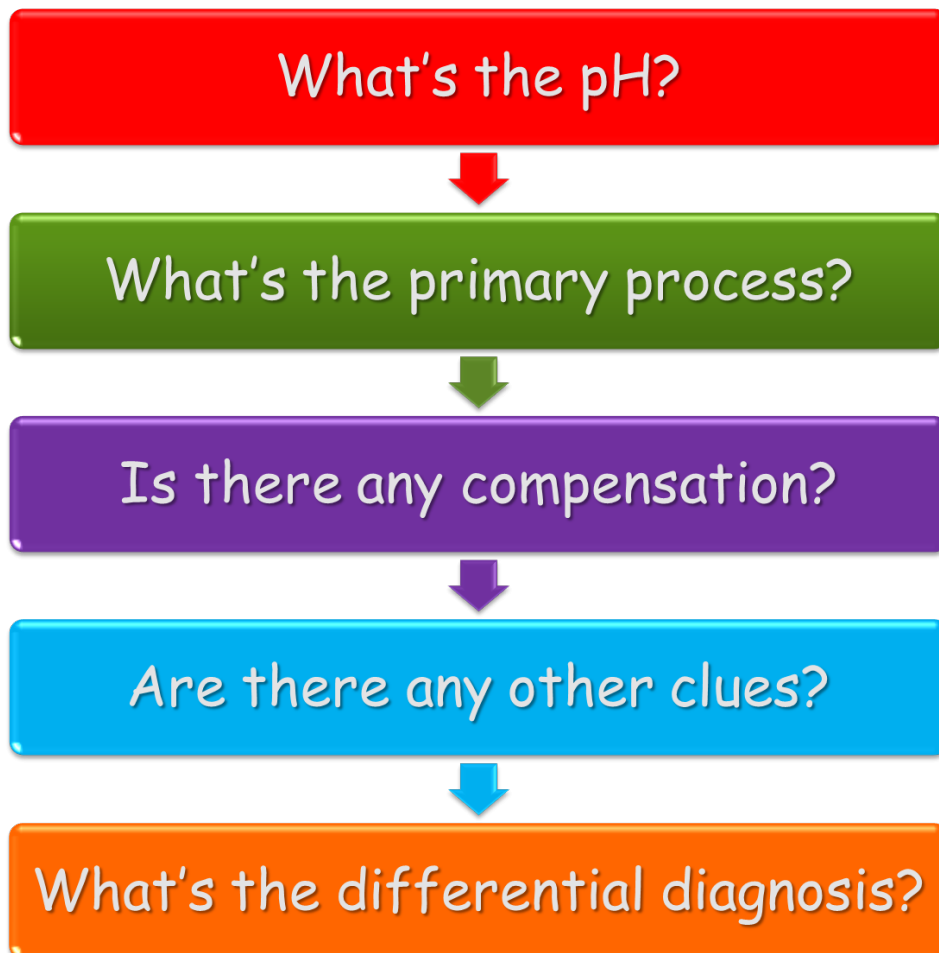


Blood Gas #6

History: A 33-year-old indigenous man presents with general malaise. Below is his arterial blood gas shortly after arrival:

pH 6.95	Na 128 mmol/L
pCO ₂ 21 mmHg	K 4.7 mmol/L
HCO ₃ 4 mmol/L	Cl 97 mmol/L
Lactate 0.9 mmol/L	Glucose 5.9 mmol/L

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What's the pH?

6.95 = severe acidaemia

What's the primary process?

HC03 4 = primary metabolic acidosis

Is there any compensation?

Expected pC02 = 1.5 x HC03 + 8

= 1.5 x 4 + 8

= 14 mmHg

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

Are there any other clues?

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

$$= 128 - (97 + 4)$$

$$= 27$$

Therefore the anion gap is markedly elevated.

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

$$= (27 - 12) \div (24 - 4)$$

$$= 0.7$$

Consistent with a co-existing anion and non-anion gap acidoses.

Electrolyte clues:

Sodium is low, chloride is borderline low. Potassium, glucose and lactate are all within normal limits.

What's the differential diagnosis?

Description: This arterial blood gas shows a severe acidemia due to primary mixed high anion gap and non-anion gap acidoses. There is either incomplete respiratory compensation, or a coexisting primary respiratory acidosis. The sodium is low. The chloride is borderline low, which is normally associated with a metabolic alkalosis. The potassium, glucose and lactate are all within normal limits.

Interpretation: This is a potentially life threatening acidemia. The markedly high anion gap limits the diagnostic possibilities in this clinical context to diabetic ketoacidosis, however the patient has a normal serum blood glucose which essentially excludes this possibility, alcoholic ketoacidosis, toxic alcohol ingestion and possibly uraemia.

The severity of the acidosis suggests a sub-acute development consistent with this differential diagnosis. Renal tubular acidosis or Addison's disease in the context of sepsis (although the lactate is low) should also be considered.

Additional information: Acute on chronic renal failure secondary to sepsis. Urea 63.1 mmol/L, creatinine 2880 µmol/L (previously 441).