

Risk Factors

- History of non-traumatic long bone/vertebral fracture (12)
- Rickets (12)
- Osteogenesis imperfecta (12)
- Previous osteopenia diagnosis (4)
- Glucocorticoids for > 3 days (4)
- Dialysis > 4 weeks (4)
- TPN > 2 weeks (4)
- Chemical immobilization (4)
- Severe malnutrition due to malabsorption (4)
- Vacteral or DiGeorge (3)
- Prematurity < 37 weeks (3)
- Prematurity < 34 weeks (6)
- Prematurity < 28 weeks (12)
- Current chylothorax (3)
- History of NEC requiring surgery/intestinal perforation (12)
- Antiepileptic drug use (3)
- Proton pump inhibitor >14 days (3)
- Patients less than 1 year (3)
- Osteopenia or bone demineralization on X-ray (12)
- Cystic fibrosis (4)
- Loop diuretics >14 days (3) or >30 days (12)
- >4 weeks 3x normal creatinine (4)
- Trisomy 13/18 (12)
- Gastroschisis (12)

Any patient scoring 12 pts or greater on the risk factors is at risk.

- Activate Osteopenia Risk order set in EMR
 - Alkaline Phosphate and Vitamin D 25 (OH) Lab order
 - Precaution and Preventative Measures Instructions

Precautions and Preventative Measures

- RN to initiate safe handling precautions (safe handling sign at bedside, fragile sign at door, apply cushion to side rail as applicable for age of child)
- RN to educate patient family regarding safe patient handling
 - RN to notify ancillary staff of risk when patient off unit
 - RT to discuss risk vs. benefit with attending if utilizing CPT
 - Dietitian to ensure optimum Vitamin D, Calcium and Phosphorous intake
 - Consider thiazide diuretic if giving loop diuretics to decrease overall need for loop diuretics
 - Metabolic bone consultation if alkaline phosphatase is > 500 U/L

Consider PT evaluation if the following criteria are met:

- Patient is medically stable, able to begin out-of-bed activity and is not doing so on a regular basis
- Patient is older than 12 months and is not able to bear weight to lower extremities

Consider OT evaluation if the following criteria is met:

- Patient is medically stable, able to perform ADLs and has not been doing so without assistance

Screening Tests

(See Next Steps)

- Initial lab test Alk Phos
- If <500U/L, recheck every 2 weeks
- If >500U/L, further labs are needed: Urine Calcium, Serum 25(OH) D, Serum Calcium, Serum Phosphorus and iPTH

Goals:

- Alkaline Phosphatase <500U/L
- Serum Total Calcium: >9mg/dL
- Serum Phosphorus: 5-6.5mg/dL
- iPTH: 10-89 pg/mL
- Vitamin D 25(OH): >32ng/ml
- Urine Calcium/Creatinine Ratio:
 - < 7mo (<0.86 mg/mg)
 - 7 mo to 18 mo (<0.60 mg/mg)
 - 19 mo to 6 yrs (<0.42mg/mg)
 - >19yrs (<0.22 mg/mg)
- Complete xray if suspected fracture

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**If all labs
are normal**

- Dieticians to perform risk level on regular assessment
- Check Alkaline Phosphatase every two weeks
- If patient was previously at risk, remove from risk list and signage from room

**>500 U/L Alkaline
Phosphatase**

- Check Urine Calcium, Serum 25(OH) D, Serum Calcium, Serum Phosphorus and iPTH
- Consult Metabolic Bone

**Low Serum Calcium,
Vitamin D, or
Phosphorous level**

- Dietitian to maximize nutritional supplementation

**Elevated
Ca/Creatinine
Ratio**

- Renal Ultrasound
 - If abnormal, consult Nephrology

Follow up

For patients who receive an Metabolic Bone consult during their stay, an outpatient metabolic bone follow-up visit should be scheduled before discharge.