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Nursing fundamentals – Basic metabolic panel (BMP)

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Basic metabolic panel (BMP)

- Potassium
- Sodium
- Chloride
- Bicarbonate
- Blood urea nitrogen (BUN)
- Creatinine
- Glucose
- Calcium

A complete metabolic panel (CMP) includes all these plus ALP, ALT, AST, protein, bilirubin, and albumin

Potassium (K)

- Normal range is 3.5 - 5.0 mEq/L
- Hypokalemia
    - Below 3.5 mEq/L
    - Treated with PO or IV potassium
    - Presentation includes muscle weakness, dysrhythmias, kidney effects
    - Can be caused by vomiting, diarrhea, diuretics
    - Often goes along with hypomagnesemia
- Hyperkalemia
    - Above 5.0 mEq/L
    - Treated with patiromer when stable and with insulin and glucose when acute
    - Presentation includes muscle weakness up to paralysis and dysrhythmias including cardiac arrest

Sodium (Na)

- Normal range is 135 – 145 mEq/L
- Volume status must be assessed. Can be low or high due to being relative to volume status
- Hyponatremia
    - Below 135 mEq/L
    - Below 120 is considered critical
    - Presentation includes seizures and coma
    - Must be corrected slowly. Generally no quicker than an increase of 0.5 mEq/L per hour
- Hypernatremia
    - Above 145 mEq/L
    - Most often related to dehydration

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Chloride (Cl)

- Normal range is 98 - 106 mEq/L (Often taught as 95-105)

Bicarbonate (Hco3)

- Normal range is 23 – 28 mEq/L
- Used in combination with CO2 and PH to assess acid base balance
- Low bicarbonate indicates acidosis
- Elevated bicarbonate indicates alkalosis

Blood urea nitrogen (BUN)

- Normal range is 8 – 20 mg/dl
- One of the primary labs for assessing kidney function
- The kidneys remove urea from the blood. High levels of urea indicate the kidneys are not doing their job

Creatinine

- Normal range for a female: 0.50 to 1.10 mg/dL
- Normal range for a male: 0.70 to 1.30 mg/dL
- One of the primary labs for assessing kidney function
- The kidneys remove creatinine from the blood. High levels of urea indicate the kidneys are not doing their job

A calculated lab value is derived from the BUN with the creatinine. BUN/creatinine ratio should be 10:1

Glucose

- Normal range is 70-110 mg/dL
- Hypoglycemia
    - Glucose under 70 mg/dL
    - Symptoms include anxiety, tremors, palpitations, confusion
    - Treated with oral glucose, IV dextrose, or IM glucagon
    - Most commonly seen in those with DM
- Hyperglycemia
    - Glucose above 200 mg/dL
    - Fasting blood glucose (FBG) is high above 126 mg/dL
    - A healthy patient without diabetes should not have a serum glucose above 200 mg/dL
    - Treated per the diabetes clinical practice guidelines (CPGs)

Calcium (Ca)

- Normal range is 8.6-10.2 mg/dL
- Hypercalcemia
    - Above 10.2 mg/dL
    - Most common causes are hyperparathyroidism and cancer
    - Can be caused by excess vitamin D intake

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- Hypocalcemia
    - Below 8.6 mg/dL
    - Symptoms include muscle spasms, cramps, seizures, paresthesia
        - Chvosteks's and Trousseau's are two assessments for hypocalcemia
    - Causes include lack of parathyroid hormone and/or vitamin D

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References

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