Vitamin D Deficiency

Vitamin D deficiency can be caused by a lack of dietary Vitamin D, malabsorption/metabolic issues and insufficient sunlight exposure. The deficiency can develop into rickets (a softening and weakening of bones). Rickets can cause skeletal deformity, pain in the spine, pelvis and legs, and delayed gross motor milestones. Due to its association with growth plates, rickets is only seen in babies and children. However, severe Vitamin D deficiency can occur in children of any age and cause hypocalcemic-related tetany and seizures.

**ASSESSMENT**
Perform a history and physical (HPE) for children at higher risk of vitamin D deficiency:
- Breast-fed infants
- Infants on less than 16 oz/day of formula
- Children with darker complexions and limited sun exposure, especially between November and May in the Cincinnati area
- Children with certain chronic conditions that cause malabsorption of nutrients, such as Crohn’s and celiac disease
- Children with any dietary restrictions

**MANAGEMENT/TREATMENT**
For children at higher risk with no red flags, encourage meeting daily RDA of Vitamin D daily (either dietary or supplementation).

For infants and young children with physical signs of rickets or mild symptoms of hypocalcemia, initiate screening. Prescribe routine daily Vitamin D supplementation until results come back. Do the same for adolescents with mild symptoms of hypocalcemia (adolescents are less likely to show physical exam findings of rickets).

Screening includes:
- Bone mineralization labs: Renal, Phosphate, 25-hydroxyvitamin D (25-OHD), Alkaline phosphatase
- X-ray: Rickets survey (wrists/knees)

For any patient with severe symptoms of hypocalcemia, refer to the ED.

See next page for recommended treatment.
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**History**
- Ask about a family history of rickets, which raises concern for non-nutritional form of the disease

**Physical Exam**
- Bowing deformities
- Delayed walking
- Poor linear growth
- Rachitic rosa
- Widening of the wrists/ankles
- Knobby deformities (“rosary beads”) across the costochondral junction

**HPE (HISTORY AND PHYSICAL EXAM) RED FLAGS**
- Any physical signs of rickets
- Symptoms of hypocalcemia. Mild symptoms: muscle cramping, weakness or spasms. Severe symptoms: tetany, altered mental status and seizures (ED referral).

**Any Red Flags?**
- Yes
- No

**Recommended Screening**
- Bone mineralization labs
  - Renal
  - 25-hydroxyvitamin D (25-OHD)
  - Alkaline phosphatase
- X-ray
  - Rickets survey (wrists/knees)

**25–OHD <10 ng/ml**
- 50,000 IU of Vitamin D for 8–12 weeks or 5,000 IU/day for 8–12 weeks
- +50 mg per kilogram/day elemental calcium (usually divide by BID): TUMS 40% bioavailable
- Make sure patient is receiving the RDA of calcium for age.

**Management/Treatment**

- 25–OHD between 10 and 20 ng/ml
  - Double the RDA for Vitamin D supplementation
    - Infants: 800 IU/day
    - Children: 1,200 IU/day
- 25–OHD >20 ng/ml but with physical signs of rickets
  - Refer to the Division of Endocrinology

**Encourage continuation of routine Vitamin D supplementation**

For urgent issues, or to speak with the specialist on call 24/7, call the Physician Priority Link® at 1-888-987-7997.