حكومة دبي
GOVERNMENT OF DUBAI

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DUBAI HEALTH AUTHORITY

Dubai Standards in Healthcare

Dubai Standards of Care – 2017

(Management of Vitamin D Deficiency in Children and Adults)

Preface

The management of vitamin D deficiency is one of the most common problem dealt with in daily practice. In Dubai, the management of vitamin D deficiency were done through various different strategies. The following guidelines were adopted from the **National Institute for Health and Care Excellence (UK)** in order to create a unified approach to the management of high blood pressure. In addition to that, these guidelines were adopted to act as a guide for clinical practice, based on the best available evidence at the time of development. Adherence to these guidelines may not necessarily guarantee the best outcome in every case. Every health care provider is responsible for the management of his or her unique patient based on the clinical picture presented by the patient and the management options available locally.

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Management of Vitamin D Deficiency in Children and Adults

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.
- 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 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 1 Risk Factors for Vitamin D Deficiency

Inadequate UV light exposure	**Gastrointestinal**	**Metabolic risk**
• Occlusive garments • Pigmented skin • Institutionalised or housebound	• Vegetarian (or fish-free diet) •Malabsorption, short bowel or liver disease • Cholestyramine use	• Older people* • Drugs (Rifampicin, anticonvulsants, antiretroviral therapy, high dose glucocorticoids) • Multiple, short interval pregnancies • Prolonged breast feeding without vitamin D supplementation

1.2 Laboratory Reporting for Vitamin D

Table 2 Laboratory Reporting

Serum 25-hydroxy vitamin D concentration	**Vitamin D Status**
<30 nmol/L	Deficiency
30-50 nmol/L	Insufficiency
>50 nmol/L	Adequate

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, eg secondary hyperparathyroidism or bone loss, but not severe enough to cause osteomalacia or rickets.

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

Vitamin D supplementation in groups at risk of deficiency

In the following groups nutritional supplements are recommended by Department of Health Guidance..

- 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 containing 300 units vitamin D

  . 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

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

<u>Particular attention should be paid to pregnant women and children</u>

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

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

	Clinical Situation	Recommendation
1.	No clinical signs and symptoms	Do not test/retest unless otherwise clinically indicated *e.g.* as in 4.
2.	Vitamin D therapy for whatever clinical indication where baseline Vitamin D concentration was adequate	Do not retest, unless otherwise clinically indicated *e.g.* as in 4.
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

Vitamin D Status	Age	Product choice	Treatment Dose
Deficiency < 30 nmol/L	0 - 18 years	Vitamin D3 oral solution (Colecalciferol) 25,000 units per ml 1ml oral ampoule	25,000 units **once every two weeks for six weeks** (i.e. three doses) This course may be repeated if clinically indicated.
	Over 12 years	Vitamin D3 (Colecalciferol) 25,000 unit tablets	25,000 units **once every two weeks for six weeks** (i.e. three doses) This course may be repeated if clinically indicated.
	Over 12 Years	Vitamin D3 (Colecalciferol) 1,000 unit tablets	2,000 units **daily for six weeks**. This course may be repeated if clinically indicated.
Once deficiency corrected remember to switch to long term maintenance dose			
Vitamin D Status	**Age**	**Product choice**	**Treatment Dose**
Insufficiency 30-50 nmol/L	0-18 years	Vitamin D oral drops	5 drops per day
Or Maintenance dose following loading dose for treatment of deficiency	1-18 years	Vitamin D3 2,400 units per ml (36 drops per ml) 10ml bottles	9 drops daily[1]
	Under 1 year	Vitamin D3 2,400 units per ml (36 drops per ml) 10ml bottles	6 drops per day
	Under 1 year	Vitamin D3 oral solution 25,000 units per ml 1ml	25,000 units **once every 8 weeks**

	Over 1 year	Vitamin D3 oral solution (Colecalciferol) 25,000 units per ml 1ml oral ampoule	25,000 units **once every 6 weeks**
	Over 12 years	VitaminD3 (Colecalciferol) 1,000 unit tablets .	1,000 units daily[1]

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 which is more suitable

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

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

- 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:

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

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 calcium-vitamin D3 supplement 500mg/400iu Chewable Tablets chewable tablet one tablet twice a day.

- For those consuming the equivalent of half to 1 pint of milk per day
  Use 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

Status	Product choice	Treatment Dose	Maintenance Dose
Deficiency < 30 nmol/L	(Colecalciferol) 25,000 unit tablets	50,000 units **once weekly for six weeks**	25,000 units **every month**[1]
	Or		
	(Colecalciferol) 1,000 unit tablets	4,000 units **daily for ten weeks**	1,000 units **daily**[1]
	Or		
	Vitamin D3 oral solution (Colecalciferol) 25,000 units per ml	50,000 units **once weekly for six weeks**	25,000 **units every month** [1]
	When oral therapy not appropriate: Ergocalciferol intramuscular injections (on specialist advice)	300,000 units intramuscularly, single dose	300,000 units intramuscularly **once or twice per year**
Once deficiency corrected remember to switch to long term maintenance dose			
Status	**Product choice**		**Maintenance dose**
Insufficiency 30-50 nmol/L	(Colecalciferol) 25,000 unit tablets		25,000 units **every month** long term [1]
Or	Or		
maintenance dose following loading dose for treatment of deficiency	Vitamin D3 oral solution (Colecalciferol) 25,000 units per ml		25,000 units **every month** long term[1]
	Or		
	(Colecalciferol) 1,000 unit tablets		1,000 units **daily** long term[1]

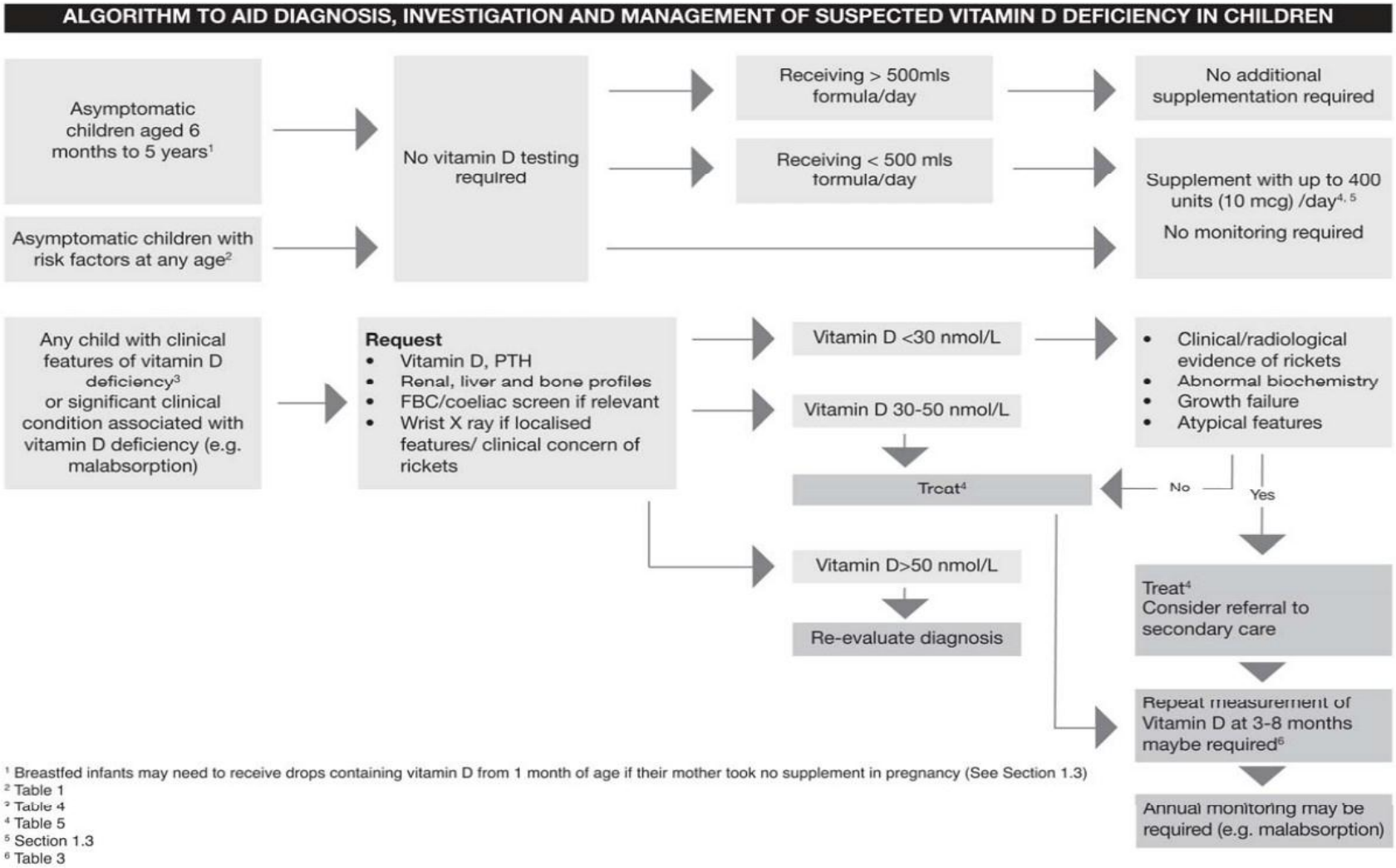
	Ergocalciferol intramuscular injections	**or twice per year**[1]	

[1]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.

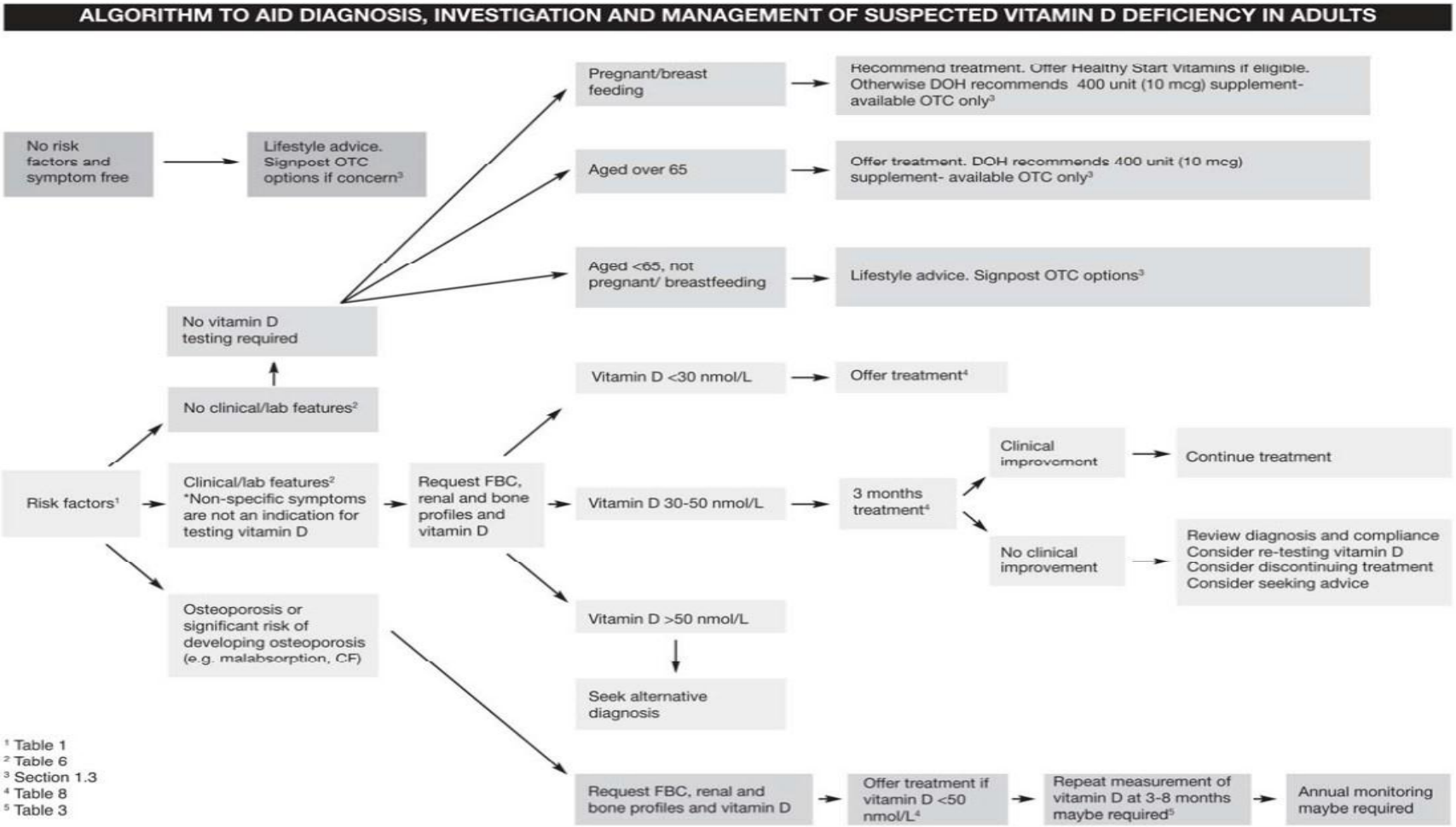
Regimens for both daily dosing and intermittent dosing are indicated in this table. The clinician should decide with the individual or family which is more suitable

Appendix 1



[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

Appendix 2


ALGORITHM TO AID DIAGNOSIS, INVESTIGATION AND MANAGEMENT OF SUSPECTED VITAMIN D DEFICIENCY IN ADULTS
No risk factors and symptom free
Lifestyle advice. Signpost OTC options if concern[3]
No vitamin D testing required
Pregnant/breast feeding
Recommend treatment. Offer Healthy Start vitamins if eligible. Otherwise DOH recommends 400 unit (10 mcg) supplement- available OTC only[3]
Aged over 65
Offer treatment. DOH recommends 400 unit (10 mcg) supplement- available OTC only[3]
Aged <65, not pregnant/ breastfeeding
Lifestyle advice. Signpost OTC options[3]
No clinical/lab features[2]
Risk factors[1]
Clinical/lab features[2] *Non-specific symptoms are not an indication for testing vitamin D
Request FBC, renal and bone profiles and vitamin D
Vitamin D <30 nmol/L
Offer treatment[4]
Vitamin D 30-50 nmol/L
3 months treatment[4]
Clinical improvement
Continue treatment
No clinical improvement
Review diagnosis and compliance
Consider re-testing vitamin D
Consider discontinuing treatment
Consider seeking advice
Vitamin D >50 nmol/L
Seek alternative diagnosis
Osteoporosis or significant risk of developing osteoporosis (e.g. malabsorption, CF)
Request FBC, renal and bone profiles and vitamin D
Offer treatment if vitamin D <50 nmol/L[4]
Repeat measurement of vitamin D at 3-8 months maybe required[5]
Annual monitoring maybe required
[1] Table 1
[2] Table 6
[3] Section 1.3
[4] Table 8
[5] Table 3

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Further Reading

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