NHS North of Tyne

Clinical Guideline

Guideline Number:

North of Tyne Guidelines

Vitamin D

Ratified by	
Date Ratified	
Date Issued	
Review Date	2013
Organisations signed up to this guideline	NHS North of Tyne (on behalf of the PCTs) Newcastle PCT, North Tyneside PCT and Northumberland Care Trust
Name of originator / author	Simon Pearce / Wendy Ross / Steve Blair
Target audience	All clinicians in Newcastle, North Tyneside and Northumberland
Consultation process	Guideline group which was multidisciplinary from all representative organisations
Mandatory / Statutory Standards or requirements	
Training Requirements	No specific training required
Distribution	Primary Care
Implementation	Implementation process in primary care required. Distribute to all GPs and uploaded onto infonet
Monitoring Compliance	

Contents Page

SUMMARY

This guideline aims to increase awareness of the prevalence and importance of Vitamin D deficiency, to provide a structured approach to the management of those patients at risk of the deficiency with the intention of reducing morbidity from the condition.

This guideline makes recommendations for the diagnosis and management in adults and children. The interventions should be offered to all people who are likely to benefit, irrespective of race, disability, gender, age, sexual orientation or religion. Information to be provided to patients in an accessible format and consideration should be given to any sensitive and cultural issues. Prescribers should review patients for contra- indications before initiating drug treatment.

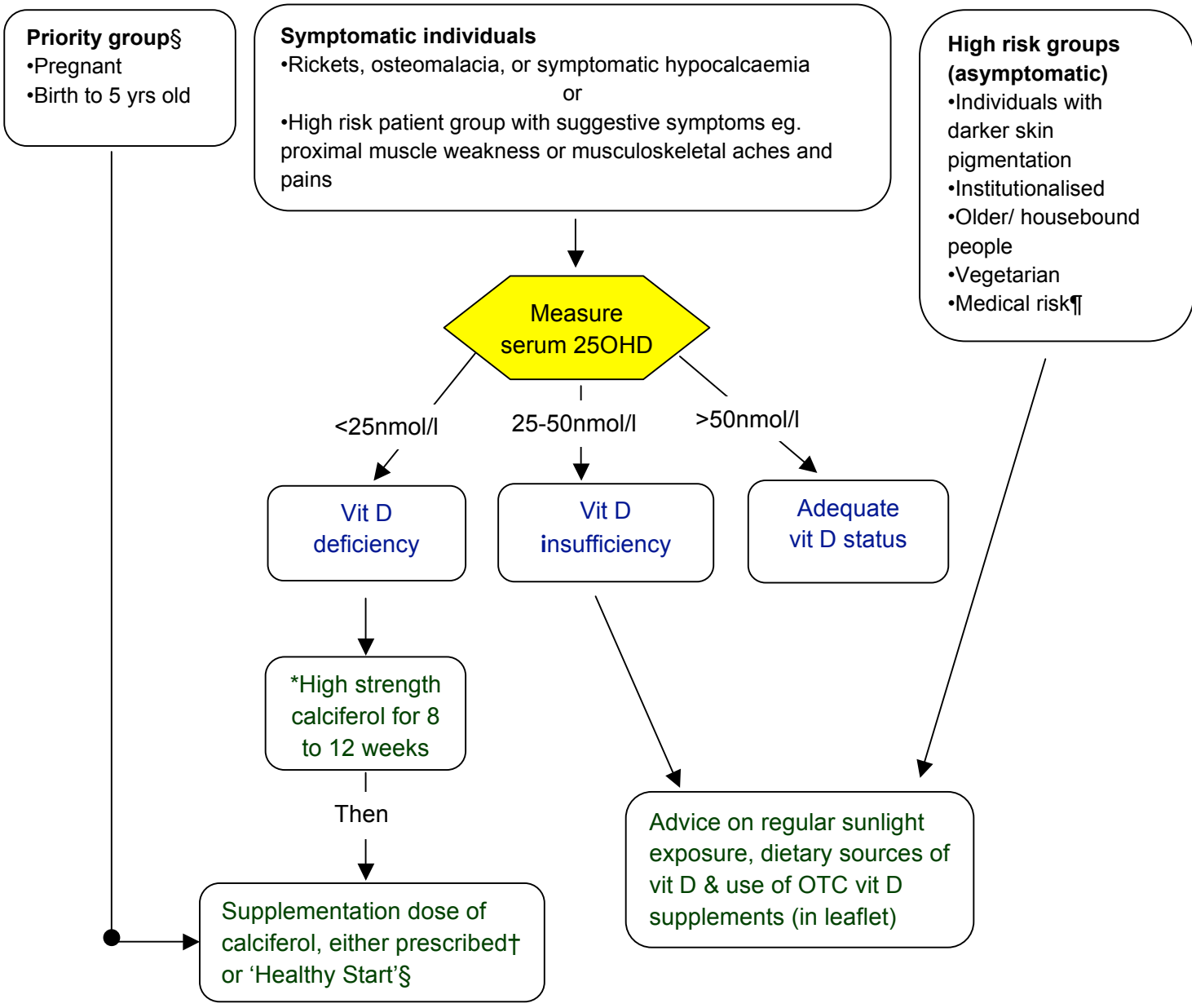
This local guideline is intended for all clinicians in the Newcastle, North Tyneside and Northumberland areas involved in the diagnosis and management of patients with Vitamin D deficiently ensuring an integrated approach across primary and secondary care.

The Guidelines include recommendations for treatment and set out indications for treatment. Patients not assessed as requiring prescribed treatment should be given diet and lifestyle advice as recommended in the guidelines document.

A flow chat is included to aid implementation.

SUMMARY FLOWCHART

Vitamin D deficiency / insufficiency; Management Algorithm



Symbol Key

* eg. colecalciferol 10,000 IU per day or 60,000 IU per week for an adult or 6,000 IU per day for a child over 6 months.

† If following documented deficiency or insufficiency, colecalciferol or ergocalciferol 800 -2000 IU per day in an adult; 400 IU per day in a child. Supplementation in many cases should be lifelong, or lifelong during winter months.

§ For **Priority groups** doses of 400 IU per day in pregnancy are contained in Healthy Start maternal vitamin tablets and for children from birth to 5yr, 300 IU per day are contained within Healthy Start vitamin drops.

¶ Medical risk factors include: renal and hepatic disease, malabsorption, bariatric surgery & short bowel, anticonvulsant and HAART use.

Ergocalciferol and colecalciferol are equivalent.

1. Introduction

This guideline aims to increase awareness of the prevalence and importance of Vitamin D deficiency, to provide a structured approach to the management of those patients at risk of the deficiency with the intention of reducing morbidity from the condition across North of Tyne.

1.1 Background

Rickets in children and osteomalacia in adults are the classic manifestations of profound vitamin D deficiency. However, in recent years, it has been recognised that there are many other adverse health consequences. The spectrum of these common disorders is of particular concern because suboptimal vitamin D status is widespread in the North East. Over recent years, childhood rickets has made a resurgence in our community, particularly among infants and children with pigmented skin. However these children represent only the tip of the iceberg of morbidity caused by the poor vitamin D status that is endemic in sections of our population. Cancer, metabolic syndrome, infectious and autoimmune disease are all associated with moderately low vitamin D levels (1). Unequivocal links have been demonstrated between breast (2), bowel (3), prostrate and lung cancer (4) and poor vitamin D status, as well as metabolic syndrome, obesity, ischaemic heart disease and type 2 diabetes. Similar associations have been found with several autoimmune and infectious conditions including tuberculosis, type 1 diabetes, multiple sclerosis and rheumatoid arthritis. (5-10).

1.2 Sources of Vitamin D

Vitamin D refers to the precursors of the active hormone, 1,25-dihydroxyvitamin D ($1,25[OH]_2D_3$). The major natural source of vitamin D (over 90% for most people) is from skin photosynthesis following ultraviolet (UV-B) solar irradiation. Unfortunately, for six months of the year (October to April), the North of England lies above the latitude that allows exposure to the UV-B wavelengths necessary for vitamin D synthesis (11), leaving our population reliant on exogenous sources of vitamin D. For this reason, vitamin D is also a micronutrient although only a relatively small number of foods contain substantial amounts of vitamin D; the most significant dietary sources being oily fish and cod liver oil. Contrary to popular perceptions, there is little or no vitamin D content in UK milk and dairy products. Indeed, only infant formula milk and margarine have statutory vitamin D supplementation in the UK. Thus, the prevalent North East diet is profoundly lacking in vitamin D. A low dietary vitamin D intake, combined with the lack of skin synthesis for half of the year, is reflected in the disturbingly high prevalence of D insufficiency in our region, affecting over half the whole adult population during winter, with 16% showing severe deficiency. (Appendix 2) (12).

2. Recommendations to Achieve Adequate Vitamin D Levels

Sun exposure:
For a fair-skinned person, 20 to 30 minutes of ('sub-erythematous') sunlight exposure at midday on the face and forearms two or three times weekly between April and October are sufficient to achieve healthy vitamin D levels in summer in the UK. However, for individuals with pigmented skin, and to a lesser extent the elderly, exposure time or frequency needs to be increased two- to ten- fold to get the same vitamin D synthesis (depending upon skin pigmentation). While recognising the importance of avoiding sunburn and sunbeds, total avoidance of sun exposure is a clear risk factor for vitamin D deficiency.

Dietary sources of vitamin D:

- 2-3 portions (100-150g per portion) weekly of oily fish including trout, salmon, mackerel, herring, sardines, anchovies, pilchards or fresh tuna. Because of the concerns of heavy metal contamination in the marine food chain, it is recommended that these amounts should not be exceeded in pregnancy, or in women who may conceive.
- Cod liver oil and other fish oils.
- Egg yolk.
- Some breakfast cereals (mainly supermarket 'own brands' – which are manufactured for the EU market where several countries have obligatory minimum levels in cereals) are supplemented.
- Margarine and infant formula milk have statutory supplementation in the UK.

3. Who Becomes Deficient or Insufficient?

The following are groups at increased risk:

- Anyone with dark skin.
- People who cover up, eg Muslim women, people with skin photosensitivity (eg azathioprine, chlorpromazine) or history of skin cancer.
- Pregnant women, or those who have recently had children, particularly multiparous women with short intervals between pregnancies.
- Housebound, institutionalised and certain older people.
- Chronic disease (liver, kidney, malabsorption including coeliac disease, short bowel, bariatric surgery).
- All babies, particularly those who have had prolonged breast feeding without supplementation.
- Family history of vitamin D deficiency.
- Vegetarian (or other non-fish eating) diet.
- Anticonvulsant, rifampicin, colestyramine, HAART, glucocorticoid use.
- Obese – risk increases with increasing obesity.

The prevalence of D insufficiency has a natural seasonal pattern, being most prevalent in winter and spring, and least frequent in the autumn. Individuals who work outdoors or who have regular outdoor leisure activity are at less risk.

4. How Does Vitamin D Deficiency Present?

In children:

- Hypocalcaemic seizures in the neonatal period or during rapid growth
- Bony deformity
  - Bowing of the legs (genu varum)
  - Knock knees (rarely)
  - Anterior bowing of the femur
  - Internal rotation at the ankle
  - Swelling of the radial epiphysis at the wrist
  - Prominent costochondral joints (rickets rosary)
  - Soft, deformable skull (craniotabes)
- Fractious child
- Child with poor weight gain
- Children and adolescents with musculoskeletal aches and pains
- Rachitic lung
  - (An increased susceptibility to infections because lung function is compromised by a pliable rib cage and muscle weakness).

In adults:

- Non specific musculoskeletal aches and pains which can be localized (rib, hip, pelvis, thigh and foot pain or low back), generalized, or migratory
- Proximal muscle weakness – difficulty rising from chair or climbing stairs
- Weakness and pain may be mis-labelled as ‘fibromyalgia’ or as a somatisation of depression
- Low bone density on DEXA scanning
- Osteopenia may be seen on plain X-ray
- Incidental findings on routine biochemistry, such as raised alkaline phosphates, raised PTH, hypocalcaemia, hypomagnesaemia, hypophosphataemia.

5. How to Investigate

In someone with suggestive symptoms and from an at risk category, vitamin D deficiency is best confirmed by direct measurement of serum 25-OHD. Measurement of serum 25-hydroxyvitamin D (25-OHD) is the most reliable indicator of vitamin D status, it is worthwhile measuring bone chemistry, but parathyroid hormone estimation is not routinely required.

It is an expensive assay and many patients can be advised to change their lifestyle (sun exposure and diet) or to take a supplementary dose of vitamin D without measuring serum 25-OHD.

Vit D (25-OHD) Levels should be interpreted as below:

25 OHD Level	Status	Manifestation	Action
<25 nmol/l	Deficiency	Rickets / Osteomalacia	Treat
25-50 nmol/l	Insufficiency	Associated with disease risk	*Lifestyle advice, diet and sun exposure
50-75 nmol/l	Adequate	Healthy	Lifestyle advice
>75 nmol/l	Optimal	Healthy	None

- *Levels of 25OHD between 25 and 50 nmol are a grey area and advice to take vitamin D supplementation will depend upon the level within this range, the season (of blood testing) and likelihood of other sources of vitamin D being effective (eg sunlight exposure, dietary change)
- *Give leaflet on vit D sources including sun exposure, diet and supplementation. There is no level 1 evidence that prescribing supplements to this group will produce health benefits.

6. Other Biochemical Features of Deficiency

- High serum alkaline phosphates
- Low serum calcium
- Low serum phosphate
- High serum parathyroid hormone

A high serum alkaline phosphatase is almost universal in children with D deficiency rickets and is also found in 80% or more of adults with osteomalacia. This occurs early and Vitamin D deficiency should be considered within the differential diagnosis for unexplained raised alkaline phosphatase. An additional biochemical feature pointing to a bony origin is if the serum alkaline phosphatase is relatively more elevated than the γ-glutamyl transferase. In vitamin D deficiency, hypocalcaemia and hypophosphataemia are less consistently present, depending on the severity

and chronicity of the disease and the patient's dietary calcium intake. Elevation of plasma parathyroid hormone, caused by secondary hyperparathyroidism, is typical but may not be found in neonates and young infants or in about a quarter of adults with vitamin D insufficiency.

7. Further Investigation and Referral

In Children

A paediatrician should be involved in the care of all children with vitamin D deficiency either directly or by liaison. X-rays should be ordered in secondary care in the presence of focal pain, asymmetrical deformities or in cases of diagnostic uncertainty such as with atypical biochemistry, or knock-knees. In adults, areas of focal pain should also be imaged, particularly if they persist or worsen during treatment (suggesting bony metastases). A small number of children will have hereditary rickets or a renal tubulopathy as the cause of their rickets, and these conditions should also be considered in the absence of known risk factors, atypical biochemistry (eg persistent hypophosphataemia, normal alkaline phosphatase, elevated creatinine) or failure to reduce alkaline phosphatase levels following vitamin D treatment. Referral for specialist assessment is appropriate in these circumstances.

In children, it is also worthwhile measuring haemoglobin levels because iron deficiency anaemia frequently co-exists with rickets. At all ages the clinician must be vigilant for a secondary medical cause of vitamin D deficiency, such as covert coeliac disease or cystic fibrosis causing malabsorption.

In Adults

Referral of adults in not routinely needed. It should be considered where there is doubt about the diagnosis, if biochemistry is atypical (eg low vitamin D and high calcium) or if the patient fails to respond to treatment.

Follow up blood tests after treatment are not needed unless there are ongoing symptoms, doubts about compliance or co-morbidities. In particular, monitoring serum vitamin D levels during treatment or supplementation of uncomplicated sunlight / dietary deficiency is not usually worthwhile.

8. Treatment of Deficiency

The treatment of choice is oral calciferol in the form of either ergocalciferol (yeast derived vitamin D_2) or colecalciferol (fish or lanolin derived vitamin D_3). Tablets, capsules and oily suspensions are available. Short-acting, potent vitamin D analogues such as alfacalcidol (1 – alpha-hydroxycholecalciferol, One-Alpha®) or calcitriol are ineffective in correcting vitamin D deficiency and may lead to dangerous hypercalcaemia in this situation.

The usual principle of therapy is to replenish the vitamin D stores over 8 to 12 weeks with high does calciferol therapy and then to continue a lower maintenance dose. Large bolus doses are also highly effective. Oral treatment is believed to be better absorbed than IM.

There is a high therapeutic index for calciferol. It has been estimated that a regular daily dose of 1000 IU raises serum 25-OHD by 24 nmol/l; vitamin D toxicity has only been observed with 25-OHD values above 500 nmol/l.

Few, if any, people have significant contraindications to calciferol therapy and toxicity (hypercalcaemia) is very rare. Pre-existing hypercalcaemic disorders, generally hyperparathyroidism or sarcoidosis, do however require liaison with secondary care before any treatment is instituted. Individuals with renal stones or nephrocalcinosis can safely be given vitamin D, but concomitant calcium therapy should be avoided.

For adults with deficiency, a daily dose of 10,000 IU calciferol, or a weekly dose of 60,000 IU will lead to restoration of body stores over 8 to 12 weeks. Long-term maintenance / supplementary therapy is then needed with calciferol 1,000 to 2,000 IU daily or 10,000 weekly. (13,14). Different regimens are also shown below.

In adults with severe malabsorption, or those in whom concordance with oral therapy is suspect, an intramuscular does of 300,000 IU monthly for 3 months followed by the same dose every 2-3 months is an alternative.

As few adults have truly reversible risk factors for vitamin D deficiency, the assumption should be that supplementation will be needed lifelong following treatment for deficiency, or lifelong during winter months (dependent upon latitude and dress habits).

For Children

Referral to a paediatrician is advised. Less than 6 months, the treatment dose is 3,000 IU daily, increasing to 6,000 IU daily after 6 months of age (15,16). 12-18 years 10,000 IU . (see children's BNF) Calcium supplements during the first weeks of therapy (50 mg/kg/day) are advisable in the growing child (16,17).

A relatively rapid biochemical response is typically seen in children with normalisation of alkaline phosphatase levels within 3 months. For children with rickets, it should be assumed that the mother and any sibs and other family members are also vitamin D deficient / insufficient. At a minimum, a maintenance dose of calciferol is recommended for other family members.

Repeat measurement of 25-OHD following treatment is generally unnecessary. However, failure to improve symptoms / deformity, recurrence of symptoms or suspected lack of compliance are indications to re-measure 25-OHD.

8.1 Treatment Regimens

8.1.1 Adults – Deficiency (25-OHD <25 nmol/1)

Calciferol dose	Frequency	Route	Length of course	Example prescription
20,000 IU (0.5mg)	Three times weekly	Oral	8-12 weeks	Colecalciferol 20,000IU (Dekristol†) capsules. Take one three times a week. Supply 30 capsules.
60,000 IU (1.5mg)	Once Weekly	Oral	8-12 weeks	Colecalciferol 20,000IU (Dekristol†) capsules. Take three on the same day each week. Supply 30 capsules.
300,000 IU (7.5mg)	Twice	IM	Two stat doses, one month apart	Ergocalciferol injection 300,000IU/ml. Supply 2 x 1ml ampoule. Give IM

Adults Maintenance Therapy

Adult (either/ or)	1000-2000 IU	Daily	Indefinite	Calcium and ergocalciferol tablets. Supply 60 tablets. Take two daily. (NB needs to be repeat prescription and patient needs to be aware of need to continue to order repeats) *see below re over the counter preparations which some patients may prefer to use
	20,000 IU	Weekly or twice monthly	Indefinite	Colecalciferol 20,000IU (Dekristol†) capsules. Supply 12. Take one twice a month. (NB needs to be repeat prescription and patient needs to be aware of need to continue to order repeats)

To convert from IU to mg, divide by 40

8.1.2 Children – Deficiency (25-OHD <25 nmol/1)

Under 6 months	3,000 IU	Daily	8-12 weeks	Colecalciferol oily solution 3,000IU/ml. Supply 100mls. Take 1ml daily. OR Ergocalciferol oily solution 3,000IU/ml (*excipients may contain peanut oil) – current difficulties with supply
Over 6 months	6,000 IU	Daily	8-12 weeks	Colecalciferol oily solution 3,000IU/ml. Supply 200mls. Take 2mls daily. OR Ergocalciferol oily solution 3,000IU/ml(*excipients may contain peanut oil) – current difficulties with supply

The alternative high dose regimen can only be used in children over a year old, and is a one off dose of 300,000 IU for a child. As for all high dose regimens, it should be followed by maintenance.

Children's maintenance after treatment

Age	Calciferol dose	Frequency	Length of course	Example prescription
Under 6 months	400 IU	Daily	Indefinite	*Dalivit or *Abidec oral solution. Supply 50mls. Take 0.6mls daily. (NB needs to be repeat prescription and parents need to be aware of need to continue to order repeats)

Over 6 months	400-800 IU	Daily	Indefinite	*Dalivit or *Abidec oral solution. Supply 50mls. Take 1ml daily. (NB needs to be repeat prescription and parents need to be aware of need to continue to order repeats)

*__Multivitamin preparations; not suitable for prolonged high dose therapy as may lead to vitamin A toxicity__

†Dekristol has been approved by the North of Tyne Area Prescribing Committee and if prescribed on FP10 will be ordered by community pharmacies. (see Appendix 4).

9. What About Prevention

People at risk and those demonstrated to have suboptimal serum 25-OHD levels should be targeted for lifelong lifestyle advice, especially about sun exposure and diet, and advice on vitamin D supplementation as per leaflet.

There is no clear evidence of cost effectiveness in the insufficiency group, supplementation has no evidence that it prevents long term sequelae. Therefore prescription is not advised.

How to identify people for advice on supplementation and lifestyle in the general population

- All non-Caucasian individuals
- All people with restricted sun exposure (eg doesn't have outdoor activity through work or leisure, agoraphobia, wears a veil, uses sun-block regularly, photosensitive skin disorder, previous skin cancer)
- People with limited dietary fish intake (particularly vegetarians, those with poor diet)

In addition the following groups need particular attention (Department of Health recommendation):

Pregnant and breastfeeding women

We recommend that all pregnant women take a supplementation dose of vitamin D in the form of Healthy Start Women's vitamins throughout their pregnancy. This is in accordance with NICE recommendations, as women in the North East are at risk due to poor sunlight exposure (18). Eligible groups for free Health Start vitamins are those on Income Support, Income based Jobseekers or Child tax credit (but not Working tax credit). All pregnant women / girls under 18 years old also qualify. Anyone at risk not eligible for Healthy Start vitamins (for example asylum seekers) should be prescribed oral calcium and vitamin D supplementation.

Preschool children

All children from 6 months to age 5 in the North of the UK are recommended to take vitamin D supplements (19). These can be easily administered as Dalivit drops (0.6mls/day) or Children's Healthy Start vitamins (5 drops/day).

Breast fed babies

Breast fed babies are at particularly high risk, and all should receive supplementary vitamin D drops (doses as above). This is particularly important for the babies of all non-white mothers particularly those with additional risk factors such as use of concealing garments or vegetarian diet.

Housebound, institutionalised and older people (including those with fracture risk)

Institutionalised, housebound and at risk older people (as defined above) should be advised on supplementation. A number will be on calcium and vit D prophylaxis and osteoporosis.

Anticonvulsant, rifampicin and HAART use

Routine supplementation with 1000-2000 units of vitamin D daily should be given advice and a leaflet, in individuals on enzyme inducing antiepileptic medications (particularly phenytoin, carbamazepine, phenobarbitone). Similar supplementation is advised during prolonged rifampicin and HAART use. In addition patients should be given a leaflet and advice on diet and lifestyle.

References

1. Holick MF. Vitamin D: a D-lightful health perspective. Nutrition Rev 2008; 66: S182-S194.

2. Lin J, Manson JE, Lee IM, Cook NR, Buring JE, Zhang SM. Intakes of calcium and vitamin D and breast cancer risk in women. Arch Intern Med 2007; 167: 1050-1059

3. Yin L, Grandi N, Raum E, Haug U, Arndt V, Brenner H. Meta-analysis: longitudinal studies of serum vitamin D and colorectal cancer risk. Aliment Pharmacol Ther 2009; 30: 113-125.

4. Garland CF, Gorham ED, Mohr SB, Garland FC. Vitamin D for cancer prevention: global perspective. Ann Epidemiol 2009; 19:468-83.

5. Pittas AG, Dawson-Hughes B, Li T, Van Dam RM, Willett WC, Manson JE, Hu FB. Vitamin D and calcium intake in relation to type 2 diabetes in women. Diabetes Care 2006; 29: 650-656.

6. Dobnig H, Pilz S, Scharnagl H, et al. Independent association of low serum 25-hydroxyvitamin D and 1,25-dihydroxyvitamin D levels with all-cause and cardiovascular mortality. Arch Intern Med. 2008;168:1340-1349.

7. Ginde AA, Scragg R, Schwartz RS, Camargo CA. Prospective study of serum 25-hydroxyvitamin D level, cardiovascular disease and all cause mortality in older US adults. J Am Geriatr Soc 2009; PMID: 19549021 (on line Jun22, 2009)

8. Forouhi NG, Luan J, Cooper A, Boucher BJ, Wareham NJ. Baseline serum 25-hydroxy vitamin d is predictive of future glycemic status and insulin resistance: the Medical Research Council Ely Prospective Study 1990-2000. Diabetes 2008;57:2619-25.

9. Zipitis CS, Akobeng AK. Vitamin D supplementation in early childhood and risk of type 1 diabetes: a systematic review and meta-analysis. Arch Dis Child 2008;93:512-7.

10. Smolders J, Damoiseaux J, Menheere P, Hupperts R. Vitamin D as an immune modulator in multiple sclerosis, a review. J Neuroimmunol 2008;194:7-17.

11. Webb AR, Kline L, Holick MF. Influence of season and latitude on the cutaneous synthesis of vitamin D3: exposure to winter sunlight in Boston and Edmonton will not promote vitamin D3 synthesis in human skin. J Clin Endocrinol Metab 1988; 67: 373-378.

12. Hyppönen E, Power C. Hypovitaminosis D in British adults at age 45 y: nationwide cohort study of dietary and lifestyle predictors. Am J Clin Nutr 2007;85:860–8.

13. Anon. Primary vitamin D deficiency in adults. DTB 2006; 44: 25-29.

14. Pearce SH, Cheetham TD. Diagnosis and management of vitamin D deficiency. BMJ 2010; 340: 142-147.

15. Hochberg Z, Bereket A, Davenport M, Delemarre-Van de Waal HA, De Schepper J, Levine MA, Shaw N, Schoenau E, van Coeverden SC, Weisman Y, Zadik Z; European Society for Paediatric Endocrinology (ESPE) Bone Club. Consensus development for the supplementation of vitamin D in childhood and adolescence. Horm Res 2002; 58:39-51.

16. Misra M, Pacaud D, Petryk A, Collett-Solberg PF, Kappy M; Drug and Therapeutics Committee of the Lawson Wilkins Pediatric Endocrine Society. Vitamin D deficiency in

children and its management: review of current knowledge and recommendations. Pediatrics 2008;122:398-417.

17. Wharton B, Bishop N. Rickets. Lancet 2003; 362:1389-400.

18. National Institute for Health and Clinical Excellence. Guideline CG62 Antenatal Care. 2008.

19. Department of Health. Birth to five; 2007 edition. Chapter 5: Feeding your child www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_074924 (accessed 27/07/09).

Appendix 1

Participants in Guideline Group

Wendy Ross (chair), GP, St Anthony's Health Centre, Newcastle

Simon Pearce (co-chair), Consultant Endocrinologist, Newcastle upon Tyne Hospitals Trust

Jane Skinner (Guideline development lead, NUTH), Consultant Community Cardiologist, Newcastle upon Tyne Hospitals Trust

Glyn Trueman, Formulary Pharmacist, Newcastle upon Tyne Hospitals Trust
Barbara Palmer, GP, West Road Medical Centre, Newcastle
Tim Cheetham, Consultant Paediatric Endocrinologist, Newcastle upon Tyne Hospitals Trust
Richard Quinton, Consultant Endocrinologist, Newcastle upon Tyne Hospitals Trust
Harish Datta, Consultant Clinical Biochemist, Newcastle upon Tyne Hospitals Trust
Paul McKenna, Consultant Chemical Pathologist, Northumbria Healthcare Trust
Chris Strey, Consultant Endocrinologist, Northumbria Healthcare Trust
Ravi Erukulapati, Specialist Registrar, Diabetes and Endocrinology, Northern Deanery
Janet Liddell, Health Visitor St Anthony's Health Centre
Steve Blair, GP Village Green Wallsend, Chair guidelines group NHS North of Tyne
Julia Smith, Dietician
Akash Sinha Specialist Registrar, Paediatric Endocrinology, Northern Deanery
Susan Turner, Medicines Management Advisor, North of Tyne PCT
Sue Gordon, Director Public Health NHS North of Tyne
Viv Braithwaite, Public Health Specialist NHS North of Tyne

With additional written comments received from:

Nick Embleton, Consultant Neonatologist, Newcastle upon Tyne Hospitals Trust
Roger Francis, Consultant Care of Elderly (Bone Clinic), Newcastle upon Tyne Hospitals Trust
Matthew Grove, Consultant Care of Elderly, Northumbria Healthcare Trust
Andrew Loughney, Consultant Obstetrician, Newcastle upon Tyne Hospitals Trust
Emma O'Neill, GP, Cramlington Health Centre
Helen Robinson, Public Health specialist, North of Tyne PCT
Steve Robson, Consultant Fetal Medicine, Newcastle upon Tyne Hospitals Trust
Louise Smith, Lead Dietitian for Public Health Nutrition, Newcastle Nutrition
Martin Ward-Platt, Consultant Neonatologist, Newcastle upon Tyne Hospitals Trust
Jason Waugh, Consultant Obstetrician, Newcastle upon Tyne Hospitals Trust

Appendix 2

Preparations of Calciferol Available in the UK

For up to date information about preparations available visit the following link:
http://www.nelm.nhs.uk/en/NeLM-Area/Other-Lib-Updates/Drug-Discontinuation-And-Shortage/Vitamin-D-product-availability/

Product	Vitamin D Content	NHS availability		Comments
Solution/ Drops		Hosp	GP	
Dalivit*	Colecalciferol 400 IU/ 0.6 ml	√	√	0.6ml also contains 5,000 units vitamin A, as well as vitamins from the B group and vitamin C
Abidec	Colecalciferol 400 IU/ 0.6 ml	√	√	0.6ml also contains 1,333 units vitamin A, as well as vitamins from the B group and vitamin C. Recommend prescribe for asylum seekers not eligible for Healthy Start programme.
Healthy Start children's vitamin drops	Colecalciferol 300 IU/ 5 drops		Not available from pharmacies	5 drops also contain approx 700 IU vitamin A and 20mg vitamin C
Healthy Start vitamins for women	Colecalciferol 400 IU (10 micrograms)		Not normally available from pharmacies	Also contain vitamin C 70mg & folic acid 400 micrograms
Ergocalciferol oily solution	Ergocalciferol 3,000 IU/ ml	√	√	Unlicensed, but available in both primary and secondary care from specials manufacturers. Excipients may include peanut oil.
Colecalciferol oily solution	Colecalciferol 3,000 IU/ ml	√	√	
Tablets/capsules				
Calcium & ergocalciferol (Calcium & vitamin D	Ergocalciferol 400 IU	√	√	Contain 97mg calcium (2.4mmol)
Calcichew D3 Forte	Colecalciferol 400IU	√	√	Contain 500mg calcium (12.5mmol)

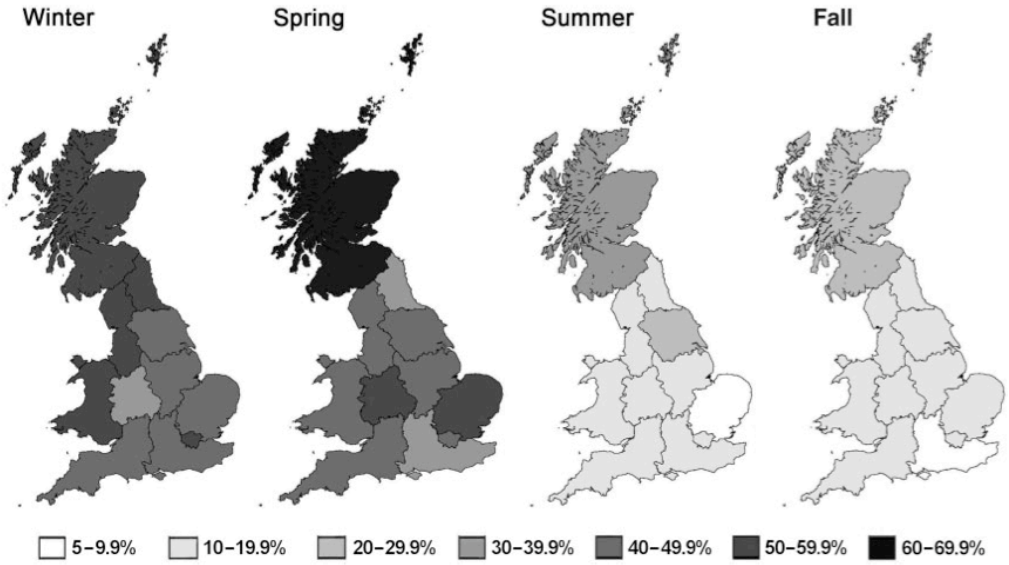
Adcal D3	Colecalciferol 400IU	√	√	Contain 600mg calcium (15mmol)
Dekristol, MIBE†	Colecalciferol 20,000 IU (500 microgram)	√	√	Unlicensed, but available from companies that supply unlicensed imported medicines e.g. IDIS
Ergocalciferol tablets	Ergocalciferol 10,000 IU (250 micrograms) 50,000 IU (1.25 mg)	See comments	See comments	Used to be manufactured by UCB Pharma but no longer available. May become available from another supplier in the future
Parenteral				
Ergocalciferol injection	Ergocalciferol 300,000 IU /ml (7.5mg)	√	√	May be liable to some supply problems

OTC

Over the counter calciferol tablets are available as 'vitamin D' from various high-street pharmacies in strengths of 10μg (400 IU), 12.5μg (500 IU) or 25μg (1000 IU) . For individuals requiring additional calcium supplementation (i.e. elderly), 'calcium and vitamin D' preparations usually containing 10μg (400 IU) of calciferol per tablet are also widely available from pharmacies or health food stores. These products are marketed as nutritional supplements and may not be manufactured to the same quality control standards as licensed medicine, nevertheless clinical experience shows that the brands stocked by the major pharmacy chains are efficacious. They are not prescribable on the NHS

Appendix 3

The seasonal and geographical variation in the prevalence of hypovitaminosis in Great Britain



URE 3. Seasonal and geographical variation in the prevalence of hypovitaminosis D (25-hydroxyvitamin D <40 nmol/L) in Great Britain.

Appendix 4

Dekristol information sheet for primary care and community pharmacies

Dekristol is included in the North of Tyne Formulary for treatment of severe vitamin D deficiency, where standard calcium + vitamin D would be inadequate or the calcium component undesired.

Although Dekristol is not listed in the BNF, it has been included in the North of Tyne Formulary because the alternate licensed products (Colecalciferol 10,000 IU and Ergocalciferol [D_2] 50,000 IU) are no longer being imported into the UK.

Appendix 5

Vitamin D Guidelines: Summary Information

Sources
The significant sources of vitamin D are sunlight and oily fish, including cod liver oil

Common groups at risk of vitamin D deficiency/ insufficiency
•Non-white skin, lack of sunlight exposure (including concealing clothing), vegetarians (non-fish eaters)
•Pregnant women, babies, children and adolescents, older housebound or institutionalised people
•Liver and renal disease, short bowel, bariatric surgery, anticonvulsant, rifampicin, HAART use

Management
In a patient with symptoms/ deformity confirm clinical suspicion by measuring serum 25-hydroxyvitamin D (25OHD)
•25OHD below 25nmol/l = deficiency- requires high dose calciferol treatment
•25OHD between 25 and 50 nmol/l= insufficiency- lifestyle (sun exposure and diet) and supplementation advice
•25OHD above 50nmol/l= sufficient (reinforce dietary and lifestyle advice)

Universal supplementation
•Recommended in pregnancy
•Important for breast-fed babies and recommended for all infants and children <5yrs

Target for supplementation and lifestyle advice
• All non-Caucasian individuals

PLUS

• All people with restricted sun exposure (eg. doesn't have outdoor activity through work or leisure, wears a veil, uses sun-block regularly, photosensitive skin disorder, previous skin cancer)

AND / OR

• People with limited dietary fish intake (particularly vegetarians, those with poor diet)

Refer
•Any child who has symptomatic hypocalcaemia or who is unwell
•If lack of clinical response to vitamin D therapy
•Persistent focal bone pain
•Suspicion of unrecognised underlying problem (eg. malabsorption)

Key points
•Vitamin D insufficiency/ deficiency is very common in children and adults with non-white skin
•Supplementation will often need to be lifelong, as lifestyle changes may not be effective.