Guidelines on the Diagnosis and Management of Vitamin D Deficiency in Children and Adults

Policy Statement

To ensure the Health Board delivers its aims, objectives, responsibilities and legal requirements transparently and consistently, we will ensure that prescribers have guidance on the appropriate diagnosis and management of Vitamin D deficiency.

Policy Commitment

This guidance is for use in primary and secondary care for infants, children and adults who are either at risk of vitamin D deficiency or with established vitamin D deficiency.

Supporting Procedures and Written Control Documents

This guidance (including appendices) covers:

- The investigation and management of vitamin D deficiency
- Clinical and cost effective prescribing of vitamin D therapy and the choice of supplements
- An appropriate balance between patient lifestyle, self management and medical treatment

The guidelines are not exhaustive and may not cover every possible clinical scenario and a degree of clinical judgement is required. The prescriber of any treatment is always responsible for outcomes and monitoring.

Other supporting documents are:

- N/A

Scope

This guidance applies to all of our staff in all locations including those with honorary contracts.

Equality Impact Assessment

An Equality Impact Assessment (EqIA) has not been completed

Health Impact Assessment

A Health Impact Assessment (HIA) has not been completed

Policy Approved by

Medicines Management Group

Group with authority to

Medicines Management Group
**Summary of reviews/amendments**

<table>
<thead>
<tr>
<th>Version Number</th>
<th>Date Review Approved</th>
<th>Date Published</th>
<th>Summary of Amendments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Medicines management group</td>
<td>24 September 2015</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Medicines management group</td>
<td>21st January 2016</td>
<td>Revised Dr Datta has co-ordinated the review of V1. V2 now includes licensed preparations only and also incorporates the Calcium/Vitamin D combinations</td>
</tr>
</tbody>
</table>

**Disclaimers**

If the review date of this document has passed please ensure that the version you are using is the most up to date either by contacting the document author or the Governance Directorate.
AIM

This guidance is for use in primary and secondary care for infants, children and adults who are either at risk of vitamin D deficiency or with established vitamin D deficiency and will advise on the following:

- The investigation and management of vitamin D deficiency
- Clinical and cost effective prescribing of vitamin D therapy and the choice of supplements
- An appropriate balance between patient lifestyle, self management and medical treatment

The guidelines are not exhaustive and may not cover every possible clinical scenario and a degree of clinical judgement is required. The prescriber of any treatment is always responsible for outcomes and monitoring.

This guidance has been updated in 2016 due in recognition of newer Vitamin D preparations and to incorporate UHB guidance on combined calcium and vitamin D preparations.

Algorithms to aid diagnosis, investigation and management for adults and children are provided in the appendices of this document.

1. GENERAL INFORMATION FOR CHILDREN AND ADULTS

- Adequate amounts of vitamin D are needed for bone health. This is normally obtained by a combination of diet and skin exposure to sunlight. Severe prolonged vitamin D deficiency may result in inadequate bone mineralization which manifests as osteomalacia in adults and rickets in children
- Low blood concentrations of vitamin D have been reported to be associated with a wide range of other medical conditions. There is currently no evidence that vitamin D replacement has benefit in the treatment of non-bone related disorders. There has also been a tendency to conflate the issues of public health nutrition, pharmacological dosing with vitamin D and blood testing.
- In Cardiff and Vale UHB vitamin D blood test requests and prescribing have increased significantly in recent years. Widespread testing can be harmful in that the result can “medicalise” otherwise healthy individuals and distract from other medical issues. Unnecessary testing and prescribing is also wasteful of resources.
- Population screening by measuring Vitamin D concentrations is not justified.
1.1 Risk factors for vitamin D deficiency

Vitamin D deficiency or insufficiency is very common in the UK with some studies suggesting that up to 50% of the UK population are insufficient and 1 in 6 adults having severe deficiency during winter months. Some individuals are more prone to vitamin D deficiency outlined in Table 1.

<table>
<thead>
<tr>
<th>Inadequate UV light exposure</th>
<th>Gastrointestinal</th>
<th>Metabolic risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occlusive garments</td>
<td>Vegetarian (or fish-free diet)</td>
<td>Older people*</td>
</tr>
<tr>
<td>Pigmented skin</td>
<td>Malabsorption, short bowel or liver disease</td>
<td>Drugs (Rifampicin, anticonvulsants, antiretroviral therapy, high dose glucocorticoids)</td>
</tr>
<tr>
<td>Institutionalised or housebound</td>
<td>Cholestryramine use</td>
<td>Multiple, short interval pregnancies</td>
</tr>
</tbody>
</table>

* See DOH advice for individuals aged >65 in section 1.3

1.2 Laboratory Reporting for Vitamin D

Table 2 Laboratory Reporting

<table>
<thead>
<tr>
<th>Serum 25-hydroxy vitamin D concentration</th>
<th>Vitamin D Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30 nmol/L</td>
<td>Deficiency</td>
</tr>
<tr>
<td>30-50 nmol/L</td>
<td>Insufficiency</td>
</tr>
<tr>
<td>&gt;50 nmol/L</td>
<td>Adequate</td>
</tr>
</tbody>
</table>

Note that assays for 25-hydroxyvitamin D do not detect Alfacalcidol or Calcitriol. 25-hydroxyvitamin D measurements are not indicated as a method for measuring treatment outcomes in patients taking these
preparations. Insufficiency means suboptimal vitamin D levels which can adversely affect bone health, e.g. secondary hyperparathyroidism or bone loss, but not severe enough to cause osteomalacia or rickets. Note that results were reported in nmol/L from April 2013. To convert results from mcg/L to nmol/L multiply by 2.5.

1.3 Lifestyle Advice and Therapeutic Intervention

80-90% of vitamin D is derived from sunlight with only 10-20% of vitamin D derived from dietary sources. Lifestyle advice should include information on diet and safe sun exposure.

- Oily fish including trout, salmon, mackerel, herring, sardines, anchovies, pilchards or fresh tuna.
- Cod liver oils and other fish oils are a good source
- Egg yolk contains a small amount
- Some breakfast cereals are supplemented
- Margarine and infant formula have statutory supplementation in the UK, but not cow’s milk
- Two or three short sunlight exposures per week (20 minutes) are sufficient to achieve healthy vitamin D levels for most people between April and September in the UK

Over the counter (OTC) vitamin D

Individuals may wish to buy OTC vitamin D and health professionals can discuss this option with patients. There are now many nutritional supplements available from retailers which contain differing strengths of vitamin D.

Vitamin D supplementation in groups at risk of deficiency

In the following groups nutritional supplements are recommended by Department of Health Guidance, adopted by Welsh Government. Individuals who are not eligible for Healthy Start vitamins should be signposted to OTC preparations.

- All pregnant and breastfeeding women should take a daily supplement containing 400 units (10mcg) of vitamin D
- All infants and young children aged 6 months to 5 years should take a daily supplement containing vitamin D in the form of vitamin drops, to help them meet the requirement set for this age group. This requirement can be met with 5 drops per day of Healthy Start Vitamins (contains 300 units vitamin D and 700
units vitamin A). However, those infants who are fed infant formula will not need vitamin drops unless they are receiving less than 500ml of infant formula a day, as these products are fortified with vitamin D. Breastfed infants may need to receive drops containing vitamin D from one month of age if their mother has not taken vitamin D supplements throughout pregnancy.

- Older people aged 65 years and over and those who have little or no exposure to the sun should take a daily supplement containing 400 units (10mcg) of vitamin D
- Healthy Start vitamins are specifically formulated for the following groups:

  Women’s vitamin tablets for pregnant and breastfeeding women
  Children’s vitamin drops for children under 4 years.

These vitamins are available free to healthy start recipients. People on low incomes can register for Healthy Start online [http://www.healthystart.nhs.uk](http://www.healthystart.nhs.uk)

Registered individuals will receive a vitamin coupon every 8 weeks that can be exchanged for vitamins through the health visitor, midwife or through a community clinic. For further information people should contact their midwife or health visitor. **Healthy Start vitamins are not available to buy or via prescription.**

In the absence of specific clinical concern, individuals in these groups do NOT routinely need laboratory testing for blood vitamin D concentrations.

Particular attention should be paid to pregnant women and children who have darker skin and/or may not be exposed to sunlight, where the risks of the clinical consequences of vitamin D deficiency are greater.

### 1.4 Repeat Testing for Vitamin D

Repeat blood testing for vitamin D is only required for a small number of clinical indications. There is usually no need to monitor blood vitamin D blood levels in patients on supplements, unless there are particular circumstances as below. Therefore the laboratory will review all requests for repeat blood vitamin D tests and will only process those that meet these guidelines. For repeat tests that are not processed, a report will be sent to the clinical requestor and the sample stored for up to 1 week so that the laboratory can be contacted if there are special clinical indications for individual cases.
Patients taking treatment doses of vitamin D should have serum calcium measured periodically and testing after 1 month is recommended.
Table 3  Retesting Vitamin D Levels During Treatment

<table>
<thead>
<tr>
<th>Clinical Situation</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.  No clinical signs and symptoms</td>
<td>Do not test/retest unless otherwise clinically indicated e.g. as in 4.</td>
</tr>
<tr>
<td>2.  Vitamin D therapy for whatever clinical indication where baseline Vitamin D concentration was adequate</td>
<td>Do not retest, unless otherwise clinically indicated e.g. as in 4.</td>
</tr>
</tbody>
</table>
| 3.  Vitamin D therapy for whatever clinical indication where baseline Vitamin D concentration was low | Do not retest, unless patients symptoms have not resolved or otherwise clinically indicated e.g. as in 4.  
Repeats will not be allowed before 3 months. All requests for repeat measurement will be reviewed. **Clinical indication for repeat testing should be clearly mentioned on the request form** |
| 4.  Vitamin D therapy and patient in one of the following categories (usually in conjunction with secondary care):  
  - Osteoporosis  
  - Malabsorption (to include cystic fibrosis and coeliac disease)  
  - Chronic hepatic and renal disease  
  - Taking anticonvulsants or similar medications  
  - Children with clinical rickets | Repeat after 3-8 months on recommended replacement dose where baseline was low.  
Annual monitoring for patients on adequate replacement.  
Repeats will not be allowed before 3 months. All requests for repeat measurement will be reviewed. **The clinical indication for repeat testing should be clearly mentioned on the request form** |
2. DIAGNOSIS AND MANAGEMENT IN CHILDREN

An algorithm to aid diagnosis, investigation and management is provided in Appendix 1

2.1 Clinical Features of Vitamin D Deficiency in Children

Table 4 Clinical Features of Vitamin D Deficiency in Children

- Deformed bones (bow legs or knock knees)
- Poor growth, delayed fontanelle closure
- Delayed walking or a waddling gait
- Tender or swollen joints, classically the wrists or costochondral junctions
- Bone pain and tenderness
- Delayed eruption of teeth or enamel hypoplasia
- Carpopedal spasm, seizures or irritability
- Breathing difficulties (apnoea or stridor)

2.2 Investigation and treatment in infants, children and young people

- Daily supplements of up to 400 units (10 mcg) vitamin D are safe on an ongoing basis and should be used in at risk groups (see Table 1) without the need for blood tests. Healthy Start Vitamins are available for those eligible. (Section 1.3)
- Population screening by measuring vitamin D concentrations is not justified
- All children with suspected metabolic bone disease, with relevant clinical features should have their vitamin D levels measured. If a child has clinically manifest metabolic bone disease, siblings and other family members are also likely to require clinical assessment.
- If clinician elects to do blood tests due to increased clinical concern of metabolic bone disease then measure: Vitamin D, renal, liver and bone profiles, PTH, FBC, coeliac screen.
- Wrist X ray if there is clinical concern of rickets e.g. bow legs or wrist swelling or tenderness

Therapeutic intervention for vitamin D deficiency is outlined in Table 5
### Table 5 Treatment in Infants, Children and Young People

<table>
<thead>
<tr>
<th>Vitamin D Status</th>
<th>Age</th>
<th>Product choice</th>
<th>Treatment Dose</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deficiency &lt; 30 nmol/L</td>
<td>0 - 18 years</td>
<td>InVita D3 oral solution (Colecalciferol) 25,000 units per ml 1ml oral ampoule</td>
<td>25,000 units once every two weeks for six weeks (i.e. three doses)</td>
<td>This course may be repeated if clinically indicated. Does not contain gelatin or peanut oil. Suitable for vegetarians. Can also be taken by mixing with a small amount of cold or lukewarm food immediately prior to use. £4.45 per course. Licensed for all ages</td>
</tr>
<tr>
<td></td>
<td>Over 12 years</td>
<td>Stexerol D3 (Colecalciferol) 25,000 unit tablets</td>
<td>25,000 units once every two weeks for six weeks (i.e. three doses)</td>
<td>This course may be repeated if clinically indicated. Does not contain gelatin or peanut oil. Suitable for vegetarians. Halal &amp; Kosher approved. Tablets are crushable £4.25 per course. Licensed for over 12yrs only</td>
</tr>
<tr>
<td></td>
<td>Over 12 years</td>
<td>Stexerol D3 (Colecalciferol) 1,000 unit tablets</td>
<td>2,000 units daily for six weeks.</td>
<td>This course may be repeated if clinically indicated. Does not contain gelatin or peanut oil. Suitable for vegetarians. Halal &amp; Kosher approved. Tablets are crushable. Licensed for over 12yrs only. £8.26 per course</td>
</tr>
</tbody>
</table>

### Once deficiency corrected remember to switch to long term maintenance dose

<table>
<thead>
<tr>
<th>Vitamin D Status</th>
<th>Age</th>
<th>Product choice</th>
<th>Treatment Dose</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficiency 30-50 nmol/L Or Maintenance dose following loading dose for treatment of deficiency</td>
<td>0-18 years</td>
<td>Healthy Start Vitamins</td>
<td>5 drops per day</td>
<td>Does not contain gelatin or peanut oil. Contains 300 units vitamin D and 700 units vitamin A. Available to recipients of Healthy Start Vouchers</td>
</tr>
<tr>
<td></td>
<td>1-18 years</td>
<td>InVita D3 2,400 units per ml (36 drops per ml) 10ml bottles</td>
<td>9 drops daily¹</td>
<td>600 units vitamin D. Does not contain peanut oil or gelatin. Suitable for vegetarians. Use each opened bottle within 3 months. £2.47 per month. (£3.26 per 10ml bottle). Licensed for all ages</td>
</tr>
<tr>
<td></td>
<td>Under 1 year</td>
<td>InVita D3 2,400 units per ml (36 drops per ml) 10ml bottles</td>
<td>6 drops per day</td>
<td>400 units vitamin D. Does not contain peanut oil or gelatin. Suitable for vegetarians. Use each opened bottle within 3 months £1.65 per month (£3.26 per 10ml bottle). Licensed for all ages</td>
</tr>
<tr>
<td></td>
<td>Under 1 year old</td>
<td>Abidec</td>
<td>0.3mls per day</td>
<td>Contains peanut oil, but not gelatin. Contains 200 units vitamin D and 666 units vitamin A. £0.82 per month</td>
</tr>
<tr>
<td></td>
<td>Under 1 year old</td>
<td>Dalivit</td>
<td>0.3 mls per day</td>
<td>Does not contain peanut oil or gelatin. Contains 200 units vitamin D and 2500 units vitamin A. £0.85 per month</td>
</tr>
<tr>
<td></td>
<td>Under 1 year</td>
<td>InVita D3 oral solution 25,000 units per ml 1ml</td>
<td>25,000 units once every 8 weeks</td>
<td>Intermittent dosing option. Does not contain gelatin or peanut oil. Suitable for vegetarians. Can also be taken by mixing with a small amount of cold or lukewarm food immediately prior to use. £4.45 per course. Licensed for all ages</td>
</tr>
</tbody>
</table>
### Oral Ampoules

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Product</th>
<th>Dose/Day</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 1 year old</td>
<td>Abidec</td>
<td>0.6 ml</td>
<td>25,000 units every 6 weeks</td>
</tr>
<tr>
<td>Over 1 year old</td>
<td>Dalivit</td>
<td>0.6 ml</td>
<td>25,000 units every 6 weeks</td>
</tr>
<tr>
<td>Over 1 year</td>
<td>InVita D3 oral solution (Colecalciferol)</td>
<td>0.6 ml</td>
<td>25,000 units every 6 weeks</td>
</tr>
<tr>
<td>Over 12 years</td>
<td>Stexerol D3 (Colecalciferol)</td>
<td>1.0 ml</td>
<td>1,000 units daily</td>
</tr>
</tbody>
</table>

### Tablets

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Product</th>
<th>Dose/Day</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 1 year old</td>
<td>Dalivit</td>
<td>1,000 units</td>
<td>400 units vitamin D and 1333 units vitamin A. £1.63 per month</td>
</tr>
<tr>
<td>Over 12 years</td>
<td>Stexerol D3 (Colecalciferol)</td>
<td>1,000 units</td>
<td>400 units vitamin D and 5000 units vitamin A. £1.70 per month</td>
</tr>
</tbody>
</table>

N.B. These doses may be inadequate for breastfed babies with low vitamin D stores at birth, it may be appropriate for this group to receive drops containing vitamin D from one month of age if their mother has not taken vitamin D supplements throughout pregnancy.

The doses provided in this Table are based on licensed recommendations. There are many guidelines and protocols for treating Vitamin D deficiency/insufficiency in infants, children and young people which recommend differing treatment regimens and doses.

Regimens for both daily dosing and intermittent dosing are indicated in this table. The clinician should decide with the individual or family which is more suitable.

Separate guidance on Vitamin D supplementation for preterm neonates is available - see ‘Vitamin and Mineral supplementation in preterm neonates’. This gives information about supplementation required for preterm neonates depending on the feed they are having: [http://nww.cardiffandvale.wales.nhs.uk/pls/portal/docs/PAGE/CARDIFF_AND_VALE_INTRANET/TRUST_SERVICES_INDEX/NEONATOLOGY_CP/GIDOCS/FLUIDS_NUTRITION/VITAMIN%20AND%20MINERAL%20IN%20PRETERM%20%20DEC%20%202015%20FINAL.PDF](http://nww.cardiffandvale.wales.nhs.uk/pls/portal/docs/PAGE/CARDIFF_AND_VALE_INTRANET/TRUST_SERVICES_INDEX/NEONATOLOGY_CP/GIDOCS/FLUIDS_NUTRITION/VITAMIN%20AND%20MINERAL%20IN%20PRETERM%20%20DEC%20%202015%20FINAL.PDF)

1Consider higher dose for maintenance if clinically required. Please refer to the relevant Summary of Product Characteristics for higher dose recommendations.
3. DIAGNOSIS AND MANAGEMENT IN ADULTS

An algorithm to aid diagnosis, investigation and management is provided in Appendix 2.

3.1 Clinical Features of Vitamin D Deficiency in Adults

Table 6 Clinical Features of Vitamin D Deficiency in Adults

- Bone pain
- Proximal myopathy
- Low bone mineral density +/- fracture
- Laboratory features such as hypocalcaemia, hypophosphataemia and increased ALP are often a late presenting feature of vitamin D deficiency

Non-specific symptoms such as tiredness, malaise and depression are usually not caused by vitamin D deficiency and these symptoms rarely resolve with vitamin D supplementation.

3.2 Investigation and treatment in adults

Table 7 Investigation and Treatment in Adults

<table>
<thead>
<tr>
<th>Patient Characteristics</th>
<th>Advice and Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy, no risk factors, symptom free</td>
<td>• No investigations required</td>
</tr>
<tr>
<td></td>
<td>• Lifestyle advice</td>
</tr>
<tr>
<td>Risk factors only</td>
<td>• Lifestyle advice</td>
</tr>
<tr>
<td></td>
<td>• Supplement all pregnant/breastfeeding women and adults aged over 65</td>
</tr>
<tr>
<td></td>
<td>• Other individuals with risk factors may choose to take OTC vitamin D*</td>
</tr>
<tr>
<td>Risk factors AND clinical features OR Risk factors AND significant risk of osteoporosis e.g. short gut</td>
<td>• Lifestyle advice</td>
</tr>
<tr>
<td></td>
<td>• Investigations: FBC, renal and bone profile, vitamin D</td>
</tr>
<tr>
<td></td>
<td>• Therapeutic intervention (see section on therapeutic intervention below)</td>
</tr>
</tbody>
</table>

*OTC= over the counter vitamin supplementation. See section 1.3.

- In patients with risk factors who present with non-specific myalgia, in whom vitamin D deficiency is likely, it may not be clear if the presenting symptoms are due to vitamin D deficiency. The presence of symptoms in individuals with vitamin D deficiency does not prove a causative effect. At present there is no recommendation to supplement all
individuals with risk factors; however, a 3 month trial of vitamin D supplementation may be considered. **Vitamin D supplementation should be discontinued if commenced in the context of musculoskeletal symptoms, if there is no evidence of benefit despite good compliance.**

- Population screening by measuring Vitamin D concentrations is not justified.

**Calcium & Vitamin D Recommendation:**

See Table 9

1. Supplementation for frail older people and for those who are house bound or living in institutional care:
   - The evidence is that supplementation with 1g of calcium and 800 units of vitamin D3 per day will reduce hip fractures
   - Swallowing large tablets (eg. Accrete D3) can prove difficult, and preparation of dissolved formulation poses its own problems. Such patients are more likely to accept chewable tablets and these should be considered in this setting  
   - Use Evacal D3 one BD

2. Supplementation alongside antiresorptive and bone stimulating therapies for osteoporosis

If patients with osteoporosis are found not to be reliably/regularly consuming at least 700 mg calcium per day, then titrated supplementation with calcium and vitamin D3 is recommended:

- For those with an intake equivalent to less than half a pint of milk per day  
  Use Accrete D3 tablet or Evacal D3 chewable tablet one tablet twice a day. If adherence is likely to be poor encourage increased dairy intake & give Kalcipos D one tablet once daily

- For those consuming the equivalent of half to 1 pint of milk per day  
  Use Kalcipos D one tablet once daily - 600mg calcium plus 800 units of vitamin D3

- For those consuming more than 1 pint of milk per day (or the equivalent in other dairy products) Use Vitamin D alone as per table 8
### Table 8 Treatment in Adults

<table>
<thead>
<tr>
<th>Status</th>
<th>Product choice</th>
<th>Treatment Dose</th>
<th>Maintenance Dose</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deficiency &lt; 30 nmol/L</strong></td>
<td>Stexerol (Colecalciferol) 25,000 unit tablets</td>
<td>50,000 units once weekly for six weeks</td>
<td>25,000 units every month ¹</td>
<td>Does not contain gelatin or peanut oil. Suitable for vegetarians. Halal &amp; Kosher approved. Tablets are crushable £1.42 per month</td>
</tr>
<tr>
<td></td>
<td>Or</td>
<td>4,000 units daily for ten weeks</td>
<td>1,000 units daily ¹</td>
<td>Does not contain gelatin or peanut oil. Suitable for vegetarians. Halal &amp; Kosher approved. Tablets are crushable £27.53 for treatment then £2.95 per month</td>
</tr>
<tr>
<td></td>
<td>Stexerol (Colecalciferol) 1,000 unit tablets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Or</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>InVita D3 oral solution (Colecalciferol) 25,000 units per ml</td>
<td>50,000 units once weekly for six weeks</td>
<td>25,000 units every month ¹</td>
<td>Does not contain gelatin, or peanut oil. Suitable for vegetarians but not vegans. Treatment cost £17.80 then £1.48 per month</td>
</tr>
<tr>
<td></td>
<td>When oral therapy not appropriate: Ergocalciferol intramuscular injections (on specialist advice)</td>
<td>300,000 units intramuscularly, single dose</td>
<td>300,000 units intramuscularly once or twice per year</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Or</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Once deficiency corrected remember to switch to long term maintenance dose.

<table>
<thead>
<tr>
<th>Status</th>
<th>Product choice</th>
<th>Maintenance dose</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insufficiency 30-50 nmol/L</strong></td>
<td>Stexerol (Colecalciferol) 25,000 unit tablets</td>
<td>25,000 units every month long term ¹</td>
<td>Does not contain gelatin or peanut oil. Suitable for vegetarians. Halal &amp; Kosher approved. Tablets are crushable £1.42 per month</td>
</tr>
<tr>
<td>Or maintenance dose following loading dose for treatment of deficiency</td>
<td>Or</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>InVita D3 oral solution (Colecalciferol) 25,000 units per ml</td>
<td>25,000 units every month long term ¹</td>
<td>No peanut oil or gelatin. Suitable for vegetarians. £1.48 per month</td>
</tr>
<tr>
<td></td>
<td>Or</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stexerol (Colecalciferol) 1,000 unit tablets</td>
<td>1,000 units daily long term ¹</td>
<td>Does not contain gelatin or peanut oil. Suitable for vegetarians, Halal &amp; Kosher approved. Tablets are crushable £2.95 per month</td>
</tr>
<tr>
<td></td>
<td>When oral therapy not appropriate:</td>
<td>300,000 units intramuscularly once</td>
<td>Use on specialist advice. £9.35 per dose</td>
</tr>
</tbody>
</table>

Note: ² Intramuscular injections on specialist advice.
Ergocalciferol intramuscular injections or twice per year

Consider higher dose if:
- Institutionalised or hospitalised individuals
- Dark skinned individuals
- Individuals with limited effective sun exposure due to protective clothing or consistent use of sun screens
- Obese individuals
- Patients being evaluated for osteoporosis
- Use of certain concomitant medications (e.g., anticonvulsant medications, glucocorticoids)
- Patients with malabsorption, including inflammatory bowel disease and coeliac disease

N.B. Please refer to the relevant Summary of Product Characteristics for higher dose recommendations.

Regimens for both daily dosing and intermittent dosing are indicated in this table. The clinician should decide with the individual or family which is more suitable

### Table 9 Calcium and Vitamin D Combination Therapy

<table>
<thead>
<tr>
<th>Name</th>
<th>Formulary status</th>
<th>Vit D</th>
<th>calcium</th>
<th>dose</th>
<th>Monthly cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accrete D3 tablet</td>
<td>1st line</td>
<td>400 units 10 mcg</td>
<td>600mg</td>
<td>One BD</td>
<td>£2.95 (60)</td>
<td>Film coated tablet, may be broken in half</td>
</tr>
<tr>
<td>Evacal D3 chewable</td>
<td>1st line</td>
<td>400 units 10 mcg</td>
<td>600mg</td>
<td>One BD</td>
<td>£2.92 (56)</td>
<td>Chewable alternative to Accrete D3</td>
</tr>
<tr>
<td>Kalcipos D Chewable tablet</td>
<td>2nd line</td>
<td>800 units 20 mcg</td>
<td>500mg</td>
<td>One daily</td>
<td>£4.21 (30)</td>
<td>In good calcium intake, higher vitamin D content</td>
</tr>
<tr>
<td>Adcal D3 dissolve</td>
<td>3rd line</td>
<td>400 units 10 mcg</td>
<td>600mg</td>
<td>One BD</td>
<td>£4.99 (56)</td>
<td>Soluble option</td>
</tr>
</tbody>
</table>
To discuss treatment options in adults please contact:

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To discuss treatment options in children please contact:

Dr Justin Warner/ Professor John Gregory, Consultants in Paediatric Endocrinology, or Dr Gilliam Body, Consultant Paediatrician, Noah’s Ark Children’s Hospital for Wales, UHW.

Lead for this document: Dr Dev Datta

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Appendix 1

ALGORITHM TO AID DIAGNOSIS, INVESTIGATION AND MANAGEMENT OF SUSPECTED VITAMIN D DEFICIENCY IN CHILDREN

Asymptomatic children aged 6 months to 5 years¹
Asymptomatic children with risk factors at any age²

Any child with clinical features of vitamin D deficiency³ or significant clinical condition associated with vitamin D deficiency (e.g. malabsorption)

Request
- Vitamin D, PTH
- Renal, liver and bone profile
- FBC/coeliac screen if relevant
- Wrist X ray if localised features/clinical concern of rickets

Vitamin D <30 nmol/L
- Clinical/radiological evidence of rickets
- Abnormal biochemistry
- Growth failure
- Atypical features

Treat⁴

Vitamin D 30-50 nmol/L

Vitamin D >50 nmol/L
- Re-evaluate diagnosis

No
- Yes
- Re-evaluate diagnosis
- Treat⁴
- Consider referral to secondary care

Repeat measurement of Vitamin D at 3-8 months maybe required⁵

No additional supplementation required

Supplement with up to 400 units (10 mcg) /day⁶
- No monitoring required

¹ Breastfed infants may need to receive drops containing vitamin D from 1 month of age if their mother took no supplement in pregnancy (See Section 1.3)
² Table 1
³ Table 4
⁴ Table 5
⁵ Section 1.3
⁶ Table 3
References:

Biliniski K & Boyages S. The rise and rise of vitamin D testing. BMJ 2012; 345 e4743
Professor Dame Sally Davies, chief Medical Officer (Interim). Department of Health, 24 January, 2011.
Dept of Health – advice on supplements for at risk groups, published February 2012 http://www.dh.gov.uk/health/2012/02/advice-vitamin-d/
Durup D et al; A Reverse J-Shaped Association of All-Cause Mortality with Serum 25-Hydroxyvitamin D in General Practice, the CopD Study. The Journal of Clinical Endocrinology & Metabolism 97: 2644-2652, August, 2012.
Harvey, NC. Vitamin D: some perspective please, Health claims are ahead of the evidence. BMJ 2012;345:e4695.

Further Reading