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Simple Approach to Acid Base

Things you need:

1) ABG
2) Renal (Na^+, Cl^-, $HCO3^-$)

1) pH – (normal 7.38-7.42) – acidemic or alkalemic?
2) Anion Gap [Na^+ - (Cl^- + HCO_3^-)] - (normal 12-16)
   if >16 then **Anion Gap Metabolic Acidosis** (AGMA)
3) CO_2 – (normal about 40)
   if <40 consider **Respiratory Alkalosis**
   if >40 consider **Respiratory Acidosis**
4) HCO_3^- (normal 18-24)
   if <18 consider **Metabolic Acidosis**
   if >24 consider **Metabolic Alkalosis**

Special situations:

If patient has AGMA then evaluate delta-delta (gap-gap, corrected HCO_3^-)
   Corrected HCO_3^- = AG - 12 + HCO_3^-
   If Corrected HCO_3^- > 30 consider **Metabolic Alkalosis**

What to do:

1) AGMA – go through MUDPILES differential diagnosis
   labs: **serum ketones, ASA, lactic acid, osmoles**
   osm gap – measure osm - calculated osm (Na^+ x 2 + BUN/2.8 + Glucose/18)
      if osm gap > 20 then consider toxins (ethanol, ethylene glycol, methanol)
2) NAGMA – HARD UP mnemonic for differential
   a. Hyperal
   b. Acetazolamide
   c. RTA
   d. diarrhea
   e. ureteral diversion
   f. pancreatic fistula
   labs: **urine Na^+, K^+, Cl^-, pH, serum K^+**
   urinary anion gap – U_{Na+} + U_{K+} - U_{Cl-}
      Negative gap = GI loss of HCO_3^-
      Postive anion gap = altered distal urinary acidification
         Urine pH <5.5, high plasma K^+ = type 4 (Hyperkalemic) RTA
         Urine pH <5.5, low K^+ = type 2 (Proximal) RTA
         Urine pH >5.5, low-normal K^+ = type 1 (Distal) RTA
3) Metabolic Alkalosis – Chloride responsive vs. Chloride resistant
   labs: **urine Cl^-**
   U_{Cl-} < 15 = Cl^- responsive (contraction alkalosis)
   U_{Cl-} > 15 = Cl^- resistant (Cushings, hyperaldosteronism, hypo Mg^{2+}, hypo K^+)
4) Respiratory Acidosis (intubated patient) – Increase Resp Rate or Tidal Volume
5) Respiratory Alkalosis (intubated patient) – Decrease Resp Rate or Tidal Volume