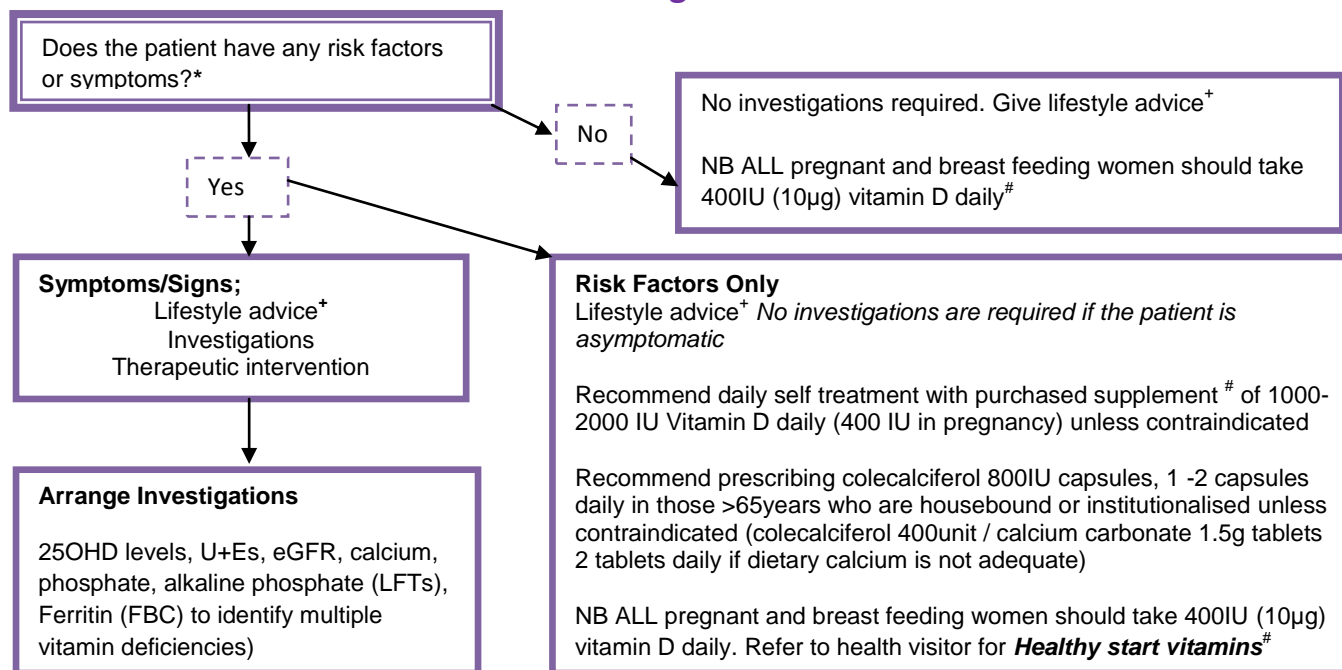


ADULTS - Management Flowchart



Insufficiency / maintenance

Vitamin D levels (25OHD) 25-50nmol/L (12-20ng/ml)

- Recommend OTC # colecalciferol 1000-2000 IU (25-50µg) daily
- OR consider prescribing colecalciferol 800IU capsules, 2 capsules daily (*licensed product, contains peanut oil and gelatine, suitable for Halal and Kosher diets*)
- OR consider prescribing colecalciferol 400unit / calcium carbonate 1.5g tablets 2 tablets daily if dietary calcium is not adequate

Treatment of Deficiency

Vitamin D levels (25OHD) <25nmol/L (12ng/ml)

Colecalciferol 800IU, 4 capsules (3,200 IU) daily for 12 weeks then oral maintenance as above (*licensed product, contains peanut oil and gelatine, suitable for Halal and Kosher diet*)

OR

Alternative where peanut allergy/ vegetarian

Colecalciferol 800IU, 5 tablets (4000IU) daily for 12 weeks then oral maintenance of 2 tablets daily (*licensed product does not contain gelatine, soya or peanut oil*)

OR

Alternative ONLY where GI absorption is an issue

IM injection of ergocalciferol 300,000 IU** 2 injections 3 months apart followed by maintenance treatment as either oral doses above or regular injections once per year (*licensed product*)

Pregnancy and Breast Feeding

The recommended dose for ALL pregnant/ breast feeding women is 400IU (10µg) daily which can be achieved by referring for Healthy Start vitamins# or prescribing colecalciferol 400unit / calcium carbonate 1.5g tablets, 1 daily

Breast fed babies of women found to be insufficient/ deficient should be supplemented # Refer pregnant women found to be deficient to specialist

Refer to Specialist if:

- Significant renal impairment, renal disease/ stones
- Abnormal Calcium
- TB, sarcoidosis
- Liver disease, lymphoma, metastatic cancer
- Parathyroid disorders
- Atypical biochemistry (persistent hypophosphataemia, elevated creatinine)
- Focal bone pain
- Deficiency that fails to respond to treatment

Further assessment required consider referral to Bone Health (or to Obstetrics for pregnant women)

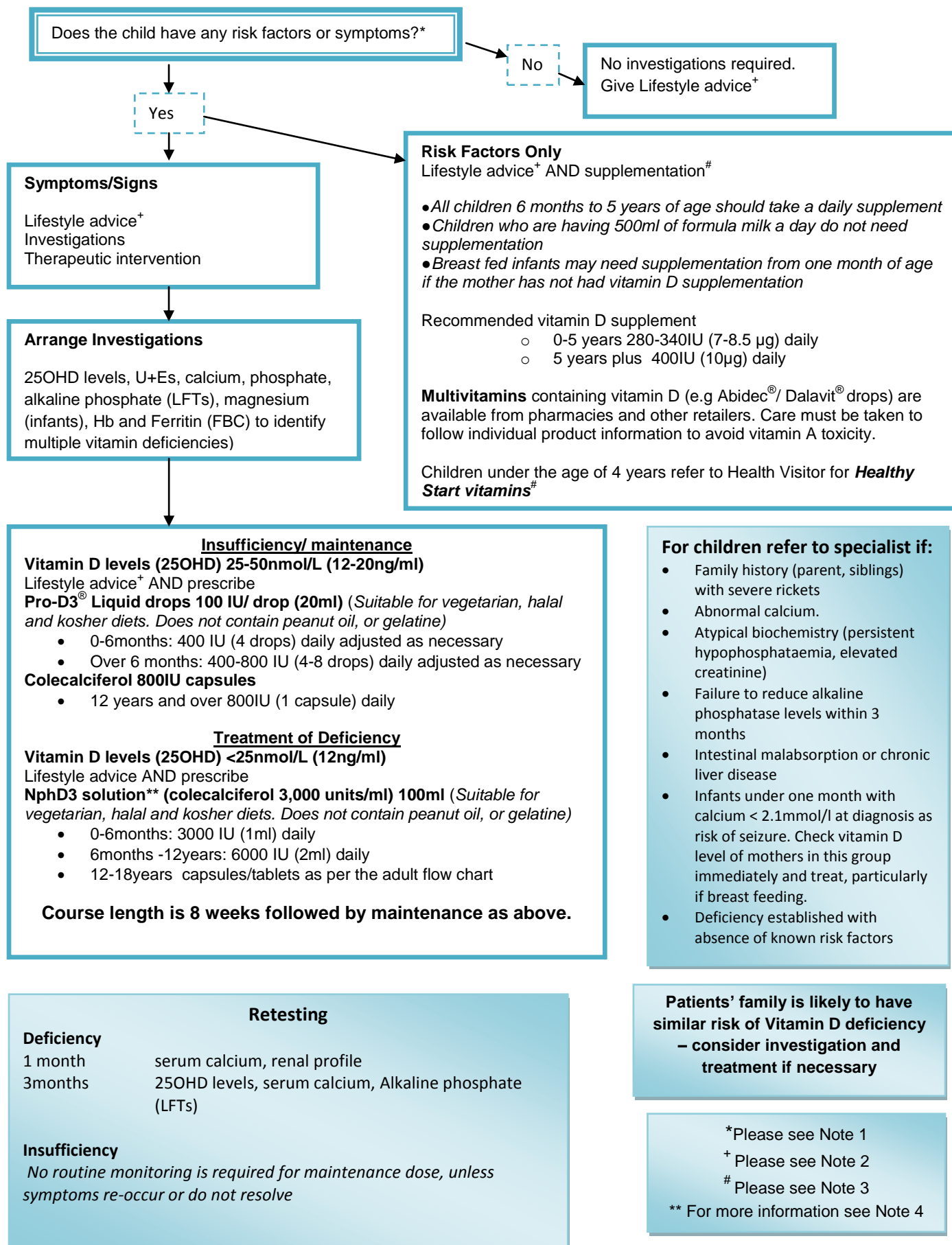
Patients' family is likely to have similar risk of Vitamin D deficiency – consider investigation and treatment if necessary

*Please see Note 1
 + Please see Note 2
 # Please see Note 3
 **to convert IU to µg calciferol, divide by 40

Retesting

<p>Deficiency</p> <p>1 month serum calcium and renal profile</p> <p>6 months 25OHD levels</p>	<p>Insufficiency</p> <p><i>No routine monitoring is required for maintenance doses, unless symptoms re-occur or do not resolve</i></p>
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CHILDREN – Management Flowchart



Note 1 – Risk Factors, Signs, Symptoms

Risk Factors for Vitamin D deficiency

Inadequate UV light exposure	Poor dietary intake	Metabolic risk
<ul style="list-style-type: none"> Northern latitude (applies to Rotherham) Air pollution Occlusive garments Habitual sunscreen use Dark pigmented skin Institutionalised/ housebound Poor mobility i.e. wheelchair dependency 	<ul style="list-style-type: none"> Malabsorption including short bowel and cholestatic jaundice, crohns, cystic fibrosis, coeliac disease. Cholestyramine use Exclusively breast fed infants of mothers who have not taken vitamin D supplements during pregnancy/breast feeding 	<ul style="list-style-type: none"> Reduced synthesis :elderly over 65years Infants and young children under 5 years Pregnant and breastfeeding women particularly multiple short interval pregnancies, teenage and young women Obesity Increased breakdown Drugs (rifampicin, anticonvulsants, HAART, glucocorticoids) Reduced stores: liver disease Reduced hydroxylation: liver and/or kidney disease

Clinical features/ symptoms of Vitamin D deficiency

Symptom, sign, biochemistry	Children	Adult
Seizures	✓	✓
Tetany	✓	✓
Hypocalcaemia	✓	✓
Irritability	✓	
Leg bowing	✓	
Knock knees	✓	
Impaired linear growth	✓	
Delayed walking	✓	
Limb girdle pain	✓	✓
Muscle pain	✓	✓
Proximal myopathy	✓	✓
Impaired innate antimycobacterial immunity	✓	✓
Delayed fontanelle closure	✓	
Painful wrist swelling	✓	

Note 2 Lifestyle advice

Sunlight

Mankind derives >90% of its vitamin D from ultraviolet B light exposure¹. The amount of sun exposure required to produce a set amount of vitamin D varies with latitude, season, time of day and skin type.

For adults in the UK exposure of the hands, face and arms for 20-30minutes (this increases to 3-10x this for dark pigmented skin) on most days during the summer months (April to September) is estimated will provide sufficient exposure to the ultraviolet B wavelengths (UVB) to achieve healthy Vitamin D levels^{2,3}.

Sunscreens with SPF 15 or greater are essential to prevent skin damage with longer sun exposure but will reduce Vitamin D synthesis by 99%^{1,3}. Advising to omit sunscreen for short, incidental sun exposures would be reasonable². Deliberate exposure to sunlight between 11:00 and 15:00 in the summer months is not advised².

NB. For the six months between October and April 90% of the UK lies above the latitude that permits exposure to the UVB that is necessary for Vitamin D synthesis. During these months people are reliant on exogenous sources i.e. from diet (see below) or supplementation (see Note 3).

Diet

Less than 10% of Vitamin D is acquired through diet. It is a micronutrient and as such the naturally occurring amounts in food is small. Only a relatively small number of foods such as oily fish (for example mackerel, salmon and sardines) and eggs naturally contain vitamin D, and these amounts are small. The amount in most vegetable sources is negligible.¹ At the present time, sufficient intake via exogenous sources can only be guaranteed by supplementation.⁴

If adequate sunlight exposure to generate sufficient endogenous colecalciferol is not possible, then a vitamin D supplement is recommended² (see Note 3)

ALL infants and children from 6 months to 5 years should receive a supplement unless they are drinking 500ml or more of formula milk each day (as formula milk is supplemented).

Breast fed infants may need supplementation from one month of age if the mother has not had vitamin D supplementation

ALL pregnant and breast feeding women should take 400IU (10µg) vitamin D daily

People aged over 65years, particularly the housebound or with reduced mobility, should take a vitamin D supplement^{4,5,6} 400 – 2000IU (10-50µg) daily

Note 3 Over-The-Counter Preparations

Vitamin D preparations for adults available over the counter and online without prescription
Ergocalciferol (vitamin D₂) and colecalciferol (vitamin D₃) are not equivalent, colecalciferol (Vitamin D₃) is the preparation of choice as ergocalciferol has less than a third of the potency of colecalciferol⁴.

Vitamin D supplements can be purchased from pharmacies, supermarkets, health food shops and over the internet. If patients would usually pay prescription charges it may work out cheaper to buy. **The following list is not exhaustive.**

Product	Suitable for vegetarians
Healthy Start Vitamins for Pregnant women Vitamin D₃ 10µg (400IU) per tablet	<i>Suitable for vegetarians and free from milk, egg, gluten, soya and peanut residues</i>
Holland and Barrett Sunvite D₃ Fast acting liquid 25µg (1000IU)/ 10drops, 10µg (400IU)/ 4drops	Yes
BioLife Vitamin D₃ 25µg (1000IU) tablets	Yes
Holland and Barrett Sunvite Vitamin D₃ 25µg (1000IU) caplets	
Boots Pharmaceuticals Vitamin D₃ 25µg (1000IU) tablets	Yes
Nature's Remedy Vitamin D₃ 25µg (1000IU) tablets/capsules	Yes
Vitamind3uk Vitamin D₃ 1000IU microtablets	Yes
Carlson Vitamin D₃ 50µg (2000IU) per drop	
Pure Essence Labs Vitamin D₃ 50µg (2000IU) capsule	
Vitamind3uk Vitamin D₃ 2000IU microtablets (easy to swallow/ disintegrate in the mouth)	Yes

Multivitamin preparations for Children available over the counter and online without prescription

Product	Source	Suitable for vegetarians
Healthy Start Vitamin Drops for Children Vitamin D₃ 300IU/ 5 drops	Application forms: call the Healthy Start helpline on 0845 607 6823 asking them to send one to patients home by post www.healthystart.nhs.uk	<i>Suitable for vegetarians and free from milk, egg, gluten, soya and peanut residues</i>
Abidec® Vitamin D₃ 400IU/0.6ml <i>Contains arachis oil; avoid in those with allergy to peanuts</i>	Pharmacies	
Dalavit® Vitamin D₂ 400IU/0.6ml	Pharmacies	<i>Suitable for vegetarians, orthodox Jews, Hindus, Muslims if keen to avoid animal source</i>

Note 4

NphD3 solution (colecalfiferol 3,000 units/ml) 100ml (Contains only colecalfiferol Ph.Eur and sunflower oil Ph.Eur) This product is a special and is manufactured by the Department of Pharmacy, Northwick Park Hospital. They have been making colecalfiferol oral solution for some time and it is in an MHRA licensed facility, is fully QC tested and has full stability data (Certificate of Analysis available if required). The price is less than half that of similar products and they only use pharmacopoeial grade ingredients. Once a customer is on the system, the products are delivered the next working day

Pack size: 100ml Price: £47.30

Order code: COL 712

Shelf life: 12 months from date of manufacture. Store at room temperature.

No in-use shelf life (i.e. no need to discard 28 days after first opening).

**For further information, contact nwlh-tr.pharmacyspecials@nhs.net
To place an order, please call 020 8869 2295 or fax 020 8869 2370**

There is no minimum order charge. Orders received by 12 noon will be delivered by 17.00hr the next working day.

Northwick Park Hospital Specials

MHRA Licence number: MS 13045

Department of Pharmacy, Northwick Park Hospital, Watford Road, Harrow, Middlesex HA1 3UJ.

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- 4 **Update on Vitamin D: Position Statement by the Scientific Advisory Committee on Nutrition (2007)** http://www.sacn.gov.uk/pdfs/sacn_position_vitamin_d_2007_05_07.pdf accessed 24th November 2011
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