Perioperative goal-directed haemodynamic treatment and the equity of differing modalities

Editor—We read the recent article written by Dr Bartha and colleagues addressing goal-directed haemodynamic treatment (GDHT) in patients with proximal femoral fracture with great interest. This subset of surgical patients is indeed elderly and at high risk with 20% 4 month mortality. Therefore, an evidence base to guide clinicians in their perioperative care to optimize clinical outcome is very much required. However, the improvements we can make are heavily influenced by significant patient co-morbidities and also financial viability as the annual spend for this group is already above £385 million in the NHS.

While we accept the authors’ point that there is no specific evidence to support an influence on postoperative complications, published work showing a reduced time of fitness to discharge does imply a reduction in morbidity. We also feel that it is important to set this in the context of evidence to support the reduction in postoperative complications in other high-risk surgical groups. Importantly, a stance has been taken by both NICE and the UK GIFTASUP guidelines in supporting the use of GDHT in high-risk surgical groups.

Secondly, and most importantly, although the authors highlight the differences between their recent piece of work and previously published research, they do not emphasize the importance of comparing different technologies. This issue is well illustrated in a recent publication in the *Br J Anaesth* comparing stroke volume optimization between the oesophageal Doppler monitor (ODM) and the uncalibrated LiDCOrapid in elective high-risk colorectal surgery patients. The ability of the LiDCOrapid to track changes in the stroke volume measurements of the ODM was weak with a calculated concordance of 80%. The sensitivity and specificity to detect a positive fluid challenge was 48% and 80%, respectively. We note that the authors used calibrated LiDCO but what is not clarified is whether the monitor was recalibrated after establishing spinal anaesthesia or after vasopressor therapy since the algorithm is sensitive to changes in systemic vascular resistance and measured oxygen delivery may not have remained accurate. It is interesting to note that the ODM itself, although considered a gold standard for perioperative monitoring in the UK, may have significant limitations. It has been shown that only 37% of patients who have a decrease in SV perioperatively respond to a subsequent fluid bolus and also absolute measurements of ODM stroke volume can also vary from true values by 40%.

Returning to this trial, it is unfortunate that recruitment remained less than planned or required to provide statistically robust results for the short-term primary and secondary outcome measures; however, we suspect that even if the required number of patients were evaluated, the results from this study may not have been comparable with previous studies using different technologies and assuming them to be providing interchangeable data.

While we appreciate the work involved and the contribution that this study has made to progressing research in this area, we feel that it is crucial to validate and compare these technologies and then apply them consistently in order to be able to reap the benefits that they offer our patients. The question that could be answered is whether outcomes remain the same in spite of the monitor and optimization protocol used.

Declaration of interest

S.D. has received an unrestricted travel Grant from LiDCO and Honoraria from Edwards Lifesciences.

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8 NICE medical technology guidance. CardioQ-ODM oesophageal Doppler monitor, March 2011
9 British Consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients, March 2011
10 Shoemaker WC. Prospective trial of supranormal values of survivors as therapeutic goals in high-risk surgical patients. Chest 1988; 1176–86
doi:10.1093/bja/aet275

Reply from the authors

Editor—We thank Dr Minhas and colleagues for their comments and interest in our findings.1

As they correctly pointed out, we could not confirm the influence of goal-directed haemodynamic treatment (GDHT) on the length of hospital stay in contrast with previous findings on patients with hip fracture. In our study, an individualized multidisciplinary programme of standard care was applied in both groups and it is possible that this shadowed the effect of GDHT. Probably, the control group (routine treatment) in our population received better care compared with the control groups of the two previous trials.

Our ‘negative’ finding on the length of hospital stay should not be interpreted that the GDHT is not effective. We just could not capture it by measuring the hospital stay. We would like to reiterate that in our trial the length of hospital stay was not a measure of primary outcome as, in our opinion, the length of hospital stay is a suboptimal measure, which is influenced by a large number of factors that are not related to medical fitness. Even if the medical fitness is used as a surrogate for length of hospital stay in some studies, the definition of medical fitness is vague.

We agree that the choice of monitoring technology is important, especially if a GDHT protocol is used that is targeted by a set value of oxygen delivery index. Our aim was to choose a bed-side monitor that is applicable in the clinical routine anaesthesia care of awake and even confused patients and which is possible to calibrate. Based on the available evidence when the trial was designed in 2008, the LiDCOplus had comparable accuracy and precision with the pulmonary artery (PA) catheter. In our opinion, it was an appropriate choice. Recalibration after spinal anaesthesia is not necessary according to the manufacturer, as spinal anaesthesia does not influence the capacitance of the aorta that is defined by the calibration. Of course this problem could have been addressed in a pilot study separately before we started the trial, but given the available evidence in 2008, the LiDCOplus monitor was considered to be the best choice under the circumstances of routine care of acute surgery. The ability of LiDCOplus to trace stroke volume changes in aged patients is an important issue and it is worthwhile to assess. The possible bias of the haemodynamic parameters compared with the PA catheter does not exclude the use of LiDCOplus applying haemodynamic variables derived by the PA catheter.

It is a separate issue whether it was reasonable to test Shoemaker’s cut-off value in these aged patients. In general, we agree, each GDHT protocol should use monitors and haemodynamic values that may be traced with the actual monitor. Even if the sample size had been adequate in our trial, naturally findings on aged populations could be difficult to generalize, irrespective of the monitors used. As we discussed in the paper, an adequate sample size given the risk of postoperative complications we found in the control group—which was lower than expected complication rate used for sample size calculation—would require a sample size of more than 700 patients.

Sometimes, it is reasonable to make reflections around the effect size, even if the finding is not statistically significant. We did not find statistically significant reduction in postoperative complications, but we suggest that the size of relative risk (RR: 0.79) is clinically relevant. In a previous paper on cost-effectiveness analysis of GDHT by modelling the possible influence of GDHT on postoperative complications, we found that the GDHT is cost-effective even at lower clinical effect (i.e. RR up to 0.9). In that analysis, we could demonstrate that the length of hospital stay (i.e. hospital costs) had less impact on the cost-effectiveness than the frequency of postoperative complications.2

We are looking forward to publishing a detailed account of the haemodynamic responses to GDHT according to Shoemaker and routine care in the elderly. Our objectives are to continue the search for more adequate fluid protocols for these aged patients.

Declaration of interest

E.B. received a lecturing fee for one lecture from Edwards Lifesciences LLC (Irvine, CA, USA).

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doi:10.1093/bja/aet278