## Vitamin D Deficiency



### **FAST FACTS**

## 400 IU/day

recommended daily allowance of Vitamin D for babies <1

## 600-1000 IU/daily

RDA of Vitamin D for children 1+

All cow's milk is fortified at 100 IU/8 oz. of Vitamin D.

### WHEN TO REFER

Refer patients to the Division of Endocrinology who:

- Have signs of rickets despite a 25-OHD level >20ng/dL
- Continue to have 25-OHD level <20ng/dL labs despite 8–12 weeks of recommended treatment

To refer a patient, discuss a case or for more information, contact the Division of Endocrinology at 513-636-4744.

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 32 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

### Look for physical signs of rickets:

- · Bowing deformities
- Delayed walking
- · Poor linear growth
- Knobby deformities ("rosary beads") across the costochondral junction
- · Widening of the wrists/ankles

Ask about a family history of rickets, which raises concern for a non-nutritional form of the disease.

### HISTORY AND PHYSICAL EXAM RED FLAGS

- · Any physical signs of rickets
- Symptoms of hypocalcemia. Mild symptoms include muscle cramping, weakness or spasms. Severe symptoms include tetany, altered mental status and seizures.

### **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.

If you would like additional copies of this tool, or would like more information, please contact the Physician Outreach and Engagement team at Cincinnati Children's.

Tool developed by Cincinnati Children's physician-hospital organization (known as Tri-State Child Health Services, Inc.) and staff in the James M. Anderson Center for Health Systems Excellence. Developed using expert consensus and informed by Best Evidence Statements, Care Practice Guidelines, and other evidence-based documents as available. This tool is presented for the purpose of educating providers. It should not be considered inclusive of all proper methods of care or exclusive of other reasonable methods of care. The ultimate judgment regarding care of a particular patient must be made by the physician in light of the patient's individual circumstances.

## Vitamin D Deficiency

### Children at higher risk for Vitamin D deficiency include:

- Breast-fed infants
- Children with darker complexions and limited sun exposure, especially between November and May in the Cincinnati area
- · Infants on less than 16 oz/day of formula

- Children with certain chronic conditions that cause malabsorption of nutrients, such as Crohn's and celiac disease
- Children with any dietary restrictions

# **Patient Presents**

### Standard Workup

### History

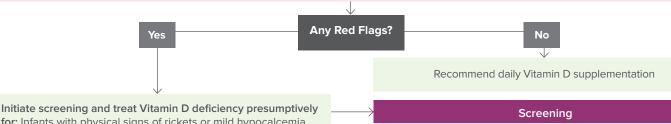
· Ask about a family history of rickets, which raises concern for non-nutritional form of the disease

### **Physical Exam**

- Bowing deformities
- Delayed walking
- Poor linear growth
- Rachitic rosary
- · Widening of the wrists/ankles
- Knobby deformities ("rosary beads") across the costochondral junction

### **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).



for: Infants with physical signs of rickets or mild hypocalcemia symptoms and adolescents with mild hypocalcemia symptoms

Refer to ED if severe symptoms of hypocalcemia are present.

### Bone mineralization labs

- 25-hydroxyvitamin D (25-OHD)
- Phosphate
- Alkaline phosphatase

## · Rickets survey (wrists/knees)

### 25-OHD <10 ng/ml

50,000 IU/week of Vitamin D for 8-12 weeks or 5,000 IU/day for 8-12 weeks (2,000 IU/ day for infants < 1 year of age)

+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.

25-OHD between 10 and 20 ng/ml Double the RDA for Vitamin D supplementation

Management/Treatment

- · Infants: 800 IU/day
- Children: 1.200 IU/day
- Adolescents: 1,000-2,000 IU/day

Also: Ensure adequate calcium intake

### 25-OHD >20 ng/ml but with physical signs of rickets

Refer to the Division of Endocrinology

Recheck 25-OHD in 8-12 weeks: <20 ng/ml?

Encourage continuation of routine Refer to the Division of Endocrinology 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.