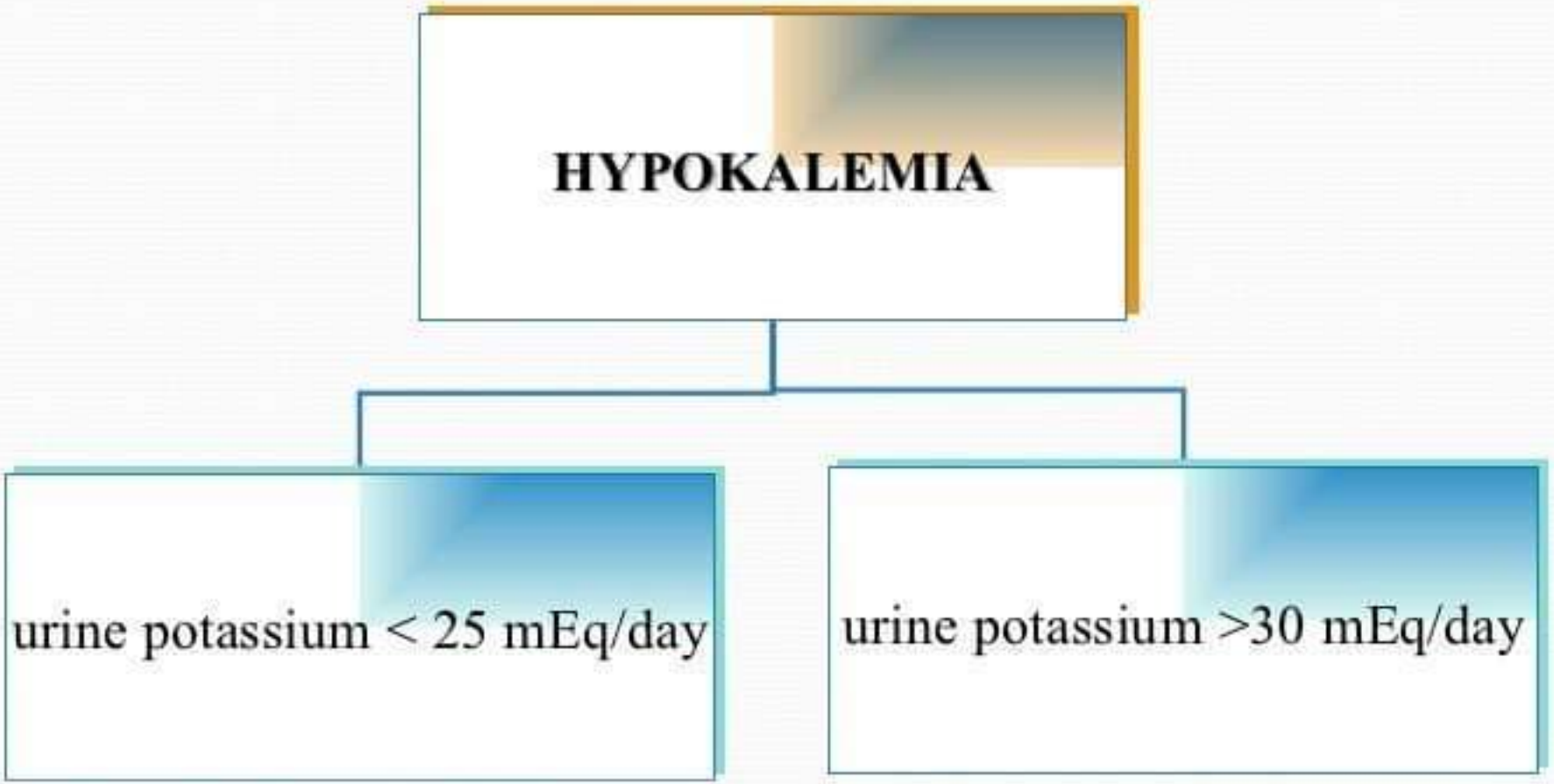
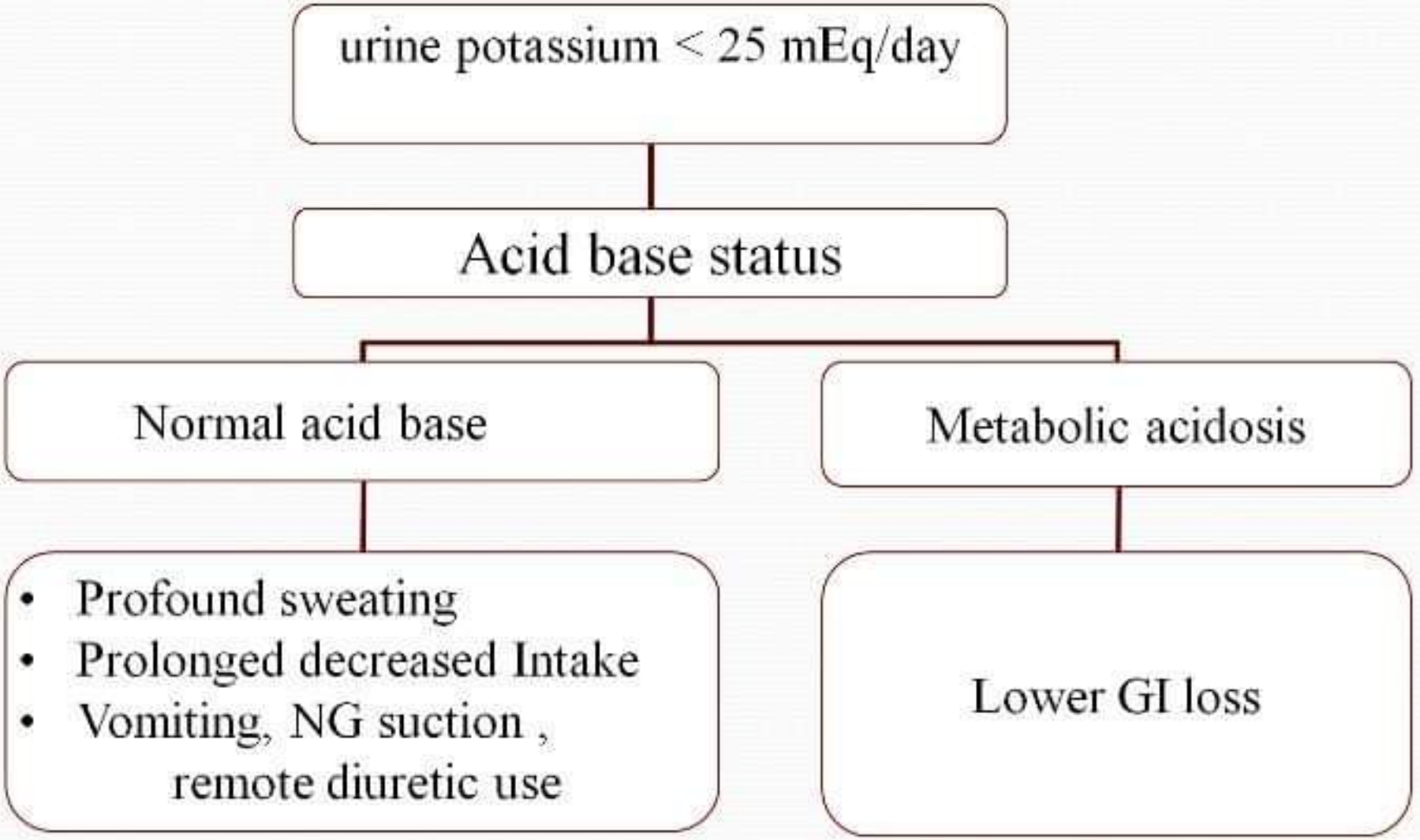
APPROACH TO HYPOKALEMIA

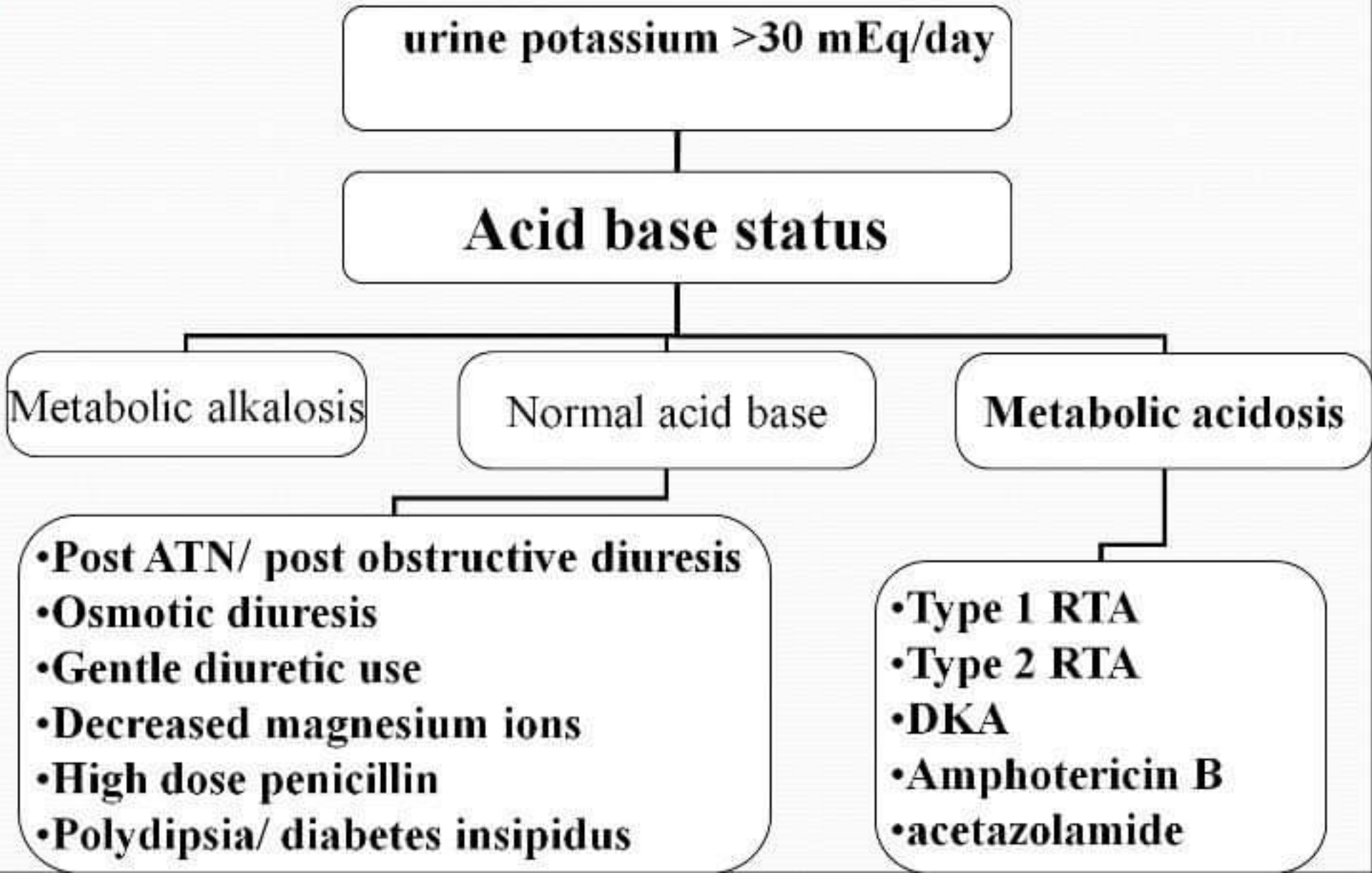
Fb/Nurse Info


HYPOKALEMIA
urine potassium < 25 mEq/day
urine potassium >30 mEq/day

Urinary conservation +



Urinary conservation -



HYPOKALEMIA

urine potassium >30 mEq/day

Metabolic alkalosis

Urine chloride<20 mEq/liter

- **Nasogastric suction**
- **vomiting**

Urine chloride>20 mEq/liter

Blood pressure

HYPERTENSIVE

Normal / low aldosterone

- **CUSHINGS**
- **CAH**
- **LIDDLE'S SYNDROME**
- **APPARENT Mineralocorticoid excess**

- **HYPERALDOSTERONISM(1'and 2')**

NORMOTENSIVE/ HYPOTENSIVE

- ***BARTTER'S SYNDROME***
- ***GITELMAN'S SYNDROME***
- ***AGGRESSIVE DIURETIC USE***

- **HYPOKALEMIA:**

REDUCED INTAKE

RENAL WASTING- most common cause

TRANS CELLULAR SHIFT.

Hypokalemia

plasma K+ concentration <3.5 mmol/L,

- CAUSES:

I. Decreased intake (Seldom a sole cause for K+ depletion)

- A. Starvation
- B. Clay ingestion (Geophagia – binds dietary K+ and Fe)

II. Redistribution into cells

- A. Acid-base

  1. Metabolic alkalosis(1.K+ redistribution into cell 2.Excess renal loss)

- B. Hormonal

  1. Insulin (Stimulation of Na H antiporter and secondary activation of NA K ATP ase pump)

  2. beta-Adrenergic agonists (1.Directly induces cellular uptake of K+ 2.Stimulates insulin secretion)

  3. alpha-Adrenergic antagonists

C. Anabolic state (D/T K+ shift into newly formed cells)

- 1. Vitamin B12 or folic acid
  (RBC production)

- 2. Granulocyte-macrophage colony stimulating factor
  (white blood cell production)

- 3. Total parenteral nutrition

- D. Other
  - 1. Pseudo hypokalemia
  - 2. Hypothermia
  - 3. Hypokalemic periodic paralysis (Calcium Channelopathy)
  - 4. Barium toxicity

pseudohypokalemia

- Prevented storing the blood sample on ice or rapidly separating the plasma from the cells.
- e.g., acute myeloid leukemia
- .....low measured plasma K+ concentration d/t white blood cell uptake of K+ at room temperature

- III. Increased loss
- A. Non renal
  - 1. Gastrointestinal loss (1.diarrhea – per se loss of K+)…profuse diarrhea, villous adenomas, VIP oma, laxative abuse 2.Vomitting - mainly d/t ^ renal K+ excretion caused by volume depletion and metabolic alkalosis)
  - 2. Integumentary loss (sweat) (ECF contraction…Aldosterone secretion)

- B. Renal
- **1.Increased distal flow:**
- diuretics
- osmotic diuresis
- salt-wasting nephropathies

- **2. Increased secretion of potassium**
- **I. Mineralocorticoid excess:**
- Primary hyperaldosteronism (ca, Conn's , hyperplasia) ...low plasma renin activity
- Secondary hyperaldosteronism (1.malignant hypertension, 2.renin-secreting tumors –RCC, Ovarian Ca, Wilm's tumor, 3.renal artery stenosis, 4.hypovolemia)...Hyperreninemia
- Bartter's s.. (Na K 2 Cl pump mutation...Volume depletion...hyperaldosteronism...K+ secreted

- Apparent Mineralocorticoid excess (licorice, chewing tobacco, carbenoxolone) ...cortisol occupies the aldosterone receptor for action...cortisol to cortisone does not occur d/t 11 beta HSDH deficiency/inhibition...– low renin and aldosterone
- Congenital adrenal hyperplasia (D/T non aldosterone Mineralocorticoids – corticosterone, deoxycorticosterone)
- Cushing's s.. (cortisol formed overwhelms the activity of 11 beta HSDH)

- **II. Distal delivery of non-reabsorbed anions:**
- vomiting …HCO_3 in urine
- nasogastric suction
- proximal (type 2) renal tubular acidosis
- diabetic ketoacidosis …Beta OH butyrate
- glue-sniffing (toluene abuse) …Hippurate
- penicillin derivatives …(1.Secrete K+; 2. Osmotic diuresis)

- **III. Other:**
- Amphotericin B...(^ distal nephron K+ permeability)
- Liddle's syndrome... (ENaC up regulation in CCD... negative Electrical gradient in lumen...H+ & K+ secretion)
- Hypomagnesaemia...(Resistant to treatment)

Genetic disorders

- Hypokalemic periodic paralysis
- Bartter's syndrome
- Gitelman's syndrome
- Liddle's syndrome
- Apparent mineralocorticoid excess
- Glucocorticoid-remediable hyperaldosteronism

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