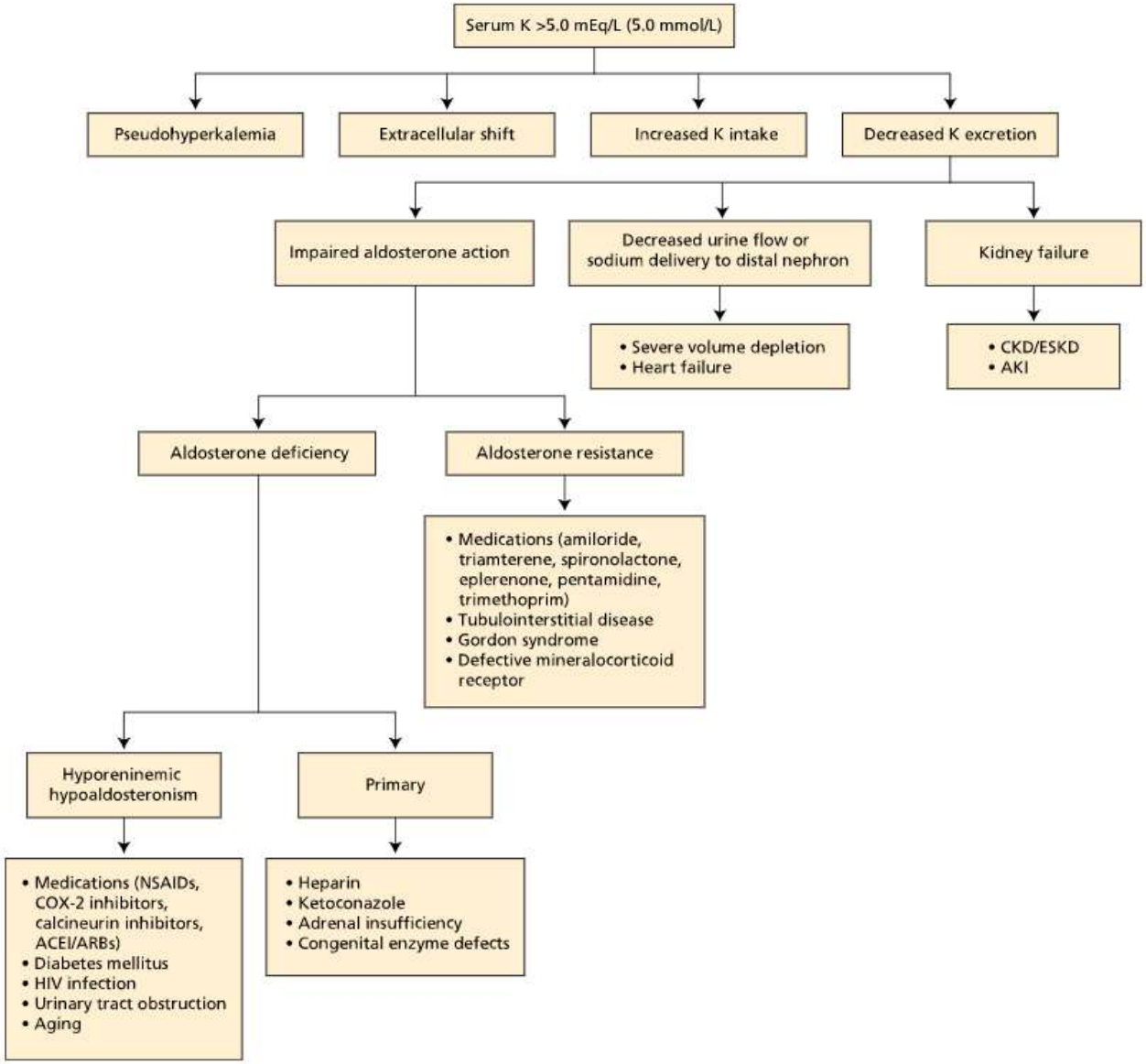
HYPERKALEMIA


Serum K >5.0 mEq/L (5.0 mmol/L)
Pseudohyperkalemia
Extracellular shift
Increased K intake
Decreased K excretion
Impaired aldosterone action
Decreased urine flow or sodium delivery to distal nephron
Kidney failure
• Severe volume depletion
• Heart failure
• CKD/ESKD
• AKI
Aldosterone deficiency
Aldosterone resistance
• Medications (amiloride, triamterene, spironolactone, eplerenone, pentamidine, trimethoprim)
• Tubulointerstitial disease
• Gordon syndrome
• Defective mineralocorticoid receptor
Hyporeninemic hypoaldosteronism
Primary
• Medications (NSAIDs, COX-2 inhibitors, calcineurin inhibitors, ACEI/ARBs)
• Diabetes mellitus
• HIV infection
• Urinary tract obstruction
• Aging
• Heparin
• Ketoconazole
• Adrenal insufficiency
• Congenital enzyme defects

CC: LE edema

HPI: 57 y/o man.
New onset, progressive b/l LE edema. Started 1 month ago.

Extends from ankles to his hips and sacrum.

Endorsed difficulty ambulating due to swelling.

Has not seen a PCP in years.

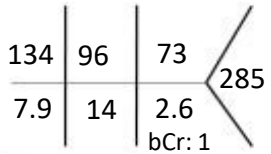
Denied CP, SOB, DOE.

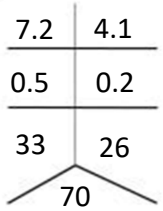
ROS negative.

PMH: T2DM, HTN
SH: Denied current or past use of ETOH, tobacco, or drugs.
FH: Noncontributory
Allergies: NKDA
Meds:
- None

PHYSICAL EXAM:
Tmax: 37.1C, BP: 153/68, HR: 74, RR: 19, SpO2: 96% on RA
General: in NAD, resting in bed
HEENT: PERRL, EOMI, oropharynx clear
CV: regular rate and rhythm, no M/R/G
Pulm: unlabored breathing on room air, CTAB
GI: obese, bowel sounds present, nondistended, soft, nontender, **sacral pitting edema**
MSK: b/l 3+ pitting edema from ankles up to hips, warm extremities with palpable distal pulses
Skin: no petechiae or rashes
Neuro: AOx3, answering questions appropriately, following commands, moving all extremities against gravity, no deficits

LABS:





A1C: 9.5

Troponin: 61 -> 58
CK: 46

UA
SG: 1.014
2+ protein
2+ glucose
Hgb negative
LE negative
Nitrites negative

Urine Na: 86
Urine Cr: 54.3

Urine Pro/Cr: 0.53

PROBLEM REPRESENTATION:
Adult male with HTN and uncontrolled T2DM, presenting with subacute b/l LE and abdominal edema.

DIAGNOSIS: Hyperkalemia

LEARNING POINTS:
- Framework to organize causes of hyperkalemia
- EKG features of hyperkalemia
  - Tall peaked T waves, loss of P waves, widening QRS, sine wave / ventricular arrhythmia / asystole
- Hyperkalemia tx (Check out the hyperkalemia order set!)
  - Calcium
    - Stabilize cardiac membrane action potential
    - Rapid onset (minutes); short duration (30-60 min)
    - Contraindicated in digoxin toxicity
  - Insulin + Dextrose
    - Intracellular shift of K via ↑ Na-K-ATPase
    - Rapid onset (10-20 min); lasts hours
  - $NaHCO3^-$
    - Intracellular shifts of K
    - Rapid onset (minutes); short duration
  - Beta-2-adrenergic agonists
    - Intracellular shifts of K
    - Rapid onset (minutes)
    - Watch for tachycardia and angina
  - Loop diuretics
    - Excretion of K, prevention of K absorption
    - IV Lasix peak effect (30 min); IV Lasix duration (2 hrs)
  - GI cation exchangers
    - Bind K in GI lumen -> excretion
    - Slow onset (many hrs); long duration (many hrs to days)
    - SPS (Kayexalate) associated w/ intestinal ischemia
  - Dialysis