

Intensive Care Update

Peter Hicks

Intensive Care Unit, Wellington Hospital

Ventilation

High flow nasal prongs (HFNP) providing 40-50 litres/min flow 21 -100% are a very useful addition to non-invasive support. They have been copied from paediatric/neonatal oxygen delivery systems. F&P have developed these in Auckland and marketed them worldwide with NZ being early adopters.

This was highlighted by a recent NEJM article showing the use of HFNP prevented invasive ventilation more than face mask CPAP did. This is a “surprising” result with some methodical issues. It may well be a compliance issue rather than a therapeutic advantage. HFNP are described as providing 3-5 cm CPAP.

Our impression is that they are very well tolerated with very little side effects and have the added advantage of humidification. There are commercially purchased systems for ward areas that provide up to 60% O₂. They seem to provide a useful small level of assistance and don't seem to delay referral to intensive where it is appropriate.

The only down side is that they are so well tolerated that patients may not ask to have them removed which gives the impression they are dependant of them and so appear sicker than they are.

N Engl J Med 2015; 372:2185-219: High-Flow Oxygen through Nasal Cannula in Acute Hypoxemic Respiratory Failure

Excess Oxygen may not be good for your brain. Registry and observational data suggest a high PaO₂ in the first 24 hours worsens patient outcomes after cardiac arrest. A high PaO₂ in the first 24 hours for general ICU patients, is not associated with a poorer outcome. Feasibility studies are underway but the concept that excess oxygen may be harmful will force a change in our practise, particularly in ICU where the FiO₂ is generally controlled by the nurses. We may start prescribing an upper SpO₂ limit.

Intensive care medicine: 2015, Volume 41: 49 – 57, The association between hyperoxia and patient outcomes after cardiac arrest: analysis of a high-resolution database.

Temperature

Much effort has been put towards preventing and treating hyperthermia but Registry and observational data show differing effects of hyperthermia. For patients with infections hyperthermia may improve outcome compared to normothermia. For patients with neurologic diseases (stroke, bleed, trauma) a higher temperature is associated with a worse outcome but this is not the case if the neuro disease is an infection (encephalitis, meningitis).

Randomised studies of (not using) Paracetamol are underway as a way of assessing the effect. We are a long way from looking for strategies to make people hot but we may be less vigorous in cooling patients with temperatures < 39.0.

Intensive Care Med (2015) 41:823-832. Early temperature and mortality in critically ill patients with acute neurological diseases: trauma and stroke differ from infection.

Intensive Care Med (2012) 38:437-444. Early peak temperature and mortality in critically ill patients with or without infection

We know hypothermia worsens outcome for most patients but it may improve neurological outcome. So far cardiac arrest studies show no improvement and a recent studies in head injuries in children does not improve outcome. Strictly controlled normothermia seems to be the aim now. This is frustrating as hypothermia is an attractive treatment for managing raised intra cranial pressure.

Crit Care Med. 2015 Jul;43(7):1458-66. Hypothermia for Traumatic Brain Injury in Children-A Phase II Randomized Controlled Trial

Systems

After hours discharge from intensive care (after 1800 hours) is still associated with worse patient outcomes, independent of severity of illness and adjusting for other factors. This creates a dilemma for ICU when we get referrals in the evening and we have to balance the harm of not admitting one patient with the harm of an evening discharge. The not admitted patient is much harder to study so there is a research bias.

Intensive Care Medicine 2014 2005 – 2012. Mortality related to after-hours discharge from intensive care in Australia and New Zealand,

Medical Emergency Team (MET). 150 of 166 ICUs in Australia and New Zealand have a Medical Emergency Team (MET). Cardiac arrests with attempted resuscitation should be becoming a rarity. The Early Warning Score (EWS) looks to become a standard assessment on wards, on discharge from Emergency Departments and Intensive Care, and may have a role pre hospital with GP triage and ambulance. Increasing numbers of MET calls in a hospital is associated with decreased cardiac arrest calls, and increased numbers of palliative care discussions and decisions. The effect on mortality is complicated because MET calls occur in patients who are dying, and for whom treatment is limited.

The Health Quality and Safety Commission have started a project to develop a national EWS. The response to the EWS will be different in different sized hospitals.

Future

Interventional angiographic clot retrieval after stroke improves outcomes. Two papers in the NEJM clearly show a benefit. I am uncertain about the need for anaesthesia for these procedures. Urgent intervention for acute cardiac/coronary events doesn't generally need anaesthesia. The number of eligible stroke patients are likely to be low and it will only be available in neuro centres.

N Engl J Med 2015;2285-95 Saver JL, Goyal M, Bonafe A, et al. Stent-retriever thrombectomy after intravenous t-PA vs. t-PA alone in stroke.

N Engl J Med 2015;2296-306 Jovin TG, Chamorro A, Cobo E, et al. Thrombectomy within 8 hours after symptom onset in ischemic stroke.

Citrate anticoagulation for continuous haemodiafiltration in ICU, is better than heparin at prolonging filter life, and does not cause systemic anticoagulation problems. It is becoming the preferred method. Citrate is infused pre-filter chelating the Ca⁺, and Calcium is infused post filter to correct it.

This has some implications for patients going to theatre from ICU where there was often an issue with the timing of stopping the heparin and/or dialysis. Now it will just be the logistics of getting the patient off the machine. The "new" problem will be citrate toxicity if the patient can't hepatically metabolise the citrate. This leads to low ionised Calcium and high (total) serum Calcium and is managed by stopping the citrate infusion.

Crit Care Med: 2015: 43(8): 1622 – 1629. A Randomized Controlled Trial of Regional Citrate Versus Regional Heparin Anticoagulation for Continuous Renal Replacement Therapy in Critically Ill Adults

Facts

Intensive care in NZ costs \$3600/patient day, which compares well to Australia except we spend \$47 NZD/person on intensive care and Australia spend \$71 AUD/person. This is because they have more \$\$/person and a much bigger private insurance system which has 30% of the intensive care beds compared to NZ's 7% (Source: ANZICS CCR).

Long term outcomes: The following table shows the mortality outcomes for sequential time periods, after you are admitted to ICU. Pre-existing conditions have more long term influence than acute physiology. (Source: Wellington ICU)

	All	Age>=80	Have cancer
In Hospital	11.5%	20.6%	16.2%
First year after discharge	9.0%	15.1%	21.2%
Second year after discharge	3.7%	4.5%	13.6%