Reviewer's report

**Title:** A Prospective Study To Evaluate The Accuracy Of Pulse Power Analysis To Monitor Cardiac Output In Critically Ill Patients.

**Version:** 1  **Date:** 21 May 2007

**Reviewer:** Mervyn Singer

**Reviewer's report:**

**General**

This paper from Cecconi and colleagues investigates an important question, namely the accuracy of CO measured by a pulse power analysis to accurately track over time that measured by its calibrator technique (Lithium dilution) in critically ill patients with an unstable haemodynamic status. The work is well performed and will be of interest to those using cardiac output monitoring devices.

**Major Compulsory Revisions**

Although the bias is good, the precision between the two techniques is poor, especially as the techniques were calibrated together as little as one hour prior to the first comparator measurements being taken. The authors comment “there was considerable variability in these changes between patients and overall the percentage errors tended to increase in individual patients over time” – I agree and feel this point needs to be stressed both in the abstract and covered in the discussion. This individual variation is ‘diluted’ by averaging all the values taken at each timepoint – this highlights a problem with the Bland-Altman technique i.e. if neither technique consistently over- or under-estimates, then the bias will be good. Even though the precision is poor, this also does not reflect changes over time in the individual patient.

There are numerous grammatical and spelling mistakes and typos that will need correcting.

**Abstract Concluding paragraph:** I’m not sure ‘accurate and precise’ are the correct descriptors that should be used to describe the agreement between LiDCO and the pulse power algorithm when limits of agreement average 27%. ‘Acceptable’ is probably a better term, as is used in the last sentence of page 4. However, the weak ability to monitor changes in the individual patient should be mentioned.

**Discussion/Conclusion:**

P9: As with the abstract, I’m not sure ‘reliable and precise’ are correct descriptors, especially as the two techniques were calibrated to be equal to each other at Time 0.

**Minor Essential Revisions**

**Abstract:**

LiDCO is a proprietary name, not a technique.

**Background:**

P5 In protocol section – Manufacturer of the device .. – not pleural.

P6 Calibrated not equalized

P12: “Until further data become available we would recommend re-calibration is performed utilizing at least two lithium dilution curves in order to reduce variability in the technique and improve accuracy” – this may indeed be the case but it cannot be a recommendation in the absence of any data from the authors to verify this does improve accuracy.

**Discretionary Revisions**
What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Needs some language corrections before being published

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I am on advisory boards and have done research supported by unrestricted educational grants for Edwards and Deltex, who make two competing devices. I also was the principal Clinical investigator of the PAC-Man study, a large multicentre study funded by the Dept of Health in the Uk to assess the effectiveness of the pulmonary artery catheter, another bedside device for measuring cardiac output.