Vitamin D Management in Adults

NOTTINGHAMSHIRE GUIDELINES ON THE PREVENTION, DIAGNOSIS AND MANAGEMENT OF VITAMIN D DEFICIENCY IN PRIMARY CARE

NICE recommends NO routine vitamin D testing unless patient presents with any of the following:
- clinical features and symptoms of deficiency – see box 1 in appendix 1
- suspected or diagnosed bone disease (e.g. osteoporosis, Padget's disease)
- planned administration of potent antiresorptive therapy (e.g. zoledronate, denosumab, teriparatide)
- a clinical reason e.g. a metabolic factor (Specialists may test other specific patient groups if necessary)

This advice also applies to patients with risk factors for developing vit D deficiency – table 1 in appendix 1, and patients receiving oral antiresorptive therapy if co-administered with maintenance vitamin D.

Initiate lifestyle interventions - see appendix 2

Measure serum 25-hydroxyvitamin D (25[OH]D) and arrange:
U+Es, LFTs, bone profile, and PTH if calcium <2.15 mmol/L or >2.6mmol/L

< 25 nmol/L
vitamin D levels DEFICIENT

25-50 nmol/L
vitamin D levels may be inadequate or INSUFFICIENT in some individuals

> 50 nmol/L
vitamin D levels SUFFICIENT for most individuals

Treat only if one or more of the following applies:
- Fragility fracture / osteoporosis / high fracture risk
- Prior or during treatment for bone disease
- Symptomatic of vitamin D deficiency – appendix 1
- Increased risk of developing vitamin D deficiency - appendix 1

If treatment not required reinforce lifestyle advice

NO

No treatment required
Provide lifestyle advice to maintain vitamin D levels through safe sun exposure, diet, and self-care with use of over the counter (OTC) supplements. More info in appendix 2 and click here for patient leaflet.

YES

Does the patient have any of the following?
- CKD with eGFR < 30 ml/min/1.73m^2
- hypercalcaemia
- granulomatous condition e.g. sarcoidosis, active TB
- metastatic bone disease or metastatic calcification
- lymphoma
- primary hyperparathyroidism
- malabsorption disorder
- active or history of renal stones
- severe liver disease or jaundice
- pregnant

YES → Consider referral or seek advice from appropriate specialist

NO

Correct vitamin D level with high dose treatment / loading regimen
Providing approximately a total dose of 300,000 units colecalciferol orally over 6-10 weeks. Prescribe full course on acute prescription by brand as one of the formulary products - see table 1 in appendix 4
- **Colextra-D3® 20,000 units capsules** – Take two capsules once a week for 7 weeks
- **InVita D3® 50,000 units capsules** – Take one capsule once a week for 6 weeks

Check serum calcium level 3-4 weeks after finishing loading regimen and before the initiation of vitamin D maintenance (vitamin D repletion may unmask primary hyperparathyroidism)

Calcium normal

YES

Hypercalcaemia
Check PTH, advise to stop if taking any vitamin D and refer to appropriate clinic

Advise self-care vitamin D maintenance supplementation all year round with oral colecalciferol 800 – 2000 units daily **purchased OTC** and reinforce lifestyle advice. Currently 1000 units (25 microgram) tablets are the most cost effective to purchase OTC. See appendix 3 for details. **Assess dietary calcium intake** (calcium calculator) if <700mg per day (<1000mg in osteoporosis) advise to increase dietary intake. If unable, advise self-care calcium supplements (combination with vitamin D available OTC). **Do not prescribe on the NHS** vitamin D maintenance supplementation, **unless** the patient has osteoporosis, or at risk of vitamin D deficiency or malabsorption secondary to a chronic condition or surgery. See appendix 4 for the advice. Routine repeat vitamin D testing is not required but reinforce concordance at routine reviews. Following loading regimen, if still symptomatic at 3 months, retest vitamin D and review diagnosis. Patients with malabsorption conditions may require repeat testing.

SYMPTOMATIC PATIENTS WHO DO NOT RESPOND TO COLECALCIFEROL LOADING

Patients who present with symptoms of vitamin D deficiency following completion of recent colecalciferol treatment dose / loading regimen and who continue recommended vitamin D maintenance to prevent deficiency

Re-test serum 25-hydroxyvitamin D (25[OH]D) 3 months after completion of loading

< 50 nmol/L

Repeat colecalciferol high dose treatment / loading regimen. Check serum calcium level 3-4 weeks after completion and before the initiation of vitamin D maintenance.

- Colextra-D3® 20,000 units capsules
  two capsules once a week for 7 weeks OR
- InVita D3® 50,000 units capsules
  one capsule once a week for 6 weeks.

Symptoms of vitamin D deficiency persist 3 months after completion of the second colecalciferol treatment dose / loading regimen in patients who continue recommended vitamin D maintenance to prevent deficiency.

Re-test serum 25-hydroxyvitamin D (25[OH]D)
3 months after completion of loading regimen

< 50 nmol/L

Refer to Metabolic Medicine Specialist

Specialist may initiate oral calcifediol (Domnisol®, (25(OH)D_3), activated vitamin D metabolite which does not require hepatic metabolism) **following two failed vitamin D courses (colecalciferol) within 6 months.**

Initial treatment course – to be prescribed by Specialist:
Calcifediol monohydrate 266 micrograms (one capsule) once a week for 12 weeks. Treatment response is to be assessed by the Specialist and once 25(OH)D level is above 50 nmol/L the ongoing maintenance prescribing may be requested from Primary Care.

Ongoing calcifediol maintenance dose – may be requested from Primary Care after efficacy has been confirmed:
Calcifediol monohydrate 266 micrograms (one capsule) once a month (Amber 2).

> 50 nmol/L

No treatment required
Vitamin D levels SUFFICIENT for most individuals. Consider another cause for the symptoms. Provide lifestyle advice to maintain vitamin D levels through safe sun exposure, diet, and self-care with use of over the counter (OTC) supplements. More info in appendix 2 and click here for patient leaflet.

> 50 nmol/L

FOR PRIMARY CARE CLINICIANS INFORMATION ONLY:

For clinical reasons vitamin D loading regimens in hospitalised patients in the local Trusts may vary from those specified in this guideline.

Within inpatient settings **a rapid high dose treatment / rapid loading regimen** with vitamin D may be required for some patients e.g.:

- Those admitted with a fragility fracture awaiting administration of strong resorptive treatment with zoledronate, denosumab, or teriparatide.
- Those who are unable to complete high dose treatment over 6-7 weeks following weekly intervals for clinical reasons (e.g. patients with dementia, learning difficulties, requiring compliance aids, as per trust policy).

Where rapid vitamin D deficiency treatment / rapid loading is required, the **full course will be prescribed and supplied to the patients while in hospital care**. If vitamin D maintenance dose is indicated or any follow up monitoring required (e.g. serum calcium re-check, if deranged baseline) – this will be communicated to Primary Care within the discharge letter.

The following rapid vitamin D loading / correction regimens are used in the local Trusts following internal guidelines:

Sherwood Forest Hospitals NHS Foundation Trust:

- Oral colecalciferol 60,000 units once a day for 5 days (total loading dose 300,000 units).
- Oral colecalciferol 100,000 units as a single dose (total loading dose 100,000 units).

Nottingham University Hospitals NHS Trust:

- Oral colecalciferol 40,000 units (given as 2x20,000 units capsules) once a day for 7 days (total loading dose 280,000 units).
- Oral colecalciferol 50,000 units (given as 2x25,000 units oral solution ampoules) once a day for 6 days (total loading dose 300,000 units).
- Vitamin D level <25nmol/L AND symptoms AND renal impairment: oral colecalciferol 25,000 units, once a day, for 7 days, then 25,000 units, once a week, for 4 weeks (total loading dose 275,000 units).

Appendix 1: Clinical features and risk factors for vitamin D deficiency or insufficiency

Box 1: Clinical features of vitamin D deficiency and osteomalacia

- Gradual onset and persistent bone pain without preceding mechanical injury (frequently in back, ribs or lower limbs).
- Fragility fracture.
- Proximal muscle weakness (difficulty with stairs, getting up off the floor or standing after sitting in a low chair, waddling gait) or muscle pain.
- Carpopedal spasm, tetany, seizures, or irritability due to hypocalcaemia and requiring urgent treatment.
- Osteopenia on plain radiograph.
- Low bone density on DEXA (dual energy X-ray absorptiometry) scan (does not equate to osteoporosis).

Table 1: Risk factors for vitamin D deficiency

Inadequate UVB light exposure	Inadequate dietary intake or absorption	Metabolic factors
• Pigmented skin (non-white ethnicity). • Lack of sunlight exposure or atmospheric pollution. • Skin concealing garments or routine use of sun protection factor 15 or above. • Housebound or indoor living (e.g. care homes). • Seasonal.	• Vegetarian (or other fish-free diet). • Malabsorption (e.g. coeliac disease, Crohn's disease etc.). • Short bowel. • Cholestatic liver disease, jaundice. • Following bariatric surgery.	• Age 65 years old and over (reduced synthesis in the skin). • Co-prescribed drugs with potential to affect vit D levels e.g. antacids, anticonvulsants (carbamazepine, oxcarbazepine, phenobarbital, phenytoin, primidone and valproate), calcium channel blockers, cholestyramine, digoxin, glucocorticoids, highly active antiretroviral treatment (HAART), isoniazid, orlistat, rifampicin, sucralfate, thiazide diuretics. • Severe liver disease/failure. • Chronic/end stage renal disease. • Pregnancy or breast feeding. • Obesity with BMI>30kg/m^2 (vitamin D trapped in adipose tissue).

Appendix 2: Patient information about vitamin D and lifestyle advice

Link to printable local patient information leaflet:
Notts APC website / Patient Info / Vitamin D - Patient information leaflet

Advice on lifestyle measures to maintain and prevent low vitamin D levels consist of:

- safe sun exposure
- self-supplementation
- dietary advice

Advice on safe sun exposure:

From late March or early April to the end of September, most people should be able to get all the vitamin D they need from sunlight. The body creates vitamin D from direct sunlight on the skin when outdoors. Between October and early March however, not enough vitamin D is created from the sunlight, and it may be difficult to get the recommended daily intake from diet alone. More information about sun exposure and vitamin D is available on the Royal Osteoporosis Society website: Vitamin D: welcome to the 'sunlight zone' (theros.org.uk)

Advice on supplementation of vitamin D:

To prevent vitamin D deficiency, Public Health England recommend taking a daily supplement containing 10 micrograms* (400 units) of vitamin D during autumn and winter when there is limited sun exposure. All year-round supplements should be considered for people aged 65 and over, with history of vitamin D deficiency, or who have very little or no sunshine exposure e.g. housebound, in a residential home, usually wearing clothes that cover up most of the skin. Patients should be advised to purchase vitamin D supplements over the counter.

*Note that, currently, supplements containing 25 micrograms (1000 units) are considerably cheaper to buy than those containing 10 micrograms (400 units) or 20 micrograms (800 units). This is a suitable dose to take daily as supplement to prevent vitamin D deficiency.

Advice on dietary sources of vitamin D:
Vitamin D is also found in a small number of foods including:

- egg yolks,
- fortified foods – such as most fat spreads, soy yogurts, soy milk, almond milk, some orange juices and some breakfast cereals,
- liver,
- mushrooms,
- oily fish – such as salmon, sardines, herring and mackerel,
- fresh or canned tuna,
- red meat,
- ricotta cheese.

In the UK, dairy products from cows' milk are not routinely fortified, so are not regarded as good sources of vitamin D but are great dietary sources of calcium.

More information for patients is available on the following websites:

- NHS Website – Vitamin D
- Osteoporosis: Nutrition for bones (theros.org.uk)
- Vitamin D: welcome to the 'sunlight zone' (theros.org.uk)
- Royal College Obstetrics and Gynaecologists: Healthy eating and vitamin supplements in pregnancy
- Vitamin D (bda.uk.com)

Appendix 3: Vitamin D products for maintenance available without prescription

Patients should be advised to buy vitamin D supplements unless they meet one of the specific vitamin D exception criteria in the NHS England guideline: Conditions for which over the counter items should not routinely be prescribed in primary care.

Note that maintenance or preventative supplementation is not an exception for vitamin D prescribing. Exceptions to self-care are also listed in the local ICB vitamin D position statement.

Prescriptions for vitamin D should be reserved for the treatment of patients with confirmed deficiency or insufficiency that require **treatment** with loading doses. **Subsequent maintenance doses should then be purchased over the counter.**

Patients can buy vitamin D supplements at most pharmacies, supermarkets and discount stores for less than £5 for a three months' supply. Women and children who qualify for Healthy Start scheme can get free supplements containing the recommended amounts of vitamin D. The NHS website provides additional information for patients.

Products and supplements available over the counter are suitable for prophylaxis and prevention of deficiency during winter, as well as all year-round maintenance therapy if required.

Pregnant and breast feeding women
NICE recommend that all pregnant and breastfeeding women should be informed about the importance of vitamin D and should take 10 micrograms (400 units) daily to prevent vitamin D deficiency. Supplements are available to purchase over the counter or via Healthy Start programme if the patient is eligible (see below).

REMEMBER – pregnant women should avoid taking multivitamins containing vitamin A (retinol) due to the teratogenic risk of vitamin A.

Healthy Start vitamins
Healthy Start vitamins (www.healthystart.nhs.uk) for women and children are free of charge for low income families and are available from Sure Start centres and some other health centres. You can also ask your midwife or health visitor for where they are available locally.

Women qualify for free Healthy Start vitamins from the tenth week of pregnancy or if they have a child under four years old, and if she or her family receives any of the following:

- Income Support
- Income-based Jobseeker's Allowance
- Income-related Employment and Support Allowance
- Child Tax Credit (but only if the family's annual income is £16,190 or less)
- Universal Credit (but only if the family earns £408 or less from employment)
- Working Tax Credit (but only if the family is receiving the 4 week 'run-on*' payment)

**Working Tax Credit run-on is the payment received for a further 4 weeks immediately after ceasing to qualify for Working Tax Credit.*

Women who are under 18 and pregnant also qualify, even if they do not get any of the above benefits or tax credits.

Some Sure Start centres will also sell them to other customers (at minimal charge), but not all have the facility to take money.

There are two different Healthy Start products:

- Healthy Start **women's** vitamin **tablets.** The daily dose of one tablet contains: 400 units of vitamin D3 per tablet (as well as 70 micrograms of vitamin C and 400 micrograms of folic acid).
- Healthy Start **children's** vitamin **drops**. The daily dose of five drops contains: 300 units of vitamin D3 (as well as 233 micrograms of vitamin A and 20 milligrams of vitamin C).

For those people in whom Healthy Start vitamins are not suitable, a range of vitamin D supplements are available for purchase over the counter.

Appendix 4: Vitamin D preparations available for prescribing in line with this guideline

- Full treatment course to be prescribed by brand name and issued as an acute prescription rather than added to a repeat prescription.
- To help absorption, vitamin D should be taken with food.
- All products listed below are licensed in the UK.

Table 1: Recommended vitamin D preparations for correction of vitamin D level with high dose treatment/loading regimen in deficiency/insufficiency

PRODUCT Prescribe by brand name	**Treatment dose & course length**	**Total cost for full course**	**Cost per pack**	**Pack size**	**Gelatin free?**	**Suitable in peanut / soya allergy?**	**Suitable for vegetarians?****	**Notes**
Colextra-D3® 20,000 units capsules	2 x 20,000 units once per week for 7 weeks	**£7.42* (£8.26)**	£15.90 (£5.90)	30 (10)	N	Y	N	*Depending on dispensing pack size. Pack of 30 is the most cost effective.
InVita D3® 50,000 units capsules	1 x 50,000 units once per week for 6 weeks	**£9.90**	£4.95	3	N	Y	N	Not licensed for under 18 years
Colextra-D3® 25,000 units tablets	2 x 25,000 units once per week for 6 weeks	**£12.40**	£12.40	12	Y	Y	Y	
InVita D3® 50,000 units/ 1ml oral solution unit dose ampoules sugar free*	1 x 50,000 units once per week for 6 weeks	**£12.50**	£6.25	3	Y	Y	Y	Not licensed for under 18 years
Strivit-D3® 20,000 units capsules	2 x 20,000 units once per week for 7 weeks	**£9.21* (£13.44)**	£13.15 (£9.60)	20 (10)	N	Y	N	*Depending on dispensing pack size. Pack of 20 is more cost effective.
InVita D3® 25,000 units capsules	2 x 25,000 units once per week for 6 weeks	**£15.80**	£3.95	3	N	Y	N	

*InVita D3® comes as a “Snap and squeeze” ampoule (see below). Patients should be advised to take InVita D3® at mealtimes. If preferred, the contents can be emptied onto a spoon and taken orally or mixed with a little cold or lukewarm food immediately before use.

****** There is currently no licensed oral vitamin D preparation available that would be suitable for a vegan diet. There are unlicensed products available that may be suitable, please see Choosing an oral vitamin D preparation for vegetarians or vegans published by Specialist Pharmacist Service (SPS) for more information.

See table 2 overleaf for routine replacement therapy

Table 2: Maintenance and prevention of deficiency

Products listed below are only to be prescribed if the patient meets the exception criteria listed in the local position statement e.g. the patient has osteoporosis, or at risk of vitamin D deficiency or malabsorption secondary to a chronic condition or surgery (excluding bariatric surgery). All other patients should be advised to **purchase** a vitamin D supplement which will provide 800 to 2000units per day (click here for patient information leaflet).

PRODUCT Prescribe by brand name	**Dose**	**Monthly cost (NHS)**	**Cost per pack (NHS)**	**Pack size**	**Notes**
ValuPak® Vitamin D3 1000 units tablets (food supplement)	One to be taken daily	**£0.35**	£0.75	60	The most cost-effective option. Food supplement, unlicensed product. Gelatin free.
Colextra-D3® 25,000 units tablets	One to be taken **once a month**	**£1.03**	£12.40	12	Licensed product. Gelatin free.
Invita D3® 25,000 units capsules	One to be taken **once a month**	**£1.32**	£3.95	3	Licensed product. Contain glycerol and gelatin.
InVita D3® 25,000 units/ 1ml oral solution unit dose ampoules sugar free	One to be taken **once a month**	**£1.48**	£4.45	3	Licensed product. Gelatin free. Suitable for a vegetarian diet. Lactose free, nut free and soya free.
Calcifediol (Domnisol®) 266 micrograms capsules	One to be taken **once a month**	**£2**	£1.99	1	Amber 2 For patients who do not respond to colecalciferol. Ensure other Vitamin D preparations are not co-administered (prescription or OTC).
			£5.97	3	

Colecalciferol is derived from lanolin (wool fat). Therefore all vitamin D3 products may not be suitable for strict vegan diet, as originating from wool fat. There are no licensed vitamin D3 preparations which are suitable for vegans. Some products contain vitamin D derived from the wool of live sheep, and those are considered suitable for vegetarian diet (i.e. all Invita D3 products). Please see the Specialist Pharmacist Service document "Choosing an oral vitamin D preparation for vegetarians or vegans" for more information.

Intramuscular Injection:

Please note that injection of ergocalciferol is not routinely encouraged due to variable absorption and slower onset of repletion. It should only be used if an oral preparation is not suitable.

Dose for vitamin D deficiency caused by intestinal malabsorption or chronic liver disease (under expert supervision): 300,000 units of ergocalciferol given by intramuscular injection every 3 to 6 months.

There is a UK licensed ergocalciferol injection but affected by variable and intermittent availability. This is gelatin free. Ergocalciferol, 7.5 mg/ml (300,000 units/ml) in oil, injection for intramuscular use only. Drug Tariff price per one 1mL ampoule = £9.35.

Alfacalcidol/calcitriol (Specialist initiation only):

Alfacalcidol and calcitriol have no routine place in the management of primary vitamin D deficiency and should be reserved for use in renal disease, liver disease and primary hypoparathyroidism.

References and further resources

Information on available vitamin D preparations:

- BNF available at https://bnf.nice.org.uk/drugs/colecalciferol/
- Drug Tariff available at http://www.drugtariff.nhsbsa.nhs.uk/
- Summaries of Product Characteristics available at www.medicines.org.uk/emc

National Guidance:

- NHS England: Conditions for which over the counter items should not routinely be prescribed in primary care. Published: March 2024 https://www.england.nhs.uk/publication/policy-guidance-conditions-for-which-over-the-counter-items-should-not-be-routinely-prescribed-in-primary-care/
- NICE CKS Vitamin D deficiency in adults. Last revised January 2022. https://cks.nice.org.uk/topics/vitamin-d-deficiency-in-adults/
- NICE NG201: Antenatal care. Published: 19 August 2021. https://www.nice.org.uk/guidance/ng201
- NICE NG34: Sunlight exposure: risks and benefits. Published: 09 February 2016 https://www.nice.org.uk/guidance/ng34
- NICE PH11: Maternal and child nutrition. Published: 26 March 2008 Last updated: 01 November 2014 https://www.nice.org.uk/guidance/ph11
- NICE PH56: Vitamin D: supplement use in specific population group. Published: 26 November 2014. Last updated: 30 August 2017 https://www.nice.org.uk/guidance/ph56
- Vitamin D and Bone Health: A Practical Clinical Guideline for Patient Management - The quick guide. November 2018 https://theros.org.uk/media/5imnumtq/ros-vitamin-d-quick-guide-november-2018.pdf

SPS Medicines Q&As:

- Choosing an oral vitamin D preparation for vegetarians or vegans. Published 13 December 2021 https://www.sps.nhs.uk/articles/choosing-an-oral-vitamin-d-preparation-for-vegetarians-or-vegans/
- Dosing and monitoring for treatment of Vitamin D deficiency in pregnancy. Published 24 March 2021. Updated 15 December 2021 https://www.sps.nhs.uk/articles/dosing-and-monitoring-for-treatment-of-vitamin-d-deficiency-in-pregnancy/#:~:text=vitamin%20D