Physiological Approach to Assessment of Acid–Base Disturbances

TO THE EDITOR: In their algorithm for the assessment of acidosis, Berend et al. (Oct. 9 issue)\(^1\) state that in respiratory acidosis, a rise in the serum bicarbonate level of 1 mmol per liter per 10 mm Hg increase in the partial pressure of arterial carbon dioxide (Paco\(_2\)) above normal indicates that the process is acute. This claim, which is based on the observed relationship between serum bicarbonate and Paco\(_2\) in acute hypercapnia, is not always true. As pointed out many years ago, the same set of values for the carbon dioxide–bicarbonate buffer pair can also be seen in mixed chronic respiratory acidosis and metabolic acidosis.\(^2\) Distinguishing simple acute respiratory acidosis from chronic respiratory acidosis combined with metabolic acidosis requires knowledge of the clinical history.\(^3\,4\) Stated more broadly, sets of serum values for bicarbonate and Paco\(_2\) that fall within a confidence band that relates the two values in patients with uncomplicated respiratory disorders are consistent with but not diagnostic of a simple disorder. Failure to recognize this important but often misunderstood point can lead to serious mistakes in diagnosis.

Aaron Spital, M.D.
Mount Sinai St. Luke’s
New York, NY
spital@att.net

No potential conflict of interest relevant to this letter was reported.


DOI: 10.1056/NEJMc1413880

TO THE EDITOR: Berend et al. propose an instructive algorithm for the assessment of metabolic acidosis. As underscored by the authors, urinary ammonium is a valuable diagnostic measurement in the case of normal anion-gap acidosis. An increased value for urinary ammonium (280 mmol per day) suggests an extrarenal cause and is generally associated with a negative urinary anion gap. Decreased excretion (<80 mmol per day) indicates impaired renal urine acidification and is usually associated with a positive urinary anion gap. Because urinary ammonium is seldom measured, the urinary anion gap and urinary osmolal gap are used as surrogates.\(^1\,2\) Nevertheless, the reliability of these measures in clinical practice has been challenged.\(^3\) The linear relationship between the urinary anion gap and urinary ammonium has been questioned.\(^4\) The urinary anion gap is unreliable in the case of polyuria, a urine pH of more than 6.5, or excretion of an anion other than chloride, and the urinary osmolal gap may be misleading in the case of undissociated acid.

The use of a valuable measurement, rather than unsatisfactory surrogates, would lead to a modern and simplified diagnostic approach. Since urinary ammonium can be easily quantified with the use of modern autoanalysers,\(^3\) laboratories should be encouraged to provide direct measurement of urinary ammonium.

Mohamad Zaidan, M.D.
Necker Hospital
Paris, France
mohamad.zaidan@hotmail.fr

No potential conflict of interest relevant to this letter was reported.


DOI: 10.1056/NEJMmc1413880

TO THE EDITOR: I agree with the fundamental decision made by Berend et al. to choose the physiological approach, since the base-excess approach can be misleading when a chronic respiratory disorder is in place, and the Stewart method is less intuitive. However, I am curious why the authors do not mention the use of the ratio of the partial pressure of arterial oxygen to...