study determined the association of intranasal fentanyl with rates of hospital admission in children and young people presenting to ED with VOE.[3]

This was a secondary analysis of data from a guideline compliance study of 20 academic paediatric EDs in North America between 2015 and 2016. Children with more severe forms of SCD (haemoglobin SS disease or haemoglobin Sβo thalassaemia) presenting with VOE were included; those presenting with acute chest syndrome were excluded.

Among 400 paediatric patients (3–21 years old), 19% received intranasal fentanyl and 91% received intravenous opioids. Intranasal fentanyl was associated with a faster time to administration of a non-oral opioid compared with those not receiving intranasal fentanyl; time to administration was not directly compared with those only receiving intravenous opioids in this study. Patients receiving intranasal fentanyl had an adjusted OR (AOR) of 8.99 for being discharged from the ED independent of presenting pain score and size of reduction in pain compared with those not receiving it. Patients who received oral morphine before receiving a parental opioid had a threefold AOR of being discharged from the ED, which was thought to reflect a need for rescue medication which had not

been administered at home prior to ED attendance.

The study is limited by its retrospective design and was restricted to academic paediatric EDs and so may not be representative of general EDs. The results may not be applicable to patients older than 21 or to all genotypes of VOE. This observational design means the study cannot make claims of causality.

Bottom line

Intranasal fentanyl for paediatric patients with SCD in VOE may improve time to analgesia and rates of discharge from ED.

The tolerability and efficacy of duloxetine for the prevention of persistent musculoskeletal pain after trauma and injury: a pilot three-group randomised controlled trial by Beaudoin *et al*.

Topic: analgesia

Outcome rating: head-turner

Many individuals relate their chronic pain to a single traumatic incident or injury. This study investigated duloxetine as an adjunctive therapy for the prevention of persistent musculoskeletal pain (MSP) among adults presenting to the ED with acute MSP after trauma or injury.[4]

This was a prospective, randomised, double-blind, placebo-controlled clinical trial conducted at two EDs in the Northeastern USA. Eligible participants were between 18 years and 69 years of age with acute moderate to severe MSP. Participants were randomised to 2 weeks of placebo (n=27), 30 mg duloxetine (n=24) or 60 mg duloxetine (n=27) alongside a standardised regimen of ibuprofen and paracetamol.

A total of 78 participants were recruited. Of the 78 participants, 29 (37%) presented after a trauma and 49 (63%) presented after non-traumatic events such as lifting. At 6 weeks, moderate to severe persistent pain was present in 52%, 50% and 36% of participants in the placebo and 30 and 60 mg groups, respectively. After controlling for age, sex and race, there was a significant difference in pain between the 60 mg group and the placebo group (p=0.03), but not between the 30 mg group and the placebo group (p=0.51). There were no serious adverse effects.

Limitation included the small sample size, which may have resulted in a type 2 error for the comparison of the 30 mg group and the placebo group. Additionally, the study did not assess longer-term pain outcomes, whereas chronic pain is defined as pain persisting for 3 months.

Bottom line

Sixty-milligram duloxetine resulted in a reduction in pain intensity at 6 weeks compared with placebo, but more work is necessary to measure outcomes at these and subsequent time intervals.

Asymptomatic COVID-19 trauma patients have worse outcomes and resource utilisation by Sozzi *et al*.

Topic: COVID-19

Outcome rating: worth a peek

Patients presenting with surgical and traumatic injuries with a concomitant diagnosis of COVID-19 have been found to experience worse outcomes and experience more complications. This study assessed whether asymptomatic COVID-19 was prognostically important in trauma patients. The authors used retrospective data from a level 1 trauma centre in Los Angeles from 2020 to 2021 when all patients were clinically and virologically screened for COVID-19.[5]

A total of 185 asymptomatic COVID-19-positive patients were propensity matched using age, weight, mechanism of injury, patient observations and comorbidities with 554 COVID-19-negative patients. Hospital mortality was 6.5% in both groups, but COVID-19-positive patients spent longer on a ventilator, had longer intensive care and hospital length of stays, and had higher rates of myocardial infarction and cardiac arrest.

The study is from a single level 1 trauma centre, so results may not be generalisable to other sites. Propensity matching, though a reasonable method, does not address unmeasured confounders. Newer COVID-19 variants may affect the association found in this study.

Bottom line

Asymptomatic COVID-19 in trauma patients was associated with more resource use but not mortality. However, it is unclear whether this association would persist with newer variants.

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