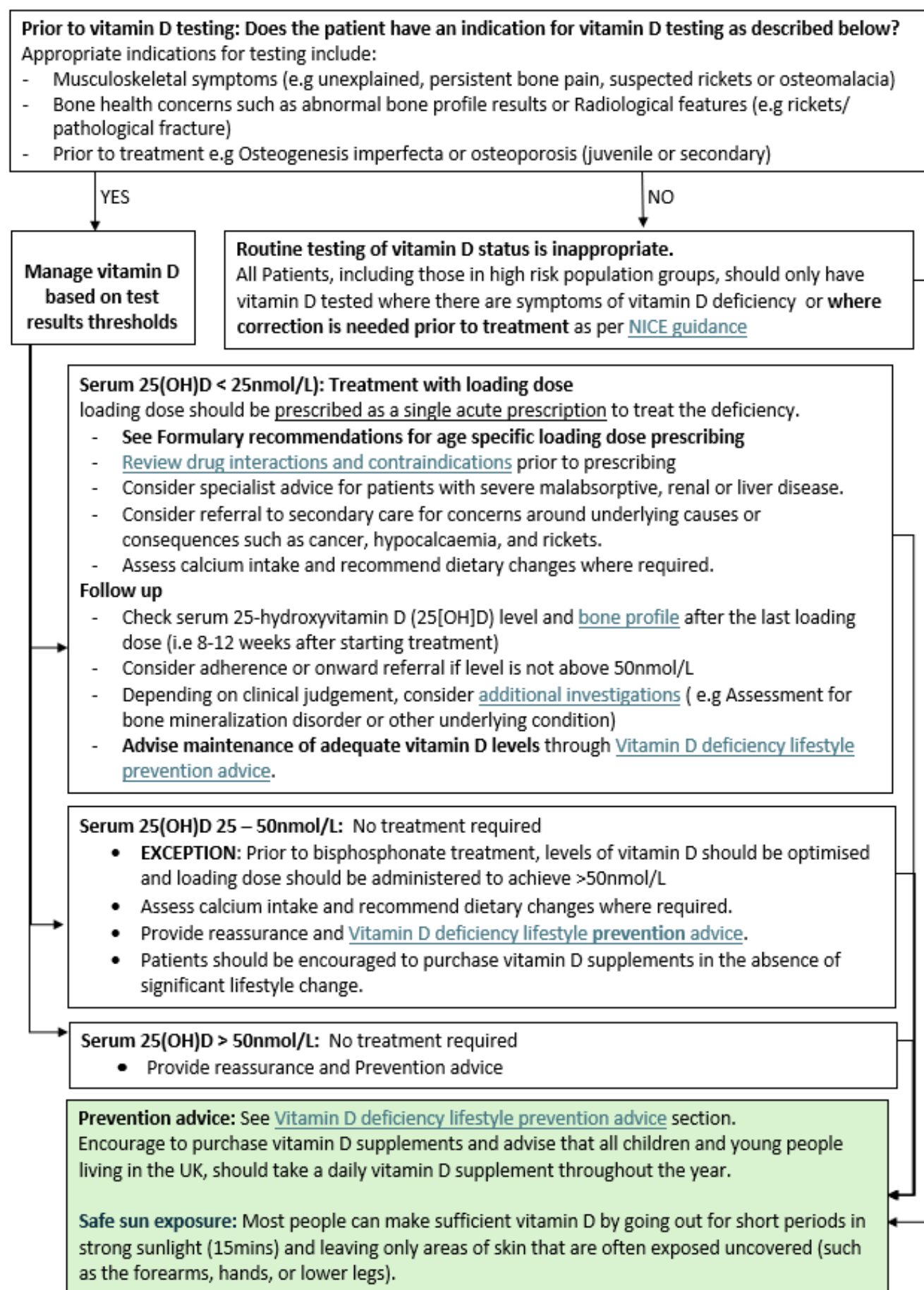


Vitamin D Deficiency in 0-18 years with eGFR ≥ 30 ml/min/1.73m² – Diagnosis, Treatment and Prevention Primary Care Pathway

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1. Diagnosis, Treatment and Prevention Primary Care Flowchart



2. Diagnosis and management Information

Do not routinely test for vitamin D deficiency in children and young people who are asymptomatic, even if they belong to higher risk groups.

Asymptomatic people at [higher risk](#) of vitamin D deficiency do *not* need routine testing for vitamin D deficiency, but should be advised on the need for prevention supplementation of vitamin D as [NHS and department of health advice](#).

- Only check serum vitamin D if a person has musculoskeletal symptoms attributable to vitamin D deficiency (e.g rickets/ osteomalacia) or bone health concerns such as abnormal bone profile results, Radiological features or prior to treatment where correction of vitamin D is required (e.g Osteogenesis imperfecta)
- Following loading dose treatment for vitamin D deficiency, patients will require lifestyle changes in addition to self-care with daily vitamin D supplement to maintain optimum vitamin D levels.

3. Management of Deficiency <25nmol/L: Loading dose Treatment

- Patients with a diagnosed deficiency should have a loading dose **prescribed as a single acute prescription** to treat their deficiency.
- [Assess calcium intake](#) and make dietary advice recommendations as required.
- Check the serum 25-hydroxyvitamin D (25[OH]D) level and [bone profile](#) after the last loading dose (i.e 8-12 weeks after starting treatment).
 - If serum 25(OH)D remains under 50nmol/L assess adherence or consider specialist referral for further investigation.
 - If hypercalcaemia is detected stop Vit D (and calcium, if taking). See [guidance on hypercalcaemia](#) and consider specialist referral for further investigation.
- After treatment patients will require changes to their lifestyle to prevent recurrence. Patients should be advised to purchase a vitamin D supplement after completing the loading dose in line with NHS and department of health. See [Lifestyle and prevention advice section](#).

3.1. Loading doses: Cambridgeshire and Peterborough ICS Formulary options

- Thorens is first line product for the treatment of paediatric vitamin D deficiency.
- Thorens is administered daily and measured in drops. Millilitre equivalent is detailed below.
- Where there is concern with daily compliance Invita D3 25,000 units/1ml single dose oral solution is administered weekly and the second line for treatment of paediatric vitamin D deficiency.
- Thorens and Invita D3 25,000 units/1ml single dose oral solution should be brand prescribed as there are limited products licensed for paediatric vitamin D deficiency.

Table 1 Prescribing information for Thorens Loading dose

Age category	Regimen	Dose	Cost	Quantity to prescribe for full course
Age 1 – 6 months	3,000 IU daily for 8 weeks	0.3ml daily (equivalent to 15 drops) for 8 weeks	£11.70	2 x 10ml
Age 6 months – 11 years	6,000 units daily for 8 weeks	0.6ml daily (equivalent to 30 drops) for 8 weeks	£23.40	4 x 10ml
Age 12 – 18 years	10,000 units daily for 8 weeks	1ml daily (equivalent to 50 drops) for 8 weeks	£35.10	6 x 10ml

Table 2 Prescribing information for Invita D3 25,000 units/ 1ml oral solution loading dose

Age category	Regimen	Dose	Cost	Quantity to prescribe for full course
Age 1 – 6 months	25, 000 IU weekly for 7 weeks	(1 x 1 ml dose per week)	£10.38	7 x 1ml ampoules
Age 6 months – 11 years	50,000 units weekly for 7 weeks	(2 x 1ml dose per week)	£20.77	14 x 1ml ampoules
Age 12 – 18 years	75,000 units weekly for 7 weeks	(3 x 1ml dose per week)	£31.15	21 x 1ml Ampoules

3.1.1. Allergies, contra-indications and cautions

- For contra-indications, drug interactions and cautions, see [BNF for children](#) for up to date guidance
- Seek specialist advice for children with malabsorptive disorders, severe renal or liver disease.
- For allergens: manufacturers can change their formulations at any time, please check suitability at point of prescribing. Where the above recommendations are not suitable Please contact [SPS](#) or the cpicb.prescribingpartnership@nhs.net for further advice and support.

3.1.2. Hospital supply

Where a patient is supplied vitamin D deficiency treatment in hospital, the full course length should be supplied by the hospital (please note vitamin D formulations may differ between primary and secondary care and conversion between products should be completed carefully with the patient and their parents/carers counselled fully BEFORE any change is made to avoid any dosing errors.

4. Management of Insufficiency 25 – 50nmol/L: Prevention advice

No treatment required; Provide reassurance and advise on measures to prevent vitamin D deficiency.

- [Assess calcium intake](#) and make dietary advice recommendations as required.
- Patients should be encouraged to purchase vitamin D supplements in the absence of significant lifestyle change. See [Vitamin D deficiency lifestyle prevention advice](#) section.

5. Management of Adequate levels >50nmol/L: Prevention advice

No treatment required; Provide reassurance and [Vitamin D deficiency lifestyle prevention advice](#).

6. Vitamin D deficiency prevention:

6.1. Lifestyle advice

Advise that all children and young people living in the UK, including those at risk of vitamin D deficiency, should take a daily vitamin D supplement throughout the year, including in the winter months.

- For children and young people aged 1 year and older – 400-800 international units (IU) equivalent to 10-20micrograms of vitamin D.
- For children aged 0 to 1 year (including exclusively and partially breast-fed infants, from birth) – 340 to 400 IU equivalent to 8.5 to 10micrograms of vitamin D.
- Children eligible for the NHS Healthy Start scheme should register at www.healthystart.nhs.uk and can obtain free vitamin at a [local distribution point](#).
- For those not eligible for the NHS Healthy Start scheme, multivitamin preparations and individual vitamin D preparations are available containing 400IU of vitamin D from pharmacies and supermarkets.

Safe sun exposure: Provide advice on safe sun exposure to help skin synthesis of vitamin D, such as:

- Infants aged under 6 months should be kept out of direct strong sunlight.
- Most people can make sufficient vitamin D by going out for short periods in strong sunlight and leaving only areas of skin that are often exposed uncovered (such as the forearms, hands, or lower legs).
- Longer periods of sun exposure may be needed for people with dark pigmented skin.
- Prolonged exposure to strong sunlight (for example leading to burning or tanning) is unlikely to provide additional benefit and should be avoided.
- The British Association of Dermatologists' [Sunscreen Fact Sheet provides useful information on sunscreens](#) and sun safety tips
- Use of sunbeds is ineffective for vitamin D synthesis, is potentially harmful, and should be avoided.

6.2. Vitamin D deficiency prevention: Preparations Available to Purchase

Please note that children may consume vitamin D from multiple sources, when not treating deficiency the [total daily consumption should](#) not exceed:

- >1000IU/ day for infants under 12 months
- >2000IU/ day for children 1-10 years
- >4000IU/ day for ages 11 and over

Children consuming 500ml or more of formula milk or prescribed nutritional supplements a day do **not** require additional vitamin D supplementation.

Healthy Start Children's Vitamin Drops - Free of charge where eligible voucher scheme in place from birth until their fourth birthday. For more information visit healthystart.

- Find contact details for local distribution points at [Find healthy start vitamins services](#).

For those not eligible to receive free healthy start vitamins, vitamin D can be purchased over the counter from as little as 4p per dose. A full year's supply of multivitamins (including Vitamin D and calcium) for children can be acquired from supermarkets or pharmacies for less than £20 per year.

Table 3 Examples (non-exhaustive) of vitamin D containing supplements available for purchase

Age range	Dose and frequency	Examples of preparations
Newborn up to one month	300 - 400 international units daily	Abidec, Dalivit, Baby D drops, NHS 'Healthy Start' Vitamins
1 month – 18 years	400 units - 1,000 units daily	Abidec, Dalivit, Boots Vitamin D, Baby D drops, Holland & Barrett Multivits, Asda kids chewable multivitamins and minerals, Tesco children's chewable multivitamins and minerals, Wellkid Liquid, Boots A-Z multivitamin and minerals

7. Dietary Calcium Intake Assessment

- Adequate levels of both vitamin D and calcium are needed to ensure optimum serum calcium levels, and it is important to ensure that both are maintained to prevent long-term adverse effects on the bones.
- Use an online calculator, e.g. [Royal osteological society calcium calculator](#) to determine patient's dietary calcium intake.
- Advise that the recommended daily calcium intake for children to prevent rickets is:
 - Birth to 6 months: 200 mg a day.
 - 6–12 months: 260 mg a day.
 - Over 12 months: more than 500 mg a day.
- If the child or young person has an inadequate dietary calcium intake, advise on dietary measures to correct this.
 - The British Dietetic Association (BDA) [Calcium: food fact sheet](#) may be helpful.
 - The Royal Osteoporosis Society (ROS) [Calcium-rich food chooser](#) may be helpful.
- If the child or young person is unable or unwilling to increase their dietary calcium, consider the need for supplemental calcium, in addition to high dose vitamin D – consider seeking specialist advice.
Combined calcium and vitamin D preparations are available; however, they are not recommended for people on high-dose vitamin D treatment because they contain very low levels of vitamin D.

Document ratification details

Ratification Process	Details
Authored by:	Cambridgeshire and Peterborough Integrated Care System
Ratified by:	Cambridgeshire and Peterborough Joint Prescribing Group
Date ratified:	June 2025
Version number:	1
Review date:	June 2028