

Temperature and Perfusion Strategy During Cardiopulmonary Bypass (CPB) in Neonates and Infants

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Introduction:

Temperature and perfusion during cardiopulmonary bypass (CPB) are two modifiable variables which could potentially impact neurologic outcome in neonates and infants after surgery for congenital heart defect (CHD). We conducted an international survey to determine variability in practice of temperature and perfusion strategies during CPB at various children's hospitals.

Methods:

We performed an anonymous, cross-sectional, cohort, internet-based survey involving pediatric cardiac surgical teams of America, Europe, Asia and Australia. The list of survey participants was developed using congenital heart surgery network. The content and phraseology of survey questions were developed in an iterative manner using modified Delphi method. Pediatric and cardiac intensivists, pediatric cardiac surgeons and perfusionists assessed the content and construct validity of the survey items. Pilot testing of the survey was performed for readability, clarity and functionality prior to finalization and distribution. The final survey was developed based on the response from these reviews.

Results:

Out of 1960 pediatric cardiac surgical team members to whom the survey was emailed, 284 (14.4%) responded. Of the 284 respondents, 280 (98.5%) were pediatric surgeons and 4 (1.4%) were perfusionists. Of the 153 respondents who answered all the questions, the proportion of practitioners from free-standing children's versus university versus community hospital were 31%, 54% and 14%, respectively; from America, Europe, Asia and Australia were 32%, 46%, 19% and 3%, respectively. CPB flow in cc/kg versus cc/sq meter cardiac index was used by 47% versus 53%. The goal mean arterial pressure on CPB used was 30-50 mm Hg by majority (78%). When using selective antegrade cerebral perfusion (SACP), 44% used cc/kg flow strategy whereas 20% used % base flow, 16% titrated to NIRS, 10% titrated to MAP and remaining had inconsistent approach. Mild, moderate, deep and profound hypothermia was used by 6%, 26%, 59% and 9% for Norwood stage 1, respectively. For ASD repair, 94% used mild; whereas for TAPVR and aortic arch repairs, 75% and 88% used moderate-to-deep hypothermia. Rectal probe was used by majority as temperature monitoring site. Arterial to nasopharyngeal cooling and rewarming gradients of 4-10°C were used by 71% of respondents.

Conclusions:

There is variability in practice of temperature and perfusion strategies during CPB in children. More work is needed to study the outcome differences following these strategies.