Whittington Health NHS

Treatment Of Vitamin D Deficiency/ Insufficiency In Adults

Subject:	Vitamin D deficiency
Policy Number	N/A
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Date Ratified:	September 2012
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Policy Executive Owner:	Dr Helen Taylor and Dr Celia Bielawski
Designation of Author:	Head of Pharmacy
Name of Assurance Committee:	Drug & Therapeutics Committee
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Target Audience:	All clinical staff
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Version Control Sheet

Version	Date	Author	Status	Comment
1	Aug 2012	Laura Morgan	Approved	Approved by D&TC Sept 2012
2	Jan 2015	Dr Celia Bielawski Priyal Shah Rebecca Chennells	Approved	Approved by D&TC February 2015

➢ Criteria for use

• The purpose of this guideline is to provide guidance on treatment of vitamin D deficiency or insufficiency in adults.

• The doses recommended in this guideline are based on adult patients with normal renal function. For advice on dosing in renal or hepatic impairment, please contact your ward pharmacist or Medicines Information.

• This guideline does not focus on vitamin D supplementation during pregnancy or breast feeding or give guidance for treating children (for further guidance see most recent BNFc edition).

Please see Whittington Health Guidelines:

'Vitamin D Supplementation and Treatment of Deficiency in Pregnancy'

'Rickets due to vitamin D deficiency' (paediatric guideline)

➢ Background/ introduction

- Vitamin D is a fat soluble sterol essential for the absorption of calcium and phosphates to enable optimal bone mineralization. It is also involved in maintenance of neuromuscular function and low levels have been associated with various other diseases including immune function disorders and metabolic syndrome[1, 2].

- Rickets, in children, and osteomalacia are due to deficiency of vitamin D and are becoming increasingly common in the UK and among certain high risk groups; a recent UK wide survey showed up to 15% of adults may have severe deficiency during winter and spring[3]. If left untreated, vitamin D deficiency in adults can lead to muscular aches and pains, and in severe cases cardiomyopathy and potentially fatal heart failure.

- Treatment of deficiency or insufficiency is not the same as supplementation for those at risk of deficiency.

- There is national guidance on vitamin D supplementation – it is recommended that all pregnant and breastfeeding mothers, those aged over 65 and those not exposed to much sun should take 400 IU a day[2,4].

- However there is currently no national guideline or recommendation regarding how much vitamin D to prescribe for vitamin D deficiency in adults[5].

- To treat vitamin D deficiency, high doses of vitamin D may be needed for a short period initially. Once vitamin D stores have been replenished, most patients will generally need lifelong preventative vitamin D supplementation[1].

➢ Clinical management

1. Clinical features

- proximal muscle weakness
- tenderness over pseudofractures
- widespread bone pain or tenderness or myalgia
- Insufficiency fractures

2. Risk factors

- black or ethnic minority with darker skin;
- elderly
- housebound or institutionalised e.g. nursing/residential home or prison;
- routine covering of skin on face or body;
- vegan/vegetarian;
- liver/renal disease;
- alcoholism;
- intestinal malabsorption;
- obesity;
- bariatric surgery;
- COPD
- anticonvulsants, cholestyramine, rifampicin or anti-retrovirals[1].

3. Investigations

Investigate if patient has ≥1 clinical feature of vitamin D deficiency (e.g. fractures, muscle weakness) AND ≥1 risk factor for vitamin D deficiency (e.g. vegetarian, housebound) AND if other causes for symptoms have been excluded[6].

Check 25-OHD, Ca^{2+}, ALP, PO_4, U+Es, LFTs, FBC, PTH in these patients.

Vitamin D facilitates the absorption of calcium, so low vitamin D is often associated with hypocalcaemia. Low serum levels of calcium can often be compensated for by the release of parathyroid hormone which can stimulate osteoclast mediated bone demineralisation, causing increased levels of ALP[1].

Bisphosphonates can precipitate hypocalcaemia in vitamin D deficient patients. All patients starting on bisphosphonates should be tested and treated for vitamin D deficiency before treatment with bisphosphonates is started.

As in the COPD guideline, patients with COPD should have a vitamin D level tested once yearly.

	Please see Whittington Health Guideline: **'Acute Exacerbation of COPD Clerking Proforma'**

4. Points to remember:

- Vitamin D deficiency can be due to malabsorption.
- If failure to respond to treatment after 3 months consider non-concordance.
- Atypical biochemistry- in particular vitamin D <25 nmol/L associated with hypercalcaemia or normocalcaemia may indicate hyperparathyroidism.

Ca^{2+} levels may then become high on treating the associated Vitamin D deficiency/insufficiency.

- Possible complications of treatment e.g. history of renal stones[1].

5. Treatment

Vitamin D status is determined by measuring serum 25-hydroxyvitamin D (25-OHD). The optimum serum levels of vitamin D have not been established and may vary at different stages of life, but levels of under 30nmol/L are classified as deficient. Levels between 30nmol/L and 50nmol/L may be deficient for some patients, who will need a loading dose if they have other risk factors[2].

Who to treat:

- Serum 25OHD < 30 nmol/L: loading dose then maintenance dose[2]

- Serum 25OHD 30–50 nmol/L: loading dose then maintenance dose should be considered for patients with the following additional risk factors:

- fragility fracture, documented osteoporosis or high fracture risk
- treatment with antiresorptive medication for bone disease
- symptoms suggestive of vitamin D deficiency
- increased risk of developing vitamin D deficiency in the future because of reduced
- exposure to sunlight, religious/cultural dress code, dark skin, etc.
- raised PTH
- medication with antiepileptic drugs or oral glucocorticoids
- conditions associated with malabsorption

If none of above risk factors, maintenance dose only[2].

- Serum 25OHD > 50 nmol/L: provide reassurance and give advice on maintaining adequate vitamin D levels through safe sunlight exposure and diet[2].

Vitamin D treatment regimes[2]		
	Patients <120kg weight	Patients >120kg weight
Loading dose	Colecalciferol 40 000 units orally daily for 7 days **OR** Colecalciferol 60 000 units orally weekly for 6-8 weeks **OR** 300 000 units ergocalciferol IM injection STAT dose – see note below	Calculate total dose as below: Dose (units) = 40 x (75-serum vitamin D) x body weight[7] minimum loading dose given must be 300 000 units. Dose should be rounded up to nearest 20 000 units and divided into appropriate daily or weekly dose **OR** 300 000 units ergocalciferol IM injection STAT dose – see note below.
Maintenance dose	800-2000 units colecalciferol daily (e.g. 2 tablets per day of Adcal D3® if calcium is also required) **OR** 10 000 units colecalciferol weekly	Consider higher maintenance dose of up to 4 000 units per day.

Ergocalciferol has been associated with a smaller and less sustained increase in serum vitamin D levels. As a result, colecalciferol is the replacement of choice, but IM ergocalciferol may be appropriate for patients who cannot swallow, with malabsorption, or those who have poor compliance with oral therapy[2].

6. Discharge information

All patients tested for vitamin D deficiency should have the level included in the discharge summary, even if the level is normal. If the patient has been found to be deficient or severely deficient this should be included in the “Diagnosis” section. If a treatment course has been completed in hospital (and therefore not prescribed on the TTA), this should also be documented on the discharge letter (e.g. if a stat dose of ergocalciferol is given)

Where vitamin D replacement is prescribed, all discharge letters should ask the GP to check a bone profile at one month and repeat the vitamin D level at three months. It should emphasise that treatment is lifelong as underlying risk factors are unlikely to change and should state that other family members may benefit from testing as they are likely to share the same risk factors.

➢ Further information

Toxicity

Optimum levels of vitamin D are often regarded as those above 75nmol/L up to 220nmol/L with toxicity often occurring with levels above 500nmol/L[1].

Excessive intake of vitamin D can lead to hyperphosphatemia or hypercalcaemia and its associated effects[8]. Symptoms of toxicity include apathy, anorexia, constipation, diarrhoea, dry mouth, fatigue, headache, nausea, vomiting, thirst and weakness[9]. Toxicity can lead to calcification of soft tissues[8] and can include bone pain, cardiac arrhythmias, hypertension, kidney damage (increased urinary frequency, decreased urinary concentration; nocturia, proteinuria), psychosis (rarely) and weight loss[9]. If toxicity is suspected, vitamin D must be withdrawn and serum calcium and renal function checked urgently, since emergency inpatient care with rehydration is usually indicated[9].

➢ Contacts (inside and outside the Trust including out-of-hours contacts)

Pharmacy Department – Medicines Information ext 5021

Diabetes and Endocrinology Department- ext 3156

➢ References

1. Pearce SHS, Cheetham TD. Diagnosis and management of vitamin D deficiency. British Medical Journal 2010; 340: 142-147.
2. Vitamin D and Bone Health: a Practical Clinical Guideline for Patient Management. National Osteoporosis Society, April 2013
3. Hyppönen E, et al. Hypovitaminosis D in British adults at age 45 y: nationwide cohort study of dietary and lifestyle predictors. Am J Clin Nutr. 2007 Mar;85(3):860-8.

4. Vitamin D – advice on supplements for at risk groups. Letter from the Chief Medical Officers for the United Kingdom. [accessed 18/06/2014] https://www.gov.uk/government/publications/vitamin-d-advice-on-supplements-for-at-risk-groups
5. Vitamin D deficiency and insufficiency in adults and paediatrics: a guideline collation document for London and East & South-East England. East & South East England Specialist Pharmacy Services March 2011
6. Saker L, Al-Qassab S. Diagnosis and Management of Vitamin D Deficiency/Insufficiency in Camden (primary care). NHS North Central London. Camden Office. April 2011
7. Van Groningen L, et al. Colecalciferol Loading Dose Guideline for Vitamin D deficient Adults. Eur J Endocrinol 2010; 162: 805-811
8. Vitamin D substances- monograph. Martindale Online, accessed via Medicines Complete May 2012.
9. UKMi. What dose of vitamin D should be prescribed for the treatment of vitamin D deficiency? East Anglia Medicines Information Service. October 2010.

- **Compliance with this guideline (how and when the guideline will be monitored e.g. audit and which committee the results will be reported to) Please use the tool provided at the end of this template**

To be completed and attached to any procedural document when submitted to the appropriate committee for consideration and approval

		Yes/No	Comments
1.	**Does the procedural document affect one group less or more favourably than another on the basis of:**		
	• Race	No	
	• Ethnic origins (including gypsies and travellers)	No	
	• Nationality	No	
	• Gender	No	
	• Culture	No	
	• Religion or belief	No	
	• Sexual orientation including lesbian, gay and bisexual people	No	
	• Age	No	
	• Disability - learning disabilities, physical disability, sensory impairment and mental	No	

		Yes/No	Comments
	health problems		
2.	**Is there any evidence that some groups are affected differently?**	No	
3.	**If you have identified potential discrimination, are any exceptions valid, legal and/or justifiable?**	No	
4.	**Is the impact of the procedural document likely to be negative?**	No	
5.	**If so can the impact be avoided?**	N/A	
6.	**What alternatives are there to achieving the procedural document without the impact?**	N/A	
7.	**Can we reduce the impact by taking different action?**	N/A	

If you have identified a potential discriminatory impact of this procedural document, please refer it to the Director of Human Resources, together with any suggestions as to the action required to avoid/reduce this impact.

For advice in respect of answering the above questions, please contact the Director of Human Resources.

Checklist for the Review and Approval of Procedural Document

To be completed and attached to any procedural document when submitted to the relevant committee for consideration and approval.

	Title of document being reviewed:	**Yes/No**	**Comments**
1.	**Title**		
	Is the title clear and unambiguous?	Yes	
	Is it clear whether the document is a guideline, policy, protocol or standard?	Yes	
2.	**Rationale**		
	Are reasons for development of the document stated?	Yes	
3.	**Development Process**		
	Is it clear that the relevant people/groups have been involved in the development of the document?	Yes	
	Are people involved in the development?	Yes	
	Is there evidence of consultation with stakeholders and users?	Yes	

	Title of document being reviewed:	Yes/No	Comments
4.	**Content**		
	Is the objective of the document clear?	Yes	
	Is the target population clear and unambiguous?	Yes	
	Are the intended outcomes described?	Yes	
5.	**Evidence Base**		
	Are key references cited in full?	N/A	
	Are supporting documents referenced?	N/A	
6.	**Approval**		
	Does the document identify which committee/ group will approve it?	Yes	
7.	**Dissemination and Implementation**		
	Is there an outline/plan to identify how this will be done?	Yes	
8.	**Document Control**		
	Does the document identify where it will be held?	Yes	
9.	**Process to Monitor Compliance and Effectiveness**		
	Are there measurable standards or KPIs to support the monitoring of compliance with and effectiveness of the document?	Yes	
	Is there a plan to review or audit compliance with the document?	Yes	
10.	**Review Date**		
	Is the review date identified?	Yes	
	Is the frequency of review identified? If so is it acceptable?	Yes	
11.	**Overall Responsibility for the Document**		
	Is it clear who will be responsible for co-ordinating the dissemination, implementation and review of the document?	Yes	

Executive Sponsor Approval			
If you approve the document, please sign and date it and forward to the author. Procedural documents will not be forwarded for ratification without Executive Sponsor Approval			
Name		Date	

Signature			
Relevant Committee Approval			
The Director of Nursing and Patient Experience's signature below confirms that this procedural document was ratified by the appropriate Governance Committee.			
Name		Date	
Signature			
Responsible Committee Approval – only applies to reviewed procedural documents with minor changes			
The Committee Chair's signature below confirms that this procedural document was ratified by the responsible Committee			
Name		Date	
Name of Committee		Name & role of Committee Chair	
Signature			

Tool to Develop Monitoring Arrangements for Policies and guidelines

What key element(s) need(s) monitoring as per local approved policy or guidance?	Who will lead on this aspect of monitoring? Name the lead and what is the role of the multidisciplinary team or others if any.	What tool will be used to monitor/check/observe/Assess/inspect/ authenticate that everything is working according to this key element from the approved policy?	How often is the need to monitor each element? How often is the need complete a report ? How often is the need to share the report?	What committee will the completed report go to?
Element to be monitored	**Lead**	**Tool**	**Frequency**	**Reporting arrangements**
Adherence to this guideline	**Principal Pharmacist: Medicines Management**	**Audit tool to be designed**	**Annually**	**To Drug & Therapeutics Committee**