

# For use in South and West Hertfordshire and East and North Hertfordshire

# <u>Guidance on Vitamin D Deficiency/Insufficiency – November 2011</u> (updated February 2012, December 2015, December 2016 and December 2018)

This guidance aims to provide general advice for clinicians in a community setting including areas where clinical uncertainty remains.

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# Investigation and treatment of Vitamin D deficiency / insufficiency in adults Flowchart

Does the patient have ≥1 CLINICAL or BIOCHEMICAL FEATURE of vitamin • widespread bone pain or tenderness or myalgia • proximal muscle weakness	D deficiency?		No	Vitamin D testing not required at				
tenderness over pseudo fractures     Insufficiency fractures - osteoporosis     low serum calcium or high ALP				this stage				
Yes				+				
		]		Give				
• elderly and housebound				advice				
pregnancy & breast feeding     darker skinned people			No					
<ul> <li>low sun exposure (e.g. habitual skin covering, housebound, skin conditions)</li> </ul>				→				
vegan/vegetarian     liver/renal disease								
malabsorption		an anti actua inda						
<ul> <li>anticonvulsants, glucocoticolos, cholestyramine, colestipol, laxatives, liquid para</li> <li>obesity</li> </ul>	affin, sucraitate, ritampicir	or anti-retrovirais						
Known disorder of calcium metabolism				Exclude other				
Yes			No	causes of				
Have other causes for symptoms been excluded?				then restart				
Yes				patnway				
Carry out tests for suspected vitamin D deficiency: 25-OHD, Ca <sup>2+</sup> , ALP, PO₄	, also U+Es, LFTs, FBC. I	PTH is elevated in vita	min D deficient states	but routine				
measurement not indicated. (nb - Vitamin D loading doses contra-indicated in hy	percalcaemia but mainter	ance doses are not).						
¥								
Do any of the following apply?		Refer to appropria	te secondary care sp	ecialist(s).				
skeletal deformity		If patient referred a	nd treatment is necess	ary then 1st				
malabsorption     renal stones	Yes	treatment course in	itiated by secondary ca	are.				
chica dono     chica disease, severe liver disease, lymphoma, metastatic cancer,	parathyroid	Patient should only	be transferred back to	primary care with				
<ul> <li>disorders, sarcoidosis, TB</li> <li>atypical biochemistry (e.g. low vit D and hypercalcaemia)</li> </ul>		a treatment plan. treatment are advis	Patients requiring ongo ed to buy vitamin D su	pplements OTC				
pregnancy or breastfeeding     byporparathyraidism		(low dose vitamin E	supplements will not r	outinely be				
		prescribed by the G	иг <i>)</i> .					
Assess need for treatmen	Assess need for treatment based on total serum 25-OHD level							
25-OHD < 30nmol/L	25-OHD 30 - 50nmol	/∟ ↓	25-OHD >	50nmol/L				
25-OHD < 30nmol/L Loading/ Treatment dose required (#) – Prescribe by Brand as acute Rx	25-OHD 30 - 50nmol Maintenance of 800-	/L	25-OHD >	50nmol/L Diet &				
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# Investigation and treatment of Vitamin D deficiency / insufficiency in children Flowchart

Is patient a child (<16 years of age) with one of the following (i • tetany • reluctance to bear weight • leg bowing or knock knees • impaired linear growth • skeletal deformity • muscle pain or weakness • bone pain • proximal myopathy • low serum calcium or high ALP	n the contex	xt of child's age)?		No	Vitamin D testing not required at this stage + Give appropriate Lifestyle advice
Yes 🗸				□ No	Exclude other
Have other causes for symptoms been excluded?					<ul> <li>causes of symptoms then</li> </ul>
Yes					restart pathway
Carry out tests for suspected vitamin D deficiency: 25-OHD, Cameasurement not indicated.	a <sup>2+</sup> , ALP, PO	D <sub>4</sub> , also U+Es, LFTs,	FBC. PTH is elev	ated in vitamin D deficient states	but routine
			[		
Do any of the following apply? • 25-OHD < 30nmol/L			Refer to speci	alist in secondary care.	
<ul> <li>aged one year or under</li> <li>bone deformities (including rickets)</li> <li>malabsorption</li> </ul>		Yes	<ul> <li>Where appropriate approprise appropriate appropriate appropriate appropriate appropriate</li></ul>	priate, consider commencing trea nt is seen by specialist (see belo ons)	atment in primary w for treatment
<ul> <li>renal stones</li> <li>chronic renal disease, severe liver disease, lymphoma, metastatic parathyroid disorders, sarcoidosis, TB (very rare in childhood)</li> <li>Atypical biochemistry (e.g. low vit D and hypercalcaemia)</li> </ul>	c cancer,		•Patient should treatment plan are advised to	I only be transferred back to prim <b>1.</b> Patients requiring ongoing ma buy vitamin D supplements OTC ill not routingly be prescribed by	ary care with a intenance treatment (low dose vitamin D the CP)
No 🚽			Supplements w	in not routinely be prescribed by	line of ).
If specialist advice/input deemed necessary in clinician's jud	gement disc	cuss with secondar	y care specialis	t and consider referral if indica	ated. If not treat in
Assess need for	or treatment	t based on total ser	um 25-OHD leve		
25-OHD < 30nmol/L 25-OHD > 50 nmol/L 25-OHD > 50 nmol/L					
25-OHD < 30nmol/L		25-OHD 30- 50	nmol/L	25-OHD > 5	0 nmol/L
25-OHD < 30nmol/L ↓ Refer to specialist but where appropriate consider commencing treatment in primary care until seen by specialist – see above – Loading/ Treatment dose required (#) – Prescribe by Brand as acute Rx		25-OHD 30- 50 Oral prevention of v • Neonates to < 12r • All other ages: 40	nmol/L Nutritional supp vitamin D deficie nonths: 340-400 0-600 IU daily	25-OHD > 5 Iement (#) ncy: IU daily	0 nmol/L Appropriate Lifestyle advice
25-OHD < 30nmol/L Refer to specialist but where appropriate consider commencing treatment in primary care until seen by specialist – see above – Loading/ Treatment dose required (#) – Prescribe by Brand as acute Rx Rx: Thorens colecalciferol (licensed) 10 000 IU/ml oral drops (1 drop contains 200 IU colecalciferol) for 90 days: • <3 months to 12 months: 2,000 IU daily (10 drops = 0.2ml) • >12 months to 12 years: 3,000-6,000 IU daily(15 to 30 drops = 0.3ml to 0.6ml) • >12 years 6,000 IU daily (30 drops = 0.6ml)		25-OHD 30- 500 Oral prevention of v • Neonates to < 12r • All other ages: 40 Advise patients to k supplement OTC (k routinely be prescri OTC available Multi - Healthy Start Child [5 drops contain cc - Abidec® (vitamins	Nutritional suppritamin D deficie nonths: 340-400 0-600 IU daily ouy or access free ow dose vitamin bed by the GP) vitamin drops ca ren's Vitamin (vit blecalciferol 300 II A, B, C, D) drops	25-OHD > 5 Idement (#) ncy: IU daily es supplies of vitamin D D supplements will not + appropriate lifestyle advice pontaining vitamin D: amins A, C, D) drops J, vitamin A 700 units] :	0 nmol/L Appropriate Lifestyle advice
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## Vitamin D levels

- Opinions on the ideal level of vitamin D and optimal serum concentrations vary.
- For the purpose of this guideline the following definitions for vitamin D status measured by total serum 25-hydroxyvitamin D (25-OHD) taken from the National Osteoporosis Society (NOS) guidelines will be used:
  - Vitamin D levels <30 nmol/L probably indicate vitamin D deficiency & treatment is required.
  - Vitamin D levels 30-50 nmol/L probably indicates vitamin D inadequacy in some patients.
  - Vitamin D levels >50 nmol/L probably indicate normal vitamin D status.
- Individual laboratory assays may vary in their definitions of thresholds for deficiency and insufficiency. However, the above definitions are those which have been agreed locally and will be used as intervention thresholds.
- Vitamin D status may be reported separately as 25-hydroxyvitamin D2 and 25-hydroxyvitamin D3. The two values should added together to obtain the total serum 25-hydroxyvitamin D (25-OHD).

# All patients, where appropriate, should receive lifestyle advice to help to meet their vitamin D requirements (see Lifestyle Advice section page 4).

## Investigation and Treatment of Vitamin D deficiency and insufficiency

For guidance on investigation and treatment of vitamin D deficiency and insufficiency:

- in adults refer to the flowchart on page 2
- In children refer to the flowchart on page 3

#### **Further Considerations**

The regimes recommended in the flowchart have taken into account potential costs and availability (also **see product choice document**).

#### Loading/treatment dose

- There are now various licensed as well as unlicensed products containing just colecalciferol, available in the UK. This is an important determinant for clinicians to note when considering product selection for the treatment of vitamin D deficiency.
- There is a licensed ergocalciferol injection but there are often availability issues with this. However it has recently been suggested that large doses of vitamin D given intermittently are ineffective and may actually increase fracture risk.
- As with all unlicensed specials, all clinical and legal responsibility lies with the prescriber rather than the manufacturer (unless it can be proven that the product was faulty). Informed consent should always be obtained from patients before prescribing in these circumstances.

#### Maintenance Treatment

All patients, where appropriate, should receive lifestyle advice to help to meet their vitamin D requirements (see Lifestyle Advice section page 4).

- Patients requiring ongoing oral maintenance treatment should be advised to take over the counter (OTC) vitamin D supplements (a variety of preparations and strengths (including preparations containing 400IU, 800IU, 1000IU, 2000IU & 4000IU) are available to buy OTC) and that low dose vitamin D supplements will not routinely be prescribed by the GP (unless Adcal D3 is indicated (see flowchart page 2 and page 7). Also refer to supplements section page 5.
- NICE recommends that suitable supplements should be available for people with particular dietary needs for example those who avoid nuts, are vegan, or have a halal or kosher diet. Refer to treatment choice document for further information

#### Pregnancy/breast feeding

- For symptomatic, high risk patients refer to secondary care as per flowchart. Advice regarding treatment of deficiency in pregnant women can be found in the UKMI Medicines Q&A: Dose of oral vitamin D during pregnancy [LINK]
- Advice regarding supplementation is available on page 5.

## Lifestyle Advice

### Sun Exposure advice

- The body creates most vitamin D from modest exposure to direct UVB sunlight.
- Our bodies make vitamin D when our skin is exposed to summer sunlight (late March/early April to end of September) so during the winter months it can be particularly difficult to get enough.
- During the winter (October to early March), we get vitamin D from our body's stores and from food sources as sunlight doesn't contain enough UVB radiation for skin to be able to make vitamin D.
- The amount of time you need in the sun to make enough vitamin D is different for everyone. Most people will make enough vitamin D if they have a short daily period of sun exposure with their

forearms, hands or lower legs uncovered and without sunscreen during the summer months (late March/early April to October), mostly between 11am and 3pm. Exposing yourself for longer is unlikely to provide any additional benefits.

- People with dark skin, such as those of African, African-Caribbean or south Asian origin, will need to spend longer in the sun to produce the same amount of vitamin D as someone with lighter skin.
- · However, patients should be advised:
- the longer they stay in the sun, especially for prolonged unprotected periods, the greater the risk of burning and skin cancer.
- to stay covered up & use sunscreen (SPF at least 15) for the majority of time spent outside 0
- to always cover up or protect the skin before it starts to turn red or burn. 0
- in view of the risk of skin cancer, sun beds are not recommended. 0
- you can't make vitamin D if you are sitting indoors by a sunny window because UVB rays can't get 0 through the glass.
- Children aged under six months should be kept out of direct strong sunlight.
- From March to October in the UK, children should:
- cover up with suitable clothing (including wearing a hat and wearing wrap-around glasses) 0
- spend time in the shade (particularly from 11am to 3pm)
- wear at least sun protection factor (SPF) 15 sunscreen.
- All patients, where appropriate, should be advised about sun exposure and vitamin D and increasing safe sun exposure. Sunshine advice for patients: http://www.nhs.uk/Livewell/Summerhealth/Pages/vitamin-D-sunlight.aspx
- All patients, where appropriate, should be advised to improve their dietary intake and consider buying OTC vitamin D supplements.

#### **Dietary Sources**

- Patients should be advised that food can contribute to vitamin D levels, but the average daily intake is just 2–4 micrograms (80 to 160 IU). It is difficult to obtain enough vitamin D from diet alone.
- Vitamin D is found in oily fish (e.g. salmon, mackerel and sardines), eggs and meat.
- In the UK, margarine, infant formula milk, breakfast cereals, soya products, dairy products and powdered milks are often modestly fortified with vitamin D

vitamin D content of selected foods.	
Type of Food	Average amount vitamin D per 100 grams
Oily fish	200-400 IU (5-10 micrograms)
Fortified margarine	280 IU (7 micrograms)

Vitamin D content of selected foods:

Fortified breakfast cereals

Red meat

Egg yolk Mushrooms

 All patients, where appropriate, should be advised to improve their dietary intake of vitamin D. Dietary advice for patients : www.nhs.uk/Conditions/vitamins-minerals/Pages/Vitamin-D.aspx

#### Supplements

- A variety of oral vitamin D supplements (including multivitamin preparations for adults and children) are available to buy OTC at most pharmacies, health food shops and supermarkets (includes preparations containing 400IU, 800IU, 1000IU, 2000IU & 4000IU).
- Strength may be stated in IU (international units) or micrograms 1000 IU = 25 micrograms.
- From late March/early April to September the majority of the population should get enough vitamin D through sunlight on the skin and a healthy, balanced diet.
- Based on findings from the Scientific Advisory Committee on Nutrition (SACN), Public Health England advises that:
- o Adults and children over five years old (including pregnant and breastfeeding women) should consider taking a daily supplement containing 10 micrograms (400IU) of vitamin D particularly during the winter months (October until the end of March). From late March/early April to September most should be able to get enough vitamin D from sunlight, so they may choose not to take a vitamin D supplement during these months.
- People who have low or no exposure to the sun e.g. those who are frail or housebound; are in an institution such as a care home; usually wear clothes that cover up most of their skin when outdoors; people who regularly use high-factor sunscreen should take a daily supplement containing 10mcg of vitamin D throughout the year.
- People from minority ethnic groups with dark skin, such as those of African, African-Caribbean or South Asian origin, might not get enough vitamin D from sunlight and should consider taking a daily supplement containing 10mcg of vitamin D throughout the year.

120-320 IU (3-9 micrograms)

40 IU (1 microgram) Approximately 20 IU per egg yolk (0.5 micrograms)

Small quantities

- Breastfed babies from birth to one year of age should be given a daily supplement containing 8.5 to 10mcg (340-400 IU) of vitamin D.
- Babies fed infant formula should not be given a vitamin D supplement until they are receiving less than 500ml (about a pint) of infant formula a day, because infant formula is fortified with vitamin D
- Children aged 1 to 4 years old should be given a daily supplement containing 10mcg (400 IU) of vitamin D
- NICE Clinical Guideline on Antenatal Care states: all women should be informed about the importance for their own and their baby's health of maintaining adequate vitamin D stores during pregnancy and whilst breastfeeding.
- In order to achieve this, women should be advised to take a vitamin D supplement (10 micrograms of vitamin D per day), as found in the Healthy Start multivitamin supplement. Particular care should be taken to enquire as to whether women at greatest risk are following advice to take this daily supplement.
- Supplements of vitamin D containing vitamin A should not be taken in pregnancy as excessive vitamin A doses are associated with foetal CNS malformations.

#### Healthy Start vitamins

- Healthy start vitamins are vitamin supplements that contain vitamin D. They are recommended for pregnant women, women up to 1 year after delivery of baby and children under 5 years old (women supplement provides 10 micrograms/day; children vitamin drops provides 7.5 micrograms/day). For further information visit <u>www.healthystart.nhs.uk</u>
- Hertfordshire Children's Centres are now offering Healthy Start vitamins to all women who are pregnant or breastfeeding and all babies aged from 6 months up to 4 years old. Children who are having 500ml or more of formula a day do not need Healthy Start vitamins.
- Hertfordshire's offer is universal and free; parents do not need vouchers to collect vitamins. Please signpost parents to their local children's centre to collect their vitamins: www.hertsdirect.org/childrenscentres
- All patients, where appropriate, should be advised about meeting their vitamin D requirements through safe sun exposure, diet and be advised to take OTC vitamin D supplements. General Vitamin D advice for patients: <u>http://www.nhs.uk/conditions/vitamins-minerals/pages/vitamin-d.aspx</u>
- Low dose vitamin D supplements should not routinely be prescribed.
- Some supplements may contain peanut (arachis), sunflower oil or soya oil. Allergy to these may lead to severe allergic reactions including anaphylaxis. Patients should be advised to raise allergies & dietary restrictions at the point of purchase to ensure the content of the product is safe and appropriate to take.

## Safety and Other Considerations

- High dose vitamin D may be harmful. Adults and children over 11 years old should not take more than 100mcg (4,000 IU) of vitamin D a day; Children aged 1-10 years should not have more than 50mcg (2,000 IU) a day; Infants under 12 months should not have more than 25mcg (1,000 IU) a day.
- Vitamin D loading doses are contraindicated in patients with hypercalcaemia or metastatic calcification, or where there may be significant interactions with other medications.
- A local specialist has advised that modest hypercalcaemia (< 2.8 mmol/l) with marked vitamin D deficiency and hyperparathyroidism would be managed with a trial of vitamin D treatment under specialist care with monitoring of the calcium, vitamin D and PTH response along with monitoring of renal function.</li>
- Supplements of vitamin D containing vitamin A should not be taken in pregnancy as excessive vitamin A doses are associated with foetal CNS malformations.
- Alfacalcidol & calcitrol should only be used in patients who cannot activate vitamin D and should therefore not be used for the routine treatment of primary vitamin D deficiency/insufficiency, as they carry a higher risk of toxicity and require long-term monitoring.
- There is a small risk of hypercalcaemia developing in the presence of undiagnosed sarcoidosis in patients taking vitamin D.
- Vitamin D treatment can unmask previously undiagnosed primary hyperparathyroidism.
- Some products may contain peanut (arachis) oil, sunflower oil or soya oil. Allergy to these may lead to severe allergic reactions including anaphylaxis. Some patients have other particular dietary requirements (eg vegan, halal or kosher diet) Healthcare professionals should check for allergies and dietary restrictions before prescribing or when recommending supplements. Patients should also be advised to raise allergies and dietary restrictions at the point of dispensing or purchase to ensure the content of the product is safe and appropriate. Current status of the product ingredients should be obtained from the manufacturer as formulations may change. Refer to product choice document for further information and also UKMI documents on suitable products for

patients with peanut or soya allergies, halal, kosher vegan & vegetarian status in references section on page 8.

- Do not recommend vitamin D supplements to prevent chronic disease because clear evidence does not currently exist and adverse effects cannot be excluded.
- Note: a local specialist has advised that Vitamin D normalisation with standard dosage is often ineffective in the elderly with secondary hyperparathyroidism and/or those of South Asian origin.

## Hertfordshire Guidelines on Management of Osteoporosis

The following recommendations are included in the guideline:

- All patients on treatments for osteoporosis (e.g. bisphosphonates) must also be prescribed calcium 1 – 1.2 gram + colecalciferol 20 micrograms (800 IU) daily unless the clinician is confident the patient has adequate calcium intake and is vitamin D replete.
- Patients, who are frail, increased fall risk and housebound should take calcium 1 1.2 gram and colecalciferol 20 micrograms (800IU) daily.
- Note it may not always be clinically appropriate to give calcium and colecalciferol e.g. in primary hyperparathyroidism when calcium supplements must be avoided.

## Vitamin D deficiency

- Vitamin D deficiency develops when there is inadequate sunlight exposure or lack of dietary vitamin D and usually takes a long time to develop due to the slow release of the vitamin from body stores.
- Prolonged vitamin D deficiency in infants and children results in rickets.
- In adults, vitamin D deficiency results in osteomalacia, the clinical symptoms of which include skeletal pain and muscle weakness and pathological fractures.
- Evidence suggesting that vitamin D might protect against non-bone health outcomes (e.g. cancer, heart disease, diabetes, multiple sclerosis) is insufficient, conflicting or inconclusive. More randomised trials are needed.
- Current data is insufficient to clarify relationships between intake, biochemical status and chronic illness outcome.

## **Risk Factors for reduced Vitamin D levels**

Groups at high risk of vitamin D deficiency include:

- pregnant and breastfeeding women (including multiple, short interval pregnancies)
- young children (under the age of 5, particularly infants who are exclusively breast fed)
- older people (65 years and over)
- darker-skinned people
- low sun exposure (those who avoid the sun, wear whole-body coverings, live in institutions or are housebound, skin conditions e.g. skin cancer, habitual sunscreen use)
- obese individuals
- malabsorption or other dietary problems
- vegetarian or fish free diet
- severe liver disease
- chronic kidney disease and nephrotic syndrome
- certain medicines e.g. use of anticonvulsants (e.g. carbamazipine, phenobarbital, phenytoin, primidone), rifampicin, cholestyramine, colestipol, glucocorticoids, laxatives, liquid paraffin, sucralfate and highly active antiretroviral treatment

### **Background Information**

- Awareness of Vitamin D deficiency in the UK population has increased substantially in recent years and there have been numerous articles published on the subject. National surveys suggest that about a fifth of adults and 8 – 24% of children may have low vitamin D status.
- There are different opinions regarding the ideal levels of vitamin D and the potential consequences of deficiency and insufficiency. The NOS published a practical clinical guideline in April 2013 to support health professionals with the aim of providing a uniform approach in the management of adult patients with vitamin D deficiency.
- Vitamin D includes ergocalciferol (calciferol, vitamin D2) and colecalciferol (vitamin D3). The BNF states the forms of colecalciferol and ergocalciferol should be considered bioequivalent and interchangeable. It has been reported that colecalciferol raises serum vitamin D concentrations more effectively than ergocalciferol due to high affinities of colecaliferol and its metabolites for liver enzymes, plasma vitamin D binding protein and vitamin D receptors.
- The evidence-base is not completely defined in relation to best management of vitamin D deficiency states and the monitoring required following treatment.
- Population screening of Vitamin D levels is not currently recommended.
- Further guidance is needed on how patients with possible suboptimal vitamin D status should be investigated and managed.

## References

- Barnet and Chase Farm Hospitals NHS Trust Guidelines for the investigation and treatment of suspected vitamin D deficiency in ADULT patients September 2013
- Barnet and Chase Farm Hospitals NHS Trust Management of Vitamin D Deficiency in Adults, November 2010.
- Barts and The London Clinical Effectiveness Group Vitamin D guidance, January 2011.
- Bjelakovic et al Vitamin D supplementation for prevention of mortality in adults (Review), Cochrane Review, Issue 7, 2011.
- British Association of Dermatologists, Cancer Research UK, Diabetes UK, the Multiple Sclerosis Society, the National Heart Forum, the National Osteoporosis Society and the Primary Care Dermatology Society Consensus Vitamin D position statement, Dec 2010.
- British National Formulary for children <u>www.bnfc.org</u>
- British National Formulary www.bnf.org
- Department of Health Vitamin D leaflet, 2009.
- East and South East England Specialist Pharmacy Services Vitamin D deficiency and insufficiency, using appropriate available products, August 2014. <u>http://www.medicinesresources.nhs.uk/en/Communities/NHS/SPS-E-and-SE-England/Medicines-Information/North-London-Regional-MI-Network/Vitamin-D-deficiency-and-insufficiency-using-appropriate-available-products/</u>
- East and South East England Specialist Pharmacy Services Vitamin D deficiency and insufficiency in adults and paediatrics: a guideline collation document for London and East and South-East England, August 2011.
- Holick MF et al Evaluation, Treatment, and Prevention of Vitamin D Deficiency, J Clin Endocrin Metab, 96(7), July 2011.
- Institute of Medicine Dietary Reference Intakes for Calcium and Vitamin D, Nov 2010.
- Meyer HE, Holvik K & Lips P Should vitamin D supplements be recommended to prevent chronic diseases? BMJ 2015;350:h321
- NHS North Central London Diagnosis and Management of Vitamin D deficiency/insufficiency in Camden, May 2011.
- NHS Wandsworth Vitamin D Deficiency in Adults August 2010
- NICE Clinical Guideline 62 Antenatal Care, March 2008. <u>http://publications.nice.org.uk/antenatal-care-cg62</u> Update November 2014
- Pearce SH and Cheetham TD Diagnosis and management of vitamin D deficiency, BMJ 340:142-147, January 2010
- Royal College of Paediatrics & Child Health Guide for Vitamin D in Childhood, October 2013
- The Scientific Advisory Committee on Nutrition (SACN) recommendations on vitamin D (July 2016). <u>https://www.gov.uk/government/publications/sacn-vitamin-d-and-health-report</u>
- UKMi Medicines Q&As (check LINK for more up to date versions):
  - Dose of vitamin D to treat deficiency [LINK] (06/05/2015)
  - Vitamin D supplements for vegetarians and vegans [LINK] (05/03/2015)
  - Calcium and vitamin D supplements for vegetarians and vegans [LINK] (19/09/2014)
  - Dose of oral vitamin D during pregnancy [LINK] (12/09/2014)
  - Vitamin D products for patients with peanut or soya allergy [LINK] (21/06/2013)
  - Information on Kosher and Halal medicines [LINK] (10/01/2014)
- Vitamin D advice on supplements for at risk groups February 2012 UK CMO CAS Letter Vitamin D
- Public Health England (PHE) updated advice on vitamin D, July 2016. https://www.gov.uk/government/news/phe-publishes-new-advice-on-vitamin-d
- NHS Choices: Vitamins and minerals Vitamin D <u>http://www.nhs.uk/conditions/vitamins-minerals/pages/vitamin-d.aspx</u>; How to get vitamin D from sunlight http://www.nhs.uk/Livewell/Summerhealth/Pages/vitamin-D-sunlight.aspx