**Supplemental Data: DOI:**[**10.1515/cclm-2015-0333**](http://dx.doi.org/10.1515/cclm-2014-0090)

**Figure A.** Flowchart of the study

CAHCO3‒

Database extraction

ABL800 Flex® blood gas analyzers

n=17698 patients

MV*t*CO2

Database extraction

Cobas Integra 400 Plus® analyzers

n=100282 patients

Fusion of both databases

based on patients’ files numbers using

VLOOKUP function (Excel, Microsoft, USA)

CAHCO3‒ associated to concomitant MV*t*CO2

n=6850 patients

Patients with

PaCO2 ≥45 mmHg

and

PaO2 <70 mmHg

n=292

CAHCO3‒ *versus* MV*t*CO2 concentrations

Passing-Bablok regression

Bland-Altman plots

Mann-Whitney test

Distribution of absolute differences

**Figure B.** Levey-Jennings chart and inter-assay coefficient of variation for measured total carbon dioxide (*t*CO2) values from quality control collected over an 8-month period.

**Legend**: After excluding cases presenting alarm messages, the blood gases (CAHCO3‒) database was merged with the MV*t*CO2 database, using the VLOOKUP function from Excel (Microsoft, USA) based on patients’ file numbers, in order to select only patients sampled at the same time and assayed for both these alkaline indicators (n=6850). Then, we selected patients with a PaCO2 ≥45 mmHg associated to a PaO2 <70 mmHg (*i.e.* the blood gases criteria of OHS), resulting in a database of 292 patients with simultaneous CAHCO3‒ and MV*t*CO2 values.

Abbreviations: CAHCO3‒: calculated arterial bicarbonate concentrations; MV*t*CO2: measured venous total carbon dioxide concentrations; PaCO2: partial pressure of arterial carbon dioxide; PaO2: partial pressure of arterial oxygen.

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**Legend**: The solid bold black line (X) represents the MV*t*CO2 target concentration for quality control (Liquid Unassayed Multiqual®, ref#699, Bio-Rad). The two horizontal short-dashed lines on either side represent one standard deviation (+1S) from the target concentration, and the two solid non-bold lines represent two standard deviations (+2S) from the target concentration. The green points (n=471) correspond to the MV*t*CO2 values of Bio-Rad quality control measured twice daily using the phosphoenolpyruvate reaction (CO2-L, ref#03289923 190, Roche Diagnostics, Germany) and collected from April to December 2014.

Abbreviations: CV: coefficient of variation; MV*t*CO2 conc.: measured venous total carbon dioxide concentrations; SD: standard deviation.

**Figure C.** Variations of *t*CO2 concentrations measured in heparinized plasma stored for up to 6 hours after centrifugation.



**Legend**: The solid black curve represents the mean biases from baseline for *t*CO2 venous concentrations measured on lithium heparin-plasma stored at room temperature (21.3±1.8°C) for up to 6 hours after centrifugation (n=21 hospitalized patients). The two vertical bars on either side represent the standard deviation from the mean, and the short-dashed lines correspond to the analytical change limit, which is equals to 1.96\*√2\*CVa=15.4% (CVa: inter-assay imprecision, calculated from Bio-Rad Quality Control values collected over an 11-month period, *see above* Figure A). The mean baseline plasma *t*CO2 concentration (min; max) was 23.8 (19.5; 30.7) mmol/L. The mean biases ± standard deviation from baseline for *t*CO2 concentrations were ‒5.5±3.5%, ‒12.4±4.5%, ‒19.7±7.1% at 2h, 4h, and 6h of storage after centrifugation, respectively.

Abbreviations: ACL: analytical change limit (%); *t*CO2: total carbon dioxide.

**Table A.** Agreement analysis between the different measured and calculated bicarbonates cut-offs.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cut-off (mmol/L) | MV*t*CO2 | | CAHCO3‒ | | **% agreed values** | **Inter-rater agreement results** | | |
| % NEG | % POS | % NEG | % POS | **Cohen’s κ** | 95%CI | Strength of agreement \* |
| All patients (n=6850) | | | | | | | | |
| 27 | 86.3 | 13.7 | 86.0 | 14.0 | **95.1** | **0.796** | 0.774-0.817 | Good |
| 28 | 89.6 | 10.4 | 89.6 | 10.4 | **96.4** | **0.805** | 0.781-0.829 | Good |
| 29 | 92.5 | 7.5 | 92.1 | 7.9 | **97.5** | **0.824** | 0.798-0.850 | Very good |
| 30 | 94.6 | 5.4 | 94.0 | 6.0 | **98.1** | **0.826** | 0.797-0.856 | Very good |
| Patients with a PaCO2 ≥45 mmHg associated to a PaO2 <70 mmHg (n=292) | | | | | | | | |
| 27 | 51.0 | 49.0 | 47.6 | 52.4 | **87.0** | **0.740** | 0.663-0.817 | Good |
| 28 | 57.5 | 42.5 | 54.8 | 45.2 | **89.7** | **0.792** | 0.721-0.862 | Good |
| 29 | 63.7 | 36.3 | 61.0 | 39.0 | **91.8** | **0.825** | 0.758-0.892 | Very good |
| 30 | 71.6 | 28.4 | 68.5 | 31.5 | **92.1** | **0.813** | 0.739-0.886 | Very good |

**Legend**:

\* according to Cohen *et al*, 19681, the Cohen’s K-value can be interpreted as follows:

<0.20 Poor strength of agreement

0.21 – 0.40 Fair strength of agreement

0.41 – 0.60 Moderate strength of agreement

0.61 – 0.80 Good strength of agreement

0.81 – 1.00 Very good strength of agreement

1 Cohen J. Weighted kappa: nominal scale agreement with provision for scaled disagreement or partial credit. Psychol Bull 1968;70:213–20.

Abbreviations: CAHCO3‒: calculated arterial bicarbonate concentrations; MV*t*CO2: measured venous total carbon dioxide concentrations; %NEG and %POS: percentages of bicarbonate concentrations below and above the corresponding cutoffs, respectively; 95%CI: 95% confidence interval.