

Paper reports

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Mortality and morbidity prediction and reduction in the high risk patient

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The high-risk patient is a much talked about entity in intensive care circles, but identification of these patients still consumes an abundance of research material. The search continues for that elusive symptom, sign or investigation which has a high sensitivity and specificity. Several of the paper reports over the last couple of months have focused on ways to predict mortality in those patients considered to be high risk. Cole *et al* looked at heart rate recovery following maximum treadmill stress testing in patients referred for this investigation and therefore presumably presenting with cardiac symptoms and signs. They found that this relatively simple and non-invasive investigation predicted a worse outcome if the heart rate failed to decline rapidly after exercise. Mortality at 6 years was 19% compared to 5% in those patients with a normal heart rate recovery. Perhaps this investigation may help us perioperatively identify those at high risk of cardiac events.

Smith *et al* looked at Therapeutic Intervention Scoring System (TISS) scores to see whether they could help in the decision process regarding discharge from the intensive care unit (ICU) and in particular highlight those discharges with a poor outcome after leaving the ICU. They concluded that patients with a TISS score between 10 and 19 should not be discharged to the ward but receive some intermediate care facility. Only when the TISS score was below 10 was ward care appropriate. In the cardiac ICU, Wong *et al* used multiple logistic regression models for identifying independent risk factors for delayed extubation, prolonged ICU length of stay and mortality following coronary artery bypass graft (CABG) surgery. Perioperative rather than preoperative variables were important in predicting delayed extubation with the risk factors for mortality being female sex, emergency surgery and poor left ventricular function, which are already used in other scoring systems.

Two very important papers have appeared in the *New England Journal of Medicine* over the last two months. The Heart Outcomes Prevention Evaluation Study Investigators have highlighted the reduction in mortality in

patients treated with the angiotensin converting enzyme (ACE) inhibitor, ramipril. The significance of this paper was that these patients were not known to have heart failure or a low ejection fraction and so it broadens the use of ACE inhibitors to many more patients who have risk factors for cardiovascular disease. The Dutch Echocardiographic Cardiac Risk Evaluation Applying Stress Echocardiography Study Group has published extremely important results for the high-risk surgical patient. They have shown a dramatic reduction in cardiac events with the use of the cardioselective beta-blocker bisoprolol in the perioperative period, in high-risk patients undergoing major vascular surgery (34% in the control group compared to 3.4%). This study will presumably change clinical practice but leaves many questions unanswered, such as the timing of introduction of beta-blockade preoperatively, the use of alternative beta-blockers and the treatment of those patients without a positive result during dobutamine echocardiography. Perhaps this latter group will benefit from optimisation with beta-agonists – a diametrically opposite pharmacological approach, which has also shown encouraging results.

Robertson *et al* investigated whether they could affect outcome following head injury by targeting cerebral blood flow via increases in mean arterial pressure. Unfortunately, although they concluded that secondary ischaemic insults caused by systemic factors could be prevented with a targeted management protocol, this was offset by an unexplained fivefold increase in the frequency of adult respiratory distress syndrome (ARDS), and there was no difference in neurological outcome.

Two further papers report on the benefits of hyperthermia on the immune system on the one hand and those of hypothermia in acute liver failure on the other. In a rat model of peritonitis, Ozveri *et al* showed that hyperthermic preconditioning improves immune system function, and there was a trend towards improved 7-day survival in the hyperthermic preconditioned rats, although this did not reach statistical significance. Moderate hypothermia in

patients with acute liver failure resulted in a significant drop in intra-cranial pressure (ICP) in patients with uncontrolled intracranial hypertension which is frequently the cause of death in these patients (Jalan *et al*). Anything that lengthens survival for the patient awaiting liver transplantation is a bonus. However, little benefit has previously been shown in neurological centres using hypothermia and so a randomized controlled trial is needed for this therapy. This highlights the problems we have with diametrically opposed therapies showing benefits to one organ system but which may be detrimental to another.

Finally, well worth a read is the hypothesis proposed by Laffey and Kavanagh that hypercapnia is good for you. Certainly they give an interesting and very plausible perspective on 'permissive hypercapnia', arguing that it is the carbon dioxide that offers you the survival advantage rather than the reduced mechanical stresses inflicted on the lungs. This highlights another feature of paper reporting where we hope to provide brief comments and hyperlinks to important journal reviews on topics of interest in intensive care.

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