Vitamin D Guidance MSC 18.145.5 O/C

1 Introduction

Vitamin D is required for the absorption and utilisation of calcium and phosphorous, vital in maintaining musculoskeletal health. The two main forms are vitamin D_2 (ergocalciferol) and D_3 (colecalciferol). Vitamin D deficiency develops when there is inadequate exposure to sunlight or a lack of dietary sources.

2 Vitamin D Monitoring

Serum 25-hydroxyvitamin-D (25OH-D) is measured to reflect vitamin D availability over recent weeks. Asymptomatic, healthy individuals should **not** routinely have serum 25OH-D levels tested, and can be advised to self-care with advice from community pharmacy.

3 At Risk Groups

The following groups are considered 'higher risk' for vitamin D deficiency:

- Limited sun exposure (between 10am-2pm April to September):
  - Spend little time outdoors (e.g. housebound or institutionalised)
  - Cover skin for cultural reasons
  - Those working night shifts
  - Consistent use of sun cream (over SPF 15)
- Elderly (over 65 years)
- Have malabsorption conditions (e.g. coeliac disease, Crohn's disease)
- Obese (BMI over 30kg/m^2)
- Taking medicines that may affect vitamin D (e.g. orlistat, antiepileptics, rifampicin)

DoH advises that people over 65years consider 400units vitamin D daily (self-care)

PHE advises everyone consider 400units vitamin D daily for autumn and winter (self-care)

4 Testing 25OH-D Levels

- Serum 25OH-D levels may be clinically appropriate in the following presentations:
  - Elderly patients who have had a recent fall or fragility fracture
  - Initiation of potent antiresorptive agent (e.g. zoledronic acid or denosumab)
  - Symptoms of osteomalacia (e.g. bone discomfort, muscle aches, weakness)
  - Conditions improved by vitamin D treatment (e.g. osteoporosis)
  - All patients newly diagnosed with melanoma

Note: Serum 25OH-D **AND** calcium (bone profile) should be taken. Use a brown-topped serum gel tube. Turnaround time is one day from the WVT Pathology laboratory.

5 When to Offer Treatment

Table 1: Serum 25OH-D (nmol/L) reference ranges and corresponding treatment initiation advice

Serum 25OH-D (nmol/L)	Threshold and Advice
<30	**Deficient** – Initiate treatment
30-50	**Inadequate in some people** – Advise self-care and supplementation (BDA leaflet). Initiate treatment in those at higher risk of deficiency or if there is a clinical reason (see 4.)
>50	**Sufficient** – Provide reassurance and dietary advice. Consider alternative diagnosis if musculoskeletal symptoms

6 Choice of Therapy

- Oral vitamin D_3 (colecalciferol) preparations are the treatment of choice
- Loading regimens should only be initiated once serum 25OH-D **and** calcium reported
- Consider combination vitamin D and calcium preparations if dietary calcium intake is regularly less than 700mg daily (1000mg in osteoporosis)
    - Calcium calculator: www.cgem.ed.ac.uk/research/rheumatological/calcium-calculator

7 Adult Dosing

Table 2: Adult Vitamin D (and Calcium) dosing regimens and formulary preparations

Therapy	Recommended Regimen *(10micrograms=400units)*	Formulary Vitamin D Preparations
Treatment or Replacement *(≈300,000units)*	10,000units oral once daily for 28 days	SunVit D3 10,000unit tablets (supplement – prescribe as brand in primary care)
	50,000units oral once weekly for six weeks*	25,000unit tablets / capsules (generic) InVita D3 25,000unit/mL oral solution**
	300,000units IM single-dose. Only if malabsorption (e.g. short bowel syndrome, high output stoma)	Ergocalciferol 300,000unit/mL IM injection (***hospital only***)
Maintenance or Prevention	800-1000units oral daily (generic prescribing at this dose)	Desunin 800unit tablets *[can be crushed if swallowing difficulties, licensed]* Stexerol D3 1,000unit tablets Thorens drops 200unit/drop
	As above, with calcium if required	Calci-D Chewable 1000mg/1000unit tablets, ***one daily***
		CalciChew D3 Forte Chewable 500mg/400unit, ***two daily*** *[Can be crushed if swallowing difficulties, unlicensed]*
	Pregnant/breastfeeding: 400units oral daily	InVita D3 400unit capsules

*Intermittent dosing regimens should be avoided in the frail elderly and those with recurrent falls
**Oral solution is suitable for enteral tubes. Mix with small amount of enteral feed immediately prior to administration. Contact WVT Medicines Information (ext. 4017 / 01432 364017) for further information

- For vegetarian or vegan patients, and those with allergies to soya, peanuts, or gluten please refer to UKMi guidance and manufacturer information.
- **IM not routinely** recommended due to the unpredictable bioavailability, slower onset, and the administrative burden

7.1 Cautions to Replacement Therapy

- Caution is advised when prescribing high-strength (>10,000units daily) vitamin D if:
    - Hypercalcaemia (particularly if cause not known), hypercalciuria, and controlled hyperparathyroidism
    - Granulomatous diseases, e.g. TB, Sarcoidosis, Wegener's Granulomatosis (GPA vasculitis)
    - Pregnancy
    - Cardiac glycosides (e.g. digoxin) – increased risk of toxicity if calcium increases, especially if co-prescribed with thiazide diuretics which reduce calcium renal excretion
- Consider alternative replacement regimen of 1,600units to 2,000units daily. Monitor calcium every 2-4 weeks during loading.

8 Paediatric Dosing

Suitable (licensed) paediatric preparations include:

- InVita D3
  - 2,400 IU/ml oral drops, solution (67 units/drop)
  - 25,000 IU oral solution
  - 25,000 IU soft capsules (licensed for use in 10+ years)
  - 5,600 IU soft capsules (licensed for use in 12+ years)
  - 800 IU soft capsules (licensed for use in 12+ years)
- Thorens
  - 10,000 IU/ml oral drops, solution (200 units/drop)
  - 25,000 IU/2.5ml oral solution

Table 3: Paediatric Vitamin D dosing regimens

	Treatment		Prevention	
Age	**Daily Dose for 8-12 weeks**	**Alternative Dosing**	**Maintenance Daily Dose**	**Maintenance Alternative Dosing (single dose)**
1 to 6 months	3000 units	25,000 units once every 2 weeks, for 6 weeks (followed by maintenance therapy of 400-1000 units/day)	400 units	25,000 units every 8 weeks
6 months to 1 year	6000 units		400 units	25,000 units every 8 weeks
1 to 12 years	6000 units		400 units	25,000 units every 6 weeks
12 to 18 years	10,000 units		400 units	25,000 units every 6 weeks

9 Calcium Monitoring During Replacement Therapy

- Serum calcium should be checked at the end of loading regimen to check for unmasked hyperparathyroidism, **then consider maintenance regimen**
- Serum 25OH-D does not need to be repeated (unless toxicity suspected)
  - Steady state not reached until 3-6months after loading

10 Renal Impairment

- For patients on dialysis or with renal complications, **do not initiate vitamin D therapy without the involvement of the patient's renal consultant**
- In patients with CKD4-5 (eGFR<30), hydroxylation to active vitamin D may be impaired
- International KDIGO guidelines state for CKD3-5, vitamin D deficiency and insufficiency be corrected using treatment strategies recommended for the general population. For patients not currently under a renal consultant, consider referral if appropriate
  - Do **not** routinely offer short-acting, potent vitamin D analogues (alfacalcidol, calcitrol) for patients with eGFR<30 unless underlying deficiency corrected
  - If vitamin D therapy indicated, closely monitor serum calcium and phosphate.

11 Patient Information

Most patients will be referred to self-care and purchase their own vitamin D supplements. Primary care prescribing at NHS expense can be considered for patients in need of treatment (loading) dose and maintenance therapy for at-risk groups at the discretion of the prescriber**.**

The British Dietetic Association (BDA) leaflet on vitamin D sources includes information on safe sun exposure, diet and supplementation**:** http://www.bda.uk.com/foodfacts/VitaminD.pdf

12 References

1. National Osteoporosis Society. Vitamin D and Bone Health: A Practical Clinical Guideline for Patient Management. April 2013. Available from: www.nos.org.uk
2. Clinical Knowledge Summaries. Vitamin D Deficiency in Adults. Available from: www.cks.nice.uk
3. Clinical Knowledge Summaries. Vitamin D Deficiency in Children. Available from: www.cks.nice.uk
4. UK Medicines Information. Medicines Q&A 82.3 What dose of vitamin D should be prescribed for the treatment of vitamin D deficiency? April 2015. Available from: www.sps.nhs.uk
5. Department of Health (DoH). Vitamin D – Advice on supplements for at risk groups. February 2012. Available from: www.gov.uk
6. Public Health England (PHE). PHE publishes new advice on vitamin D. July 2016. Available from: www.gov.uk
7. Joint Formulary Committee. British National Formulary (online) London: BMJ Group and Pharmaceutical Press Available from: www.medicinescomplete.com
8. Smyth J, editor. The NEWT Guidelines for administration of medication to patients with enteral feeding tubes or swallowing difficulties. 3rd edition. 2015. North East Wales NHS Trust. Available from: www.access.newtguidelines.com
9. White R, Bradnam V. Handbook of Drug Administration via Enteral Feeding Tubes. London: Pharmaceutical Press. Available from: www.medicinescomplete.com
10. Kidney Disease: Improving Global Outcomes (KDIGO). Clinical Practice Guideline for the Diagnosis, Evaluation, Prevention, and Treatment of Chronic Kidney Disease-Mineral and Bone Disorder (CKD-MBD). August 2009. Available from: www.kdigo.org
11. National Institute for Health and Care Excellence (NICE). Guideline CG182: Chronic kidney disease in adults: assessment and management. January 2015. Available from: www.nice.org.uk
12. Summary of Product Characteristics. InVita D3. Available from: www.medicines.org.uk/emc
13. Summary of Product Characteristics. Thorens. Available from: www.medicines.org.uk/emc