NHS Tayside Management of Vitamin D deficiency in Adults: Notes to Accompany Flow Chart

1. Those in a risk group without symptoms should be given lifestyle advice and take a daily maintenance dose. See DoH leaflet http://www.scotland.gov.uk/Resource/0038/00386785.pdf

2. Lifestyle advice: 10-20 minutes unprotected sun exposure between 11 and 3pm (April to September). This level of exposure is considered safe but skin should be covered before it becomes red. This will be insufficient for those with darker skin. Family members are likely to have similar risk -give lifestyle advice.

   Only a small amount of vitamin D is acquired from food. Dietary sources include
   Oily fish such as trout, salmon, mackerel, herring, sardines, fresh tuna (200-400 IU per 100g)
   Cod liver oil (1360 IU per tablespoon), some breakfast cereals (check individual brands).

3. Check FBC because there is often co-existing anaemia.
   Those with CKD 4 or 5 may not respond to cholecalciferol and should be referred.
   PTH samples must be received by the laboratory within 4 hours of being taken and a sample for calcium analysis must be sent at the same time.

4. In vitamin D deficiency, serum Ca may be low or, because of secondary hyperparathyroidism, may be normal. Serum phosphate usually decreases, and alkaline phosphatase usually increases. Serum PTH may be elevated, depending on severity of deficiency.

Calcium	PTH	Vitamin D	Diagnosis	Action
Normal	normal	<25	vitamin D deficiency	Vitamin D replacement
Low	Raised	<25	vitamin D deficiency with secondary hyperparathyroidism.	Vitamin D replacement, may need some initial calcium too.
Normal	raised PTH	low Vit D	May have primary hyperparathyroidism masked by co-existent vitamin D deficiency or vitamin D deficiency with secondary hyperparathyroidism..	Treat vitamin D deficiency check calcium and PTH if calcium rises refer to endocrine.
Low	Low/normal		Hypoparathyroidism	Refer to endocrine

5. Vitamin D deficiency in pregnancy: immediately start cholecalciferol (Fultium) 800iu daily and seek specialist advice. There is debate regarding high dose supplementation in pregnancy. The baby is at high risk of deficiency particularly if breast fed and should receive supplementation see Tayside Prescriber Issue 124; June 2012.

6. Seek specialist advice before giving treatment doses of vitamin D in those with hypercalcaemia.

7. Fultium D3 contains peanut oil- check for allergy before prescribing. Not suitable for vegetarians as the gelatin is of bovine origin but it is Halal certified. Vegetarians should be prescribed cholecalciferol 3000 IU/ml made by Tayside Pharmaceuticals, please indicate supplier on the prescription. The cholecalciferol source is lanolin from wool. If unavailable, an alternative is Pro D3 cholecalciferol tablets 10,000 IU daily for 30days. They are gelatin free and suitable for vegetarians and Muslims.

8. All patients receiving vitamin D treatment doses or calcium should be advised of the signs of hypercalcaemia, namely; nausea, vomiting, abdominal pain, headache, apathy, polyuria, anorexia. Patients on thiazides may be more likely develop hypercalcaemia.

9. Following treatment of deficiency, maintenance treatment should be continued and probably be lifelong. Symptoms will take approximately 8 weeks to improve following treatment of deficiency.

10. The time of year a sample has been taken should be taken into consideration in interpreting borderline results. Results from the end of summer will be the highest that patient will achieve all year and results at the end of spring will be the lowest. Patients with low-normal levels at the end of summer could benefit from supplementation.

11. Erogocalciferol is 25(OH) vitamin D2. Testing for Vitamin D is undertaken by Glasgow Royal Infirmary. The method used has changed and now measures 25(OH) vitamin D3 (cholecalciferol). To measure vitamin D following ergocalciferol, request analysis by the previous method of mass spectrometry – contact biochemistry.

12. Patients whose PTH does not return to within the reference interval following correction of vitamin D status may have tertiary hyperparathyroidism due to prolonged stimulation of the parathyroids by severe longstanding vitamin D deficiency. Patients whose PTH remains elevated should be discussed with endocrinology.

13. Many OTC preparations are widely available in many formulations in pharmacies, supermarkets and healthfood shops. They cost around £1 per month of treatment. If compliance is difficult, maintenance doses can be taken weekly eg 6,000 IU a week. For patients who cannot take tablets an oral spray is available called DLUX in strengths of 400 IU, 1000 IU, 3000 IU per spray.

NHS Tayside Guideline for Investigation and Treatment of Vitamin D deficiency

Does the patient have ≥1 symptom of vitamin D deficiency?
- widespread bone pain or tenderness or myalgia (no mechanical injury)
- proximal muscle weakness
- gait abnormalities

AND

Does the patient have ≥1 risk factor for vitamin D deficiency?
- black or ethnic family origin
- housebound/residential care
- habitual skin covering or strict sunscreen use
- vegan/vegetarian
- liver/renal disease
- intestinal malabsorption
- anticonvulsants, cholestyramine, rifampicin, anti-retrovirals, glucocorticoids
- Obesity BMI>30
- >65yrs

No → Vitamin D testing not required. Give lifestyle advice [1, 2]

Yes

If other causes for symptoms have been excluded, take blood for the following: 25 (OH) Vitamin D, Ca^{2+}, PTH, LFTs, PO^{4+}, U+Es, FBC [see 3]

Does the patient have any of the following?

Hypercalcaemia [6]	Pregnant
Primary Hyperparathyroidsim [4]	CKD 4 or 5
Severe liver disease	Sarcoidosis
Metastatic bone disease	Malabsorption

Yes → If pregnant see [5]. Otherwise contact relevant specialist.

No → Proceed to treatment based on vitamin D level

Less than 25nmol/L = deficient
Give Fultium 3,200 IU (4 capsules) daily for 12 weeks. [see 7, 8 first] then advise OTC maintenance 800 IU daily. [13]. Give lifestyle advice [1, 2]

If hypocalcaemic consider giving 1000mg calcium.

Check Calcium 4 weeks after starting Vitamin D, but every 2 weeks if also given calcium. [8] Stop calcium supplementation when calcium levels are within reference interval.

If PTH or Alk Phosp were abnormal prior to starting vitamin D repeat at 12 weeks. [12]

If known to have malabsorption check vitamin D levels at 6 months.

25 to 50nmol/L = insufficient
Maintenance therapy with 800 IU OTC daily [13] and give lifestyle advice [1, 2].

>50 nmol/L =sufficient but consider time of year [see 10] may need OTC supplementation with 400 IU daily [13]
Give Lifestyle advice [1, 2]