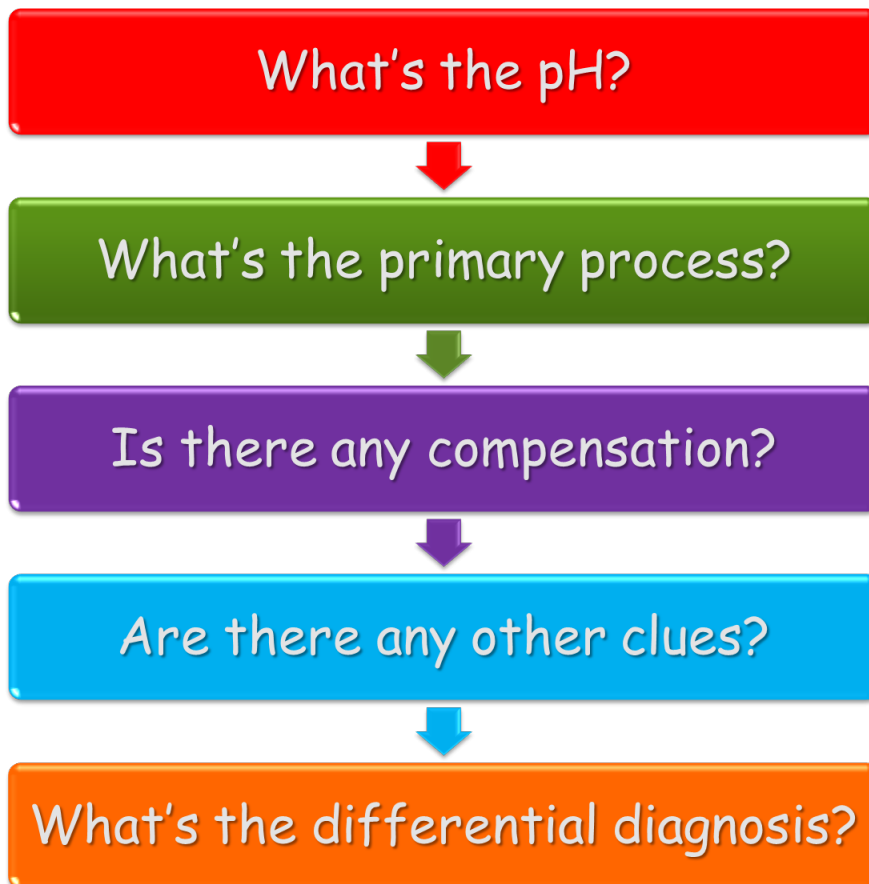


Blood Gas #3

History: An 85-year-old man is found unconscious at home. He has not been seen for several days. Below is his arterial blood gas on arrival:

pH 7.21	Na 165 mmol/L
pCO ₂ 36 mmHg	K 6.2 mmol/L
HCO ₃ 14 mmol/L	Cl 136 mmol/L
Lactate 10.3 mmol/L	Glucose 39 mmol/L

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What's the pH?

7.21 = acidaemia

What's the primary process?

HC03 14 = metabolic acidosis

Is there any compensation?

Expected pC02 = $1.5 \times \text{HC03} + 8 \pm 2$

= $1.5 \times 14 + 8 \pm 2$

= 27 – 31

Actual pC02 is higher suggesting incomplete compensation or co-existing respiratory acidosis.

Are there any other clues?

$$\text{Anion gap} = \text{Na} - (\text{Cl} + \text{HCO}_3)$$

$$= 165 - (136 + 14)$$

$$= 15$$

$$= \text{NAGMA}$$

$$\text{Corrected Na} = \text{Na} + (\text{glucose} - 5) / 3$$

$$= 165 + (39 - 5) / 3$$

$$= 176.3$$

$$= \text{severe hyponatraemia}$$

Electrolyte clues:

Lactate, chloride, potassium and sodium are markedly elevated.
Glucose is markedly elevated.

What's the differential diagnosis?

Description: This arterial blood gas reveals a moderate acidemia secondary to mixed non-anion gap metabolic acidosis and respiratory acidosis. There is hyperglycemia and severe hyponatraemia with a severe lactic acidosis, elevated chloride and potassium.

Interpretation: In this clinical context, this gas would suggest severe dehydration and a hyperglycemic, hyperosmolar state. Elevated lactate is normally associated with an elevated anion gap, however the severity of hyperchloremia is masking this. There is likely to be acute renal failure contributing to the acidosis and elevated potassium. Respiratory compensation is incomplete, probably due to impairment associated with altered mental state. Hyponatraemia and volume deficit must be corrected slowly.

Underlying sepsis or other precipitating cause should be sought and treated, however prognosis is likely to be poor.

Additional information: The final diagnosis was sepsis with altered conscious state and reduced oral intake for several days, severe dehydration and acute renal failure (creatinine 400). The patient died in ED soon after presentation.