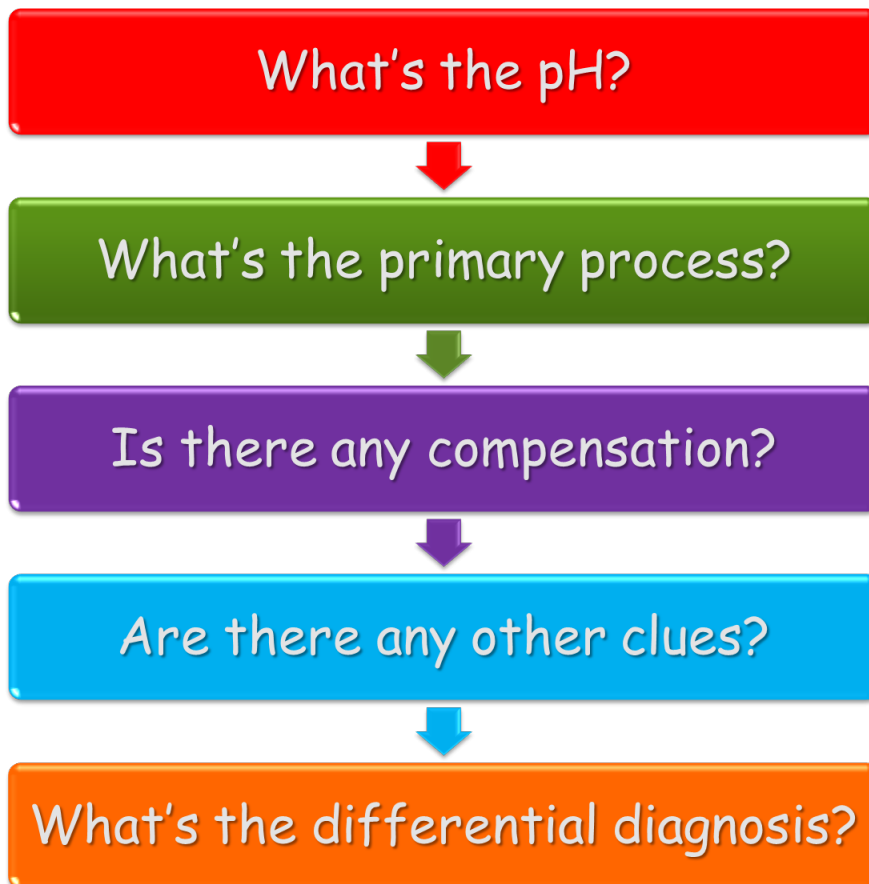


Blood Gas #4

History: An 83-year-old woman presents with an altered conscious state and a fever. Below is her arterial blood gas on arrival:

pH 7.24	Na 142 mmol/L
pCO ₂ 22 mmHg	K 4.7 mmol/L
pO ₂ 115 mmHg (FiO ₂ 0.4)	Cl 114 mmol/L
HCO ₃ 9 mmol/L	Glucose 13 mmol/L
Lactate 12 mmol/L	

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What's the pH?

7.24 = acidaemia

What's the primary process?

HC03 = 9

∴ this is a primary metabolic acidosis

Is there any compensation?

Expected pC02 = 1.5 x HC03 + 8

= 1.5 x 9 + 8

= 21.5

The measured pC02 is 22, therefore there is maximal respiratory compensation.

Are there any other clues?

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

$$= 142 - (114 + 9)$$

$$= 19$$

$$= \text{HAGMA}$$

$$\text{Delta gap} = (\text{Anion gap} - 12) \div (24 - \text{HCO}_3)$$

$$= (19 - 12) \div (24 - 9)$$

$$= 0.47$$

This suggests a coexisting NAGMA.

Electrolyte clues:

Lactate is severely elevated. Chloride and glucose are slightly elevated. Sodium and potassium are within normal limits.

$$\text{Expected PAO}_2 = (713 \times \text{FiO}_2) - (\text{pCO}_2 \times 1.25)$$

$$= (713 \times 0.4) - (22 \times 1.25)$$

$$= 257.7$$

$$\text{A-a gradient} = \text{PAO}_2 - \text{PaO}_2$$

$$= 257.7 - 115$$

$$= 142.7$$

$$= \text{elevated A-a gradient}$$

What's the differential diagnosis?

Description: This arterial blood gas demonstrates a compensated metabolic acidosis with mixed HAGMA and

NAGMA components. There is severe hyperlactataemia with elevated chloride and glucose. Sodium and potassium are within normal limits. There is a significantly elevated A-a gradient.

Interpretation: In this clinical context, the blood gas suggests severe sepsis / septic shock from a respiratory source, with impairment of oxygenation and severe lactic acidosis contributing to the anion gap. Non-anion gap acidosis (elevated chloride) is likely associated with saline hydration or adrenal insufficiency. Sources of sepsis should be sought and treated and the patient resuscitated appropriately.

Additional information: Community-acquired pneumonia with sepsis.