Publication Brief

Accuracy & Precision of COstatus Ultrasound Dilution Methodology for Hemodynamic Assessment of Infants and Children Undergoing Cardiac Surgery

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OBJECTIVE
To investigate the accuracy and precision of COstatus® (Transonic Systems Inc., Ithaca, NY) during congenital heart surgery (CHS) in neonates and infants.

STUDY
• Prospective, observational study of 15 patients weighing < 15 kg undergoing CHS for VSD Ventricular Septal Defect (VSD, n = 10); Atrioventricular Septal Defect (AVSD, n = 2); Transposition of the Great Arteries (TGA, n = 1); Right Ventricular Outflow Tract Obstruction (RVOTO, n = 1).

  Mean age: 160 days (6 days to 3.36 years)
  Mean Weight: 5.2 kg (3.2 - 14.1)

• Measurements of 2-4 injections of body temperature saline (0.5-1 mL/kg/session) were begun in the OR, before and immediately after cardiopulmonary (CP) bypass. COstatus® measurements were repeated in the pediatric intensive care unit (PICU) 2, 3, 4, 5, 6, 12 and 24 hours after weaning from CP bypass.

• COstatus® accuracy was tested in 9 patients in the OR by simultaneous transit time ultrasound measurements using COnfidence Flowprobe (Fig. 1)(Transonic Systems).

RESULTS
• 131 measurement-sessions were performed. 41 left-to-right shunts were identified.
• The % coefficient of variation was calculated for cardiac output (CO), Central Blood Volume Index (CBVI), Total End Diastolic Volume Index (TEDVI) and Active Circulation Volume Index (ACVI) in each session.
• Analysis of simultaneous measurements of cardiac output by transit-time ultrasound (COtt) and ultrasound dilution (COud) methodologies produced a percentage error (PE) (2SD/mean COtt • 100) of 23%.

| % COEFFICIENT OF VARIATION (CV = SD/Mean) |
|-------|-----|-----|-----|
| CO    | CBVI| TEDVI| ACVI|
| 3.45 (0 - 18) | 3.8 (0 - 15.5) | 3.4 (0 - 12) | 5.8 (0 - 24.6) |

STUDY’S CONCLUSIONS
• COstatus® offers reproducible measurements in infants and children without requiring insertion of a dedicated catheter.
• 2 injections are generally adequate for data collection in patients without identified shunts.
• The observed PE between COtt and COud measurements (23%) is within the recommended limits.3

COSTATUS® OBSERVATIONS
• Important COstatus validation in children against Gold Standard transit-time ultrasound technology.

REFERENCES
1 Perez De Sa V, Johansson S, Olsson AK, Johansson J, Lindberg L, “Accuracy and Precision of COstatus Ultrasound Dilution Methodology for Hemodynamic Assessment of Infants and Children undergoing Cardiac Surgery”. Poster Presentation at the Pediatric Cardiac Int Care Soc 2010, Dec 8-11, Miami Beach, FL. (Transonic Reference # CO8115V)
2 Ibid, “Accuracy and Precision of a New Method for Hemodynamic Assessment in Children Undergoing Cardiac Surgery Based on Ultrasound Dilution Methodology. Poster Presentation, EAPS 2010, Copenhagen. (Transonic Reference # CO8043AH)