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Usefulness of transcutaneous carbon dioxide pressure monitoring to measure blood gases in adults hospitalized for respiratory disease

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OBJECTIVE: To evaluate the usefulness of transcutaneous carbon dioxide pressure ($TcPCO_2$) monitoring in patients hospitalized for respiratory disease.
PATIENTS AND METHODS: We used a SenTec $TcPCO_2$ monitor that also determines transcutaneous oxygen saturation (SpO_2) by means of a sensor placed behind the ear lobe at a temperature of 42 degrees C. We compared arterial blood gas measurements--$PaCO_2$ and arterial oxygen saturation (SaO_2)--with transcutaneous measurements and analyzed the correlation, regression line, and agreement between the 2 methods.
RESULTS: Thirty patients (20 men and 10 women) with various respiratory diseases and a mean (SD) age of 71 (13) years were included in the study. The median $TcPCO_2$ was 43.25 mm Hg and the median $PaCO_2$ was 42.6 mm Hg with no significant differences between the 2 measurements. The correlation was significant (rho=0.979; P< .0001) and the corresponding regression equation was $TcPCO_2$=-2.475+1.058 $PaCO_2$. The mean difference was 0.16 mm Hg (95% confidence interval [CI], --0.74 to 1.06). The lower limit of agreement (mean -1.96 SD) was -4.64 mm Hg, and the upper limit (mean +1.96 SD) was 4.96 mm Hg. For SaO_2, the median was 94% and for SpO_2, 95%. The difference between the 2 medians was significant (P< .004). The correlation was also significant (rho=0.822; P< .0001) with SpO_2=4.427+0.97 SaO_2. The mean difference was 1.14% (95% CI, 0.381% to 1.899%). The lower limit of agreement (mean -1.96 SD) was --2.93% and the upper limit (mean +1.96 SD) was 5.21%
CONCLUSIONS: Transcutaneous determination of carbon dioxide pressure and oxygen saturation is useful for patients hospitalized for respiratory disease in view of its good correlation and agreement, although SpO_2 does tend to overestimate SaO_2.

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