Commentary

Recently published papers: dying Swans and other stories

Hannah Rose and Richard Venn

Department of Critical Care, Worthing General Hospital, Worthing, UK

Corresponding author: Richard Venn, Richard.Venn@wash.nhs.uk

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Abstract

The use of pulmonary artery catheters is under debate yet again. We look at two recent trials evaluating their impact on mortality. Our suspicions regarding obesity are proven and we also look at a simple, cost effective method of reducing ventilator-associated pneumonia. Finally, an intervention to improve the poor outcome associated with out-of hospital cardiac arrests is evaluated.

A dying Swan: FACTT or fiction?

The invention of the pulmonary artery catheter (PAC) 38 years ago by Drs Jeremy Swan and William Ganz was embraced by the medical world wholly and enthusiastically. It was presumed that the increased information provided would help deliver a more tailored and scientific approach to our critically unwell patients. However, concerns regarding their usefulness and safety are increasingly evident [1], and, with the development of alternative tools to calculate haemodynamic parameters, the use of the PAC is dwindling.

The latest study to question their use compares PAC to central venous catheter (CVC) guided therapy in the management of 1,000 patients with newly established acute lung injury in a multi-centre prospective randomised trial [2]. This 'Fluid and Catheter Treatment Trial' (FACTT) assessed 60 day mortality, fluid balance, ventilator-free days, intensive therapy unit (ITU) length of stay and complication rates. Catheter-derived haemodynamic parameters and clinical measures were used in conjunction with explicit protocols to guide fluid, inotrope and diuretic management.

Mortality rates were similar in both groups (27.4% PAC and 26.3% CVC), as were the number of ventilator-free days during the first 28 days (mean, 13.2 and 13.5, respectively). Fluid balance was similar in both groups, as was the incidence and duration of any type of organ failure. ITU stay was reduced in the CVC group, although the authors do acknowledge the mere presence of a PAC in a patient may have prevented discharge from ITU to a ward, thus causing erroneous results.

Complication rates for both groups were similar per catheter insertion. However, PAC patients, in whom a CVC may have been placed once haemodynamically stable, received 50% more catheters, thus increasing the total number of complications, mostly arrhythmias, in this group.

Is the 'Swan' destined for extinction? Proponents of PAC will point out that the conclusion only applies to a relatively young (median age 50 years), medical ITU population and excluded the majority of the 11,511 patients screened. These proponents will favour the study by Friese and colleagues [3], who scrutinised the American National Trauma Data Bank in a retrospective database analysis to assess the role of PACs on mortality in adult trauma patients admitted to ITU over an eight year period.

The 53,312 patients were initially divided into two groups: those that received a PAC as part of their management (4%) and those that did not. Subsequently, they were divided according to age, Injury Severity Score and initial base deficit.

Unsurprisingly, a higher use of PACs and a greater mortality rate was noted in patients with high Injury Severity Score, greater initial base deficits and increasing age. Interestingly, however, patients in all age groups appeared to benefit from a PAC if they had an initial base deficit of −11 or worse, with a high Injury Severity Score (25 to 75). Elderly patients (age 61 to 90 years) with a high Injury Severity Score also seemed to benefit from a PAC with a moderate base deficit (−6 to −10). All other groups showed an increased mortality if a PAC was used.

As conceded by the authors, this paper has several limitations and the discussion is worthwhile reading. The

CHX = chlorhexidine 2%; COL = colistin 2%; CVC = central venous catheter; ITU = intensive therapy unit; PAC = pulmonary artery catheter; VAP = ventilator acquired pneumonia.

authors conclude that this study is appropriate for the generation, rather than testing, of new hypotheses.

Obesity: a large predictor of mortality

Obesity is epidemic in the United States of America. In 2004, the prevalence of adults with a body mass index >30 was 32% [4]. In the latest health survey in the UK, 23.7% of our adult population has a body mass index >30 [5]. A figure that continues to rise at an alarming rate.

Nasraway and colleagues [6] have now shown morbid obesity (body mass index >40 kg/m^2) to be an independent predictor of mortality in surgical patients in intensive care units [6]. Prospective data over a three year period was analysed and corrected for age, gender and illness severity. The odds of death increased 7.4 times in morbidly obese patients requiring intensive care for 4 days or more.

Physiological changes, co-morbidities, practical difficulties and altered pharmacokinetics associated with obesity are just a few of the challenging issues unique to this subset of patients. As obesity prevalence continues to rise, hospitals and health care providers will need to devote more thought and resources to help tackle this escalating problem.

Wash your mouth out

Alternative methods for reducing the incidence of ventilator acquired pneumonia (VAP) have received some attention of late. VAP has previously been shown to significantly increase both morbidity and mortality.

Two recent trials [7,8] have shown a reduction in VAP rates by using antiseptics for oropharyngeal decontamination in intubated patients. Previous trials, using both intravenous and topical non-absorbable antibiotics in VAP prophylaxis, have shown good results, but concerns regarding development of bacterial resistance, side effects and cost implications remain [9-11].

The French study, by Seguin and colleagues [7], concentrated on reducing VAP in intubated, closed head injury patients in whom ventilation was necessary for ≥48 hours, using a 10% povidone-iodine solution as an oropharyngeal cavity rinse 4 hourly. Povidone-iodine solution has both Gram-positive and negative action, with minimal resistance phenomena having been reported.

They compared three groups – a placebo group that received routine suctioning and mouth care, a saline rinse group and the study group. VAP was diagnosed according to strict criteria.

A 5-fold reduction in VAP prevalence was demonstrated in the study group (3 of 36 patients (8%) in the study group, 12 of 31 patients (39%) in the saline group, 13 of 31 patients (42%) in the control group). Mortality and length of ITU stay remained unchanged. Only one multiresistant bacteria was isolated, that being in the control group.

Koeman and colleagues [8] from the Netherlands performed a similar study across a multicentre, general ITU setting. A buccal paste containing either chlorhexidine 2% (CHX), chlorhexidine 2%/colistin 2% (CHX/COL) or placebo was administered four times daily to intubated patients.

Chlorhexidine has minimal Gram-negative cover, unlike colistin, but is effective against Gram-positive bacteria, including methicillin-resistant *Staphylococcus aureus* (MRSA). Colistin has both Gram-positive and negative cover, but is generally reserved for treatment of multiresistant Gram-negatives. Criteria for diagnosing VAP were similar to those in the French study.

Oropharyngeal decontamination with either CHX or CHX/COL reduced and delayed the development of VAP. Daily risk of acquiring VAP decreased: 65% and 55% for CHX and CHX/COL, compared with the placebo group, respectively. Again, mortality and length of ITU were not affected.

Both studies offer a simple, safe and cost effective approach to tackling VAP. Future studies should be blinded and powered for mortality and length of stay.

Aminophylline

Another attempt to improve outcome in out-of-hospital cardiac arrest patients has, unfortunately, not returned any improvement in survival rate [12]. Attention was drawn to the use of aminophylline in an attempt to inhibit the effects of adenosine on electrical activity in the heart. Adenosine, an endogenous purine released during myocardial ischaemia, depresses the sino-atrial node, atrioventricular conduction, pacemaker activity of the His-Purkinje system and catecholamine action. Aminophylline was used following routine administration of adrenaline and atropine in an unresponsive patient who presented with either asystole or bradycardic pulseless electrical activity. Median time to drug administration was therefore prolonged (13 minutes). A further 10 minutes of CPR continued following its administration in this double-blind, randomised prospective study.

Sadly, no improvement in return of spontaneous circulation, survival to hospital admission or hospital discharge could be shown.

Competing interests

The author(s) declare that they have no competing interests.

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