Supplemental material- Cardiac output estimate validation

In our study we used three cardiac output (CO) estimation algorithms to estimate percent change in CO preceding cardiac arrest. The estimates we used, by Erlanger et al., Parlikar et al. and a modification of the algorithm by Fazeli et al., have not been validated in children for either CO estimation or CO change tracking. The Erlanger algorithm has been shown to be capable of tracking directional changes in CO in adults. Sun et al.(1) compared the directional agreement of several CO estimation algorithms with the maximum change in CO measured by thermodilution in a cohort of 120 adult patients with a mean ICU stay of 2 days and a mean of 10 thermodilution measurements. The Erlanger method exhibited a 78% directional agreement with the thermodilution measurements, significantly better than the agreement between MAP and thermodilution measurements which was 56%. The Parlikar and modified Fazeli algorithms' tracking ability has not been assessed, but we believe their accuracy is in line with proprietary commercial algorithms based on the same underline windkessel model. A review of the ability of commercial continuous cardiac output monitors to measure trends in cardiac output by Critchley et al.(2) found that as the change in cardiac output increased so did the algorithms' concordance rates. The review suggests that large percent changes in CO lead to near total agreement in most algorithms.

While the study does not include absolute CO estimation, we include references to validations of absolute CO estimation for the Erlanger(1, 3), Parlikar(4, 5) and Fazeli(6) estimates.

References

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