Abstracts presented at the Annual Scientific Meeting of
The Joint Faculty of Intensive Care Medicine
and
The Australian and New Zealand Intensive Care Society

1–3 June 2007
Sydney, NSW

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Entries for the Felicity Hawker Medal

The Felicity Hawker Medal is awarded to the JFICM trainee judged to have the best formal project presentation at the annual scientific meeting. The award honours the many years of service of Dr Felicity Hawker to the specialty of intensive care medicine, both in general and specifically as the first Dean of the Joint Faculty of Intensive Care Medicine. In 2007, the Medal was awarded to Dr Sivagnanavel Senthuran for his presentation *Outcomes of dialysis patients with end-stage renal disease needing intensive care unit admission.*

**Effects of inhibition of pan-caspase and poly ADP-ribose polymerase (PARP) on apoptosis counts and tissue lactate concentrations in a rat model of haemorrhagic shock injury**

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**Objective**

To test whether broad-spectrum caspase inhibition, poly ADP-ribose polymerase (PARP) inhibition, or both together have an effect on apoptosis counts or tissue lactate concentrations following haemorrhagic shock injury.

**Method**

Our established model uses anaesthetised rats, with shock produced by blood withdrawal, followed by re-infusion 15 minutes later. Sixty minutes later, one of four treatments was given: normal saline (control), a PARP inhibitor (PJ34), a pan-caspase inhibitor (zVAD-fmk), or both the PARP and pan-caspase inhibitors.

Skin and small bowel tissue was collected at four predetermined times for histological assessment of apoptosis activity and lactate assay.

**Results**

Comparison between time-points at baseline and after haemorrhage, but before treatment was given, showed increases in gut lactate concentrations ($P=0.02$), skin lactate concentrations ($P=0.003$) and villi apoptosis counts ($P=0.004$). There was no change in crypt apoptosis counts ($P=0.30$), and only a suggestion that skin apoptosis counts increased over time ($P=0.09$).

No suppression of apoptosis or lactate concentrations was found with the inhibitor treatment(s). This supports the existence of a recently described pathway that is independent of caspase or PARP systems.

There was some evidence ($P=0.06$) that rats receiving the caspase inhibitor had an increase in skin apoptosis counts in the final time period. There may be a putative caspase-dependent inhibitor of late apoptosis, which was derepressed by caspase inhibition, in this study.

**Conclusions**

There was no reduction in apoptosis or lactate concentrations with any of the treatments. This lends support to the presence of a recently described apoptotic pathway independent of the caspase and PARP systems. Evidence (at $P=0.06$ level) of an association between caspase inhibition and an increase in late apoptosis suggests the presence of a caspase-dependent inhibitor of late apoptosis. Further research is required to elucidate details of such a system.
Outcomes of dialysis patients with end-stage renal disease needing intensive care unit admission

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Introduction
Dialysis patients often have multiple comorbidities, and there are limited data on prognostic indicators. There is only one previous Australian study — of 38 dialysis patients receiving continuous renal replacement — which noted an 18% ICU mortality and 38% hospital mortality.

Aim
• To identify features of survivors and non-survivors among dialysis patients admitted to the ICU;
• To characterise the pattern of recurrent admissions to the ICU;
• To calculate median survival following discharge from hospital after ICU admission; and
• To estimate our ICU and hospital mortality for dialysis patients.

Setting and methods
We conducted a retrospective study using prospectively collected data from local and national databases on 70 dialysis patients admitted to the ICU over 5 years between 2001 and 2006 at a single tertiary referral hospital in Queensland, Australia.

Results
Dialysis patients had an ICU mortality of 17% and a hospital mortality of 28%. The 12 deaths in the ICU occurred a median of 18 hours after admission, reflecting the severity of the patients' underlying illness. The independent predictors of hospital death were age and number of non-renal organ systems failing. Patients with pulmonary oedema had a low risk of death. Although 21 patients accounted for 55 of a total of 104 admissions, the recurrent admissions generally occurred during different hospital episodes and were not associated with a higher risk of hospital death. Admission serum calcium, phosphorus, albumin or urate concentrations did not differentiate survivors from non-survivors. Patients discharged home after an ICU stay had a median survival of 2.25 years from hospital discharge or 3.5 years from starting dialysis. In comparison, the median survival on dialysis for patients in Australia in general is 4.52 years (Australia and New Zealand Dialysis and Transplant Registry).

Conclusions
Age and number of non-renal organ failures were independent predictors of hospital death. Recurrent ICU admissions were not associated with increased risk of hospital death. Our study suggests dialysis patients discharged home after an ICU admission have an acceptable survival. A large multicentre prospective study is required to better characterise prognostic features.
Free paper abstracts

Intensive caring for Iraqi war-wounded with Medécins san Frontières

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The war in Iraq has led to an overwhelming humanitarian catastrophe with more than 650,000 civilian deaths, 1.5 million internally displaced people and untold thousands of orphans. Baghdad is the most dangerous place in the world. It is the scene of the worst of the fighting and the highest toll of casualties. The three major public hospitals in Baghdad report receiving more than 100 severely injured casualties per day. There is no reliable provision of water or electricity. Basic medical supplies and medications are unavailable. Medical equipment has not been serviced since the war began, and many machines have broken down and are out of service. Experienced, highly trained medical specialists have fled or been murdered. The most junior medical staff, who are unable to leave, are required to run the health service.

Medécins Sans Frontières has been attempting to provide humanitarian aid in Iraq. The conditions have required us to devise creative solutions. The development of a perioperative care program to support a sophisticated reconstructive surgery program for Iraqi war-wounded adults and children will be described. Conditions treated include burns from blast injury, complex maxillofacial trauma after bullet and blast injuries, and orthopaedic injuries from “ieds” (improved explosive devices), bombs and bullet wounds.

Other initiatives to deliver aid directly to critically ill patients in Baghdad, many of which are in evolution, will also be discussed.

Regulation (NICE-SUGAR) study: analysis of the first 100 hypoglycaemic events

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Introduction
Intensive insulin therapy (IIT) is a new treatment strategy that increases the risk of hypoglycaemia. Little is known about the epidemiology of hypoglycaemia in this setting.

Subjects and settings
A total of 1838 patients were recruited during the first 14 months of the NICE-SUGAR (Normoglycaemia in Intensive Care Evaluation — Survival Using Glucose Algorithm Regulation) study. This is a randomised controlled trial comparing two target ranges for blood glucose concentration, 4.5–6.0 mmol/L and < 10 mmol/L.

Methods
In the NICE-SUGAR study, all episodes of hypoglycaemia (blood glucose concentration ≤ 2.2 mmol/L) are reported as serious adverse events (SAEs). The incidence and timing of the first 100 SAEs were extracted from the study database. Two assessors independently reviewed the SAEs to determine cause; differences were resolved by consensus. Patients’ baseline characteristics were extracted from the study database to investigate risk factors for hypoglycaemia. Clinical sequelae were recorded.

Results
The rate of hypoglycaemia (events per 100 patients enrolled) was 4.1 (8.0 in the lower target group, and 0.3 in the higher target group). Initial multivariate analysis of baseline characteristics did not yield a useful model for predicting hypoglycaemia, although patients with hypoglycaemia were older (mean age, 63.9 v 59.7 years, P = 0.03), and had higher APACHE II and SOFA renal scores (mean, 23.0 v 20.2, P = 0.07; and 1.2 v 0.7, P = 0.001, respectively). Adjudicated causes were: clinician error (ie, failure to follow the computerised treatment algorithm and infrequent blood glucose monitoring), 37%; decreased nutritional intake, 24%; pre-terminal, 8%; likely spurious (measurement error), 16%; and miscellaneous, 15%. Hypoglycaemia occurred up to 55 days after randomisation: 56% of episodes occurred within 5 days of randomisation, and 26% within 48 hours of randomisation. No adverse clinical sequelae were detected.

Conclusions
During the first 14 months of the NICE-SUGAR study, 8.0% of the patients treated with IIT suffered hypoglycaemia. The major causes of hypoglycaemia were clinical error and cessation of nutritional intake. Multivariate analysis of baseline characteristics did not yield a useful model for predicting hypoglycaemia.
Applications of levosimendan in paediatric intensive care

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Introduction
Levosimendan is a calcium-sensitising agent which has been shown to be beneficial in adult cardiac failure. There are limited reports of its use in critically ill children following cardiac surgery.

Aim
To review and describe indications for, and use of, levosimendan in a large paediatric intensive care unit.

Setting

Observations
Since December 2003, we have used levosimendan in 55 patients, a total of 87 times, during 69 intensive care admissions. Thirty-seven patients (67%) received a single dose, and 18 patients (33%) received more than one dose. Median weight of patients was 14.9 kg (interquartile range [IQR], 5.1–32 kg), and median age was 41.6 months (IQR, 3.7–152.5 months). In-hospital mortality was 14/55 (26%), with 11 deaths in the ICU, and three deaths before hospital discharge. Levosimendan was given:

- after surgery for congenital heart disease in 29 of the 55 patients (53%), with a total of 39 doses given;
- to treat end-stage heart failure in 18 (33%), with a total of 37 doses given;
- after heart transplantation in six (11%), with a total of eight doses given; six of these were given acutely (median, 3 days; range, 1–23 days) after transplantation; and
- to treat sepsis-induced myocardial suppression in two patients (4%).

Levosimendan was used in 19 patients during extracorporeal life support (ECLS): 13 after cardiac surgery; five in end-stage heart failure; and one after cardiac transplant. It was given a mean of 5 days before decannulation. In-hospital mortality in this group was 8/17 (59%), with patients currently still in hospital.

Conclusions
We are increasingly using levosimendan to treat children in our ICU. Most of these children have low cardiac output following cardiac surgery, end-stage heart failure, or are weaning from ECLS. Randomised clinical trials are warranted to define the utility of levosimendan for each of these indications.

Predicted body weight underestimates delivered tidal volume, especially in women

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Introduction
Recent research suggests an association between the development of acute lung injury (ALI) and ventilation with tidal volumes greater than 6 mL/kg.1,2 We conducted a prospective audit comparing recorded body weight to predicted body weight. We then compared delivered tidal volumes calculated as mL/kg from recorded body weight with volumes calculated from predicted body weight.

Subjects and settings
Patients requiring controlled mechanical ventilation admitted to our mixed intensive care unit in October 2006 were eligible. Those who had ALI on admission or had no recorded body weight were excluded. Recorded body weight was defined as an actual or dietitian-estimated weight recorded for the current admission.

Methods
Height calculated from demispan was used to derive predicted body weight from the ARDSNet formula. Hourly Day 1 tidal volumes were downloaded from the medical record, and the mean was calculated for each patient. Volumes (mL/kg) were calculated using predicted and recorded body weight. Data are presented as mean (SD) or median (interquartile range, IQR) depending on normality. The Mann–Whitney rank sum test was used for comparisons, with P < 0.05 taken to signify statistical significance.

Results
Thirty-four patients were studied (20 male), with mean age, 60.6 (SD, 13.3) years, and mean APACHE II score, 19.5 (SD, 6.1). Predicted body weight was lower than recorded weight (69 [IQR, 61–74.8] v 75 [65–85] kg; P < 0.05). Median tidal volumes were higher for men than women (552 [IQR, 530–586] v 474 [IQR, 424–500] mL; P < 0.01). Tidal volume (mL/kg) was higher when calculated from predicted than from recorded body weight (7.8 [IQR, 7.3–8.3] v 7.2 [IQR, 6.3–7.9] mL/kg; P < 0.05). Volumes calculated from predicted body weight were higher among women than men (552 [IQR, 530–586] v 474 [IQR, 424–500] mL; P < 0.01). Tidal volume (mL/kg) was higher when calculated from predicted than from recorded body weight (7.8 [IQR, 7.3–8.3] v 7.2 [IQR, 6.3–7.9] mL/kg; P < 0.05). Volumes calculated from predicted body weight were higher among women than men (8.2 [IQR, 7.8–8.7] v 7.5 [IQR, 6.8–8] mL/kg; P < 0.05). The difference in volumes between the sexes using recorded weight was not significant (7.5 [IQR, 6.6–8.6] v 6.9 [IQR, 6.2–7.8] mL/kg; P = 0.42).

Conclusions
Predicted body weight was significantly less than recorded body weight. Consequently, in retrospective calculations, larger tidal volumes on a mL/kg basis were delivered when calculated using predicted compared with recorded body weight. In addition, when retrospectively calculating tidal
volume as mL/kg using predicted body weight, women received larger tidal volumes than men. Calculating predicted body weight using demispan as a surrogate marker of height is easy and non-invasive and may benefit ventilation of patients without ALI if clinicians plan for low-volume ventilation.

References

Effects of changing syringe driver height on flow: a small quantitative study
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Objective
To quantify flow irregularities in drug delivery caused by vertical displacement of syringe pumps.

Method
A bench experiment was performed to quantify the effect of height on pumps used in our own intensive care and theatre settings. A standard syringe pump and line set loaded with a dye solution was run through a graduated length of tubing, and the effect of changing pump height quantified by measuring progress down the tubing over time.

Results
Raising the pump 30cm produced significant drug delivery boluses — up to seven times the programmed rate at 2 mL/h. Delivery rate increased in inverse proportion to the programmed rate, as did the time taken to return to the programmed rate. Lowering the pump 30 cm resulted in no-flow times of up to 180 seconds at 2 mL/h, again inversely proportional to the programmed rate.

Conclusions
Vertical displacement of a common syringe pump by 30cm produced significant bolus and cessation phenomena. These findings confirm the observations of previous authors and also demonstrate that significant flow irregularities occur with smaller vertical displacements than previously tested. Further testing with other brands of pumps is required before a solution to this clinically important problem may be approached.

Direct visualisation of the beating heart in vivo in an ovine model
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Introduction
Mitral valve disease is a major cause of premature death. Indications for surgical correction are based on clinical progress and echocardiographic assessment. There is minimal knowledge of the mitral valve as it functions under direct vision. We created a model of direct visualisation of the mitral valve, as a precursor to a model of mitral regurgitation with assessment of flow dynamics by echocardiography versus true visual images.

Methods
Five Merino sheep were selected. Autologous blood was obtained by preoperative phlebotomy and administration of supplemental iron. After induction of anaesthesia and sterile preparation, an arterial cannula was placed in the right pulmonary artery, and a second cannula was placed proximally in the aortic root, leaving room for an aortic cross clamp to be placed between the two cannula. Systemic perfusion was achieved using standard cardiopulmonary bypass (CPB). The circuit was primed with 1L plasma-lyte P148, and 2 units of autologous sheep blood. CPB was established using a two-stage venous drainage and ascending aortic return. Physiological monitoring was conducted using a Tramscope 12C monitor (GE, Chicago, USA). Systemic pressures were maintained using pump flows of 2.5–3.5L/min.

Following left ventriculotomy, a bronchoscope was inserted into the cavity of the left ventricle. Crystalloid solution was then sucked from a reservoir and infused into the right pulmonary artery. The pulmonary circulation, left atrium and left ventricle were then perfused by crystalloid solution at a left atrial pressure of about 10mmHg, and a videorecording of the left atrium, mitral and aortic valves was obtained in bursts of 1–2 minutes. As the ischaemic time progressed, ventricular function deteriorated, and blood perfusion was then re-initiated to rest the heart.

Results and discussion
This is the first successful attempt to obtain in-vivo images of the beating heart. Future plans include creation and correction of mitral regurgitation with computer-gated imaging. This may assist in future design of devices to treat mitral valve regurgitation.
Brain-stem death induces up-regulation of the endothelin axis and increased levels of matrix metalloproteinases 2 and 9

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**Aim**

The molecular mechanisms of ischaemia–reperfusion injury after lung transplantation remain unclear. Alveolar macrophages are implicated in the development of acute lung injury. Endothelin (ET)-1 has been shown to be raised after lung transplantation and in acute inflammatory processes. Matrix metalloproteinases (MMPs) are known to cause acute lung injury and, in some situations, are up-regulated by the increase in ET-1. The link between ET-1, MMP-2 and MMP-9 in the alveolar macrophage has not been described in lung transplant recipients or donors.

**Methods**

Fourteen Wistar–Kyoto rats were anaesthetised and ventilated, and a catheter was positioned in the subdural space. This was inflated inducing brain-stem death (BSD) in eight rats, and left non-inflated in the other six (control) rats. After 4 hours of ventilation, lung specimens were labelled immunohistochemically to demonstrate ET-1, ET-A and ET-B, as well as MMP-2 and MMP-9. CD68 staining was used to characterise alveolar macrophages.

**Results**

The ratio of alveolar macrophages to polymorphonuclear neutrophils was significantly greater in the BSD group than in the control group (mean ± SD, 9.07 ± 4.13 v 3.09 ± 0.59; P = 0.002). ET-1, ET-A and ET-B levels were elevated in the BSD group (27.57 ± 5.26 v 7.01 ± 1.75, 36.1 ± 4.57 v 17.73 ± 2.56, and 54.98 ± 7.07 v 19.75 ± 3.73 cells per high power field, respectively; P < 0.0001). MMP-2 and MMP-9 expression in the experimental group was more than double that in the control group (14.88 ± 3.42 v 30.68 ± 3.38 and 14.15 ± 2.18 v 37 ± 3.67 cells per high power field, respectively; P < 0.0001).

**Conclusions**

In a murine model, BSD was associated with up-regulation of the pulmonary endothelin axis and significant rises in concentration of the gelatinases MMP-2 and MMP-9. The ratio of alveolar macrophages to infiltrating neutrophils was significantly increased after 4 hours of BSD compared with the control group. Alveolar macrophages expressed significantly higher levels of ET-1, MMP-2 and MMP-9 in BSD compared with the control. Endothelin blockade in BSD donors may reduce the risk of ischaemia–reperfusion injury and diminish the degree of tissue degradation by MMPs.

Measurement of cardiac output by nurses using a non-invasive cardiac output monitor

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**Introduction and aims**

USCOM (ultrasonic cardiac output monitor) is a non-invasive monitor which utilises continuous wave Doppler to determine cardiac output (CO). Our study compared CO measurements obtained with USCOM with those obtained using the pulmonary artery catheter (PAC), and also assessed the learning curve for use of USCOM by non-echocardiographically trained intensive care nurses.

**Methods**

Twenty-four patients, aged 24–65 years, who were spontaneously breathing and required PAC as part of evaluation for heart failure, were studied. Demographic and clinical data were recorded. In a blinded fashion, we compared CO obtained by USCOM with CO based on simultaneous thermodilution measurements obtained by PAC and estimated from a modified Fick equation. As each patient had multiple recordings, a generalised estimating equation was used to assess correlation between the methods. The Bland–Altman method was used to assess agreement.

**Results**

CO measured by PAC ranged from 2.6 to 7.1 L/min for thermodilution and from 3.1 to 8.7 L/min by Fick. USCOM-derived CO was highly correlated with CO obtained by both thermodilution and the Fick method. The mean difference was −0.35 L/min (95% CI, −0.74 to 0.04 L/min), with limits of agreement from −1.9 to 1.2. Despite the technically difficult study population, time to optimal image acquisition decreased from 25 minutes to 5 minutes between the commencement and conclusion of the study (approximately 1 year).

**Conclusions**

USCOM is reliable and accurate for measuring CO. The learning curve for successful use of USCOM by an intensive care nurse is satisfactorily short, which suggests USCOM could be used by appropriately trained nursing staff to determine CO non-invasively. Further investigation of its use is required in ventilated patients.
Coronary artery bypass graft surgery dampens neutrophil responsiveness

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Introduction
The scientific study of neutrophils (PMNs), which have a pivotal role in coronary artery bypass graft (CABG)-associated inflammation, has been relatively limited. Previous studies have focused on the perioperative and 24-h postsurgery period, and mainly on 1-selectin (CD62L) and integrins CD11b and CD18. Our serial study of five functionally important surface molecules revealed that changes caused by CABG may endure for up to 5 days and have clinical implications.

Subjects and setting
Thirty patients scheduled for elective CABG surgery at Prince Charles Hospital were recruited to the study over a 1-year period beginning January 2006. The group comprised nine women (51–82 years) and 21 men (35–79 years).

Methods
Morning blood samples were collected from patients before surgery and on Days 1, 3 and 5 after surgery. PMNs were isolated within 4 hours of blood collection and analysed:

- to determine NADPH oxidase activity; and
- to quantify surface expression of CD16 (FcγRIII), CD43, CD62L, CD18 and CD11b (Mac-1 or CR3) on the PMN surface.

Results
CABG induced phenotypic and functional changes to circulating PMNs of variable duration. Short-term changes included a decrease in expression of CD16 (FcγRIII), CD43, CD62L, CD18 and CD11b (Mac-1 or CR3) on the PMN surface.

Conclusions
The raised CD43, down-regulated CD11b response and reduced NADPH oxidase activity suggest depressed PMN function. This is important in the critical care setting as it implies that the PMN response in inflammation and infection may be depressed after CABG for longer than previously thought.

Bordetella pertussis in an adult intensive care population: a case series

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Introduction
Bordetella pertussis is a recognised pathogen in infants and children. A number of recent scientific works have investigated the incidence and consequences of pertussis infections in adolescent and adult populations.1-3 While significant morbidity and mortality in adults has been documented,3-6 a case series of critically ill adult patients with proven or suspected pertussis infections has not previously been reported.

Objectives
The aim of this study was to describe a series of adult patients admitted to an intensive care unit who tested positive to B. pertussis in serological assays.

Methods
The retrospective analysis was conducted in a single-centre ICU in regional Australia and examined patients aged 18 years or older at the time of ICU admission. Assays were requested at the discretion of treating intensivists for patients who were admitted with respiratory failure with a suspected infectious cause. Positive IgA assays from March 2004 to September 2006 were cross-referenced with the Australasian Outcomes Research Tool for Intensive Care (AORTIC) database.
Observational study of the value of continuous ScvO₂ analysis in perioperative management of high-risk cardiac surgical patients

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Introduction
Organ dysfunction and multiple organ failure are causes of prolonged hospital stay after cardiac surgery (CS). CS patients are at risk of inadequate perioperative oxygen delivery. Perioperative volume optimisation has been shown to improve outcome in CS patients, whereas inadequate oxygen delivery immediately after CS is associated with prolonged intensive care unit stay. We examined the relationship between central venous oxygen saturation (ScvO₂) measured with the PreSep catheter (Edwards LifeSciences, Irvine, Cal) and predetermined clinical measures of haemodynamic adequacy in high-risk CS patients.

Methods
Twenty high-risk CS patients were studied. High-risk CS was defined as presence of any two of the following: age > 75 years; valve and coronary artery surgery or double valve surgery; emergency surgery; creatinine concentration > 0.2 mmol/L; pulmonary hypertension (mean pulmonary artery pressure > 30 mmHg); re-do sternotomy; or preoperative intra-aortic balloon pump. The ScvO₂ catheter was inserted at the beginning of the operation, and co-oximetry was initiated on the patient’s return to the ICU. All routine haemodynamic data (heart rate, arterial pressure, central venous pressure, SaO₂, respiratory rate and ST segment), and ScvO₂ were then automatically recorded. Hourly urine output and inotrope requirement, and 4-hourly arterial blood gas analysis were recorded, along with duration of ICU stay and ventilation, and organ dysfunction scores.

Results
ScvO₂ and haemodynamic data were obtained in all patients. The study group comprised 15 men and five women, with median age, 75 years (interquartile range, 65–78 years). Mean preoperative creatinine concentration was 164 mmol/L, with mean cross-clamp and bypass time of 105 and 132 minutes, respectively. Mean duration of ventilation and ICU stay were 72 h and 75 h, respectively. There was a trend to prolonged ICU stay and inotrope requirement associated with ScvO₂ < 65% (not significant). Low ScvO₂ predicted cardiac tamponade in two cases.

Conclusions
Continuous ScvO₂ measurements give additional useful information with no additional risk in high-risk CS patients. In this small study, this did not reach statistical significance. Intraoperative central venous co-oximetry may assist in haemodynamic manipulations in high-risk patients.

When suitable is not suitable enough: medical exclusion to organ donation

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Introduction
LifeGift nsw/act state organ donor coordinators are notified of all potential organ donors from metropolitan and regional hospitals in New South Wales and the Australian Capital Territory. Medical suitability of the potential organ donor is assessed individually at the time of referral.

Aim
To identify the number of potential organ donors who were excluded in 2006 and the reasons for exclusion.

Setting and methods
Data were retrieved for the period 1 January to 31 December 2006, and all notifications were reviewed, particularly those deemed medically unsuitable for organ donation. Medical suitability is based on the recommendations of the Transplantation Society of Australia and New Zealand (TSANZ) National Organ Allocation Protocols.

Results
Of 220 notifications to LifeGift nsw/act in 2006, 33 potential organ donors were deemed unsuitable and excluded. The reasons for exclusion included malignancy (7), current intravenous drug use (7), failed physiological support (5), hepatitis B (1) or hepatitis C (3), untreated infection (3), multorgan failure (3), active high-risk behaviour (2), risk for Creutzfeldt–Jakob disease (1), previous transplant recipient with acute rejection (1), and breast cancer (current or history) (1). One donor was excluded due to no suitable recipients (1). (Some patients were excluded for more than one reason.)

Conclusions
LifeGift will continue to assess each potential organ donor individually in accordance with current TSANZ protocols to ensure the safety of the potential recipient.