JOURNAL CLUB SUMMARIES

What's hot that the other lot got

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REVERSING ACIDAEMIA IN CRITICALLY UNWELL PATIENTS WITH BICARBONATE

Metabolic acidaemia is frequently encountered among patients in the Intensive Care Unit (ICU). Administration of sodium bicarbonate infusions to manage this derangement remains an area of contention and varied practice given the lack of clinical outcomes data. Jaber *et al* (*The Lancet* 2018;392:31) performed an open label, randomised, controlled trial (RCT) across 26 French ICUs, which included a total of 389 patients. Their cohort had metabolic acidaemia defined as arterial blood gas (ABG) pH levels ≤7·20, $PaCO_2$ ≤45 mmHg and sodium bicarbonate concentration ≤20 mmol/L in addition to either Sequential Organ Failure Assessment (SOFA) score ≥4 or Lactate ≥2 mmol/L. The intervention arm received infusions of 4·2% sodium bicarbonate in order to increase and maintain arterial pH ≥7·30. The primary outcome was a composite of both 28 day mortality and the presence of at least one organ failure at day 7. They found no difference in the primary outcome, which was reached by 66% of the bicarbonate group and 71% in the control group (P=0.24). Of the secondary outcomes, bicarbonate reduced the necessity for renal replacement therapy from 52% to 35% (P=0.0009) and in patients with evidence of more severe renal impairment, a priori defined as patients with acute kidney injury network scores of 2–3 ,reduced 28 day mortality (28 day survival: bicarbonate group 63%, 95%CI 52% to 72%, control group 46%, 95%CI 35% to 55%; P=0.0283). While the provision of bicarbonate infusion in acidaemic critically ill patients did not provide a definitive benefit in terms of the primary outcome, there were a range of ancillary benefits and no evidence of harm that will support the practice of clinicians who have adopted this treatment strategy.

HFNC: TOO HOT FOR COMFORT

Despite the accumulating data on clinical efficacy and its widespread use, the optimal settings of High-flow nasal canula (HFNC) to facilitate patient comfort and hence tolerance are unknown. To determine how adjustments of HFNC temperature and flow can impact patient comfort, Mauri and colleagues (*Critical Care* 2018;22:120) performed a prospective, randomised cross over study that recruited 40 patients with acute hypoxaemic respiratory failure. Patients underwent 20 min stages of a combination of low and high flow (30 l/min and 60 l/min) with high and low temperature (37^{oC} and 31^{oC}) settings. The studies primary outcome was patient comfort rated using the Visual Numerical Scale (VNS). Patient comfort was higher during low temperature (31^{oC}) as opposed to high temperature (37^{oC}) HFNC therapy (P<0.0001), regardless of flow setting. A subgroup analysis of those on FiO2 ≥45%, found that both a lower temperature of 31^{oC} and higher flow 60 l/min resulted in a significant improvement in comfort (P<0.001). This would suggest that perhaps initiation of HFNC at a lower initial temperature setting of 31^{oC} may improve comfort and thus, tolerance for patients.

OXYGEN THERAPY IN PICU: IS IT FEASIBLE TO SET LOWER AIMS?

The detrimental clinical consequences of hyperoxia have long been established in the adult population, but high quality RCTs in the critically ill paediatric population are lacking. In particular, the optimal target range for peripheral oxygen saturation (SpO_2) has yet to be addressed. The Oxy-PICU trial (Peters, *Intensive Care Med* 2018 doi:10.1007/s00134-018-5232-7) investigators completed a UK based pilot safety and feasibility study. Infants and children requiring invasive or non-invasive mechanical ventilation were recruited and randomised to conservative (88%–92%) or liberal (>94%) SpO_2 target groups. The objectives of this pilot study were to examine logistical factors such as safety, recruitment rate estimates, timely post randomisation intervention implementation and accurate primary and secondary endpoint recording. Overall, there were no major design or implementation issues identified, and safety was preserved throughout. Of note, the investigators identified poor adherence to the conservative SpO_2 goal with the median inter-quartile range (IQR) of SpO_2 at 94.9% (92.6%–97.1%). The study demonstrates the feasibility and safety of the trial design but highlights potential difficulties in maintaining protocol adherence in the conservative group, echoing previous data in the adult population.

ASSESSING THE ROLE OF EARLY ECMO IN SEVERE ARDS

Whether or not Extracorporeal Membrane Oxygenation (ECMO) has a role to play in patients with acute respiratory distress syndrome (ARDS) continues to be debated worldwide by the critical care community. Combes *et al* (*NEJM* 2018;378:1965–75) conducted the largest to date, international, RCT of patients with severe ARDS to determine if early veno-venous (VV) ECMO initiation improved 60 day mortality. Patients were randomised if they met one of three criteria: PaO_2/FiO_2 ratio <50 mmHg for >3 hours or PaO_2/FiO_2 ratio <80 mmHg for >6 hours, or arterial pH <7.25 with $PaCO_2$ ≥60 mmHg for >6 hours (with respiratory rate <35 breaths/min and plateau pressure ≤32 cmH_2O) within the first 7 days of fully optimised mechanical ventilation. Crossover to the ECMO arm from the control arm, was permitted if pre-set criteria of refractory hypoxemia were met. The study was powered to detect an absolute reduction in mortality of 20%. The trial was stopped early (240 patients of 331 target) as a significant effect was unlikely to be seen even with full recruitment. The 60 day mortality was 35% in the ECMO group and 46% in the control group (RR 0.76; 95%CI, 0.55 to 1.04; P=0.09). Interpretation of the primary end-point needs to be taken in the context of 28% of control arm receiving ECMO. The early use of ECMO was not associated with a significant mortality benefit at 60 days compared with conventional ventilation and rescue ECMO but the trial design and wide CI does not exclude a clinically meaningful benefit of early ECMO.

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