CT Children's CLASP Guideline
Vitamin D Deficiency

INTRODUCTION	Current recommendations to prevent vitamin D deficiency aim to ensure a daily vitamin D intake that maintains 25(OH)D levels more than 20 ng/ml for the majority of healthy individuals. The amount of vitamin D in a regular diet is small, as most foods naturally contain limited quantities of this element. Only fatty fish, such as cod or salmon, contain higher amounts, but children do not usually consume these in large quantities. Clinically significant vitamin D deficiency leads to poor absorption of dietary calcium and phosphorus, secondary hyperparathyroidism and, in severe and prolonged cases, rickets and decreased bone mineral acquisition. Adequate vitamin D as well as calcium helps ensure normal skeletal mineralization.
INITIAL EVALUATION AND MANAGEMENT	**PREVENTIVE MANAGEMENT:** ▪ ALL INFANTS regardless of method of feeding should receive Vitamin D 400 IU daily (AAP, 2008). ▪ For children ages 1 – 18 years, the recommended Vitamin D dose is 600 IU daily. ▪ For children with co-existing obesity, malabsorption, chronic glucocorticoid or anti-epileptic therapy, or severe liver disease, the dosage of Vitamin D should be increased by 2- to 3-fold (2,000 IU would be a good choice). ▪ Vitamin D3 (cholecalciferol) is generally preferred over vitamin D2 (ergocalciferol), but either is fine. ▪ Vitamin D is absorbed best in the presence of dietary fat (i.e., do not take on empty stomach). ▪ Liquid, chewable or tablet formulations are available. **VITAMIN D SCREENING:** ▪ Universal screening of 25(OH) D levels is NOT recommended and may not be covered by insurance. ▪ Screening *should* be considered for patients with impaired absorption or synthesis of vitamin D, as well as bone fragility disorders (i.e. inflammatory bowel disease, CF, CRI, OI, etc), ▪ For patients with food sensory issues and/or alternative diets: CMP, 25(OH) D, PTH, phosphorus ▪ 25(OH) D level measures the body's Vitamin D stores (be careful NOT to order $1,25(OH)_2$ D). **INTERPRETATION OF 25(OH) D LEVELS: (AAP, Pedi Endo Society, IOM and Global Consensus)** ▪ Normal..... >20 ng/ml ▪ Insufficient..... >12 – 20 ng/ml ▪ Deficiency ..... <12 ng/ml Note: There remains a lack of consensus for the 25(OH) D concentration that is necessary for optimal health (i.e. Quest classifies 25(OH) D >30 ng/ml as normal and 20 -29 ng/ml as insufficient).

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MANAGEMENT OF VITAMIN D DEFICIENCY (25(OH) D <20 ng/ml):

See Appendix A: Vitamin D Supplementary Guidelines and Appendix B: Calcium Supplementary Guidelines

- Provision of daily calcium between 500 – 1,000 mg daily helps ensure skeletal mineralization.
- Vitamin D levels will decrease 2-3 weeks after completing replacement therapy unless patient continues on maintenance vitamin D dosing.
- Repeat 25(OH) D level after completing replacement therapy.
- Transition to maintenance if 25(OH) D ≥20 ng/ml. If <20 ng/ml, review compliance and timing of administration. May need to repeat replacement regimen.
- See table below for dosing recommendations:

Age	Replacement daily dose (IU) 90 days	Replacement weekly dose (IU) 90 days	Maintenance daily dose (IU)
Neonate – 12 mo	1,000 – 2,000	8,000	400
>12 mo – 12 yr	3,000 – 6,000	25,000	600
>12 yr	6,000	50,000	600

WHEN TO REFER

ROUTINE REFERRAL:

- 25(OH) D levels persistently <20 ng/ml after 2 regimens of replacement using vitamin D, in a non-fasting state with confirmed compliance

EMERGENT REFERRAL (within 2 weeks):

- Infant with 25(OH) D levels <12 ng/ml at any time, or infant or child with 25(OH) D <20 with elevated alk phos and/or elevated PTH.

HOW TO REFER

Referral to Endocrinology via CT Children's One Call Access Center
Phone: 833.733.7669 **Fax:** 833.226.2329

Information to be included with the referral:

- Complete growth chart
- Relevant laboratory studies

WHAT TO EXPECT

What to expect from Connecticut Children's visit:

- History, physical exam
- Evaluation of prior lab testing and growth chart
- Additional labs, imaging if appropriate
- Initiation or adjustment of Vitamin D treatment
- Comprehensive patient education
- If appropriate, referral to nutrition

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APPENDIX A: Vitamin D Supplementary Guidelines

- **Your child's daily dose of Vitamin D is _____ IU Daily. Take with the biggest meal of the day!**
- Be sure your child is also getting 1-3 servings of calcium containing foods/drinks each day.
- Vitamins and supplements are not regulated by the FDA. Some brands voluntarily submit to the USP Dietary Supplement Verification Program (USP) which ensures that these brands contain the ingredients listed on the label, in the declared potency and amounts, do not contain harmful levels of specified contaminants (e.g., lead and mercury), and have been made according to FDA current Good Manufacturing Practices using sanitary and well-controlled procedures.
- Reliable brands include:

Carlson's drops *(available at Whole foods, Amazon.com, vitacost.com)*	 400, 1000, 4000 IU/drop Careful not to use multiple drops
Any USP verified brand, such as Nature Made *(available at CVS, Rite Aid, etc.)*	Nature Made 
Kirkland *(available at Costco)*	KIRKLAND Signature
Berkley & Jensen *(available at BJs)*	BERKLEY & JENSEN

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APPENDIX B: Calcium Supplementary Guidelines

Recommend Daily Allowance	
Age (yr)	**Calcium**
1-3	700 mg
4-8	1000 mg
9-18	1300 mg

(IOM, 2011)

- Give Ca BID/TID if >500 mg

Calcium Carbonate – smaller tablets; best to take with food

	Ca Content	Vit D3	Chewable?
Caltrate 600 + D	600 mg	400 IU	yes
Viactive Ca + D	500 mg	500 IU	yes
TUMS	200 mg	-	yes
TUMS EX 750	300 mg	-	yes
TUMS Ultra	400 mg	-	yes

Calcium Citrate – can take on empty stomach and if on acid-blockers

	Ca Content	Vit D3	Chewable?
Citracal + D	250 mg	200 IU	No
Citracal Max + D	315 mg	250 IU	No
Citracal Petites + D	200 mg	250 IU	no

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