Non-invasive measurement of digital plethysmographic variability index to predict fluid responsiveness in mechanically ventilated children: A systematic review and meta-analysis of diagnostic test accuracy studies

Background: To date, the use of the plethysmographic variability index (PVI) has not been recommended to guide fluid management in the paediatric surgical population. This systematic review and meta-analysis aimed to summarise available evidence about the diagnostic accuracy of digital PVI to predict fluid responsiveness in mechanically ventilated children.

Methods: We searched the Pubmed, Embase and Web of Science databases, from inception to January 2022, to identify all relevant studies that investigated the ability of the PVI recorded at the finger to predict fluid responsiveness in mechanically ventilated children. Using a random-effects model, we calculated pooled values of diagnostic odds ratio, sensitivity, and specificity of PVI to predict the response to fluid challenge.

Results: Eight studies met the inclusion criteria with a total of 283 patients and 360 fluid challenges. All the studies were carried out in a surgical setting. The area under the summary receiver operating characteristic curve of PVI to predict fluid responsiveness was 0.82. The pooled sensitivity, specificity, and diagnostic odds ratio of PVI for the overall population were 72.4% [95% CI: 65.3-78.7], 65.9% [58.5-72.8], and 9.26 [5.31-16.16], respectively.

Conclusion: Our results suggest that digital PVI is a reliable predictor for fluid responsiveness in mechanically ventilated children in the perioperative setting. The diagnostic performance of digital PVI reported in our work for discrimination between responders and non-responders to the fluid challenge was however not as high as previously reported in the adult population.