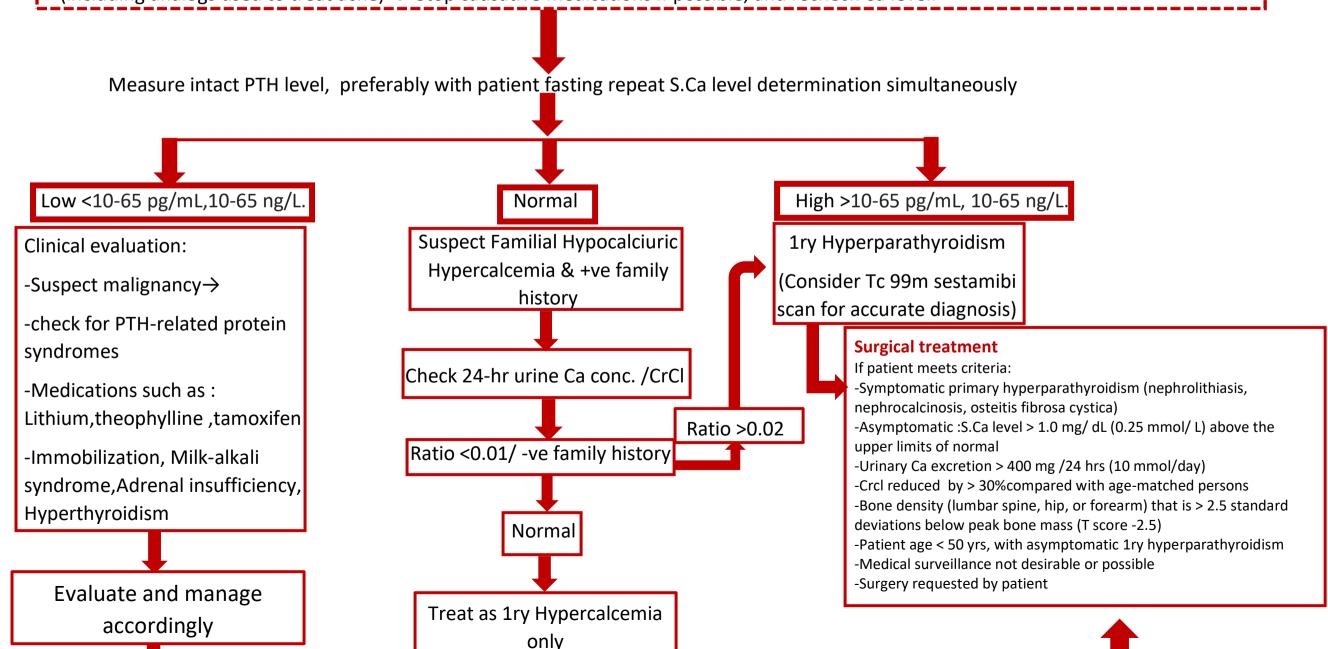
Hypercalcemia

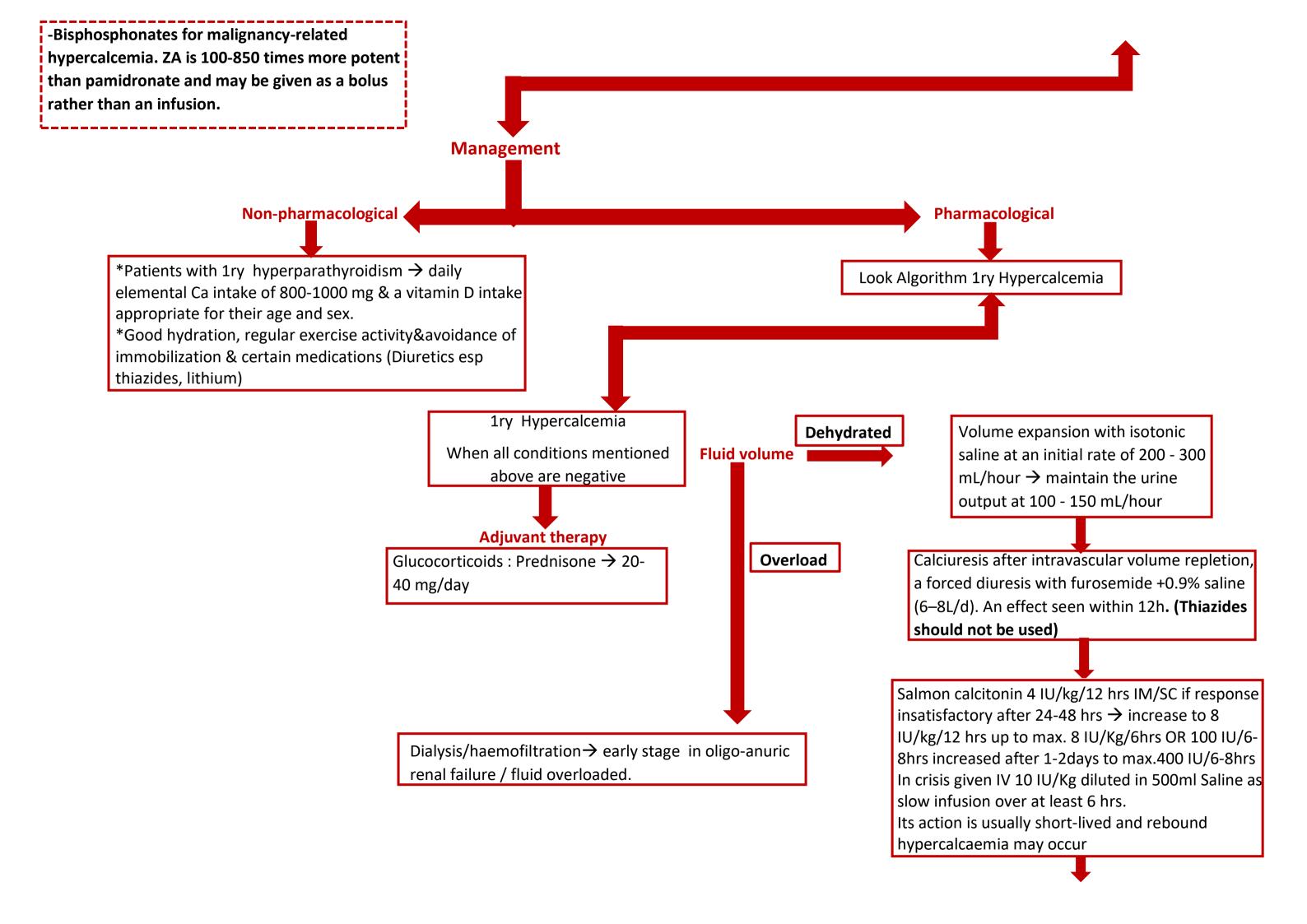
Detected when

- -Total S.Ca between 10.5 and 12 mg/ dL (2.63 and 3 mmol/ L) \rightarrow Mild hypercalcemia >14 mg/ dL (3.5 mmol/ L) \rightarrow Severe hypercalcemia⁵
- Or ionized Ca²⁺ >5.6mg/dl(1.4mmole/L)
- -Or corrected $Ca^{2+} > 10.5 mg/dl(2.625 mmole/L)$

Take careful history and physical examination focusing on:

- 1-Clinical features of hypercalcemia (Bone pain, Arthritis, Osteoporosis, Renal stones, nausea, vomiting, muscle weakness, cardiac arthymia)
- 2-Possible causative diseases (Hyperparathyroidism, Malignancy, Vitamin D intoxication)
- 3-Possible causative medications, including OTC (Thiazide diuretics (usually mild), Lithium, calcium antacids, Vitamin A intoxication (including analogs used to treat acne) → Stop causative medications if possible, and recheck Ca level.





Bisphosphonates (e.g. pamidronate) and IV PO4 should only be given after specialist advice is taken in view of their toxicity and potential complications →ZA; 4 mg [IV] over 15 mins or Pamidronate (60-90 mg over 2 hrs) or Ibandroante doses of 2 mg IV over 2 hrs normalized S.Ca, doses up to 6 mg were safe.

Contraindicated

Denosumab → 120 mg SC/ 4 weeks → additional 120 mg doses on Days 8 and 15 of the 1st month of therapy

Dose Adjustments of ZA

Nononcology uses:

CrCl 35 to 80 mL/minute \rightarrow No dose adj. CrCl <35 mL/minute \rightarrow contraindicated.

Oncology uses:

Multiple myeloma and bone metastases:

CrCl >60 mL/mins: 4 mg (no dose adj.) CrCl 50-60 mL/mins → dose 3.5 mg CrCl 40-49 mL/mins → dose 3.3 mg CrCl 30-39 mL/mins → dose 3 mg

CrCl <30 mL/mins → Not recommended.

Hypercalcemia of malignancy:

- -Mild to moderate impairment → No dose adj.
- -Severe impairment (S.Cr >4.5 mg/dL): Evaluate risk VS benefit

Dose adj. for renal toxicity during ZA ttt:

- -Hypercalcemia of malignancy: Evidence of renal deterioration: Evaluate risk VS benefit.
- -MM→ withheld for deterioration in renal function (increase of S.Cr ≥0.5 mg/dL in patients with normal baseline S.Cr or increase of ≥1 mg/dL in abnormal baseline S.Cr). Reinitiate at the same dose when S.Cr returns to within 10% of baseline.
- -Albuminuria >500 mg/24 hrs(unexplained): Withhold dose until return to baseline, then reevaluate /3-4 weeks; consider reinitiating with a longer infusion time of 30 mins or longer.

References:

- -Bilezikian JP. Clinical review 51: Management of hypercalcemia. J Clin Endocrinol Metab 1993; 77:1445.
- -Maier JD, Levine SN. Hypercalcemia in the Intensive Care Unit: A Review of Pathophysiology, Diagnosis, and Modern Therapy. J Intensive Care Med 2015; 30:235.
- -Body JJ. Hypercalcemia of malignancy. Semin Nephrol 2004; 24:48.
- -Wisneski LA. Salmon calcitonin in the acute management of hypercalcemia. Calcif Tissue Int 1990; 46 Suppl:S26.
- -Berenson JR. Treatment of hypercalcemia of malignancy with bisphosphonates. Semin Oncol 2002; 29:12.
- -Bech A, de Boer H. Denosumab for tumor-induced hypercalcemia complicated by renal failure. Ann Intern Med 2012; 156:906.