

Vitamin D Guidelines for the Management of Simple Vitamin D Deficiency in Children and Young People up to 18 years in Primary and Secondary care (Excluding those with renal failure eGFR <30mL)

Table 1: Common risk factors associated with Vitamin D deficiency (this list is not exhaustive)

Inadequate UVB light exposure	Poor dietary intake	Metabolic risk
<ul style="list-style-type: none"> -Occlusive garments - Dark skin -Institutionalised/ Housebound -Poor mobility i.e. wheelchair bound - Living in Northern Latitude and during winter /spring seasons 	<ul style="list-style-type: none"> -Malabsorption: e.g. Short gut, Cystic fibrosis, coeliac disease, Crohn’s disease -Exclusively breast fed infants of mothers who are vitamin D deficient or insufficient during pregnancy / lactation -Insufficient dietary intake of vitamin D 	<ul style="list-style-type: none"> -Infants and young children under 5 years -Obesity -Chronic renal disease -Chronic liver disease -Long-term medications (e.g. Anticonvulsants: Phenobarbitone, Phenytoin, Primidone and Carbamazepine; Rifampicin, Glucocorticoid, cholestyramine, anti-retrovirals)

Table 2: Symptoms and signs of deficiency in children (a spectrum specific to age)

Infants (Age 0 – 6 month)	Seizures, tetany, frontal bossing and cardiomyopathy
Children (6 months – 12 years)	Generalised aches and pains; myopathy causing delayed walking; rickets with bowed legs, knock knees, frontal bossing, delayed closure of fontanels and sutures, rachitic rosary, pigeon chest, swelling at wrist and ankle joints, poor growth and muscle weakness
Adolescents (12 years and older)	Aches and pains, muscle weakness, bone changes of rickets or osteomalacia

Table 3: Assessing the child

Patient Characteristics	Advice and management
-Healthy AND -No risk factors AND -Symptom free	-No investigations required -Lifestyle advice, see advice below -Consider preventative therapies (supplementation)
-Risk factors AND -No symptoms	-Lifestyle advice, see advice below -Consider long term preventative therapies (supplementation)
-Risk factors AND -Symptoms/signs	-Blood tests and/or x-ray -Treatment and then followed by long-term maintenance therapy

- **Prevention of Vitamin D deficiency in Children with Epilepsy and Neurodisability:** It is recommended to prescribe 800 – 1000 units per day to children with cerebral palsy, impaired ambulation or receiving anticonvulsant drugs as mentioned in table 1^{7,8,9,10}

- Vitamin D supplementation is recommended for **exclusively and partially breastfed babies from birth- 1 years** (approximately 300-400 units per day) and **all children from 1 to 4 years** (400 units per day).³ **Everyone over the age of 4** should consider taking a daily supplement containing 400 units vitamin D in autumn and winter. **Children and young people in institutions** where there is no direct sunlight for prolonged periods of time, those wearing occlusive garments or those who have dark skin should take a supplement of vitamin D (400 units) throughout the year.³ **Babies who are formula fed** do not require vitamin D supplementation if they are having >500mL formula milk per day.⁶

Table 4: Blood Tests

Vitamin D is measured to establish diagnosis and is not routinely monitored in children. In some cases there may be a clinical need and this would be dependent on local contractual arrangements. When indicated 25-hydroxy Vitamin D level should be tested.

Test result	Diagnosis	Action
> 50 nmol/L	Normal range	Lifestyle advice and suggest prevention therapy (see information under table 3)
25 – 50 nmol/L	Vitamin D INSUFFICIENCY	Long term prevention therapy (see page 2) Do not repeat blood test.
< 25 nmol/L	Vitamin D DEFICIENCY	Treatment therapy for 2 months followed by maintenance therapy and then repeat blood test (see page 2)

Further Investigations - in Primary care: consider performing or asking for specialist advice on appropriateness

- in Secondary and Community care perform: as standard if not already done in primary care

Renal function, bone profile (calcium), Phosphate, Magnesium (in infants < 1 year), Alkaline phosphatase, Urea and electrolytes, Parathyroid Hormone (PTH).² Where appropriate, consider including investigations for causes of malabsorption.

Supplementation of Vitamin D INSUFFICIENCY (with long-term Prevention Therapy) - Self-Care

*25-hydroxy Vitamin D level = 25 – 50nmol/L	
Birth – 1 years	300 - 400 units per day ³
*1 years – 4 years	400 units per day ³
*4 years – 18 years	400 –800 units per day ^{3,12}

(The above is also referred to as 'maintenance therapy')

*Note: plasma level of 27 nmol/L will be classified as insufficient and a prevention dose of 400 units daily for children above 1 years is unlikely to replenish their vitamin D stores in a reasonable time hence the range to choose from according to the age and level of insufficiency^{2,3}

- Supplements e.g. Abidec®, Dalivit®, Healthy Start Vitamins or other over-the-counter vitamins can be obtained from pharmacies/supermarket stores and children centres

-Give advice to the parent/carer to purchase or access (via vouchers) Healthy Start Vitamins **DO NOT PRESCRIBE**.

Table 5: Examples of Vitamin D products available¹¹:

(400 units vitamin D is the biological equivalent to 10 micrograms colecalciferol)

For supplementation or maintenance therapy		
Abidec® multivitamin drops	400 units colecalciferol per 0.6mL	Contains Arachis (peanut oil), avoid in peanut allergy. Suitable for vegetarians and vegans.
Dalivit® multivitamin drops	400 units ergocalciferol per 0.6mL	Contains plant source of vitamin D ₂ . Suitable for vegetarians and vegans. Does not contain peanut or soya.
Healthy Start vitamin drops	300 units ergocalciferol per 5 drops	Free of charge for eligible children up to 4 years through Healthy Start scheme. Suitable for vegetarians or vegans, does not contain peanuts or soya.
For the treatment of vitamin D deficiency		
Thorens® (colecalciferol) (POM) (1 st line)	10,000 units per mL 25,000 units per 2.5mL oral drops	Licensed product. An olive oil based solution. Gluten-, lactose- and nut-free.
Plenachol® (colecalciferol) (POM) (2 nd line)	20,000 unit capsules	Licensed product. Peanut, soya and gelatin free. Suitable for halal and kosher diet. Can be prescribed for larger weekly or monthly doses which may be used to aid compliance.
Fultium-D3® (colecalciferol) (POM) (2 nd line)	20,000 unit, 3200 unit, 800 unit capsules, oral drops	Licensed product. Contains peanut oil, avoid in peanut or soya allergy.
Invita D3® (colecalciferol) (POM) (1 st line)	25,000 units per mL oral drops	Licensed product. Peanut Oil free, Soya free, Vegetarian, Alcohol free Yeast free, Gluten free, suitable for Halal and Kosher diet

-For further information please refer to the BNFC <https://bnfc.nice.org.uk/> or Summary of Product Characteristics www.medicines.org.uk

-For formula fed infants receiving <500ml formula milk per day, check vitamin A content of supplement²

-For further information for patients please refer to the Public Health England guidance:

<https://www.gov.uk/government/news/phe-publishes-new-advice-on-vitamin-d>

-Give lifestyle advice: Vitamin D can be obtained from dietary sources (oily fish, eggs, fortified cereal and milk (soy, cow and rice (for aged 5 years over)) and through sunlight exposure - 10 – 15 minutes (15 – 30 minutes with pigmented skin) of face, arms and legs

-NO NEED TO REPEAT BLOOD TEST ROUTINELY

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Treatment of Vitamin D DEFICIENCY (Treatment Therapy for 2 months and then maintenance therapy - when levels are >25nmol/L after treatment)

25-hydroxy Vitamin D level = <25nmol/L		
up to 6 months	3000 units daily	8 weeks ^{2,4,5}
6 months – 12 years	6000 units daily	8 weeks ^{2,4,5}
12 years – 18 years	10 000 units daily	8 weeks ^{2,4,5}

- Table 6 lists the POM licensed options. Self-care can be considered (optional) for deficiency. Examples include ProD3, HuxD3 (GSL). Please note these are unlicensed products.

-A joint Bedfordshire (BHT, BCCG) and Luton (LDUH, LCCG) drug formulary is currently being developed with an agreed product range to be published in due course

-Activated Vitamin D preparations such as Calcitriol or Alfacalcidol should not be used (restricted use)²

--Where compliance is a concern, daily dose stated above can be multiplied by 7 and given weekly²:

up to 6 months	20 000 units weekly	8 weeks ^{2,4,5}
6 months – 12 years	40 000 units weekly	8 weeks ^{2,4,5}
12 years – 18 years	80 000 units weekly	8 weeks ^{2,4,5}

A single dose can also be used for the treatment of nutritional vitamin D Deficiency in Rickets (multiply daily dose by 30)^{2,4,5}:

Up to 6 months	Single dose of 90 000 units ^{2,4,5}
6 months – 12 years	Single dose of 150 000 units ^{2,4,5}
12 years – 18 years	Single dose of 300 000 units ^{2,4,5}

- Please note that some of the Reference Nutrient Intake (RNI) recommendations are outside the product's license (off label)

-If a child or young person is diagnosed with Vitamin D deficiency the family likely to have similar risk so should be considered for screening and treatment as appropriate.

Follow up

- Vitamin D levels – Evidence for repeating Vitamin D levels after commencing therapy is not strong. Those receiving treatment doses of vitamin D should only have their levels checked if there is an issue with compliance or at 6 months post treatment if levels were particularly low prior to treatment.¹¹

- Plasma calcium levels - if levels were particularly low prior to treatment it is recommended to check post treatment.¹¹

-If hypocalcaemia and receiving calcium supplement repeat calcium within 1 month

-If calcium normal and no supplement repeat bone profile, LFT, 25hydroxyVitamin D in 3-6 months (if indicated locally)

If 25-hydroxyVitamin D >50 nmol/L and alkaline phosphatase normal change to maintenance therapy.

If 25-hydroxyVitamin D 25 – 50 nmol/L and symptomatic; treatment dose for up to 3 months

-After treatment: patients who were deficient should continue long term maintenance therapy (OTC only) until completion of growth then follow PHE advice above.³

Please note: the commissioning arrangements for pathology services may differ locally; leading to slight variation in blood test monitoring arrangements. Both BHT and L&DUH pathology departments are working towards standardising their vitamin D blood testing protocol as part of the merger.

For primary care clinicians: Seek further guidance from Hospital or Community Paediatrics as appropriate if:

Hypocalcaemia –urgent/ same day referral, Biochemical abnormalities (low Phosphate, raised alkaline phosphatase), deformities/bone abnormalities related to rickets. if the diagnosis is uncertain-absence of risk factors/ poor response to treatment

For any queries or if you would like access to the references– please contact Dona Wingfield, Bedfordshire CCG via email BEDCCG.bedsmeds@nhs.net