

Validation of end-tidal PCO₂ and transcutaneous PCO₂ as surrogates of arterial PCO₂ in awake children

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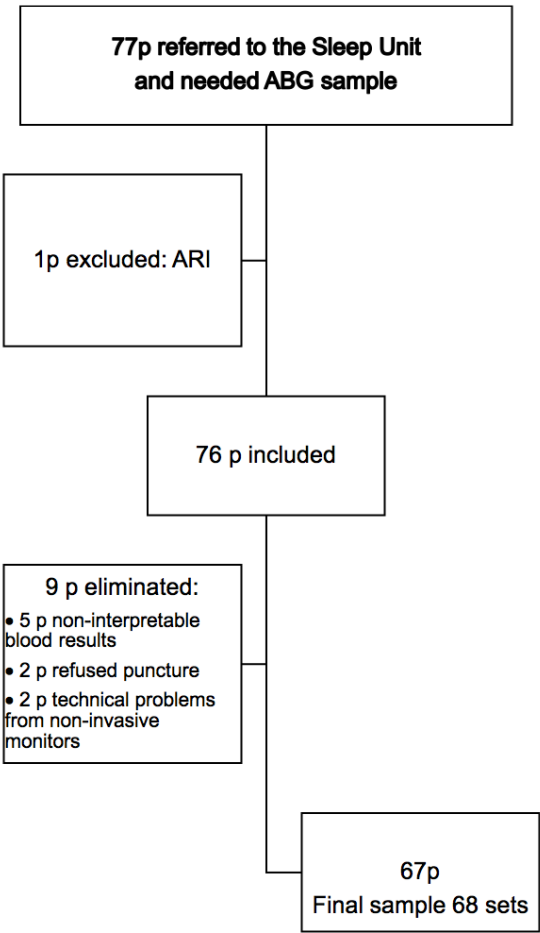
Abstract

Arterial blood gas analysis (ABG) is the gold standard test for carbon dioxide measurement. End-tidal PCO₂ (PetCO₂) and transcutaneous PCO₂ (PtcCO₂) are non-invasive alternative methods. Objective: to examine the use of PetCO₂ and PtcCO₂ as PaCO₂ surrogates in awake children. Methods: Prospective observational study. Consecutive awake children in stable condition referred to the Sleep Unit of Hospital de Pediatría Prof. Dr. J. P. Garrahan with suspected or confirmed SRRD requiring ABG were included. PetCO₂ and PtcCO₂ were recorded simultaneously during arterial puncture. PetCO₂ and PtcCO₂ values were compared with PaCO₂. Correlation coefficient and Bland-Altman analysis were applied. Sample size was calculated considering a mean difference [?] 3 mmHg as clinically acceptable. Results: 68 sample sets were obtained from 67 patients. Median age was 9.11 years (0.23-18.76). During 94.1% of the procedures patients breathed spontaneously, 30% needed multiple punctures and 92% resulted in pain. Median (IQR) PaCO₂ (mmHg) was 36.3 (31.45; 40.90), PetCO₂ 33.0 (29;39) and PtcCO₂ 38.8 (32.95;43.32). Correlation and agreement for PaCO₂/PetCO₂ and PaCO₂/PtcCO₂ was: r= 0.6 and 0.9, and median of bias=2.83(-9.97;15.64) and -1.88 (-9.01;5.24), respectively. Hypercapnia (PaCO₂>45.0 mmHg) was present in 8/68 (11.8%) samples. Sensitivity, specificity, positive predictive value and negative predictive value to detect hypercapnia with PetCO₂ was 38 %, 98%, 75% and 92%, respectively, and with PtcCO₂, 100%, 90%, 57% and 100%, respectively. Conclusion: PtcCO₂ showed better agreement with PaCO₂ than PetCO₂, but because of the wide dispersion of values, neither method can replace the gold standard. Transcutaneous CO₂ might be a good screening tool to detect hypercapnia in awake children.

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Validation of end-tidal PCO₂ and transcutaneous PCO₂ as surrogates of arterial PCO₂ in awake children. 1 available at <https://authorea.com/users/325976/articles/453904-validation-of-end-tidal-pco2-and-transcutaneous-pco2-as-surrogates-of-arterial-pco2-in-awake-children>

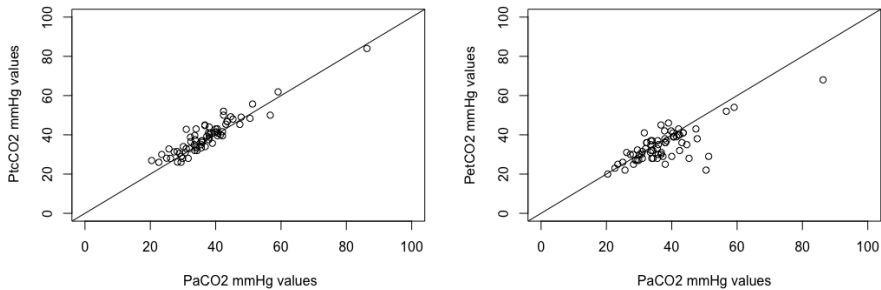
Figure 1: Enrollment flowchart

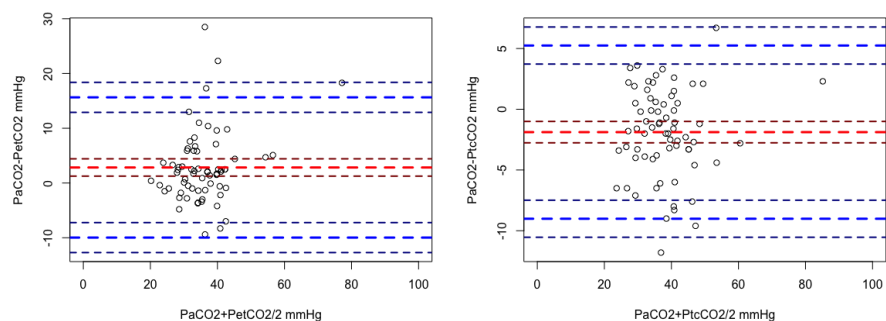


p: patients; ABG: arterial blood gas; ARI: acute respiratory infection

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Table 1.Main characteristics of patients.doc available at <https://authorea.com/users/325976/articles/453904-validation-of-end-tidal-pco2-and-transcutaneous-pco2-as-surrogates-of-arterial-pco2-in-awake-children>





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Table 2. Summary of pediatric published experiences.doc available at <https://authorea.com/users/325976/articles/453904-validation-of-end-tidal-pco2-and-transcutaneous-pco2-as-surrogates-of-arterial-pco2-in-awake-children>