

Transcutaneous arterial carbon dioxide pressure monitoring in critically ill adult patients.

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OBJECTIVE: To evaluate the accuracy of transcutaneous PCO₂ (PtcCO₂) as a surrogate for arterial PCO₂ (PaCO₂) in a cohort of adult critically ill patients in a medical intensive care unit (ICU).

DESIGN: Prospective observational study comparing paired measures of transcutaneous and arterial PCO₂.

SETTING: A 26-bed medical ICU.

PATIENTS: Fifty ICU patients monitored with a SenTec Digital Monitor placed at the ear lobe over prolonged periods.

RESULTS: A total of 189 paired PCO₂ measures were obtained. Twenty-one were excluded from analysis, because profound skin vasoconstriction was present (PCO₂ bias = -10.8 +/- 21.8 mmHg). Finally, 168 were analysed, including 137 obtained during mechanical ventilation and 82 under catecholamine treatment. Body temperature was below 36 degrees C for 27 measurements. Mean duration of monitoring was 17 +/- 17 h. The mean difference between PaCO₂ and PtcCO₂ was -0.2 +/- 4.6 mmHg with a tight correlation (R₂=0.92, p>0.01). PCO₂ bias did not significantly change among three successive measurements. Changes in PaCO₂ and in PtcCO₂ between two blood samples were well correlated (R₂=0.78, p>0.01). Variations of more than 8 mmHg in PtcCO₂ had 86% sensitivity and 80% specificity to correctly predict similar changes in PaCO₂ in the same direction. Catecholamine dose or respiratory support did not affect PtcCO₂ accuracy. Hypothermia has only a small effect on accuracy. No complication related to a prolonged use of the sensor was observed

CONCLUSION: Transcutaneous PCO₂ provides a safe and reliable trend-monitoring tool, provided there is no major vasoconstriction.

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