Vitamin D Deficiency: Prevention and Treatment for Adults in Primary Care

Version 1: April 2010
Updated: August 2010
June 2013
September 2016

Summary of Updates Made in March 2016

- **New Guidance from Public Health England** recommends that ALL people should consider taking a daily supplement containing 10 micrograms of vitamin D in autumn and winter. At risk groups should take daily supplements all year round. The Department of Health have said it is really important we all get enough vitamin D in our diet and taking supplements is a matter of individual choice. Vitamin D is only available on prescription where a doctor judges it necessary as part of a patient’s treatment plan. The CCG position is that any Vitamin D required outside a treatment plan should be purchased over the counter.

- **Additional conditions to refer to secondary care**: symptomatic hypocalcaemia, intestinal malabsorption and chronic liver disease

- **Treatment for insufficiency** (25 OHD level 30-50nmol/L)- see page 4

- **Product choice**: licensed products now available. For recommended products see page 5
**Investigation and Treatment of Vitamin D Deficiency for Adults in Primary Care: Summary of Guidance**

- **Deficient:** Levels <30nmol/L
- **Insufficient:** Levels 30-50nmol/L
- **Sufficient:** Levels >50nmol/L

### Is the patient symptomatic OR have a clinical reason for testing vitamin D?
- **Symptoms:** Bone, joint and muscle pain or tenderness, muscle weakness, waddling gait, Chronic widespread pain, Fractures etc.
- **Clinical reasons:** Osteomalacia, falls, due to start treatment with antiresorptive agents, fractures etc.

### Have other causes for symptoms been excluded?
- **NO**
- **YES**

### Test for vitamin D deficiency: 25OHD, Calcium, Phosphate, ALP & additional tests if needed (see page 4).

### Does the patient have any of the following risk factors?
- Frailty fracture, documented osteoporosis/osteomalacia or high fracture risk
- Treatment with antiresorptive medication for bone disease
- Symptoms of vitamin D deficiency
- Increased risk of developing vitamin D deficiency (see above)
- Chronic liver disease

### Does the patient have any of the following risk factors?
- Symptomatic hypocalcaemia
- Contraindication to vitamin D
- Stage 4 CKD or eGFR <30ml/min, renal stones or severe hypercalciuria
- Primary hyperparathyroidism
- Symptomatic after completion of high dose vitamin D treatment
- Intestinal malabsorption

### Assess need for treatment based on serum 25OHD level

- **Deficient: Levels <30nmol/L**
- **Insufficient: Levels 30-50nmol/L**
- **Sufficient: Levels >50nmol/L**

### TREATMENT DOSING: TO BE PRESCRIBED
- **Plenachol capsules:** 40,000 IU every week for 7 weeks or
  - **Stexerol 25,000 IU tablets:** 50,000 IU every week for 6 weeks
  - OR if unable to swallow capsules:
  - **Invita D3 or Thorens (liquid preparation):** 50,000 IU weekly for 6-8 weeks
  - OR if daily dosing preferred (but more costly):
  - **Fultium D3 caps:** 3,200 IU daily for 12 weeks
  - **Stexerol 1,000 IU tablets:** 3000 IU to 4000 IU daily for 10-12 weeks

### MAINTENANCE DOSING
- Advise purchasing supplements OTC* to provide 800-2000 IU colecalciferol daily**
  - Vitamin D supplements for maintenance in adults and young people 16 and over (excluding special groups), should be purchased over the counter. See Wandsworth CCG Position Statement on Vitamin D Prescribing
  - If calcium is LOW, consider prescribing Adcal D3 caplets (750mg calcium carbonate/200 IU colecalciferol) 2 caplets TWICE a day or a suitable equivalent as maintenance.

### MONITORING
- Check calcium one month after loading (if indicated)
- Do NOT re-check vitamin D level unless; symptoms continue OR the patient has malabsorption problems OR the patient is at high risk OR the patient has had a previous fracture

### ReASSURANCE & LIFESTYLE ADVICE
- Safe sun exposure
- Dietary Advice

### Refer to Secondary Care
- Advise purchasing OTC supplements to provide 400 IU (10micrograms) of colecalciferol daily
- Pregnant and breastfeeding women may be eligible for free multivitamins via the healthy start scheme

### NO
- Is the patient symptomatic OR have a clinical reason for testing vitamin D?
  - **Symptoms:** Bone, joint and muscle pain or tenderness, muscle weakness, waddling gait, Chronic widespread pain, Fractures etc.
  - **Clinical reasons:** Osteomalacia, falls, due to start treatment with antiresorptive agents, fractures etc.

- Is the patient at high risk of developing vitamin D deficiency?
  - Pregnancy and breastfeeding
  - Older people, aged 65 years and over
  - Low exposure to sun, e.g. routine covering of skin, housebound
  - Darker skin, e.g. African, African-Caribbean or South Asian origin
  - Conditions resulting in intestinal malabsorption, e.g. coeliac, Crohn’s
  - Liver or renal disease
  - Vegan or vegetarian diet
  - Medications: anticonvulsants, cholestyramine, rifampicin, glucocorticoids, antiretrovirals

- Do any of the following apply?
  - Symptomatic hypocalcaemia
  - Contraindication to vitamin D
  - Stage 4 CKD or eGFR <30ml/min, renal stones or severe hypercalciuria
  - Primary hyperparathyroidism
  - Symptomatic after completion of high dose vitamin D treatment
  - Intestinal malabsorption
  - Chronic liver disease

- Does the patient have any of the following risk factors?
  - Frailty fracture, documented osteoporosis/osteomalacia or high fracture risk
  - Treatment with antiresorptive medication for bone disease
  - Symptoms of vitamin D deficiency
  - Increased risk of developing vitamin D deficiency (see above)
  - Chronic liver disease

- Have other causes for symptoms been excluded?
- **YES**
- **NO**
Vitamin D Deficiency: Prevention and Treatment for Adults in Primary Care

This guideline aims to support GPs in treating vitamin D deficiency and insufficiency in adults >18 years old. The scope of this guideline does not cover special groups i.e. pregnant/breast feeding women, children and those with malabsorption.

Natural Sources of Vitamin D: Lifestyle Advice

Sunlight
Ultraviolet B (UVB) sunlight exposure is the main natural source of vitamin D. In the UK, from March to October, UVB rays help people produce vitamin D, but excessive exposure can lead to sunburn.1 Exposing commonly uncovered areas of skin (e.g. forearms and hands) for short periods will provide vitamin D, but care should be taken to avoid over exposure. People with genetically darker skin, are at relatively low risk of sunburn but are at higher risk of vitamin D deficiency, and therefore may need to spend more time in the sun to produce the same amount of vitamin D.1 Due to the latitude in the UK, from October to April sun exposure is not adequate for synthesis of vitamin D. (See: NICE guidance [NG34] Sunlight exposure: risks and benefits)

Diet
Dietary sources of vitamin D are limited. Oily fish e.g. sardines, mackerel, salmon and tuna, fortified margarines and cereals (see product labels for information), egg yolks and red meats are the main dietary sources of vitamin D and should be recommended as part of a balanced diet.

Groups at Risk of Vitamin D Deficiency
In July 2016, based on findings from the Scientific Advisory Committee on Nutrition (SACN), Public Health England advised that in addition to adult groups at risk of vitamin D deficiency, ALL people in the UK should consider taking vitamin D supplements between October and March2. Guidance on supplementation to prevent vitamin D deficiency in at risk groups is outlined in table 1 below.

<table>
<thead>
<tr>
<th>Table 1: Adult Groups At Risk of Vitamin D Deficiency2,3</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Pregnant and Breastfeeding Women (some may be eligible to obtain vitamins free of charge as part of the Healthy Start Scheme. Further information and eligibility criteria can be found at: <a href="http://www.healthystart.nhs.uk">www.healthystart.nhs.uk</a>)</td>
</tr>
<tr>
<td>People over 65</td>
</tr>
<tr>
<td>People with low or no exposure to the sun (e.g. housebound or those who cover up for cultural reasons)</td>
</tr>
<tr>
<td>People who have darker skin (e.g. those of African, African-Caribbean and South Asian Origin)</td>
</tr>
<tr>
<td>All adults living in the UK between October and March only</td>
</tr>
</tbody>
</table>

Recommendation: Advise purchasing supplements containing 400 IU of vitamin D

Other Risk Groups for Vitamin D Deficiency
Patients in the following groups are also at high risk of developing vitamin D deficiency. Preventative therapy with vitamin D supplements should therefore be considered:

- Abnormal gut function or mal-absorption
- Biliary obstruction
- Coeliac disease
- Vegan or vegetarian diet
- Obesity (possible reduced availability of vitamin D due to sequestration in body fat)
- Medications including anticonvulsants, colestyramine, rifampicin, isoniazid, glucocorticoids, antiretrovirals
- Pancreatic insufficiency
- Chronic liver or renal disease
- Small bowel disorder
Symptoms of Vitamin D Deficiency

Symptoms of vitamin D deficiency are vague and it can be difficult to ascertain whether a low vitamin D is causal or a surrogate marker. Symptoms of deficiency can include:

- Insidious onset of widespread or localised bone pain and tenderness
- Proximal muscle weakness. This may cause difficulty rising from a chair and/or a waddling gait
- Swelling, tenderness and redness at pseudo-fracture sites
- Fractures; typically femoral neck, scapula, pubic rami, ribs or vertebrae
- Non-specific myalgia especially with a raised Creatine Kinase (CK)

Testing for Vitamin D Deficiency

Vitamin D testing should be prioritised to those patients where the outcome will alter clinical management:

1. Patients with musculoskeletal symptoms that could be attributed to vitamin D deficiency
   - See ‘Symptoms of Vitamin D Deficiency’ above
   - Patients who are suspected of having symptoms caused by osteomalacia, or have chronic widespread pain can be tested as part of their clinical laboratory investigations
   - Other causes for symptoms should be excluded, for example myeloma, rheumatoid arthritis, polymyalgia rheumatica and hypothyroidism

2. Patients with bone diseases that may be improved with vitamin D treatment OR where correction of vitamin D is required prior to specific treatment:
   - Osteomalacia & osteoporosis
   - Correction is required prior to treatment with potent antiresorptive agents e.g. zoledronate and denosumab or bisphosphonate in Paget’s disease to avoid the development of hypocalcaemia
   - For osteoporosis, testing is unnecessary where calcium/vitamin D supplementation is prescribed alongside oral bisphosphonates as recommended by NICE, unless a fragility fracture is sustained when adhering to preventative therapy or if fracture healing is significantly delayed or the patient is symptomatic.
   - In patients with fractures, vitamin D levels should be tested once following the fracture and those who are deficient should be treated in order to prevent a second fracture.

3. Patients thought to be at particularly high risk of deficiency
   - Asymptomatic patients in this group should NOT routinely be tested

Health professionals should NOT routinely test vitamin D status unless:
- The patient has symptoms of deficiency
- There is a clinical reason to do so (for example, they have osteomalacia or have had a fall).
- They are considered to be at particularly high risk of deficiency AND symptomatic

Vitamin D testing should be prioritised to those patients where the outcome will alter clinical management:

1. Patients with musculoskeletal symptoms that could be attributed to vitamin D deficiency
   - See ‘Symptoms of Vitamin D Deficiency’ above
   - Patients who are suspected of having symptoms caused by osteomalacia, or have chronic widespread pain can be tested as part of their clinical laboratory investigations
   - Other causes for symptoms should be excluded, for example myeloma, rheumatoid arthritis, polymyalgia rheumatica and hypothyroidism

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   - In patients with fractures, vitamin D levels should be tested once following the fracture and those who are deficient should be treated in order to prevent a second fracture.

3. Patients thought to be at particularly high risk of deficiency
   - Asymptomatic patients in this group should NOT routinely be tested
When to Refer to Secondary Care

If the patient fulfils any of the following criteria, a referral should be made to secondary care:

- Symptomatic hypocalcaemia
- Patients with a contraindication to vitamin D; hypercalcaemia and metastatic calcification
- Patients with renal impairment (stage 4 Chronic Kidney Disease or eGFR less than 30ml/min), renal stones or severe hypercalciuria
- Primary hyperparathyroidism
- Symptomatic after completion of high dose vitamin D treatment
- Intestinal malabsorption (higher doses of vitamin D may be needed)
- Chronic liver disease

Recommended Investigations

Initial blood tests:
Serum 25OHD, serum calcium, phosphate, alkaline phosphatase (ALP)

Additional blood tests if indicated:
Renal function (to exclude renal failure), liver function tests (to exclude hepatic failure), full blood count (anaemia may be present if malabsorption), thyroid function tests, erythrocyte sedimentation rate (myeloma), serum testosterone in men less than 60 years (test at 09:00am), parathyroid hormone (PTH).

Interpreting Vitamin D Levels

<table>
<thead>
<tr>
<th>Serum 25-(OH)D levels</th>
<th>Vitamin D Status and Management advice</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30 nmol/L</td>
<td>Deficient</td>
</tr>
<tr>
<td></td>
<td>Treatment should be prescribed followed by OTC or prescribed maintenance as per the Wandsworth CCG Vitamin D position statement</td>
</tr>
<tr>
<td>30-50 nmol/L</td>
<td>Insufficient</td>
</tr>
<tr>
<td></td>
<td>1. Patients with the following risk factors should be treated as for deficiency:</td>
</tr>
<tr>
<td></td>
<td>- Fragility fracture, documented osteoporosis/osteomalacia or high fracture risk</td>
</tr>
<tr>
<td></td>
<td>- Treatment with antiresorptive medication for bone disease</td>
</tr>
<tr>
<td></td>
<td>- Symptoms suggestive of vitamin D deficiency (see above)</td>
</tr>
<tr>
<td></td>
<td>- Increased risk of developing vitamin D deficiency in the future because of reduced sunlight exposure, cultural dress code, dark skin etc. (see “groups at risk of vitamin D deficiency”)</td>
</tr>
<tr>
<td></td>
<td>- Raised PTH</td>
</tr>
<tr>
<td></td>
<td>- Medication with antiepileptic drugs or oral glucocorticoids</td>
</tr>
<tr>
<td></td>
<td>- Conditions associated with malabsorption</td>
</tr>
<tr>
<td>&gt;50 nmol/L*</td>
<td>Sufficient</td>
</tr>
<tr>
<td>*Optimal level in patients with bone health issues is &gt;75nmol/L</td>
<td></td>
</tr>
</tbody>
</table>
Treatment of Vitamin D Deficiency & Insufficiency in Adults over 18 years: Product selection and Dosing

This list is not exhaustive, and should be used in combination with the BNF and the manufacturers Summary of Product Characteristics, which can be accessed at www.medicines.org.uk

<table>
<thead>
<tr>
<th>Serum 25-(OH) D status</th>
<th>Product Choices</th>
<th>Dose</th>
<th>COST PER COURSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deficient Serum 25-(OH) D levels &lt;30nmol/L</td>
<td>Plenachol 40,000 IU capsules</td>
<td>40,000 IU every week for 7 weeks followed by maintenance</td>
<td>£15.00</td>
</tr>
<tr>
<td></td>
<td>Stexerol 25,000 IU tablets</td>
<td>50,000 IU every week for 6 weeks followed by maintenance</td>
<td>£17.00</td>
</tr>
<tr>
<td></td>
<td>Invita D3 50,000 IU oral solution</td>
<td>50,000 IU every week for 6-8 weeks followed by maintenance</td>
<td>£12.50-£18.75</td>
</tr>
<tr>
<td></td>
<td>Thorens 25,000 IU/2.5mL oral solution</td>
<td>50,000 IU/week for 6-8 weeks followed by maintenance</td>
<td>£18.60-£24.80</td>
</tr>
<tr>
<td>Insufficient Serum 25-(OH) D levels 30-50 nmol/L*</td>
<td><strong>Prescribe and treat as for deficiency IF symptomatic AND/OR one of the following risk factors present:</strong>&lt;br&gt;→ Fragility fracture, documented osteoporosis/osteomalacia or high fracture risk&lt;br&gt;→ Treatment with antiresorptive medication for bone disease&lt;br&gt;→ Symptoms suggestive of vitamin D deficiency (see above)&lt;br&gt;→ Increased risk of developing vitamin D deficiency in the future because of reduced sunlight exposure, cultural dress code, dark skin etc. (see “groups at risk of vitamin D deficiency”)&lt;br&gt;→ Raised PTH&lt;br&gt;→ Medication with antiepileptic drugs or oral glucocorticoids&lt;br&gt;→ Conditions associated with malabsorption</td>
<td><strong>For ALL other patients, advise purchasing OTC vitamin D supplements to provide 800 IU to 2000 IU daily.</strong> See Wandsworth CCG Position Statement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tablets and Capsules:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stexerol 25,000 IU tablets</td>
<td>50,000 IU once a month</td>
<td>£2.95</td>
</tr>
<tr>
<td></td>
<td>Invita D3 25,000 IU oral solution</td>
<td>25,000 IU once a month</td>
<td>£1.48</td>
</tr>
<tr>
<td></td>
<td>Thorens 25,000 IU/2.5mL oral solution</td>
<td>25,000 IU to 50,000 IU once a month</td>
<td>£1.55-£3.10</td>
</tr>
<tr>
<td>Maintenance Therapy*</td>
<td>Tablets and Capsules:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stexerol 25,000 IU tablets</td>
<td>25,000 IU-50,000 IU once a month</td>
<td>£1.40-£2.80</td>
</tr>
<tr>
<td></td>
<td>Plenachol 20,000 or 40,000 IU capsules</td>
<td>20,000-40,000 IU once a month</td>
<td>£0.90-£1.80</td>
</tr>
<tr>
<td></td>
<td>Invita D3 25,000 IU oral solution</td>
<td>25,000 IU once a month</td>
<td>£1.48</td>
</tr>
<tr>
<td></td>
<td>Thorens 25,000 IU/2.5mL oral solution</td>
<td>25,000 IU to 50,000 IU once a month</td>
<td>£1.55-£3.10</td>
</tr>
<tr>
<td></td>
<td>Daily Dose Preparation:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stexerol 1,000 IU tablets</td>
<td>1,000 IU daily</td>
<td>£2.95</td>
</tr>
<tr>
<td></td>
<td>Thorens 10,000 IU/mL oral drops</td>
<td>800 IU (4 drops) daily</td>
<td>£1.31</td>
</tr>
</tbody>
</table>

Maintenance Therapy*

Vitamin D supplements for maintenance in adults (excluding special groups) and young people aged 16 and over should be purchased over the counter (OTC). See Wandsworth CCG Position Statement.

Maintenance regimens may be considered 1 month after loading, with doses equivalent to 800 to 2000 IU daily (occasionally up to 4,000 IU daily may be needed), doses can be given either daily or intermittently at a higher equivalent dose. Example regimes are listed below. Refer to SPC: www.medicines.org.uk
**Treatment of Vitamin D Deficiency in Adults over 18 years: Prescribing Considerations**

- Colecalciferol (vitamin D3) is considered the preferred form of vitamin D for treatment. Do **NOT** prescribe ergocalciferol (vitamin D2).

- The National Osteoporosis Society recommends a regimen equivalent to approximately 300,000 IU of colecalciferol to replenish stores in deficiency. Bolus doses are not advised as they may be ineffective and increase fracture risk. *For WCCG recommended formulations and doses see page 5.*

- Where rapid correction of vitamin D deficiency is required, such as in patients with symptomatic disease or about to start treatment with a potent antiresorptive agent (zoledronate or denosumab), the recommended treatment regimen is based on fixed loading doses followed by regular maintenance therapy.

- Where correction of vitamin D deficiency is less urgent and when co-prescribing vitamin D supplements with an oral antiresorptive agent, maintenance therapy may be started without the use of loading doses.

- If calcium is low, and maintenance is required, consider prescribing Adcal-D3 caplets (750mg calcium carbonate/5mcg (200 IU) colecalciferol) or suitable equivalent. Avoid in patients with adequate calcium intake or at risk of hypercalcaemia.

- Prescribe by **BRAND** where possible to avoid potential for dispensing of unlicensed preparations or preparations not suitable for specific patients (e.g. allergies, vegetarians).

- Some preparations of vitamin D contain allergens (e.g. nuts, soya, and lactose) that may not be suitable for some patients. If in doubt on the suitability of a preparation, contact the Medicines Management Team.

- As a fat soluble vitamin, oral vitamin D products should be taken with food to improve absorption.

**Adverse effects**

Whilst on treatment patients should be advised to report any signs of hypercalcaemia such as nausea, thirst, constipation, polyuria and confusion.

**Monitoring**

A calcium blood test is recommended **ONE month** after starting vitamin D supplementation. This is to make sure the patient does not have subclinical primary hyperparathyroidism.

**Routine follow-up vitamin D blood tests are generally NOT indicated UNLESS vitamin D deficiency symptoms continue, a patient has malabsorption/GI problems, is at high risk or has had a previous fracture.**

If a follow-up 25(OH)D measurement is required, it should be made approximately six months after initiating maintenance therapy to confirm that the target level has been achieved. Some patients may require a second treatment dose to reach target levels or referral to secondary care.
References

1. NICE guidance [NG34] Sunlight exposure: risks and benefits