NHS Bradford and Airedale, in Partnership with Bradford Teaching Hospitals NHS Foundation Trust and Airedale NHS Foundation Trust

Pathway for pre-pubertal children at risk of, or with, vitamin D deficiency/depletion in primary care

Is the child at risk of vitamin D deficiency?[a]

No → No further action

Yes

SIGNS AND SYMPTOMS OF VITAMIN D DEFICIENCY
Does the patient have at least one of:

- Generalised bone ache
- Delayed walking
- Muscle weakness
- Knock knees
- Bowed legs
- Abnormal pGALS screen (paediatric Gait Arms Legs and Spine examination)
- Symptomatic hypocalcaemia - **refer urgently** (eg fits, hypotonia, unexplained twitching)

No →

Vitamin D testing not required

- Give lifestyle advice
- Ensure parent / carer knows about Healthy Start vitamins for children under 5 years[c] → See "Maternal and early Years Healthy Start vitamin guidelines.
- Recommend MAINTENANCE THERAPY with OTC supplements[c]

Yes

Test:

- **Vitamin D** (25-hydroxyvitamin D [25(OH) D])
- LFT, Ca, Phosphate

Manage as below. If abnormal result and/or not sure DW paeds team
If low Ca discuss same day with on-call paediatric team

IF ANY OF THE FOLLOWING RED FLAGS ARE IDENTIFIED, REFER TO PAEDIATRICS / NOTIFY PAEDIATRIC TEAM BUT BEGIN TREATMENT AS PER THIS PATHWAY

- Wt loss/FTT Focal bone pain
- <6 months of age
- Milk free diet
- Under secondary care (malabsorption, liver disease, renal disease, premature babies)

Vitamin D DEFICIENCY: <20nmol/L
a) Commence treatment for 8 weeks:

ProD3* (Colecalciferol) (as BNF):

- **Infants 1 – 6 months:** 3000 IU daily
- **Children 6 months – fully grown:** 6000 IU daily
- **Refer to adult pathway when skeletal growth completed,** usually age 14 – 16 years. Treatment in summary:
  - **Pro D3 capsules** 40,000 units per week (supply 16 capsules)
- Stress importance of compliance.
- If poor compliance in school age children also consider as alternative ergocaliciferol IM 300,000 IU single dose

b) Consider vit D prophylaxis / assessment of other children / mother

c) Check adequate dietary calcium intake

Vitamin D INSUFFICIENCY: 20-60nmol/L

- Commence supplementation[b] until fully grown, then refer to adult pathway
- Consider referral if insufficient despite compliance with adequate supplementation
- Give lifestyle and dietary advice

After 8 weeks repeat blood tests for vitamin D, LFT, Ca, Phosphate
Is vitamin D level > 60nmol/L?

No →

Vitamin D levels still < 20 nmol/L:
Check compliance, reconsider cause

REFER to paediatrician

Vitamin D / bloods improving:
Give treatment dose of ProD3 for further 4 weeks then repeat bloods. Check compliance

Yes

Commence supplementation[b] until fully grown, then refer to adult pathway

Further Information

This pathway is intended for use by General Practitioners who see patients at risk of vitamin D deficiency. It is not a screening pathway and vitamin D testing is not a screening tool. The pathway has been designed in partnership with primary care (NHS Bradford and Airedale) and secondary care (Bradford Teaching Hospitals NHS Foundation Trust and Airedale NHS Foundation Trust). It will be monitored and reviewed in 2014 or earlier if needed.

For patients with lactose intolerance and/or poor dietary intake additional supplementation with calcium is recommended. All children can be given supplements with or without calcium. There are a variety of preparations including drops, sachets, tablets, all of which are suitable for children and a discussion about the preferred preparation may aid compliance.

The **Pro D3 range** is marketed as a food supplement in the UK and can be prescribed (including FP10). Pro D3 is a cost-effective Vitamin D preparation and should be prescribed by name. The Pro D3 website states that the Pro D3 range is suitable for vegetarians, suitable for Muslim consumption, is gelatine free, and is safe to use in patients with a peanut allergy. www.prod3.co.uk

Pro D3 LIQUID PRODUCTS

Pro D3 Liquid Drops 20ml - 100 IU per drop (2000 IU per ml) of vitamin D3 (Cholecalciferol)
Pro D3 Liquid 50ml - 2000 IU/ml of vitamin D3 (Cholecalciferol), 5ml oral syringe provided
Pro D3 Liquid 100ml - 2000 IU/ml of vitamin D3 (Cholecalciferol), 5ml oral syringe provided
Pro D3 Forte Liquid - 3000 IU/ml of vitamin D3 (Cholecalciferol), 5ml oral syringe provided

Excipients: Sunflower Seed Oil, Orange flavour.
Contains NO alcohol or polyethylene Glycol (PEG).
May be added to cold drinks or food.

1000IU = 25 micrograms

Vitamin D preparations suitable for vegetarian or vegan diets

Information about preparations suitable for a vegetarian or vegan diet can be found at the National Electronic Library for Medicine website: http://www.nelm.nhs.uk/en/NeLM-Area/Evidence/Medicines-Q--A/Which-vitamin-D-preparations-are-suitable-for-a-vegetarian-or-vegan-diet/

Vitamin D tests are listed as a biochemistry test.

NB Over treatment of deficiency can (rarely) lead to vitamin D toxicity. This is only likely with over use of high dose preparations and may present with symptoms similar to hypercalcaemia.

[a] ***Risk factors for vitamin D deficiency*:** Lack of sunlight exposure, wearing concealing clothing or strict use of sunscreen, diet restricted in major vitamin D food sources
Those most at risk: people with darker skin, exclusively breastfeed babies, formula fed babies on <500 ml infant formula/day, siblings close in age, teenagers, family history of deficiency, pre-term babies <37/40 weeks, children during periods of rapid growth. **Less commonly:** Children with chronic conditions (malabsorption syndromes, Juvenile Idiopathic Arthritis, rheumatic conditions, chronic steroid use, diabetes, disability and reduced mobility), medications interfering with vitamin D metabolism (phenytoin, carbamazepine, steroids, rifampicin).

[b] ***Recommended action by GP regarding supplementation for children with identified vitamin D insufficiency or treated deficiency:***
Check if child is entitled to free Healthy Start vitamins. If not, VITAMIN D SUPPLEMENTS CAN BE PURCHASED OR PRESCRIBED

- **Infants to five years:** GP ensures child receives a supplement of at least 300 IU/day. eg, ProD3, or Healthy Start (5 drops/300IU/7.5µg) which can be obtained from some health centres or via health visitors.
- **Children 5 – 12 yrs**: GP ensures child receives a supplement of at least 400 IU/10µg vitamin D. As above, also calcium containing sachets, tablets eg calceos.
- **Children >12 yrs:** GP ensures child receives a supplement of at least 800-1000 IU /20-25µg of Vitamin D as above or as adult pathway
- Give safe sunshine exposure and dietary advice as below and appropriate literature.
- Compliance may be improved if you discuss with the child the choice of preparations available.

[c] ***Recommended action by GP regarding maintenance for asymptomatic children at risk of vitamin D deficiency:***
VITAMIN D SUPPLEMENTS MUST BE PURCHASED BY THE FAMILY NOT PRESCRIBED

- For babies and children recommend a daily vitamin D supplement of at least 300 IU.
- Vitamin D supplements can be bought from pharmacies, many supermarkets, and over the internet. A year's supply costs less than £20.
- Ensure family knows about access to Healthy Start vitamins: www.healthystart.nhs.uk
  - All pregnant women receive four bottles of HS vitamins at midwifery booking visit from the midwife.
  - All infants from birth to six months will receive free HS infant drops from their health visitor (5 drops/300IU/7.5 µg daily). (Premature babies <37/40 weeks at birth who exclusively breastfeed are discharged from neonatologist care on double dose Healthy Start vitamin drops (10 drops daily) from health visiting services for up to a period of six months. Once they are no longer exclusively breastfed, they will receive the usual single dose (5 drops) of Healthy Start vitamins in the normal way).
  - Families eligible for HS will be encouraged by their health visitor to apply for vouchers to continue vitamin drop supplementation from 6 months to 4 years.
  - Children not eligible for HS and assessed as being 'at risk' of vitamin D deficiency will receive free vitamins for up to two years at discretion of health visitor.
- Give safe sunshine exposure and dietary advice as below and appropriate literature.

Lifestyle and dietary advice checklist:

Sunlight: The amount of sun exposure that people need in order to make sufficient vitamin D varies according to a number of environmental, physiological and social factors. Generally, going outside in the UK most days without sunscreen between 11am and 3pm in the Summer (April –September), for less time than it takes for the skin to redden and taking care not to burn, should be sufficient. For people with fair skin, more care needs to be taken to prevent burning and for people with darker skin it will take longer for the skin to manufacture vitamin D.[2]

Diet: Vitamin D is only found in a few foods, and not in sufficient quantities for a balanced diet to meet vitamin D requirements. Foods include herrings, tuna (but not tinned versions) sardines, mackerel, salmon, egg yolks, evaporated milk, and some powdered milks. In the UK, margarine and some breakfast cereals are fortified with vitamin D (check product labels).[2]

[1] Armas L, Hollis B & Heaney R. Vitamin D2 Is Much Less Effective than Vitamin D3 in Humans. *The Journal of Clinical Endocrinology & Metabolism* 89(11):5387–5391. [2] Cancer Research UK, National Osteoporosis Society, British Association of Dermatologists, Diabetes UK. Consensus Vitamin D Position Statement (2010). Available from: http://www.sunsmart.org.uk/prod_consump/groups/cr_common/@nre/@sun/documents/generalcontent/cr_052628.pdf