Reviewer's report

Title: Noninvasive Cardiac Output and Blood Pressure Monitoring cannot replace an Invasive Monitoring System in Critically Ill Patients

Version: 1 Date: 22 May 2009

Reviewer: William McGee

Reviewer's report:

Major Compulsory Revisions

Review for Manuscript (Running Title):
Noninvasive Cardiac Output Monitor

Question 1.
The abstract needs to be significantly rewritten. There is no specific question posed by the authors in the abstract. The abstract is more focused on cardiac output. The article spends more time analyzing blood pressure.

Question 2.
The method section of the abstract does not describe any methods. In the body of the paper, however, the methods are reasonably well described.

Question 3.
The data appear to be sound and specifically the cardiac output data is very interesting and could provide a better emphasis for this paper as there are plenty of commonly used and presumably reliable non-invasive blood pressure monitoring devices.

Question 4.
Yes.

Question 5.
For the amount of data presented, the discussion is too long, and a lot of results are incorrectly included in the discussion.

Although Rivers did use an arterial catheter for early goal-directed therapy, I’m not sure that this has uniformly been true. Therefore, some of the assumptions made regarding utility of a non-invasive technique to match the early goal-directed targets may not be consistent with what has been done in all instances. In addition, some of the collection of data may have been confounded by the use of vasopressors, especially when analyzing digital blood pressure. It is not clear which of the patients were actually using vasopressors at the time of data collection.
Question 6.
There is no statement about the limitations of this work and the most significant one, in my view, is the number of patients.

Question 7.
I think the article is generally well referenced.

Question 8.
I don’t think the abstract and title accurately convey what was found. Importantly, all their conclusions are based on the targets that have been identified as part of early goal-directed therapy and the guidelines for treatment of severe sepsis, the majority of this having been done in the Emergency Room within the first several hours of admission. It is unknown whether these same targets would apply to the patients that were studied in this article and specifically the comparison was made between therapy for severe sepsis and septic shock, which was not a clinical condition mentioned in any of the patients reported here.

Question 9.
The writing needs work in terms of clarity, the methodology and the abstract, and many of the statements included in the discussion are not accurate. They are not supported by the data.

This article could simply be a study that looks at the efficacy of this technology versus present technology. The reference to other studies that mention therapy based on targets is not appropriate. Simply, can you agree or disagree that with this level of bias and precision and the R2 value found in this paper for both blood pressure and cardiac output monitoring. Is the data acceptable for this type of monitoring device? In general I would agree with the authors that it is not; however, if more patients were studied, the data may actually look more favorable.

Interestingly, the cardiac output data was very accurate, and the authors did make a suggestion at the end of their paper that this might be a way to develop data rapidly non-invasively. This represents a research theme that could be better developed.

Further suggestions
The non-essential revisions have to do with making sure that the initial abstract better reflects the data that is presented on both cardiac output and blood pressure. I also feel that a better description of the physiology of the patients, specifically how many were on norepinephrine, needs to be better delineated. The major revisions relate to a comparison of apples and oranges. Are we simply asking: can this device measure cardiac output and blood pressure adequately and accurately. This information should be separated from whether or not it is accurate based on some targets related to early goal-directed therapy. No therapy was delivered as a result of this device. So, simply, would it be useful in that situation based on R2 and Bland-Altman analysis? Can we reliably use this
device across the spectrum of patients who we would see in an ICU? I don't think there is enough data here to decide that question one way or the other. The major revision that needs to be done is to include many more patients and have a much better description of their physiology and demographics, especially with regard to the use of vasopressors when talking about a device that measures both cardiac output and blood pressure in the fingertips.

I do think that the cardiac output data specifically was very compelling, and I would encourage the authors to develop this theme.

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

Quality of written English: Not suitable for publication unless extensively edited

Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.

Declaration of competing interests:

Speakers bureau for Edwards LifeSciences, LLC which makes hemodynamic monitoring equipment.