Publication Brief

Ultrasound Dilution: An Accurate Means of Determining Cardiac Output in Children

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BACKGROUND

• Cardiac output (CO), a useful measure of myocardial performance, is frequently monitored in critically ill adults in order to guide physicians’ treatment strategies.
• The COstatus® system (Transonic Systems Inc., Ithaca, NY) uses ultrasound dilution (UD) technology and works off in-situ catheters and an innocuous normal saline indicator that allows for routine measurements of CO and blood volumes in pediatric patients.
• Standard pulmonary artery thermodilution method (PAC) of determining CO is not without risk. Its invasive nature and other technical considerations makes it particularly challenging to use in children.

OBJECTIVE

To validate CO measured by COstatus® with PAC thermodilution CO measurements.

STUDY

• Prospective study that included any child with a structurally normal heart that underwent hemodynamic evaluation in the cardiac catheterization laboratory of a single institution.
• Twenty-eight patients were evaluated (median age: 8 yrs; median weight: 31 kg).
• A prograde right heart catheterization was performed and CO was determined using (PAC) thermodilution technique. Results were compared with CO measurements obtained by using COstatus®.
• Results were analyzed by standard correlation, Bland-Altman, and Critchley and Critchley analyses.

RESULTS

<table>
<thead>
<tr>
<th>CAR DiAG Index</th>
<th>MEAN</th>
<th>RANGE</th>
<th>COReLAtiON CoEFFICIENT “r”</th>
<th>BLAND-ALTMAN</th>
<th>ERROR</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MEAN DIFFERENCE</td>
<td>PRECISION (2SD)</td>
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<tr>
<td>COstatus®</td>
<td>3.17 L/min</td>
<td>± 1.31 L/min</td>
<td>0.95 (p&lt;0.0001)</td>
<td>- 0.004 L/min</td>
<td>0.8 L/min</td>
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<tr>
<td>PAC</td>
<td>3.18 L/min</td>
<td>± 1.35 L/min</td>
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STUDY’S CONCLUSIONS

• COstatus®, using ultrasound dilution technique of determining CO, provides a less invasive method than traditional pulmonary artery thermodilution for accurately determining cardiac output in children.
• This study represents the first validation of the COstatus® system in pediatric patients.
• Further studies are required to establish its accuracy in pediatric patients with cardiac shunts and other hemodynamically unstable conditions.

REFERENCES


www.transonic.com